

**AN INVESTIGATION INTO FOOD SECURITY AMONG FEMALE-HEADED
HOUSEHOLDS IN KENYA: A CASE OF VOI DIVISION IN TAITA-TAVETA COUNTY**

by

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ABSTRACT

Title: An investigation into food security among female-headed households in Kenya: A case of Voi Division in Taita-Taveta County

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The World Food Summit (WFS) of 1996 in Rome stipulated that food security exists when all people, at all times, have physical and economic access to sufficient, safe, nutritious food to meet their dietary needs and food preferences for an active life and healthy life. Every human being has a right to live in conditions that ensures food security, irrespective of their social or economic situations. This study is an investigation into food security among female-headed households in Kenya, focusing on Voi Division in Taita-Taveta County as the case for the study. The study was guided by the Ecological Systems perspective by Urie Bronfenbrenner, (1979). In the Millennium Development Goals term (2000-2015), food security was a vivid indicator of the MDG1. Moreover, in the post-Millennium, food security is enshrined in the SDG2. Like everyone else, members of FHHs are entitled to food security as stipulated in the WFS of 1996. By highlighting the statuses of food security among FHHs, this report acts as a reference to researchers, policy makers, programme planners and practitioners on food security among FHHs. The question which guided this study is:

What is the status of food security among female-headed households in Voi Division, Taita-Taveta County, Kenya?

The main goal of this study was to investigate and describe the statuses of food security among female-headed households in Voi Division, Taita-Taveta County, Kenya. The study was guided by the following specific objectives, which were to:

- Determine the status of dietary diversity among female-headed households in Voi Division, Kenya by utilising dietary diversity score as an indicator of food security.
- Measure food consumption frequency among female-headed households in Voi Division, Kenya by utilising food consumption score as an indicator of food security.
- Determine the overall status of food security among female-headed households in Voi Division, Kenya.

- Describe the statuses of food security among female-headed households in Voi Division, Kenya and provide practice guidelines regarding the food security statuses.

The study approach was pragmatism, a research paradigm of mixed methods of triangulating quantitative and qualitative phases. The type of the study was an applied research, whose design was convergent parallel design of triangulating cross-sectional survey and collective case study designs for quantitative and qualitative phases respectively.

Quantitative phase

The study utilised a randomised cross-sectional survey design in data collection for quantitative part. The cross-sectional survey yielded quantitative findings which are presented and discussed in chapter 5 of this report. The reliability of the questionnaire was tested through piloting among 14 respondents. Content validity of the questionnaire was ensured by making it conventional to the relevant technical domains of measuring food security, and seeking guidance from supervisor. Additionally, the researcher structured and formatted questions in a logical order, and utilised relevant questions to the study to enhance the questionnaire's face validity. Moreover, the study supervisor also provided instruction, and the pilot test respondents' provided opinions on the relevance of the items in the questionnaire.

Population for the quantitative survey was all female-headed households, as the universe or target population of the study; while all *de jure* female household heads were prioritised as the accessible population, for they displayed characteristics of interest with the objectives of the study.

Sampling of the *de jure* female-headed households was done using the following inclusion criteria:

- Female household heads must have been aged 18 years and above;
- The female household heads must not have been attached to any male household headship;
- The female household heads must have had dependents; and
- The female household heads must have been functionally proficient in either English or Kiswahili.

The quantitative phase of the study utilised a structured researcher-administered questionnaire. The questionnaire was structured according to recommendations by *Food*

and Nutrition Technical Assistance (FANTA), which offers technical guidance on how to generate food and nutrition survey questions. The survey respondents were female-household heads, who were also the principal household caregivers. The researcher conducted pre-testing of the questionnaire for the quantitative part among 14 female household heads in Mwatate Division in Taita-Taveta County, and these respondents were not part of the main study. Prior to the actual survey, the researcher trained her research assistants on data collection procedures. The research commenced with researcher or research assistants visiting the respondents at their households and convenient places they had agreed to respond at, to administer the questionnaire. Computer software packages the *Microsoft (MS) Excel* and *Statistical Package for Social Sciences (SPSS)* were used in organising and analysing quantitative data.

Qualitative phase

The participants for key informants' interviews were workers in organisations or institutions that dealt with food security in the Voi Division. The units for observations and photographs were the female-headed households.

Research instruments for the qualitative phase were semi-structured interview schedule (and cellphone audio-recorder), observation checklist and digital camera for key informants' interviews, observations, and photograph-taking respectively.

The researcher pre-tested the interview schedule and the audio-recorder with two key informants who were excluded from the main inquiry. The digital camera was pretested along with the questionnaire.

The data from the qualitative phase was prepared and analysed spirally through scrutinising the data, making data back-ups on computer folders, and retrieving the data for the analysis. Computer software programmes MS Word, MS Excel, and SPSS were used for the analysis. To ensure credibility of qualitative findings, researcher prioritised emic interpretation and made her own opinions (etic interpretation) secondary.

Quantitative findings

With regards to quantitative findings, the biographical profile findings indicate that, out of the 134 households surveyed, 44.8% (60) and 55.2% (74) resided in the urban and rural areas of Voi Division respectively. Majority of the respondents (86 or 64.2%) were women of reproductive age (15-49 years). Ages of the rest of the female household heads (48 or 35.8%) were 50 to 90 years. The major occupation of the female household heads was farming (42 or 31.3%). The majority of the respondents (41.8% or 56) and 29.9% (40) had

attained primary and secondary education respectively. The range of the number of household members was 2 to 10 with a mean of 3.63 people. Majority of the respondents (50% or 67) were female household heads as a result of being widowed. Small-scale farming was the major source of livelihood at 31.3% (42). The major source of income for the respondents was casual labour at 39.6% (53).

With regards to the first objective, the findings on household dietary diversity are as follows: the first and second most consumed food groups were cereals (97.8%), sugar and honey at 97.8%; and with the exclusion of “miscellaneous”, the third most consumed food group was fat and oils at 91.8%. The poorly consumed food groups were meat and poultry (8.2%), fruits (9%), and fish and seafood (9%).

Findings concerning the second objective on food consumption frequency reveal that, acceptable consumption scores were as follows: main staples (99.2% or 132), pulses (7.5% or 10), vegetables (76.7% or 102), fruits (21.1% or 28), “meat, fish and eggs” (15% or 20), milk and dairy products (58.6% or 78), sugar and honey (94% and 125), and fats and oils (91% or 121).

With regards to the third objective, household dietary diversity score (HDDS) and food consumption score (FCS) revealed a significant strong positive correlation of ($r=.515$, $p=.000$). The overall food security statuses were: severe food security (0%), moderately food insecure (12.8%), and mild food insecure/food secure (87.2%). Moreover, majority of the female-headed households experienced adequate food provisioning during 3 months preceding the study; coping strategies index (CSI) results show that, majority of the female-headed households fell in the first quartile of the CSI, which means they were in a state of food security. The most common coping strategies used by the female-headed households were: reducing number of meals per day, reducing size of meals, consuming less preferred or cheaper foods, and purchasing food on credit.

The findings of partial correlation between HDDS and FCS revealed the following: HDDS and FCS statuses ($r=.378$, $p=.000$); HDDS categories and CSI quartiles ($r=-.322$, $p=.000$); FCS categories and CSI quartiles ($r=-.460$, $p=.000$). These correlations were acquired in the situation where the effects of the CSI quartiles on the other variables (HDDS and FCS) were not controlled for. When the researcher controlled the effects of the CSI on the HDDS and FCS categories, resultant correlation weakened to $r=.273$, $p=.002$. Multiple regression on the HDDS food security statuses and FCS food security statuses to predict the CSI quartiles/food security statuses yielded the following results: $R=.487$, $R^2=.237$ and adjusted $R^2=.226$ at a $p=.000$; and the standard error of estimate was .673. Therefore, there was

significant relationship between the predictor variables, HDDS and FCS food security statuses and the predict, CSI food security statuses.

Qualitative findings

The qualitative findings are based on key informants' interviews, observations, and photographs. The key informants' interview findings indicate background and nature of key informants' work as follows: The age group of key informants ranged from 26 to 50 years and a vast majority of them (13 out of 14) were aged 30 to 50 years. Eleven out of the 14 participants were males and only 3 were females. With regards to the highest level of education, half of the participants (7) had attained a degree, four participants had attained a diploma, one a master's degree, another, an advanced certificate and one had a certificate. All participants worked in an area of food security; and a slightly more than half of the participants (8) had 10 and above years of work experience, while the longest serving informant had 29 year experience in food security work, and only two key informants had two and one-year experience in food security sector. Most key informants (11) held long term career jobs. All the key informants indicated that they dealt with females in the line of their work.

With regards to thematic analysis of the interviews, key informants were experiencing both challenges and tranquility at work; some of them were aware while others were not aware of a previous research on food security, that had been carried out in the Voi Division, but did not coincide directly with the current study. Needs of female-headed households were: male household headship, finances, security, proper healthcare, and food. Their challenges were: lack of male household headship, lack of financial empowerment, emotional insecurity, landlessness, and gender inequality.

With regards to food consumption patterns, the key informants indicated that, Voi Division households' dietary diversity was characterised by mostly poor dietary diversity. However, the poor dietary diversity, acceptable dietary diversity, and coping strategies were influenced by rural-urban nexus and/or economic capacity. The participants also indicated that, the households' food consumption frequency was characterised by poor food consumption score (FCS), acceptable FCS, and coping strategies as influenced by rural-urban nexus and/or economic capability.

Cereals was the major food group, that all participants mentioned maize as being consumed by households in the Voi Division.

Sources of food for households in the Voi Division were own production, market and food aid; while the households' comfort with the food accessibility was mostly not comfortable because of droughts, food import from far flung areas, lack of employment for income generation, lack of food subsidies by the government, general low purchasing power and high food prices. Among the differences that existed between the male and female-headed households' sources of food, was that, females were praised for being hard-working, and not involved in vices such as alcoholism, hence they provided food to their households more than the males.

The households were employing the following coping strategies: skipping meals, reducing portion size of meals, purchasing food on credit, reduce portions for adults to allow more to children, and parents sending children to eat elsewhere.

The overall food security statuses in the Voi Division (according to the key informants) were moderate food insecurity and poor food security.

With regards to interventions for food security in the general community of the Voi Division, support from external change agents, and participatory community engagement were found to be useful.

Regarding interventions for food security among the FHHs, the key informants suggested several strategies that elicited 3 sub-themes, as follows: No special treatment (equal treatment with men), formation of self-help initiatives, and interventions for food security among FHHs should be specially designed.

Observational analysis indicates that, most of the FHHs' main dwelling places were semi-permanent houses. With regards to food groups observed, the "HDDS cereals" or "FCS main staples" food group featured prominently, particularly, the maize and its products. Sources of food were own production and markets. The most prevalent water source was the tap. The mostly used coping strategy was skipping of meals.

Visual analysis illustrates that, there were poor housing conditions especially among the elderly depicting the extreme poverty prevalence in the division. Dandelion was the most available vegetable through own production, and sources of food were own production and markets. Cooking arrangements were patterned as follows: sources of fuel, kitchen places, and fuel conservation methods. Firewood was the leading source of the fuel, particularly in rural areas, while charcoal was the second in prominence. Kitchen places were both enclosed and outdoor kitchens. With regards to firewood-cooking stoves, earth mound helped preserve heat and prevent ultimate firewood wastage through the wood getting

blown and swayed by winds. Charcoal stoves were constructed from metal outer-layer and the inside (of the stove) smeared with clay soil, as fuel conservation method. Water supply was through community water sources and private-owned water sources.

Practice guidelines are based on key findings on the 3 objectives which inform the objective 4, and the key guidelines are on planning, implementation, and key informants'. The guidelines are as follows: With regards to programme planning, guidelines are proposed that: food assistance organisations and institutions should plan while considering rural-urban nexus, programme planning should consider male-female nexus, the organisations should conduct institutional mapping of partners, the organisations should also plan for diversity in the food resources for allocations to the households, the organisations should inculcate participatory rural appraisals before the planning, and maintaining effective communication among planning partners. Guidelines for policy and programme implementation include: nutrition and climatic change interventions through water provision, capacity-building for self-reliance, and agricultural extension services. The key informants proposed the following guidelines: formation of self-help groups by the FHHs, capacity-building interventions for the FHHs' empowerment, FHHs specially designed participatory rural appraisals for needs assessments and decision-making, subsidising FHHs children's education, formulation of female-friendly policies, and specially designed extension services on females only.

In conclusion, this study met all objectives, and was timely. Generally, the researcher recommends for multi-agency and community collaborations in meeting the food security needs among the female-headed households in the Voi Division, Kenya.

Keywords: food security, household, female-headed households, female food security, food consumption, right-based issues, female food security as a right-based issue, household dietary diversity, household dietary diversity score, food consumption frequency, food consumption score

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ABBREVIATIONS AND ACRONYMS

CSI	Coping strategies index
FCS	Food consumption score
FHH	Female-headed households
HDDS	Household dietary diversity score
MAFP	Months of adequate food provisioning
WFS	World Food Summit

CHAPTER 1

GENERAL INTRODUCTION

1.1 Introduction

The World Food Summit (WFS) of 1996 in Rome stipulated that food security exists when all people, at all times, have physical and economic access to sufficient, safe, nutritious food to meet their dietary needs and food preferences for an active life (Aiga & Dhur, 2006:36; Du Toit, Ramonyai, Lubbe & Ntushel, 2011:2). The researcher of this study therefore is of the opinion that every human has a right to live in conditions that ensures food security, irrespective of their social or economic situations. There are 1.4 billion people in extreme poverty and 925 million hungry globally, on a daily basis (FAO, IFAD, WFP & Biodiversity International, 2012:2). A recent report by the Food and Agriculture Organisation (FAO) indicates that about 805 million people worldwide were estimated to be chronically undernourished between 2012 and 2014 (FAO, 2014:8). The researcher deciphers that poverty causes and exacerbates food insecurity especially in developing countries. Mwaniki (2015:1) asserts that the main cause of food insecurity in the developing countries is poverty. In Africa, it is also caused by war/civil strife, and gender inequality (Mwaniki, 2015:1). The researcher is of the opinion that war may cause death of a spouse bringing about widowhood and the ultimate female-headed households' vulnerability to food insecurity.

Over 70% of the food insecure population in Africa lives in rural areas, and 30% are the landless poor in rural areas and the urban poor (Mwaniki, 2015:1). The researcher is of the opinion that poverty, including rural poverty leads people lack access to food, therefore may go hungry for days. In Sub-Saharan Africa, one in four people remain chronically hungry (FAO, 2014:4). The researcher feels that such extended feeling of lack of food is against human right of access to adequate food.

In Kenya, the right to food security is enshrined in the *National Food and Nutrition Security Policy* (FNSP), which indicates that, it is the policy of the government that all Kenyans, throughout their life-cycle enjoy at all times, safe food in sufficient quantity and quality to satisfy their nutritional needs for optimal health (Republic of Kenya, 2011:vii). The researcher observes that the food security policy document contains policy guidelines as ratified by Kenya from the United Nation's FAO food security convention called the WFS of 1996. The ratification is rationalised on the fact that Kenya is a member country of the United Nations (UN). Despite the stipulations provided in the policy, the researcher has come across households in the country that are living in extreme poverty and food

insecurity. About half of Kenya's estimated 38.5 million people are poor, and some 7.5 million people live in extreme poverty, while over 10 million people suffer from chronic food insecurity and poor nutrition (Olielo, 2013:4; Republic of Kenya, 2011:1). Eighty per cent of poverty-stricken Kenyans are in the rural areas (Mutavi, Kokonya, Obondo, Wariua & Ocharo, 2013:209). Major causes of poverty to women in Kenya are low literacy levels and the death of a bread-winner (Mutavi et al., 2013:209). The researcher is of the opinion that low literacy levels may hinder females from practising informed dietary habits, while the death of a husband plunges widows into extreme poverty and the consequential food insecurity. This study was designed to investigate food security among female-headed households (FHHs) in Kenya. More specifically, it focused on Voi Division in Taita-Taveta County. This study was envisaged on the rationale that the Voi Division is an Arid and Semi-Arid Lands (ASALs) area. A salient characteristic of ASALs is frequent droughts which jeopardise crop yields and livestock productivity leading to household food insecurity. The main participants in the study were females who were sole household heads, probably due to various life circumstances, including being never married, separated, divorced or widowed. Female-headed households are very vulnerable to food insecurity.

The following are the subsequent contents of this chapter: definitions of key terms, contextualisation of food security, theoretical framework, rationale and problem statement, goal and objectives of the study, research methodology, and outline of thesis.

1.2 Definitions of key terms

The following concepts are used in the study and need to be uniformly interpreted:

1.2.1 Food security

"Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food, which meets their dietary needs and food preferences for an active and healthy life" (FAO, 2013b:16-17). For this study, food security means that all members of female-headed households in Voi Division have enough food to meet their daily dietary needs and food preferences; and the foods should be adequate in nutrition, safe, and socially acceptable in the community.

1.2.2 Household

"A group of persons residing in the same homestead, and have same cooking arrangements, and are answerable to the same household head" (KNBS, 2010:4). FAO (2010:9) refer to household as all persons living under the same roof who share meals. For

this study, this concept refers to all the members of a female-headed household who consume food from the same dietary pot and consider the female as the head of their family.

1.2.3 Female-headed household (FHH)

“Households headed by single women distinguished as “de jure and de facto” (Klasen, Lechtenfeld & Povel, 2011:6). In the case of the former, women are the legal and customary heads. Examples are households headed by widows and unmarried, separated or divorced women (Klasen et al., 2011:6), and the latter have either a self-reported female head whose husband is present or, more typically, a self-reported male head who is absent for most of the time (Quisumbing et al., 2001 in Klasen et al., 2011:6). For this study, FHH is the household headed by a woman who is unmarried, widowed, divorced or separated, and a female relative or wellwisher taking care of destitute and/or orphaned children.

1.3 Contextualisation of food security

The focus on food security has now shifted from the Millennium Development Goals (MDGs) to the post-2015 agenda of the global Sustainable Development Goals (SDGs). This is because of the need to eradicate the World’s problems sustainably. The researcher is of the opinion that, poverty is the main cause food insecurity globally, in Africa and Kenya, including the Voi Division and among the FHHs.

Although MDG number one (MDG1) of halving poverty rate among everyone had been attained globally by the year 2010, the researcher notices that this half achievement was not enough against the backdrop of some regions in the world having indicated better achievements than others. UN (2015a:6) indicates that, globally the number of people living in extreme poverty has declined from 1.9 billion in 1990 to 836 million in 2015. In 1990, almost half of the population (43%) in developing regions lived on less than \$1.25 a day, but this rate dropped to 22% by 2010 (UN, 2014a:9). This intimates that the MDG1 targets were achieved worldwide by 2015, but the researcher agrees that extra efforts are necessary for a total eradication of poverty and hunger.

In order to address the world’s challenges sustainably, the UN’s 70th session of the General Assembly launched the global SDGs at the United Nation’s headquarters in New York from 25th to 27th of September, 2015 (UN, 2015:3). The SDG1 is to end poverty in all its forms everywhere; and the SDG2 is to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture (UN, 2015:14). The researcher is optimist that concerted multi-sectoral efforts will help achieve these goals sustainably and everywhere in the world including in Africa.

According to the World Bank, Sub-Saharan Africa has not met the MDG hunger target by 2015 (UN, 2014a:9), and remains with the highest prevalence of undernourishment (FAO, 2013b:10). Overall, the prevalence of hunger in the Sub-Saharan Region declined by 30% between 1990 and 2015; such that Western Africa reduced it by 60% (the proportion declined from 24.2 percent in 1990 to 9.6 percent in 2015), while other sub-regions experienced an increase in the absolute number of undernourished people, by approximately 2% and 20% in Southern and Eastern Africa respectively (FAO, 2015:1). Middle Africa has more than doubled its number of undernourished people over the same period, largely due to civil strife (FAO, 2015:1). The researcher observes that despite Western Africa having halved its hungry population by 2015, many other parts of the Sub-Saharan Africa are yet to achieve this. Furthermore, FAO (2015:1) indicates that Middle Africa is off-track while Eastern Africa has made slower progress toward this target. Poverty rates are also high in Kenya.

The Basic Report on the Well-Being in Kenya, reports that the current poverty ratios are 45.9%, 49.1%, and 45.8% of the national poverty, rural poverty, and food poverty, respectively (KNBS, 2007:43); with the rural Gini co-efficient of expenditure per adult of 0.380 (KNBS, 2007:83). The North Eastern, the Coast, and the Eastern regions of Kenya have the highest poverty prevalence; such that their rural poverty rates are 73.9%, 69.7%, and 50.9%, respectively (KNBS, 2007:48). Taita-Taveta County (with rural poverty rate of 57.2%) is in the Coastal Region. One reason the researcher has decided to focus on the Voi Division is because it is geographically located in a region (Coastal) with the highest poverty levels in Kenya.

Food insecurity in Kenya is caused by recurrent droughts, high fuel prices and globalisation that is rapidly redefining food affordability; and also limiting poor people's consumption, which make them shift to less balanced diets and less frequent meals (Republic of Kenya, 2011:5). The researcher is of the opinion that, poverty, exacerbated by the above factors, is the major defining factor against food security among FHH. This study adopted availability, access, utilisation and stability as food security indicators. They are the core pillars against which food security is measured by international food security organisations, such as FAO (FAO, 2015:2-3). The FHHs are vulnerable to food insecurity.

Food poverty affects women more than men, because many women can go hungry in order to feed their children; and single parents, 89% of who are women, are twice as likely to live in poverty as complete families (Cooper, Purcell & Jackson, 2014:8). The *Gender and Food Security Overview Report for 2014* states that food and nutrition insecurity is a gender justice issue, because of the low status and lack of access to resources by women since

they are the most disadvantaged by the inequitable global economic processes that govern food systems, and moreover, their nutritional and food security needs are neglected at the household level, where discriminatory social and cultural norms prevail (Bridge, 2014:2).

In the post MDG era (post-2015), it is of great essence to focus on the FHH food security as a strategy of achieving the post-2015 goal of eradicating poverty and hunger (UN, 2015:4). For this reason, this study was designed to investigate the status of food security among FHHs in Kenya, focusing on Voi Division in Taita-Taveta County. The findings, practice guidelines and recommendations of the study will assist in future interventions on the issue of food security. Moreover, the study is contextualised on SDG number two (SDG2) of eradicating hunger and food insecurity among everyone and is underpinned by the ecological systems perspective.

1.4 Theoretical framework

The present study is contextualised in the human-ecological systems perspective as theorised by Urie Bronfenbrenner in 1979. The study was guided by the ecological systems theory of Urie Bronfenbrenner, (1979). The theory consists of the scientific study of progressive, mutual accommodation throughout the life cycle between an active, growing human being and the changing properties of the immediate settings in which the developing person live and are affected by the relations between these settings and the larger contexts in which the settings are embedded (Friedman & Allen, 2011:9). In line with this postulation, FHHs are found within local and broad environments that are affected by political, social and economic factors that help shape their members' lives. Kaiser (2011:65) observes that policy makers are challenged to balance social and environmental justice issues in an ecological social approach to food security particularly through production and accessibility of affordable, healthy foods which must be considered in terms of human rights. For this study, the researcher is of the knowledge that besides frequent droughts in ASAL environments, particularly the study area, females are affected by man-made poverty, which exacerbates food insecurity in their households. This is due to economic and social discriminations that the larger socio-cultural environment has "placed" upon the females. Kaiser (2011:65) further notes that besides food systems being tied to the natural environment, it is also important to view it in terms of human contributions which she refers to as human-dominated ecological-social systems.

The perspective identifies five environmental systems within which an individual interacts (Friedman & Allen, 2011:9). In this section, the researcher makes a discussion of the

theoretical framework, linking the five environmental systems as illustrated by (Friedman & Allen, 2011:9) and its application in this study.

The first of the environmental systems is micro-system which is the immediate environment we live in. Ettekal and Mahoney (2017:3) stipulate that this environmental system is the most proximal ecological level in which individuals directly interact. Furthermore, Friedman and Allen (2011:9) quote Bronfenbrenner that, “at the innermost level (of the ecological environment) is the immediate setting containing the developing person” In other words, micro-systems are the institutions and groups, that most immediately and directly impact people (Härkönen, 2007:8) such as a family or household. In line with this study, members of FHHs are directly impacted by their household dynamics of food security.

The second level of the ecological environment is the meso-system which is the interconnections between different micro-systems. It is the interrelations between two or more settings in which the developing person actively participates (Neal & Neal, 2013:724). For example, the interactions between the household and the workplace of a female household head. The female may experience hardships coping at the workplace micro-system, because of the hardships caused by being a sole caregiver to her household micro-system.

The third level is the exo-system which are the links between social settings in which persons do not have an active role and which they have an active role. This level is composed of interactions between two or more settings, but the individual is in only one of the settings (Hong & Espelage, 2012:317). For example, a hungry caregiver may not have much control of getting themselves food especially through purchasing, because she lacks money, but she can control her moods towards her supervisor at work.

Macro-system is the fourth ecological environment and it refers to the culture in which individuals live. The macro-system can be thought of as a societal blueprint for a particular culture, sub-culture, or other broader social context (Härkönen, 2007:12). In essence of this study, the local patriarchal cultures have stratified women as a “lesser” gender with nothing or little to inherit from their parents. Single women are faced with the problem of being landless hence stretch themselves too much for their household food security. The Republic of Kenya (2014:19) furthermore says culture, plays an important role in the ability of households to access food, such as the cultures that define gender roles and biases. However, it observes that, under the Constitution, the GOK has an obligation to ensure that gender disparities are eliminated, especially those that propagate disempowerments of a gender - for instance, discriminations against women’s land inheritance (Republic of Kenya,

2014:20). Other macro-systems of importance in this study include: socio-economic status of the FHHs and the study area of the Voi Division in which the FHHs are physically bounded.

The last level is known as chrono-system. This is the final level of the ecological framework which includes consistency or change in historical or life events, of the individual and the environment over the life course; such as changes in family structure (Hong & Espelage, 2012:317). The researcher is of the opinion that, patterning of environmental events and transitions over the life course as well as socio-historical circumstances such as divorce may cause a female to become a sole breadwinner for her household. Moreover, if the female is unemployed, her household's vulnerability to food insecurity gets exacerbated. According to Friedman and Allen (2011:10), bio-psycho-social development of individuals and families within cultural, historical, communal, and societal contexts, is a perspective that requires us to look as well at all events in the person's life.

Per this theoretical construction of the five environmental systems, the researcher was able to deduce how the systems interact to influence food security among FHHs in the Voi Division in accordance with the objectives of the study. The theoretical framework is further discussed in more detail in chapter 4 of this study report.

1.5 Rationale and problem statement

The researcher is of knowledge that UN member states should have been working towards achieving the MDG1 of eradicating extreme poverty and hunger in the period between 1990 and 2015. Some of the targets laid down for achieving this goal were: halve between 1990 and 2015, the proportion of people whose income is less than \$1.25 a day and halve, between 1990 to 2010 the proportion of people who suffer from hunger. As mentioned in section 1.3, since the year 2015 is already surpassed, the focus is now on the post-MDG agenda, especially the UN's SDGs established by the 2012 UN Conference on Sustainable Development in Rio de Janeiro (IFPRI, 2014:4) and launched in New York in September, 2015. The timeline for achieving the SDGs' targets straddles from 2015 to 2030. For instance target 1 of the SDG2 is, by 2030, end hunger and ensure food access by all people, in particular the poor and people in vulnerable situations, to safe, nutritious and sufficient food all year round (UN, 2015:15). In the essence of formulating this study, the researcher sought to establish whether substantial efforts would have been made in the post-2015 to eradicate food insecurity among vulnerable and poor populations of the FHHs.

The *UN MDG Report for 2014* (UN, 2014a:4) stipulates that global poverty rates had fallen to less than half by 2010. In developing regions, the proportion of people living on less than

\$1.25 a day fell from 47% in 1990 to 22% in 2010; and the proportion of undernourished persons decreased from 24% in 1990–1992 to 14% in 2011–2013 (UN, 2014a:4). Despite this achievement, a good section of the world's population continues to suffer in extreme poverty and hunger. This is illustrated in the *MDG Report for 2015* (UN, 2015:15) that 1 billion people are extremely poor. Moreover, the same report (UN, 2015:20) indicates that about 795 million people are still undernourished. This lack of the MDG achievement has prompted the launch of the SDGs which calls for more efforts to achieve eradication of poverty and hunger in their entirety. Furthermore, the Sub-Saharan Africa had been able to reduce the poverty rate from 56% to only 48% in 1990 and 2010, respectively (UN, 2014a:8). See also the section 1.3 for more detail on the region's under-achievement with regard to hunger and food insecurity eradication.

Kenya is a member country of the UN and together with other member states, it is ratified to the adoption of the MDG and the post-MDG agenda. There are several GOK policy documents that have focused on mainstreaming MDGs into policy, planning and budgeting process (Republic of Kenya, 2012:4). The Kenya Vision 2030 is a major policy document, in which the first Medium Term Plan (MTP 2008-2012) aimed at accelerating the achievements of MDGs by redirecting spending to high priority areas; and corresponding District Development Plans also ensured that local level planning and budgeting in all districts responsive to the MDGs. The County development plans and their implementations should be adopted from Kenya Vision 2030 level and should be responsive to the MDGs (Republic of Kenya, 2012:7) and the SDGs. The Kenya Vision 2030 number one pillar is the Economic Pillar, whose objective is to maintain a 10% economic growth rate annually; so as to achieve the MDG1 of eradicating extreme poverty and hunger, and the MDG3 of achieving gender equality and empower women (Republic of Kenya, 2012:8). Despite these stipulations, Kenya did not achieve the MDGs. The Kenya MDG Status report shows that the proportion of people living below the poverty line only reduced from 52% in 2000 to 46% in 2006 and that the set target for 2015, 26% has not been achieved (Republic of Kenya, 2012:9).

In the MDG term (1990-2015), food security was a vivid indicator of the MDG1. Moreover, in the post-MDGs era, food security is enshrined in the SDG2 (total eradication of hunger and food insecurity by 2030). Like everyone else, members of FHHs are entitled to food security as stipulated in the World Food Summit (WFS) of 1996. The current study was motivated by the fact that Kenya (including other countries within the Sub-Saharan Africa) had not yet achieved the target of the MDG1 of halving the population of the poor and the hungry even at the onset of 2015. Moreover, the researcher is of the opinion that females

are cumbered with the burden of caregiving, poor socio-economic status and social exclusions. This makes their households experience the worst challenges associated with food insecurity. By investigating into food security among the FHHs, and presenting and discussing the findings, and proposing practice guidelines, the report will act as a reference to researchers, policy makers, programme planners and practitioners on food security among FHHs. Through intensive literature searches, the researcher has not found published work on the study topic focusing specifically on the Voi Division in Taita-Taveta County, Kenya. Several databases such as SciDev.Net's Sub-Saharan Africa desk, SABINET, Pathways to African Feminism and Development, Journal of African Women's Studies Centre, Global Journal of Agricultural Research, Journal of Food Composition and Analysis and many others have not shown such information, thus attesting an existence of a gap in research and the need for the current study. Thus, the ultimate question which guided the study is:

- What is the status of food security among female-headed households in Voi Division in Taita-Taveta County, Kenya?
- The sub-questions for the study are:
 - What is the status of dietary diversity among the female-headed households in the Voi Division?
 - What is the status of food consumption frequency among the female-headed households in the Voi Division?

1.6 Goal and objectives of the study

In this section, the goal and the objectives of the study are highlighted.

1.6.1 The goal of the study

The main goal of this study was to investigate and describe the statuses of food security among female-headed households in Voi Division, Taita-Taveta County, Kenya.

1.6.2 Objectives

The study was guided by the following specific objectives, which were to:

- Determine the status of dietary diversity among female-headed households in Voi Division, Taita-Taveta County, Kenya by utilising dietary diversity score as an indicator of food security.

- Measure food consumption frequency among female-headed households in Voi Division, Taita-Taveta County, Kenya by utilising food consumption score as an indicator of food security.
- Determine the overall status of food security among female-headed households in Voi Division, Taita-Taveta County, Kenya.
- Describe the statuses of food security among female-headed households in Voi Division, Taita-Taveta County, Kenya and provide practice guidelines regarding the food security statuses.

1.7 Research methodology

The research methodology is discussed in detail in chapter 5 of this study. Subsequently it is merely summarised.

The researcher prioritised the mixed methods approach and a research paradigm of pragmatism, which involved combination of both quantitative and qualitative approaches in collection and analysis of data. The type of research is applied research, whose purpose was to investigate real life phenomenon of food security among female-headed households. The research design for the mixed methods approach was the convergent parallel mixed method design, and for the quantitative phase of the study the randomised-cross sectional survey. For the qualitative phase of the study the collective case study design was used. The study was conducted in the physical location of Voi Division in Taita-Taveta County, Kenya. The study demarcation comprised of rural and urban areas which were Sagala Location and Voi Location respectively. The target population of the quantitative phase of the study was all female-headed households in the division, while the accessible population was the females who were the legal and customary heads of the households (*de jure*). In sampling the survey respondents, the researcher used Stoker's (1985) table, which offers 14% sample size from a population of over 500 up to 1000 (Strydom, 2011b:225). The accessible population was 850 FHHs therefore; the researcher extracted the 14% of the 850 as the sample to get a sample size of 119 FHHs. Additionally, the researcher increased the sample size to 140 to cater for natural attrition. However, in the end data was collected from 134 respondents. The researcher and research assistants collected data for quantitative phase of the study via a survey, whose main instrument was a structured questionnaire.

The qualitative data collection involved 3 methods, namely: key informants' interviews, observation and photograph-taking. The research instruments for these methodologies were a semi-structured interview schedule (and cellphone audio-recorder), observation

checklist and a digital camera respectively. For the one-to-one interviews with key informant participants, the researcher was guided by open-ended questions in the interview schedule. The second data collection method was observation. The researcher and research assistants wrote field notes for the data regarding the observed food security behaviours, in the observation checklist. In situations where participants allowed, the researcher or the research assistants took photographs of food security situations as they occurred at the time of the observation and not of any participants. Computer software used for the quantitative data entry were the MS Excel and SPSS. Univariate and multivariate analyses were applied. Analyses of the qualitative data included transcriptions of the interviews and field notes in MS Word, as well as using MS Excel and SPSS where necessary to reflect the profile of the participants, observations and photographs. The findings were presented thematically.

1.8 Outline of thesis

A brief outline of this thesis is as subsequently provided.

Chapter 1: General introduction

The first chapter of the thesis is general introduction. The chapter covers the following headings: introduction, definition of key terms, contextualisation of food security, theoretical framework, rationale and problem statement, goal and objectives of the study, and research methodology.

Chapter 2: Food security

The chapter 2 of this study entails literature review and discussion of the literature on the following sections: introduction, and food security. The food security is the key issue of the study, therefore, the researcher has done extensive literature review of its key concepts as follows: concept of food security, national food security, household food security, universal pillars of food security, food insecurity, food insecurity versus nutritional insecurity, measuring food security, factors affecting food security, consequences of food insecurity. The final section of the chapter is summary.

Chapter 3: Food security among female-headed households

This chapter explores the topic of the study focusing on female-headed households. The FHHs were the target population of the study. The broad sections in the chapter are: introduction, definition of key terms, female food security as a rights-based issue, factors affecting FHHs food security and consequences of the FHHs food insecurity. Finally the summary of the entire chapter is provided in the last section.

Chapter 4: Ecological systems perspective and food security among female-headed households

This chapter discusses ecological systems perspective as the theoretical framework of this study. Food security among female-headed households is contextualised with the perspective. In this chapter the following topics are discussed: Definition of key terms, ecological systems perspective and security among female-headed households, aspects of human ecology and physical ecology in food security, domains of food security and the ecological perspective, and finally the summary of the chapter.

Chapter 5: Research methodology

The chapter 5 involves the discussion of the research methodologies. The discussion of the methodologies is done according to the following order: introduction; research approach; type of research; research design; study demarcation, population and sampling; data collection; data analysis; pilot study; and ethical consideration.

Chapter 6: Research findings: Quantitative phase

This chapter will focus on the quantitative research findings, discussion and interpretation. The chapter is presented in the following order: introduction, quantitative findings which are on biographical profile of respondents, household dietary diversity, food consumption score, overall status of food security among FHHs, months of adequate food provisioning, coping strategies index. The last section is the summary.

Chapter 7: Research findings: Qualitative phase

In chapter 7, qualitative findings from the collective case study are presented in the following sequence: qualitative findings of key informants' interviews, observational analysis and visual analysis of photographs.

Chapter 8: Practice guidelines

Chapter 8 discusses practice guidelines for interventions on food security particularly among female-headed households, including those in the Voi Division. The chapter is basically outlined in two major sections - international food security situations, and practice guidelines. The guidelines are arranged in sub-sections as follows: guidelines for programme planning, guidelines for policy and programme implementation, and guidelines by key informants.

Chapter 9: Summary, conclusions, recommendations

In chapter 9, overall study summary, conclusions and recommendations are provided.

The next chapter focusses on the literature review on food security.

CHAPTER 2

FOOD SECURITY

2.1 Introduction

This chapter explores the origin of the concept food security. The concept of food security has been formulated along generations until the latest definition by the 1996 World Food Summit (WFS). The concepts of national food security and household food security have also been generated alongside the broader concept of food security. The commonly agreed-upon pillars of food security are food availability, food access, and food utilisation. All these pillars are maintained by food stability. The antonym of food security which is food insecurity is also discussed and compared with nutrition insecurity. Measurement of food security entails various approaches which may be in either aggregated or disaggregated form. Tools for food security measurement discussed in this chapter are socio-economic and food security survey, and household food insecurity access scale. The researcher has also briefly explored on factors affecting food security, and lastly on consequences of food insecurity.

2.2 Food security

Food security can be described and measured according to a variety of definitions, dimensions, timeframes, and units of analysis (Vaitla, Coates & Maxwell, 2015:1). The common definition of food security across most sectors is the one by the 1996 WFS. In corroboration with the WFS definition, FAO, IFAD and WFP (2015:53) define food security as: *“A situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food, that meets their dietary needs and food preferences for an active and healthy life”*. Vaitla et al. (2015:1), also uphold that this is the definition of food security by FAO. According to Vaitla et al. (2015:48), the key terms of the definition are: stability means food stability at all times, quantity is access to sufficient food, quality refers to dietary needs or diversity, acceptability is food preferences, and safety means food is safe. The researcher is of the opinion that physical access may be through own food production, social access may be through social assistance, and economic access may be through purchase. FAO, IFAD and WFP (2015:42) recommends for improving productivity of resources held by family farmers and smallholders to improve livelihoods of the rural poor in order to ensure physical access and rural economy for economic access. The researcher is of the opinion that female-headed households would improve their physical access to food by practising smallholder subsistence farming consistently. The consistency would help stabilise their food access at all times. Additionally formal employment would strengthen their economic access to food. Physical food access

among vulnerable groups in society can also be boosted through voluntary and governmental efforts in provision of food assistance. Today, every country in the world has at least one social assistance programme in place, such as school feeding programme, unconditional cash transfers, conditional cash transfers and public works/community asset programmes (FAO, IFAD & WFP, 2015:35). Such social programmes should be provided on consistent basis to cushion the poor, especially FHHs from plunging back into food insecurity.

This study captured the aspect of food access by including questions on sources of food. The question items on sources of FHHs' food were in section C of the study questionnaire. The variables captured for food sources are: market; own production; gifts from relatives, neighbours and friends; food-for-work; free relief food; money donations to buy food; wild food; and other. The "other" variable is meant to capture any other source not enlisted. The report by FAO 2015, however, illustrates the discrepancy between the existence of the social protection and the access to them by the world's vulnerable. It laments that despite the proliferation of the programmes around the world, the International Labour Organisation (ILO) estimates that 70% of the world's poor still do not have access to adequate social protection (FAO, IFAD & WFP, 2015:35). This implies that the impacts of the social programmes have not been widely felt. This viewpoint thus highlights the importance of including the social protection variables; food-for-work, free relief food, and money donations, so as to investigate whether the female-headed households have access to social protection food services.

2.3 Background and meaning of food security

The concept of food security is explored under the following sub-headings: the background and meaning of food security, national food security, household food security, pillars of food security, food insecurity also as relating to nutritional insecurity, and measuring food security. Several tools for measuring food security are also discussed: months of adequate food provisioning (MAFP), the use of dietary diversity scores, micro-nutrient adequacy measures, and subjective measures of food security.

2.3.1 The concept of food security

Despite, or perhaps because of the fundamental importance of food security, it is a concept whose definitions and operationalisation have been numerous and varied. Indeed, a sufficiently large number of terms have been used in discussions of food security to cause difficulties in identifying what exactly, is being discussed, measured or intervened upon. This is partially due to the multi-disciplinary and multi-sectoral nature of food security

(Jones, Ngure, Pelto & Young, 2013:481). Of note, in Europe, the term food security is often used to describe what in the US is called food safety, the regulation and control of food supply chains in order to monitor food hygiene, toxicity, and traceability (Jones et al., 2013:482). The concept of food security is said to have been and continues to evolve along generations. The initial efforts were the use of terms of food security measurements. It is for this reason Jones et al. (2013:483), note that there had been efforts to measure the availability of food before the coining of the phrase “food security” and the measurement of national food availability began in the post-World War I period and increasingly during and following World War II, whereby the international community began to collect national food balance sheet data to facilitate food allocation and distribution efforts in conflict-affected regions. Pinstруп-Andersen (2009:5) depicts food security to have been originally used to describe whether a country had access to enough food to meet dietary energy requirements of its citizens or not. This meant that a country which was able to provide for per capita energy requirement of its citizens was deemed to be food secure as Pinstруп-Andersen (2009:5) points. Later the concept of food security was formulated at the 1974 World Food Conference, held by FAO.

Food security was first defined at this conference as “availability at all times of adequate world food supplies to sustain a steady expansion of food consumption and to offset fluctuations in production and prices” (FAO, 2006:1; Qureshi, Dixon & Wood, 2015:394). Despite this new formulation, the definition was still limiting. Qureshi et al. (2015:394) and Pinstруп-Andersen (2009:5) argue that this definition reflects an earlier concept of food security where the focus was solely on the supply side; and overlooked the multiple variables that affect the demand and access. Due to this limitation the definition of food security was advanced from global and national levels, to household and individual levels; and in 1983, food security was redefined as access to enough food to live a healthy and productive life (Pinstруп-Andersen, 2009:5). FAO analysis focused on food access which led to the definition based on the balance between supply and demand of food, and the definition was thus: “ensuring that all people at all times have both physical and economic access to the basic food that they need” (FAO, 1983 in FAO, 2006:1). The earlier definitions had focused on global and national levels. However, this definition is inclusive of all people, such that individual and household levels are also catered for as illustrated by FAO (2006:1). This definition was further amplified by FAO to include the nutrition value and food preferences; and ultimately, a common definition was agreed upon at the WFS of 1996 as indicated in the preceding section.

This new definition emerged from the 1996 WFS as: "... food security exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food that meets dietary needs and food preferences for an active and healthy life" (Pinstrup-Andersen, 2009:5; Qureshi et al., 2015:394; WFP, 2012:7). FAO (2006:1) and Jones et al. (2013:482), corroborate this definition by asserting that the most commonly used definition of food security is based on the definition from the 1996 WFS, whether at the individual, household, national, regional or global levels. This study is mainly guided by the WFS definition. In this study, food security among the FHHs was considered to be sufficient when on the average, every member of the household was deemed to have access and utilisation of enough food that had met their nutritional needs and food preferences. The aspects of access and utilisation were captured by asking the respondents about sources of food, and their households' food consumption questions respectively. Data on food preferences (as well as aspect of access and stability) was captured by asking them whether their households had employed several coping strategies in the last one month prior to the study. Coping strategies index (CSI) include items that capture preference and is a better indicator of stability compared to direct consumption measures (Vaitla et al., 2015:17). To be in tandem with the latest definition of food security, this study also gave special attention to whether all members of female-headed households on average, had sufficient and culturally acceptable food to cater for their health and energy provision.

Adding a nutrition element to the food security definition ensures a focus not just on calorific value of food, but the micro-nutrient value also (Qureshi et al., 2015:394). The analysis of this study's data included classifying food items into food groups, to capture the aspects of nutritional and micronutrient. Food groups in the 24 hour and 7 day recalls provide for nutritional value of foods across diets. Moreover, Pinstrup-Andersen (2009:6) says that the addition of "safe" and "nutritious" emphasises food safety and nutritional composition, while the addition of "food preferences" changes the concept of food security from mere access to enough food, to the food preferred. The researcher assessed food safety among the FHHs by utilising qualitative observations on food preparation behaviours and water supply. Some limitations are however associated with this latest definition by the WFS.

It is argued that people with same access to food, but different food preferences could show different levels of food security (Pinstrup-Andersen, 2009:6). This study strived to overcome this limitation, by purposely identifying a study area with common similar food culture and/or food preferences. For the sake of this study, a food preference is interpreted to mean ethically and culturally acceptable foods among the community of the study and not the food which a specific individual may "crave" for. Though there could be disparities among

food preferences among Muslims and Christians in the Voi Division, the variable religion was not used for the purposes of this study. This was to mitigate avoidance of answering the survey by an individual with suspicion that her religion was targeted badly. The issue of terrorism by Al-Shabaab in Kenya has influenced some kind of religious “sensitivities” in the country, thus the government is discouraging any religious “tags” among Kenyans. Other food security-rated concepts reviewed for this study are as illustrated in the subsequent sub-sections. The term food security is used across contexts including nationally, and at the household levels.

2.3.2 National food security

The term national food security was used by some people to mean self-sufficiency, that a country was able to produce the food it needed or that which its population demanded (Pinstrup-Andersen, 2009:5). In Kenya, the aspect of self-sufficiency is captured in the status report of the *Kenya National Food Security of 2014*, which indicates that the aim of the first food security policy was to maintain the broad national food self-sufficiency (in major foodstuffs) and ensure equitable distribution of the food of nutritional value to all Kenya’s citizens (KNBS, 2014:3). This reference later transited to national food sovereignty. National food sovereignty refers to the extent to which a country has the means to make available to its people the food needed or demanded, irrespective of whether the food is domestically produced or imported (Pinstrup-Andersen, 2009:5). KNBS (2014:7) indicates that Kenya domestic food production largely depends on rain-fed agriculture for its food requirements. Kenya relies mostly on domestic food production for their food security and agriculture is a major contributor of its economy. This is illustrated in the *Economic Survey 2016*, which indicates that the growth in Kenya’s Gross Domestic Product (GDP) in 2015 was mainly attributed to agriculture at 22% from 14.7% in 2014 (KNBS, 2016:24). This increased growth was attributable to bumper harvests due to abundant rainfall in the year, thus maize production increased from 39 million bags in 2014 to 42.5 million bags in the 2015 (KNBS, 2016:144). Maize is the staple food in Kenya and FAO (2000) rate maize as the main staple food for Kenya (KNBS, 2014:7). The researcher has observed that this trend has reversed in 2016, and became worse in early 2017 due to poor rains in the March-May and October-December, 2016 rain seasons. The drought in the latter season had increased vulnerabilities to household food insecurity, which had prompted the president of Kenya to declare the drought, a national disaster on tenth February, 2017. The two main rain seasons in Kenya are the March-May long rains and October-December short rains (KNBS, 2014:7).

The researcher observes that since independence, Kenya has had several national policies to address food security. Kenya's first attempt to address food security was through Sessional Paper No. 4 of 1981, which was later consolidated into *Sessional Paper No. 1 of 1986 on Economic Management for Renewed Growth* (KNBS, 2014:3). To address food security challenges under this policy, the government was to put up intervention measures of setting up grain prices and the state monopoly in distributing farm inputs to farmers (KNBS, 2014:3). Following the 1991-1994 drought, Kenya formulated a second National Food Policy (*Sessional Paper No. 2 of 1994*), which promoted a market-driven approach, but on a limited scope: *National Plan of Action on Nutrition of 1994* aimed at addressing nutrition problems in Kenya by involving various sectors (KNBS, 2014:3). Later on, to further address food security, Kenya developed the *Poverty Reduction Strategy for Wealth and Employment Creation, 2003-2007*; which was supported by the *Strategy for Revitalising Agriculture 2004-2014*, which further evolved into the *Agriculture Sector Development Strategy (2010-2020)*; and whose mission was to create an innovative, commercially-oriented and modern agriculture sector to ensure a food-secure and prosperous nation (KNBS, 2014:3).

The current constitution (*the Kenya Constitution 2010*) illustrates the move by the Government of Kenya (GOK) towards the achievement of food security on the government through its provision of the right to food (Republic of Kenya, 2010 in KNBS, 2014:4). In 2011, Kenya developed the *Food and Nutrition Security Policy* (FNSP) with the aim of adding value, building synergies and guiding the implementation of food security programmes. The FNSP is framed in the context of the Kenyan constitution providing for basic human rights, children rights and women's rights including universal right to food (Republic of Kenya, 2011 in KNBS, 2014:4). Out of these moves, the researcher observes the importance of these policy documents including FNSP in addressing national food security. She is however aware of many gaps to implementing such policies by the government of Kenya. Not many of these policy document objectives have been implemented and/or achieved. For instance, despite indication by the *Famine and Early warning Systems 2013* established under the partnership between the GOK and World Food Programme (WFP), on the outlook of food security in Kenya from October 2012 to March 2013, which revealed that the population in need of humanitarian assistance declined from 2.2 million in February 2012 to 2.1 million in September 2012.; there was also a decline in the national food stock. The total maize output (the main staple in Kenya) was likely to be below average. The national maize output from the long rains was expected to be 16% below the five year average (KNBS, 2014:8-9).

2.3.3 Household food security

USAID defines food security as, “when all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life.” (Bilinsky & Swindale, 2010:1). As mentioned earlier, the phrase “all people” includes households as well, thus household food security is captured in the definition. Furthermore, the concept of household security is widely applied according to literature. It is even applicable for programme interventions as exemplified by Pinstrup-Andersen (2009:6) that, the concept of food security has been extensively used at household level as a measure of welfare and attempts have been made to make the concept operationally useful in the design, implementation and evaluation of programmes, projects, and policies. This research investigated household food security among the FHHs for academic purposes; but its practice guidelines and recommendations may be adopted for policy programme designs, implementations, and evaluations of food security. A household is considered food secure if it has the ability to acquire the food needed by its members (Pinstrup-Andersen, 2009:6).

Pinstrup-Andersen (2009:6) discerns that there are two reasons why household food security may not assure food security for all its members: First, the ability to acquire enough food may not be converted into actual food acquisition, because household preferences may not prioritise food acquisition over the acquisition of other goods and services (such as school fees and housing); and secondly, the intra-household allocation of the food may not be based on the needs of each individual member (Pinstrup-Andersen, 2009:6). To control for the first limitation, this study objectively investigated actual food consumption through HDDS and FCS to test actual food utilisation. Moreover, the second limitation should be controlled by a future research on individual food security investigation. There are 3 major indicators or pillars of food security at any level, including household level. However, the fourth indicator, food stability is also gaining ground.

2.3.4 Universal pillars of food security

The FAO food security definition is comprised of four interrelated pillars or metrics which are food availability, access, utilisation, and the stability of food over time (Jones et al., 2013:484; Qureshi et al., 2015:394; Vaitla, et al., 2015:1, 48-49; WFP, 2012:7). USAID describes food security as having three components - availability, access, and utilisation (Bilinsky & Swindale, 2010:1). Food availability refers to ensuring adequacy of food supplies in terms of quantity, quality and variety of food (Vaitla et al., 2015:4). Household food access is defined as the ability to acquire sufficient quality and quantity of food to meet all

household members' nutritional requirements for productive lives (Bilinsky & Swindale, 2010:1). Food access is achieved by optimising stability in the affordability and allocation of food, as well as the preferences of individuals and households (Vaitla et al., 2015:4). Utilisation, in the context of food security, refers to the individual's biological capacity to make use of food for a productive life (Bilinsky & Swindale, 2010:1). This is applicable even among individual household members including of those households headed by females. Food utilisation is done well by ensuring food ingested is safe and is sufficient to meet physiological requirements of the individual whose elements include food safety, nutritional values, access to healthcare, sanitation and education; and food stability denotes the ability to consistently obtain food over time (Qureshi et al., 2015:394). Food security indicators often measure attributes of one or more of the food security pillars (Vaitla et al., 2015:4), which follow:

2.3.4.1 Food availability

At a country level, food availability can be established from food balance sheets. Food balance sheet data are supply side data, since they measure the total quantity of calories available to a population in the form of foodstuffs produced or imported into a country (Jones et al., 2013:483). The *Kenya National Food and Nutritional Policy 2011* (FNSP 2011) translates Kenya's food availability in terms cereal supply (KNBS, 2014:7).

To boost a country's food availability, FAO (2012) emphasises the importance of rural infrastructure for agricultural intensification and food supply; notably transport, energy, irrigation and market infrastructure (Qureshi et al., 2015:397). The researcher of this study notes the critical role transport, energy, and irrigation play in ensuring food supply. Transport eases transportation or movement of food commodities to the markets, energy assists in production of finished food commodities such as packaged food, while irrigation boosts food supply through agricultural production in the contemporary world, which is grappling with challenges of climate change.

Food availability also refers to the availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports, including food aid, (Bilinsky & Swindale, 2010:1; FAO, 2006:1) are consistently available to the individuals, or are within reasonable proximity to them, or are within their reach (Bilinsky & Swindale, 2010:1). Availability concentrates on supply-side issues like production and marketing of food (Vaitla et al., 2015:48). The researcher of this study is of the opinion that, own food production is the most sustainable way of ensuring food availability particularly among rural households, including the FHHs. The researcher however agrees with FAO (2006:1) that, having enough

food in the market does not (always) guarantee food security. This is because market supply of food is only relevant to households if they can afford to purchase the food commodities available in the market; hence, the researcher is of the opinion that there is need to regulate food prices, so as to ensure affordability. The good news however, is that there are benefits associated with having enough food supplies in the markets, particularly for households with other sources of income (apart from farming). A study carried out in Kenya by Kirimi et al. (2013), as illustrated by Qureshi et al. (2015:398) that, household commercialisation helped to reduce the risk of being chronically food poor and aided transition out of food poverty. This therefore, emphasises the need for availability of income in accessing the food in the market.

Moreover, Aiga and Dhur (2006:36) also emphasise that, food availability means that sufficient quantities of food are available on a consistent basis. The FNSP says, it is the physical existence of food; and should encompass availability of adequate quantities of a diversity of food commodities, such as cereals, fruits, vegetables and animal products (Republic of Kenya, 2011:11). The FNSP further reports that per capita food availability in Kenya has declined by more than 10% over the last three decades. It further indicates that most Kenyans subsist on diets based on staple crops (mainly maize whose per capita consumption has increased by 3% per annum), and lack nutritional diversity (Republic of Kenya, 2011:11). The researcher is of the opinion that, FHHs food should be present all the time and be of sufficient quantity and good quality. However, the stability of the availability among the FHHs in rural areas is not very consistent because they subsist on the staples, which most of the time are energy-dense foods that may fail to offer sufficient dietary benefits. This is due to poverty prevalence among rural populations. They may not be financially empowered to afford purchasing a variety of food items.

2.3.4.2 Food access

Food access implies having sufficient resources to obtain appropriate foods for a nutritious diet (Republic of Kenya, 2011:11), which is dependent on the level of resources such as capital, labour, knowledge and food prices (Republic of Kenya, 2011:11). The rise in prices of the world staple foods (wheat, rice and corn) is one constraint to food access. The World Bank's food price index rose by 15% between October 2010 and January 2011. International wheat and maize prices soared by 18% and 12% respectively between January and April 2014 (World Bank, 2014a:1). Such inflations constrain food access especially among the poor. In Kenya, high poverty levels have affected access to food, since most Kenyans rely on markets for most or all of their food needs (Republic of Kenya, 2011:11). Family food distribution and education among women determine the levels of

poverty and food insecurity in a country (Olielo, 2013:4). It is estimated that at any one time about 2 million people in Kenya require assistance to access food (Republic of Kenya, 2011:1).

As mentioned in chapter 1, this study captured the access domain of food security by including questions on sources of food among the FHHs in the Voi Division. Some of the sources of household food are purchasing from markets; own food production, getting food as gifts and food as payments (Mjonono, Ngidi, & Hendriks, 2009:5), and food aid (Wahlberg, 2014:3) which indicate food access. The researcher construes that, rural household food access is mostly through own food production. Moreover, FHHs in rural areas cannot easily purchase food due to lack of money and therefore may rely on own production which can be hampered by low harvests as a result of droughts in ASALs. But similarly, urban households may also practice farming as a mechanism of food access. Urban agriculture is pointed out as a strategy of managing food shortages among urban dwellers, with the food produced being used for personal consumption providing a degree of food security and dietary diversity for many of the urban poor (Chagomoka et al., 2016:2).

FAO (2006:1) describes food access as the access by individuals (or households) to adequate resources (also called entitlements) for acquiring appropriate foods for a nutritious diet. Bilinsky and Swindale focus on exchange-side of food access and offer the following description. Food access refers to individuals or households having adequate incomes or other resources to purchase or barter to obtain levels of appropriate food needed to maintain consumption of an adequate diet/nutrition level (Bilinsky & Swindale, 2010:1). Food access focuses on demand-side socio-economic and political factors that determine whether households can obtain food (Vaitla et al., 2015:48). Demand-side in food access is important in ensuring economic growth of a country. Qureshi et al. (2015:396), observe that income growth of a country drives much of the expansion in food demand. For example, there is strong evidence that rapid economic growth and high income is transforming food demand in India and China (Gandhi & Zhou, 2014 in Qureshi et al., 2015:396). Despite their huge populations, China and India have experienced high economic growth rates of 7 to 12 % in the last two decades; which has led to major changes in the levels and patterns of their food consumption and food buying behaviour (Gandhi & Zhou, 2014 in Qureshi et al., 2015:396). Food demand, particularly of specific commodities, is also determined by local production. This is supported by Qureshi et al. (2015:396) in their research, whose results revealed that rural consumption of rice was directly correlated with rice production in the same area of study (FAO, 2002 in Qureshi et al., 2015:396).

Bilinsky and Swindale (2010:1) postulate that food access depends on the ability of households to obtain food from their own production, stocks, purchases, gathering, or through food transfers from relatives, members of the community, the government or donors. The ability of households or individuals to access food either through purchase, or production, or transfers is determined by a number of factors, policies and interventions (Qureshi et al., 2015:394). The researcher of this study reasons that households (including the FHHs) would experience less strain in food access, if they are able to produce enough food of their own, without having to buy so much or depend so heavily on food assistance. Self-sufficiency may provide smallholder farmers with a degree of food security, especially, when farmers diversify their production to include high value crops or niche commodities and generate surpluses (Qureshi et al., 2015:396). Moreover, these farmers can further improve yields especially through value-addition. They are able to transition into 'enterprise' farming practices that can increase their income (Qureshi et al., 2015:396). Increased income accelerates their ability to accessing food, especially when household food stock is depleted. Practices such as mixed farming and mixed cropping help farmers diversify diets. Diversified production provides better risk management as well as a more stable source of income and food supply (Qureshi et al., 2015:396).

The question of how much access households have to available food supplies depends heavily on their income or assets or other entitlements (Anderson 2014 in FAO, 2006:1). The researcher of this study is of the opinion that household income plays critical role to household food security for farm families and/or non-farming households. Thus income including the ones earned from non-food activities, such as off-farm employment, influence a household's ability to access food. Concerning farm families, Qureshi et al. (2015:396), indicate that, employment in off-farm and cash crop activities provides farmers with an extra source of income and enables them to build resilience and reduce the risks of food shortage during periods of unexpected crop failures or between seasons when food supply is short. The researcher of this study is aware that non-farming households depend mostly on income for their ability to access food. Holden et al. (2004), in Qureshi et al. (2015:396), found that increased access to non-farm sources of income is likely to be good for household welfare, including food security. The researcher of this study is of further cognizance that households may put on sale non-food resources or barter them for food, in instances of severe food shortages, and loss of monetary income.

Besides own production, income, and non-monetary resources (entitlements), food acquisition behaviours are necessary in ensuring proper access to food by households, including the FHHs. Bilinsky & Swindale (2010:1) observe that households' access to food

can further depend on the steps they must take to obtain those resources, particularly exchange of other goods and services. Following this assertion, the researcher of this study feels that households must practice sustainable agricultural production, have the ability to purchase or barter food. This view is supported by Jones et al. (2013:483), that food acquisition behaviour of households is important for translating physical and economic access to food into food security. The aspects of off-farm income and entitlements may not be accessible by or available to the most poor and the disenfranchised in the society.

The poor may lack “entitlements” to food under conditions of high food prices and low demand for wage labour, even if food supplies are sufficient (Jones et al., 2013:483). Given that the poor spend a large proportion of their household income on food and depend on their labour power as their primary asset, such conditions inhibit their access to available food (Jones et al., 2013:483). The researcher of this study, is therefore of the opinion that a balance or a stability between demand and supply is necessary to maintain household food security all the time. To be food secure, a population, household or individual must have access to adequate food at all times; that they should not risk losing access to food as a consequence of sudden shocks (for example economic or climatic crisis) or cyclical events (for example of seasonal food insecurity) (FAO, 2006:1).

2.3.4.3 Food utilisation

Food utilisation refers to appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation, for sufficient energy and nutrient intake (FAO, 2008:1). FAO classifies food utilisation into two distinct dimensions, which are anthropometric indicators affected by under-nutrition among children under five years of age (FAO, 2013:21), used as the programming foundation and criterion for food aid interventions (Aiga & Dhur, 2006:36); and the number of determinants that reflect food quality and preparations, health and hygiene conditions, determining how effectively available food can be utilised (FAO, 2013:21). This study adopted the second dimension; whereby the indicators of food utilisation were: household dietary diversity and food consumption frequency, as proxy indicators of food security according to the *World Food Programme, 2006* (Aiga & Dhur, 2006:36; Devereux, 2006:296).

Dietary diversity is the number of individual foods or food groups consumed over a fixed period of time which is reflective of adequate nutrient intake and also encompasses nutrient adequacy (Aiga & Dhur, 2006:37). Dietary diversity is a proxy indicator of food security as a result of utilisation. Dietary diversity can be achieved through a range of interventions, including consuming greater quantities and varieties of vegetables, fruits and animal-

sourced food, fortification, bio-fortification, nutrition education and behavioural change (Qureshi et al., 2015:397). In this study, dietary diversity was established by the use of 24-hour recall. The dietary diversity is determined by calculating the number of different food groups, rather than calculating different individual foods consumed (Aiga & Dhur, 2006:37). This is because food groups offer diversity in micro and macronutrients. There are 12 food groups proposed by FAO, WHO, and FNSP in calculating HDDS. The food groups are: cereals, roots and tubers, vegetables, fruits, meat-poultry-and-offal, eggs, fish and sea food, pulses-legumes-and-nuts, milk and milk products, oil/fats, sugar and honey, miscellaneous (Agriculture and Consumer Protection, 2010:6,7). Basing her argument on the literature review, the researcher is of the opinion that, an ideal proper HDDS is the one that members of a household are able to consume different foods in a food group, and across a variety of food groups.

Household food consumption score (in this study, acronymed FCS) is a frequency-weighted HDDS (IFPRI, 2008:3). The recall period of the FCS exceeds 24 hours, and in this study, it is a 7-day recall. It is calculated using the frequency of consumption of eight different food groups. These food groups are demonstrated by Vaitla, Coates and Maxwell (2015:49) as: main staples (grains and tubers); pulses; vegetables; fruits; meat, fish, and eggs; (milk and) dairy products; sugar and honey; oils, fat, and butter. The following illustration by IFPRI (2008:3) describes food security measurement by the use of the 7-day food frequency sheet:

The FCS is measured using a standardised tool, which is a seven day food data inventory by initially classifying food items into food groups; then calculate the consumption frequencies of food items within the same group; followed by multiplying the value obtained for each food group by its weight. The food groups are assigned the following weights as shown in the brackets: main staples (2), pulses (3), vegetables (1), fruit (1), meat/fish/eggs (4), milk (4), sugar (0.5), and fat/oil (0.5). Thereafter, the weighted food group scores are added up; and finally the variable HFCS is recoded from a continuous variable into a categorical variable for the food consumption groups, using appropriate thresholds: 0-21 as food poor, 21.5-35 as borderline, and >35 as acceptable.

A similar illustration is shown by FANTA (2015) in Vaitla et al. (2015:7-8) that, the FCS is a composite score based on the number of food groups, out of 8 possible food groups, that any household member has consumed over the previous 7 days; multiplied by the number of days that the food group was consumed; weighted by the nutritional importance of the food group; for a total possible score ranging from 0 to 112 (Vaitla et al., 2015:7).

Food utilisation is conceived by the researcher of this study to imply food usage or consumption. This perspective is advanced by Bilinsky and Swindale (2010:1) that food utilisation means that food is properly used, properly processed and proper storage

techniques are employed, adequate knowledge of nutrition and child care techniques exist and is applied, and adequate health and sanitation services exist. Food utilisation focuses on the decisions households make in distributing and preparing their obtained food, as well as on the ability of individuals to absorb and retain nutrients (Vaitla et al., 2015:48). Furthermore, proper food utilisation is achieved through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being, where all physiological needs are met (FAO, 2006:1). This domain of food security also encompasses the allocation of food within households (the amounts and kinds of foods consumed by individual household members), the nutritional quality of that food, and the bioavailability of nutrients in those foods (Jones et al., 2013:499). The researcher corroborates that measuring food utilisation is essential to understanding the distribution of food within households and measuring nutritional diversity among household members. Food distribution may not be equal among all household members. This is because even in households with adequate food supplies, allocation of those supplies to individual household members may be unequal and result in nutritional deficiencies (Jones et al., 2013:499). To counter this limitation, this study utilised, besides a seven day food frequency, a 24-hour recall sheet of food consumption of each member of the FHHs, so as to determine whether every member in the household had proper food utilisation.

Specifically, “utilisation” became considered as a third component, or domain of food security, in recognition that physical and economic access to food and food acquisition are necessary, but insufficient for ensuring food security within households (Jones et al., 2013:483). Jones et al. (2013:483), marks the importance of utilisation as reflecting differences in the allocation of food within households, the nutritional quality of that food, and variation in the extent to which the nutrients in food are able to be absorbed and metabolised by individuals within households (because of differences in health status or the bioavailability of micronutrients) (Jones et al., 2013:483). This notion is advanced that delegates at the 1996 WFP adopted a further revised definition of food security that clearly highlighted the importance of diet quality as well as individual, and not just household dietary needs (Jones et al., 2013:483).

The researcher is of the perspective that the work of food stability domain is that of maintaining homeostasis among food availability, access and utilisation to meet acceptable food security status.

2.3.5 Food insecurity

Chen and Kalichman (2014:397) define food insecurity as “limited or uncertain availability of nutritionally adequate and safe foods, or limited ability to acquire acceptable foods in socially acceptable ways”. Food insecurity is a situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life; which may be caused by unavailability of food, insufficient purchasing power, inappropriate distribution or inadequate use of food at the household level. It is the opposite of food security, especially as defined by the WFS. Jones et al. (2013:482), supports this assertion by stating that from the definition by WFS, food insecurity is the absence of one or more of the conditions stipulated in the definition. Food insecurity may be classified as chronic, seasonal, or transitory (FAO, IFAD & WFP, 2015; Jones et al., 2013:282); with seasonal food insecurity falling between the two types (Jones et al., 2013:482). Vaitla et al. (2015:1) corroborate the first two in the acute food insecurity phase classification (IPC) situation but refer “seasonal” as acute. Jones et al. (2013:482), say that the time frames for chronic and transitory food insecurity classifications have not been made explicit. The researcher of this study however explored literature that tries to explain them.

Chronic food insecurity is a long term situation which may be prevalent among populations of arid lands, especially those experiencing frequent displacements due to conflicts (Qureshi et al., 2015:395). The researcher is of the premonition that such experiences are common in the Northern Frontier of Kenya, where cattle rustling has predisposed people to almost “full-time plight and flight”. The Voi Division is a semi-arid region. Out of personal experience, the researcher observes that seasonal food insecurity is an “ordinary” occurrence in semi-arid lands, especially those in Kenya. This is because sometimes rains may fail in one of the two rainy seasons in the country, hence exposing households into food insecurity in the season of the failed rains. The IPC’s acute food insecurity reference table for household group classification, and acute food insecurity reference table for area classification, embrace 5 phases of acute food insecurity: none/minimal, stressed, crisis, emergency, and catastrophe/famine (Vaitla et al., 2015:5). Transitory food insecurity is the shortest of the chronic and seasonal. Transitory food insecurity may be caused by a short-term shock, such as a burnt store-house full of grains; and the household affected ultimately will experience food shortage for a week or so, before it purchases new food stock (Qureshi et al., 2015:395). Lack of adequate food security is a global challenge that is influenced by myriad of factors.

Qureshi et al. (2015:395), are of the premonition that the state of global food security will be increasingly challenged as populations increase and food production is compromised by depleting natural resources (particularly land and water), climate change, pest and disease incursions and increasing energy costs (Baobab Magazine, 2012:6; Qureshi et al., 2015:395). The UN estimates that 1.5 billion people around the world are directly affected by land degradation, while every year 12 million hectares of land become unproductive through desertification (Baobab Magazine, 2012:6). Apart from Voi Town, the major livelihood in the rural Voi Division is subsistence farming and thus this research tried to investigate the effects of food production challenges among the rural population by the general inclusion of months of adequate or inadequate household food provisioning. This was to gauge food availability among female-headed households in the Voi Division.

2.3.6 Food insecurity versus nutritional insecurity

Food insecurity is the lack of food security. There are various classifications of food security by different authors. For instance, Qureshi et al. (2015:394), classify food insecurity into two: temporal (transitory) or long-term (chronic). Transitory food insecurity is a temporary decline in access of food, which can also be called hunger season; while chronic food insecurity is constant failure to access food (Qureshi et al., 2015:394). On agreement to the same, Jones et al. (2013:483), note that food insecurity varies across time, whether seasonally or as a result of irregular shocks such as weather events, deaths, or regional conflicts. The researcher of this study observes that this definition by Jones et al. distinguishes food insecurity as seasonal and transitory, leaving out chronic classification. In 1986, *the World Bank Report on Poverty and Hunger*, introduced the distinction between chronic food insecurity, associated with problems of continuing or structural poverty and low incomes, and transitory food insecurity, which involves periods of intensified pressure caused by natural disasters, economic collapse or conflict (FAO, 2006:1). The researcher of this study observes that even in this definition, one aspect has been left out – seasonality. She however notes that with other definitions, “seasonality” has been considered. For instance (FAO, 2016:9) observes that seasonal patterns of inadequate food availability and access are a major cause of undernutrition among poor rural communities. Conversely, FAO while referring to production of pigeon pea, a leguminous crop, in Tanzania, also states that higher production of pulses helps to diversify diets and provides extra protein during periods of seasonal food insecurity (FAO, 2016:52). These observations have led the researcher of this study to the conclusion that no fixed classification of food insecurity according to time factor, but contexts of food insecurity assessments such as aspects of vulnerability. Food insecurity is sometimes confused with nutritional insecurity.

Nutritional insecurity is sometimes used interchangeably with food insecurity, but the former is broader because, nutrition security considers care, health, and hygiene practices in addition to food security (Jones et al., 2013:484). The FAO defines nutrition security as a situation that exists when secure access to an appropriately nutritious diet is coupled with a sanitary environment, adequate health services and care, in order to ensure a healthy and active life for all household members (Jones et al., 2013:484). When there is deficiency of these situations in a household, then the household is said to have nutrition insecurity. Every household is supposed to be in a state of nutritional security. The reason for that is that sound nutrition is instrumental in achieving physical, cognitive, social and economic development (Qureshi et al., 2015:395). Additionally, several factors can lead to both food and nutrition security as literature reveals. Better home and community food processing, preservation and storage, and access to marketing facilities can contribute to household food and nutrition security by alleviating seasonal shortages in food supply and stabilising market prices (Qureshi et al., 2015:397). In order to determine whether a household is either food secure or food insecure, application of various food security measurement indicators is necessary.

2.3.7 Measuring food security

Three distinct variables are essential for the attainment of food security, as discussed earlier:

... food availability which is the sufficient quantities of appropriate, necessary types of food from domestic production, commercial imports or donors are consistently available to the individuals (including households) or are within the reasonable proximity to them or are within their reach; food access: individuals have adequate income or other resources to purchase or barter to obtain levels of appropriate food needed to maintain consumption of an adequate diet/nutrition level; and food utilisation: food is properly used, proper food processing and storage techniques are employed, adequate knowledge of nutrition and child care techniques exist and is applied, and adequate health and sanitation services exist (Coates, Swindale & Bilinsky, 2007:31).

There are several approaches of measuring food security as evidenced in research. In *Version 3 of Food and Nutrition Technical Assistance Project (FANTA) guide*, the household food insecurity access scale (HFIAS) has questions that have been refined to address the recommendations of the Nutrition and Consumer Protection Division, Food and Agriculture Organisation of the United Nations (FAO), which carried out HFIAS adaptation work in multiple countries under the EC/FAO Programme on Food Security to Information (Coates et al, (2007:i). The title of the guide is *Household Food Insecurity Access Scale for Measurement of Food Access: Indicator Guide, version 3*; which indicates that measuring food insecurity is challenging. It is observed in the guide that because it is a complex,

multidimensional concept, measuring food security has been an ongoing challenge to researchers and practitioners alike; until very recently, most household-level measures of food access, such as income and caloric adequacy, have been technically difficult, data-intensive, and costly to collect (Coates et al., 2007:1). Besides this, there are other challenges that interfere with proper measurement of food security. Vaitla et al. (2015:4), - also writing for FANTA observe that, there is no “clinical assessment” for food security at the household level, and to date there is no widely accepted “gold standard” measure of it. Vaitla et al. (2015:4), cite Heady and Ecker (2012), Carletto et al. (2013), Coates (2013), and Maxwell et al. (2013); and agrees that research shows that over the past 20 years, a variety of indicators have emerged that attempt to measure food security along a continuum and estimate its prevalence using thresholds that categorise households as food secure or food insecure; yet differing views remain about the best way to measure food security, which can result in divergent or even contradictory findings. This is because different indicators reflect different food security dimensions (Vaitla et al., 2015:4). The general consensus is that a single measure cannot adequately capture the complexity of the whole concept; and given this, it is common practice to identify and apply a “suite” of indicators that capture the different dimensions of food security (Cafiero, 2012 in Vaitla et al., 2015:4; FAO/WFP/International Fund for Agricultural Development (IFAD), 2013 in Vaitla et al., 2015:4; Coates 2013 in Vaitla et al., 2015:4). Nevertheless, the researcher of this study suggests that further intensive research should continue to improve the tools to create the balance of outcomes between multiple indicators, and make them more relevant in the measurements. To this end, over the past several years, FANTA has supported a series of research initiatives to explore and test different options for meeting this need (Coates et al., 2007:1).

From such research, FANTA has come up with a document or a guide for implementing one such option, the HFIAS. The HFIAS grew out of a decade-long initiative of scale development and validation testing sponsored by FANTA (Swindale & Bilinsky 2006 in Vaitla et al., 2015:9); and the first phase involved multi-year validation studies in Bangladesh and Burkina Faso (Frongillo & Nanama, 2003 in Vaitla et al., 2015:9). Recent field validation studies of this approach (HFIAS), to measuring food insecurity (access) more directly, by constructing measures based on households’ experience of the problem, have demonstrated the feasibility and usefulness of the approach in very different, developing country contexts (Webb et al., 2002 in Coates et al., 2007:1-2; Coates et al., 2003 in Coates et al., 2007:1-2; Frongillo & Nanama, 2003 in Coates et al., 2007:1-2). The measures constructed were strongly correlated with common indicators of poverty and food consumption as well as with indicators currently used by private voluntary organisations to

monitor their food security-related activities. The HFIAS questions were also sensitive to changes in the households' situation over time, making them valid and useful for assessing programme impact. There are other studies where United States' Household Food Security Survey Module (US HFSSM) questions have been translated, with some adaptation, to developing country settings and found to be correlated with poverty and food consumption indicators (Melgar-Quinonez, 2004 in Coates et al., 2007:2; Perez-Escamilla et al., 2004 in Coates et al., 2007:2). This gives it validity across cultural contexts. Due to this knowledge, the researcher of this study observes the advantages of HFIAS, that besides being relevant for programmatic interventions, it can also be applied in academic research, and can be usable depending on contexts of food security situation. For instance, the *Socio-Economic and Food Security* (SEFSec) survey, which is a tool used annually in Palestine, as indicated in WFP (2012:2).

The WFP (2012) in WFP (2012:2) indicates the use of food security inquiry, based on Palestine food security context, which is SEFSec survey, a joint effort between the Palestinian Central Bureau of Statistics (PCBS) and the United Nations through the FAO, the *United Nations Relief and Works Agency for Palestine Refugees in the Near East* (UNRWA) and the WFP (WFP, 2012:2). It is an annual survey which assesses the socio-economic and food security situation (WFP, 2012:2) in Palestine. The SEFSec methodology combines income, consumption, and a set of seven vulnerability variables (including trends in food and non-food expenditures) to classify households across four categories: food insecure, vulnerable to food insecurity, marginally food secure and food secure (WFP, 2012:7). The methodology was first developed in 2007, and has been field-tested, reviewed and endorsed in 2009, as a standard food security assessment approach by the different stakeholders in Palestine (WFP, 2012:7), and has been on use ever since. Another example is the adaptation of the HFIAS approach, which is widely used to estimate the prevalence of food insecurity in the United States (US) annually (Coates et al., 2007:1).

The HFIAS method is based on the idea that the experience of food insecurity (access) causes predictable reactions and responses that can be captured and quantified through a survey and summarised in a scale (Coates et al., 2007:1). The guide additionally offers guidelines on how to construct questions that measure food insecurity using the dimension or the pillar, access to food. The guidelines are informed by questions from a qualitative research with low-income households in the US which provided insight into the following ways that households experience food insecurity (access): feelings of uncertainty or anxiety over food (situation, resources, or supply); perceptions that food is of insufficient quantity (for adults and children); perceptions that food is of insufficient quality (includes aspects of

dietary diversity, nutritional adequacy, preference); reported reductions of food intake (for adults and children); reported consequences of reduced food intake (for adults and children); and feelings of shame for resorting to socially unacceptable means to obtain food resources (Coates et al., 2007:1). The eighteen-question US HFSSM, asks respondents to describe behaviours and attitudes that relate to these various aspects (Coates et al., 2007:1). FANTA uses those data to monitor food assistance programmes and to report on national prevalence of household food insecurity in the US context (Coates et al., 2007:1). However, the FANTA also applies the questions in other countries or areas of interventions. Vaitla et al. (2015:9), support that the HFIAS has been widely adopted to assess the impacts of projects seeking to improve food security. To complement research, the researcher of this study further discerns that despite these challenges, some of the prevailing measurement tools should be triangulated in determining levels of food security across sectors.

An example of a triangulated method is one FANTA developed in Somalia and used - the Integrated Food Security Phase Classification (IPC), which was a set of tools and procedures for classifying the severity of chronic and acute food insecurity across geographic areas and time, using a convergence of available data and information (Vaitla et al., 2015:iii). One important component of the acute IPC is the *Acute Food Insecurity Reference Table* for Household Group Classification (household reference table); which provides qualitative, graduated descriptions of five acute food insecurity phases (Vaitla et al., 2015:iii). The phases are: none, stressed, crisis, emergency, and catastrophe. The researcher of this study hitherto realises that the IPC approach has been used in Kenya also. Literature demonstrates the utilisation of IPC in Kenya, more specifically for the baseline survey on food security, for the status report on *the Kenya National Food Security (2014)*. The salient finding from the survey was that the majority of food insecure households in Kenya were in the stress phase, which is the second phase of IPC; while about 10% of the food insecure population was categorised as in the crisis phase, the third IPC phase (KNBS, 2014:8).

The first phase, “none” implies that “no food insecurity” exists, thus a household is deemed food secure. Vaitla et al. (2015: viii), describe this phase by showing that a household group is able to meet essential food and non-food needs without engaging in atypical, unsustainable strategies to access food and income.

The second phase - stressed, is observable if, even with any humanitarian assistance, household has minimally adequate food consumption, but is unable to afford some essential non-food expenditures without engaging in irreversible coping strategies; then crisis means, even with any humanitarian assistance,

household group has food consumption gaps with high or above usual acute malnutrition or household group is marginally able to meet minimum food needs only, with accelerated depletion of livelihood assets that will lead to food consumption gaps; emergency is when, even with any humanitarian assistance, household has large food consumption gaps, resulting in very high acute malnutrition and excess mortality or household group has extreme loss of livelihood assets, which will lead to large food consumption gaps in the short term; and catastrophe phase, means even with any humanitarian assistance, household has an extreme lack of food and/or other basic needs even with full employment of coping strategies - starvation, death, and destitution are evident (Vaitla et al., 2015:iii).

Such food security phases and others can be determined when a research utilises different indicators of food security in the inquiry. Several indicators are used in establishing which phases a household would fall in, in terms of food security.

The following, illustrated below, are the indicators for these phases as provided by FANTA and demonstrated in (Vaitla et al., 2015:vii); and are thus: “none” is a phase of good food security, thus its indicators are, when a household’s hunger score (HHS) is zero, coping strategy index (CSI) is stable, no recent deterioration of household dietary diversity (HDDS) and the household consumes equal or more than four food groups, and the food frequency of consumption score (FCS) is stable and acceptable. Stressed phase is characterised by: HHS score of one, unstable CSI, recent deterioration of HDDS by loss of one food group, and acceptable consumption but deteriorating FCS. For the crisis phase, HHS is 2 to 3, the use of coping strategies by a household is increasing, there is severe recent deterioration of HDDS with a loss of 2 food groups from usual, and the FCS is of borderline consumption. A household in the emergency phase is identified, if it displays the following features - has 4 to 6 HHS, the CSI has significantly increased, the household has less than 4 food groups in the HDDS, and the FCS is of poor consumption. Catastrophe is characterised by HHS of 6, CSI far from the normal reference, has a consumption of 1 to 2 food groups of the HDDS, and below poor consumption in the FCS.

Although this research was not majorly informed by the IPC, it has integrated HHS aspects in the composite coping strategies section, where the aspects of household hunger have been captured by items asking whether households had reduced the number of meals per day, skipped consumption the entire day, and reduced sizes of meals. FANTA supports that HHS questions which capture experiences that are the most universal (used across many contexts) in terms of interpretation, but also the most severe, are itemised thus: having no food of any kind in the household, going to sleep hungry because there was not enough food, and going a whole day and night without eating (Vaitla et al., 2015:9).

While it is clear that multiple indicators are required to capture a multifaceted phenomenon of food security, the application of the multiple indicators is necessary to capture a more holistic food security picture and different angles of approaches are required for that. Some authors propose the approach of aggregating indicators: combining measures of different elements of food security into a single scale - as the acute IPC does; while others advocate for maintaining indicator results in a disaggregated form, while presenting their measures through cross-tabulations or other mechanisms that enable a transparent examination of their relationships (Vaitla et al., 2015:18). In order to capture a wide picture of food security among the FHHs in the Voi Division, this study used the MAFP, HDDS, FCS, and CSI in their disaggregated forms, and thereafter triangulated the indicators through correlations and cross-tabulations to examine their relationships. Literature reveals several advantages of disaggregating the indicators.

While aggregating indicators (of food security) offers the benefit of streamlining communication about the food security, a more disaggregated approach recognises that the various dimensions of food security are not always well correlated, nor do they always vary in the same direction at a given time (Vaitla et al., 2015:18). Disaggregation (for example, single indicators used in combination with one another, as a “dashboard”), may provide a more useful set of diagnostic insights and can better assess which aspects of food insecurity change, when, and for whom; and it also preserves the integrity of the indicators applied, many of which may have undergone validation processes that informed their construction (Vaitla et al., 2015:18). This study considered the disaggregating tools to enrich it by reaping from these mentioned benefits. The disaggregated sections of this study were the major part of the study. However, the indicator CSI was not an absolute disaggregate. This is because the coping strategies was an aggregate of different indicators of coping mechanisms that households employ when faced with food access hardships. The aggregated indicators of the coping mechanisms were: specific CSI, reduced coping strategies index (rCSI), HFIAS and HHS. The earlier mentioned disaggregating the indicators of food security can be used to classify households into levels of food security.

Based on the HDDS, the levels are food secure/mildly food insecure, moderately food insecure, and severely food insecure, with the cut-off values of 6 to 12, 4 to 5, and 0 to 3 food groups respectively. Based on FCS the levels are acceptable which is equivalent to food secure/mildly food insecure with a cut-off of 35.5 -112, borderline, which is equivalent to moderately food insecure with a cut-off value 21.5-35, and poor equivalent of severely food insecure with a cut-off of 6-12. For the CSI, the levels are similar with the HDDS but cut-offs are 0-4, 5-10, and 11-63 respectively (Vaitla et al., 2015:25). These are the latest

classifications of food security by FANTA. Since the creation of the survey for this study was highly informed by the FANTA, most of the findings from data analysis adopted the classifications. However, the researcher classified households into quartiles of CSI.

2.3.8 Factors affecting food security

The researcher of this study explores common, but not exclusive factors that influence food security: public policies, demand, access, market, supply, production, education and knowledge, economic factors and infrastructure development.

2.3.8.1 Public policies

Current estimates and future projections of food security are important drivers of governmental policy (Jones et al., 2013:481). Public policies are essential for food security because, they can provide resources needed for producing, storing and distributing food along the value chain; can deliver institutions and regulations required to underpin equitable and safe food systems (Qureshi et al., 2015:394). The researcher of this study is of the opinion that public policies should be flexible enough to accommodate everyone's food needs and requirements. Public policies providing for sustainable food production, whether by state, communities or households, those allowing for fair marketisation of food commodities, and allowing consumers a fair access to food can be ensured by establishing food security institutions.

Foreign exchange policies, affect the prices of imported and exported goods, which in turn affects both the volume and the structure of household food demand (Qureshi et al., 2015:397). Restrictions on import and export of food can affect food price and its accessibility (Qureshi et al., 2015:397). For instance, in the 2008 food price spike, governments of some food exporting countries (including Argentina, India, Ukraine and Serbia) were concerned about the security of food supplies for their domestic consumers, and imposed restrictions on food export (Tangermann 2011 in Qureshi et al., 2015:397). On the other hand, many food-importing countries reduced their import restrictions and a few even subsidised imports of their staple food (Qureshi et al., 2015:397). Both sets of actions have added to the international food price spikes (Qureshi et al., 2015:397). Foreign exchange policies also affect food supply to the market.

Laws and regulations governing the different aspects of value chain development and trade agreements and institutions directly impact market opportunity and productivity (GHI, 2013 in Qureshi et al., 2015:397-398). For instance, in Kenya, traders in Busia County have called for the suspension of a ban on importation of chicken and poultry products from

Uganda; whereby the government of Kenya, in mid-January 2017, had imposed a ban on the products from Uganda following an outbreak of bird flu there (Pessa, 2017:12). The Busia traders, led by Egg Suppliers Union representative, said the ban will push hundreds of traders in the county out of business (Pessa, 2017:12). "We have visited different market centres in the country facing scarcity of eggs including Kitale, Moi's Bridge, Wangige and Thika, and all our customers are complaining" he said (Pessa, 2017:12).

Through policy, global food markets can offer some local food producers access to larger markets, as well as to capital for investment (Qureshi et al., 2015:397-398). A good illustration for this is China that has formulated policies to regulate imports and exports. Lagi, Bar-Yam, Bertrand and Bar-Yam (2015:121), observe that import and export policies in China have isolated the Chinese domestic grain market and domestic prices of feed grains do not track global prices, which has affected global markets because of reduction of net export. The researcher of this study is of the opinion that smallholder households, particularly the female-headed can access larger markets beyond their locality, if a country has put in place policies that empower them market their products along the value chain.

Policies for food demand in terms of entitlements represent the capacity to access food (Qureshi et al., 2015:395). Food subsidies at country level can affect food demand. For example, corn ethanol consumed a remarkable 40% of US corn crops in 2011, promoted by US government subsidies based upon the objective of energy independence and advocacy by industry groups (Lagi et al., 2015:121). The researcher of this study deduces that, food subsidies help off-set the inability or less power in food purchases, and if used as a policy can have large-scale benefits. Subsidising food prices was a commonly used policy intervention, when countries faced high food prices during the food price spike of 2006-08 (Qureshi et al., 2015:397). Furthermore, Qureshi et al. (2015:394), also support that policy approaches targeted at supply, demand and access affect food and nutrition security (Qureshi et al., 2015:393).

Public policy is also crucial to ensure the provision of public goods, such as ecosystem services or technology to facilitate changes in farming practices and to ensure a sustainable farming sector that meets societal demands (Qureshi et al., 2015:394). The researcher of this study is of the viewpoint that public policies geared towards boosting food chain infrastructure eases their marketisation. For example, policies with provisions for tarmacking of rural-access roads promote easy movement of food commodities and services across geographical settings. The *Article 43(b) (d) of the Kenya Constitution 2010* entitles everyone to access to reasonable standards of sanitation and clean safe water in adequate quantities (WSP, 2015:5). Besides the benefits of access to safe clean water for

improved nutrition, when family farms especially in ASALs are put under irrigation, crops would grow into maturity without having to wither beforehand (WSP, 2015:5). Due to climate change, water sources are drying up (WSP, 2015:5). The researcher of this current study observes crop failures in ASALs due to erratic rains; but also sees the need to make use of not-so-enough rains when they fall. She therefore feels the government and other development stakeholders should come up with ways of tapping rain water for kitchen gardening and also mechanisms of tapping water run-offs during rainy seasons. This could be done through facilitation by county governments. The Constitution of Kenya 2010 has made water supply a devolved function; therefore Kenya's counties are responsible for water supply and sanitation services (WSP, 2015:5).

Public education policies are essential for educating households on nutritional requirements, sanitation practices and food safety (Qureshi et al., 2015:394). The researcher of this study is of the opinion that the policies on nutritional education are very critical to female-headed households in promoting quality diet intakes, food handling hygiene and sanitation. Policies promoting nutritional knowledge, particularly to semi-literate and illiterate female household heads would empower them in improving their household diets. Qureshi et al. (2015:393), observes that consumer knowledge, health services and food safety are critical elements for food and nutritional security. FAO (2016:xiii) indicates that education policies are needed to mitigate many of the risks associated with diversification and migration. Sustainable education starts at formative stages of human's life. The researcher of this study is of the opinion that girl/boy child equity in accessing education should be a strict policy, not an option. The policies should be in line with the SDG4 objective of ensuring inclusive and equitable quality education and promote lifelong opportunities for all. It is for this that Economic Commission for Africa (2015:7) recommends that countries with educational disparities rectify the issue. Gender-based policies which empower both gender children at young age, assist in mitigating future gender-related challenges, including the power to access food. Therefore Free Primary Education Policy impacts life-long learning including on food and nutritional security.

Public policy is also needed to support communities to build resilience, or to bounce back following a negative shock (Qureshi et al., 2015:394). Governments can support household resilience through greater focus on agriculture and non-agriculture sector development that generates greater employment opportunities (Qureshi et al., 2015:396). Safety net policies, which are gaining popularity and directly improve purchasing entitlements and food security in stress conditions; for instance integrating safety net programs with agricultural development programs can be very effective, as exemplified by DFID programs in Ethiopia

(Qureshi et al., 2015:395). These policies are stipulated in global meetings. For example, the Intended Nationally Determined Contributions (INDCs), which formed the basis of the 2015 Paris Agreement on Climate Change, have become Nationally Determined Contributions (NDCs) to global climate objectives, through policies and actions (FAO, 2016:xv). The agriculture sectors feature prominently in the INDCs, with 94% of all countries including them in their mitigation and/or adaptation contributions (FAO, 2016:xv). Developing countries highlight the importance of agriculture and food security for adaptation; often, they also include the agriculture sectors as contributing to their mitigation targets (FAO, 2016:xv). Around one-third of all countries refer in their INDCs to the potential co-benefits between mitigation and adaptation in agriculture (FAO, 2016:xv). Other policies that assist communities build resilience against food insecurity are school feeding programmes. School feeding programs, when designed and implemented well, are good examples of policies that can deliver multiple outcomes (Qureshi et al., 2015:397). The researcher of this study is in support of this assertion and also of the opinion that school feeding programmes assist pupils cope better with household food insecurity especially during seasons of famine. Andae (2017:38) illustrates the role of the Government of Kenya in assisting pastoral communities build resilience to household food insecurity brought about by the current ravaging drought in the country, through insurance scheme policy:

The Kenya Livestock Insurance Programme (Klip) will pay pastoralists in six counties affected by drought a total of KSh.214 million to cover loss of their herds. Announcing the payout plan yesterday, Agriculture Cabinet Secretary said 12,000 pastoral households, mainly from arid and semi-arid areas, will benefit from the plan. The insurance programme, which was initiated by the government in 2015 in partnership with selected insurance firms, is aimed at averting losses that might occur as a result of lack of pasture in grazing fields.

Policy frameworks need to be drastically modified to align agricultural development, food security and nutrition, and climate stability objectives (FAO, 2016:xv) for sustainable food security. Policies that support sustained growth in food systems (from supply through to consumption) are critical drivers for inclusive economic development and for ensuring resilience (Qureshi et al., 2015:394).

Gender-based policies are critical drivers to household food security, particularly among FHHs. An illustration to gender policy is the Gender Inequality Index (GII) used to benchmark women's progress in several countries and used for development planning, advocacy and lobbying (UNDP, 2015:xvi). Gender Inequality Index of 2010 is used to present, measures the human development costs of gender inequality, whose index reflects gender differences in three dimensions: reproductive health, empowerment and labour market engagement (UNDP, 2015:28). The researcher of this study is of the opinion that

women, especially of the reproductive age, require good feeding in order to nurture their babies nutritiously. She further senses the need to improve women capacities to access food by facilitating their empowerment through trainings and capacity building, including in the ways of accessing off-farm employments. GII shows the loss in the three dimensions due to disparity between female and male achievements in the dimensions, and varies between 0, when women and men fare equally, to 1, when one sex fares as poorly as possible in all three dimensions in comparison to the other (UNDP, 2015:28). The researcher of this study is of the opinion that such index mainstreaming, when included in policy will help the most disadvantaged gender, even on food acquisition powers. Research in Africa, Asia and Latin America has found that improvements in household food security and nutrition are associated with women's empowerment, such as access to income and increased role in household decisions on expenditure, as women tend to spend a significantly higher proportion of their income than men on food for the family (Qureshi et al., 2015:935). Qureshi et al. (2015:935), are of the opinion that women's empowerment, through targeted agricultural interventions and safeguarding or strengthening the capacity of women to provide for the food security, health and nutrition of their families is the most effective pathway to food and nutrition security (World Bank, 2013 in Qureshi et al., 2015:935) and should be at the core of all efforts. Moreover, economic and social policies that respond better to the needs of men and women – including affirmative action strategies, the reform of customary laws that discriminate against women and girls, and more human and financial resources to enforce and carry out such laws, are crucial for meeting this goal (Economic Commission for Africa, 2015:7). There are other factors to boosting gender equality, which help in improving food security of a society and households. Gender-based enabling factors such as adequate access to credit and markets, action to eliminate legal, socio-cultural and mobility constraints on rural women, have been found to yield productivity improvements (FAO, 2016:xii-xiii).

The researcher is in agreement with Bridge (2014:5) assertion that, a gender-just food and nutrition security means a world without hunger, where women, men, girls and boys have equal access to nutritious, healthy food; and are not predetermined at birth but can be developed in line with person's capacities and aspirations. The researcher deciphers the need for international, regional and national (or even county governments, in the case of Kenya) legislators' obligation to formulate gender-equality policies which should cushion women against gender-based discriminations including food security. The FNSP report on Kenya indicates that, rural women in Kenya provide 75% of labour in smallholdings and directly manage 40% of smallholder farms, but they lack access to, and control of productive resources such as land and capital (Republic of Kenya, 2014:17). Discriminatory land

policies against women in the country predispose FHHs to food insecurity. Mutavi et al. (2013:209) further observes that over dependence on subsistence farming by females explains why their households are vulnerable to poverty and food insecurity. Among the main causes of FHHs in Africa are the chrono-systems of the FHHs. For example, male migration, the deaths of males in civil conflicts and wars, teenage childbearing and family disruption are the causes (IFAD, 2014:1-2). Greater vulnerabilities among the FHHs are posed by higher dependency ratio, having fewer assets and less access to resources; and tend to have a greater history of disruption (IFAD, 2014:2). The researcher is of the viewpoint that all situations of vulnerability are linked to poverty, which poses unique challenges to FHHs food security.

Besides, the WFS declarations, and the targets of the MDG1 of eradicating hunger and poverty, more efforts are needed to achieve total food security. For instance, one of IFPRI's *Global Food Policy Report of 2014* ambitious goals is ending hunger and undernutrition by 2025 (IFPRI, 2014:27). In the post MDG era (post-2015), it is of great essence to focus on the FHH food security as a strategy of achieving the post-2015 goal of eradicating poverty and hunger (UN, 2015:4). The researcher is aware of the SDG1 and SDG2 of poverty eradication and ending hunger/food insecurity respectively. This study was to investigate into the status of food security among FHHs in Kenya, focusing on Voi Division in Taita-Taveta County. The findings of the study will assist in formulating proper policies especially gender-based food security policies.

The researcher of this study is therefore of the opinion that policies should address factors that would contribute to sustainable household food security, especially among the FHHs. There is a need for political will in the design, relevant formulation and effective implementation of policies. UNDP (2015:16) corroborates that any human development perspective requires a political analysis of the forces that shape public policy. There are various advantages associated with sustainable food policies.

At the aggregate level, policies increase the global efficiency of food production, by allowing regional specialisation in the production of the locally most appropriate foods (Qureshi et al., 2015:398). The high-value coffee and cocoa value chains are good examples, where most of the global production of these ubiquitous commodities is in a small number of regions by aggregated small-holder farmers (Qureshi et al., 2015:398). A broad-based transformation of food and agriculture systems is needed, therefore, to ensure global food security, provide economic and social opportunities for all, protect the ecosystem services on which agriculture depends, and build resilience to climate change. Effective public policies are especially important to economies consisting of smallholder farmers, who face

increasingly volatile markets with price instability, climate change impacts and natural disasters (such as floods, droughts, diseases) and conflict (Qureshi et al., 2015:394). Price and income swings can significantly affect the poor (Qureshi et al., 2015:394). The researcher observes the need to adopt these systems in policy framework, including ways of combating climate change. Without adaptation to climate change, it will not be possible to achieve food security for all and eradicate hunger, malnutrition and poverty (FAO, 2016:xi). The researcher however notes that, governments should ensure that policies are clearly formulated for effective implementation, since, “a lack of clarity about which factors are responsible (for food insecurity) reinforces policy inaction” (Lagi et al., 2015:119). Failure to clearly formulate food policies may perpetuate household vulnerabilities to food insecurity.

Not all times policies work best for the benefit of farmers - which limits the capacities of farmers to produce abundantly. Often, adoption (of best practices) is hampered by policies that perpetuate unsustainable production practices rather than those that promote resource-use efficiency, soil conservation and the reduction in the intensity of agriculture’s own greenhouse gas emissions (FAO, 2016:xi).

2.3.8.2 Demand

Global food demand in 2050 is projected to increase by at least 60% above 2006 levels, driven by population and income growth, as well as rapid urbanisation (FAO, 2016:xi). The researcher of this study is of the perspective that, income promotes food accessibility by households through food purchase. Urbanisation has shifted food demand from cereal to animal products. This is because urban populations have better earnings than the rural whose main food is crop produce. Qureshi et al. (2015:393), observes that employment and incomes, food preferences determine food demand of a population. Shifting food preferences - as communities develop economically, and food price (Qureshi et al., 2015:394) also determine food demand. For example, food demand had slowed down in China and India, leading to the food price spike in 2008, which influenced the countries to remain net exporters (Lagi et al., 2015:121) of food commodities. This means, the countries’ domestic demand was too low; hence they had to ‘get rid’ of the food surpluses, by exporting to other countries. The global food spikes were associated with a major drought in Australia. However, besides the drought which was speculated to have influenced the high food prices, Lagi et al. (2015:120), indicate that the scenario of food exports by China and India also had led to accelerating the food prices, which ultimately contributed to worldwide civil unrest in the 2008. Further, such food price spikes lead to low purchasing power by poor populations (particularly female-headed households), thus exposing them to

more food insecurity vulnerability. The vulnerability is further exacerbated by the fact that the poorest households spend most of their income on food. Qureshi et al. (2015:396), support that the poorest households in low-income countries spend more than half of their income on food; and ultimately are more impacted by income and food price changes, than middle and high-income countries (Qureshi et al., 396). Large-scale lack of employment in Kenya, which translates to low income and exacerbates poverty among households, has pushed food demand to stagnate or even deteriorate. According to report by the Kenya Institute for Public Policy Research and Analysis (Kippra), about three in 10 Kenyans aged 15 to 64 are unemployed (Omondi, 2017b:6). Increasing demand for animal product food is an emerging phenomenon, especially among developing countries.

MCKune, Borresen, Young, Riley, Russo, Camara, Coleman & Ryan (2015:1) stipulate that demand for animal products continues to increase in developing nations and income growth drives much of the expansion in the food demand (Qureshi et al., 2015:396). Despite the illustration in the previous paragraph about the decline in the demand for overall food commodities, economic growth in China and India has increased demand for animal product food among households. There is strong evidence that rapid economic growth (and high income) is transforming food demand in China and India (Gandhi & Zhou 2014 in Qureshi et al., 2015:396; Lagi et al., 2015:121). The continued economic transformations in these countries are attributed to better income earning power among the countries' household heads. Despite their huge populations, comprising more than one-third of the world population (Lagi et al., 2015:121), the countries have experienced high economic growth rates of 7 to 12% in the last two decades (Qureshi et al., 2015:396). This has led to major changes in the levels and patterns of their food consumption and food buying behaviour (Gandhi and Zhou 2014 in Qureshi et al., 2015:396).

Qureshi et al. (2015:396), illustrate results of a study by Gandhi and Zhou (2014), which show that food demand is undergoing a huge transformation and will undergo further change in China and India. Consumers are rapidly increasing their consumption of animal products, vegetables and fruits, and reducing their consumption of cereals (Qureshi et al., 2015:396). Lagi et al. (2015:119), corroborate that there has been increasing demand for meat in these two countries. The Changes in diet might have a large impact (reduction) on the consumption of feed grains, because the ratio of animal feed to meat energy content has been estimated to be as high as 4:1, 17:1 and 50:1 for chicken, pork and beef respectively (Lagi et al., 2015:121). The researcher of this current study deduces the reason for the high meat and fruit consumption is that the populations of China and India have been improving their dietary diversity owing to their improving economies, which ultimately

culminate to their individual and household higher incomes. This further translates into shifts to more expensive food demand and access. This idea is accentuated by Gandhi and Zhou's results in Qureshi et al. (2015:396), which show high income elasticities of demand for many food products such as animal products, processed foods, and also eating-out-of-home in both rural and urban areas of China. In spite of the low overall food demand during the period preceding, 2008, literature shows that demand for grain is currently catching up.

Increasing demand for grain in China and India has been met by internal production (Lagi et al., 2015:121). It is estimated that China could guarantee more than 90% food self-sufficiency as long as the identified natural disasters occurred at no more than the historical average for the period 1986–2011. However, in a pessimistic scenario, consisting of the simultaneous occurrence of the worst natural disasters over this period, the consequent annual grain shortfall would put most provinces and cities into the medium or high risk range for food security in both 2015 and 2020 (Qi, Vitousek & Liu, 2015:621). The demand risk is caused by population growth and food consumption growth per capita (Qi et al., 2015:622). The researcher of this study deduces that natural disasters affect food production and hence food demand. Food demand is mainly influenced by accessibility of food commodities.

2.3.8.3 Access

The definition of the right to food enshrined in the 1966 International Covenant on Economic, Social and Cultural Rights is the right to have regular, permanent and unrestricted access, either directly or by means of financial purchases, to quantitatively and qualitatively adequate and sufficient food corresponding to the cultural traditions of the people to which the consumer belongs, and which ensure a physical and mental, individual and collective, fulfilling and dignified life, free of fear (Qureshi et al., 2015:393). The ability of individuals or households to access food either through purchase, transfers or production is determined by a number of factors, policies and interventions (Qureshi et al., 2015:396). Therefore, food access is optimising stability in the affordability and allocation of food, as well as the preferences of individuals and households (Qureshi et al., 2015:393). As stated in a previous section 2.3.4.2, also Anderson 2014 as quoted by Qureshi et al. (2015:396), indicate, the question of how much access households have to available food supplies depends heavily on their income or assets or other entitlements. The Economic Commission for Africa (2015:5) thus recommends for off-farm economies - Africa needs structural transformation involving a shift in both employment and output from its dominant agriculture-based economies, with acute dependence on natural resources to an economic

structure based on industrial development and modern services, with strong employment potential:

Income earned from activities that might be related to employment can enhance the capacity of the household to access to food (Qureshi et al., 2015:396). This view is further amplified by Holden et al. (2004), as quoted by Qureshi et al. (2015:396), that access to non-farm sources of income is likely to be good for household welfare, including food security. Employment in off-farm and cash crop activities (assets), provides farmers with an extra source of income and enables them to build resilience and reduce the risks of food shortage during periods of unexpected crop failures or between seasons when food supply is short (Qureshi et al., 2015:396).

Rural incomes are jeopardised by effects of climate change. FAO (2016:8) says that climate change limits access to food through negative impacts on rural incomes and livelihoods. Typically, livestock products are exchanged at a lower calorie per kilogram (kcal/kg) value than cereals, creating a favourable exchange for livestock holders who trade for grains (McKune et al., 2015:2). When harvests are poor, this advantage backfires as kilocalories per kilogramme (kcal/kg) values of grain rise significantly (McKune et al., 2015:2). With volatile climate, there is expected to be an increase in the intensity and frequency of climate-related natural disasters: poor people are more vulnerable to the impacts of such disasters (FAO, 2016:8). Severe droughts or floods can sharply reduce incomes and cause asset losses that erode future income earning capacity (FAO, 2016:8). The researcher of this study notes that the drought which occurred in 2017 was a “disaster” to incomes among ASALs inhabitants in Kenya – their choices concerning food security were very limited. They depended on emergency food relief from the GOK and voluntary organisations. *The Status Report on the Kenya National Food Security* illustrates increased cereal prices and reduced livestock prices (KNBS, 2014:10-12) during seasons of drought.

Access component to food security has resource aspect which may not be direct in monetary terms. FAO (2016:9) says access to adequate resources or entitlements is necessary for acquiring appropriate foods for a nutritious diet. Moreover, literature shows that accessibility to animal product food is more likely among livestock farmers or pastoralist, than crop agriculturalists. This is because livestock is their major assets as food source.

McKune et al. (2015:2), advance that livestock holders are more likely to consume meat and other nutrient significant animal products, such as milk and eggs, than non-livestock holders because of their increased proximity and access to animal-based nutrient rich foods. FAO estimates that livestock products provide roughly one fifth of total caloric intake and half of total protein consumed in developing countries (McKune et al., 2015:2). The researcher of this study is of the opinion that households which have proper access to

protein food are likely to experience less protein-based malnutrition, especially among children. She further indicates that when animal protein foods are accessible to households including female-headed ones, the household members' dietary diversity is advanced, thus the individuals in the households get a range of macro and micronutrients. In the cases of unfavourable conditions, such as drought, pastoralists become very vulnerable to household food insecurity.

Droughts deplete pasture and water especially in ASALs; which culminate into deterioration of livestock body mass, and the ultimate decrease in animal products outputs. To demonstrate the intensity of droughts, FAO (2016:1) illustrates a photo of mother and daughter preparing maize as the only ingredient for dinner for their household in Abba Geramso Area in Northern Kenya. The mother had no other food to complement with maize. The pastoralists of the area had lost almost 90% of livestock to drought. During environmental disaster (including drought), livestock holders can be more vulnerable to food insecurity than their agricultural counterparts because of limited economic access to food and unfavourable market exchange rates (Nori et al., 2005 in McKune et al., 2015:3). Droughts constrain food accessibility through averting food production and poor quality of the food.

Agriculture is the main source of livelihood for about two thirds of the Africa's population, and it contributes about one third of the Gross Domestic Product (GDP) and employs about 60% of the population (AfDB, 2013 in Economic Commission for Africa, 2015:5), and thus enhancing its performance is central to food security and sustainable poverty reduction (Economic Commission for Africa, 2015:5). The researcher of this study is of the premonition that self-food sustainability is better achieved through own crop production than through food aid. This is because food aid does not always provide for household food preferences and sometimes the food supplies may not be in concordance with society's culturally accepted foods. Probably, cash transfers may cater for food preferences but on a limited scale. Qureshi et al. (2015:396), say self-sufficiency may provide small-holder farmers with a degree of food security, however, when farmers diversify their production to include high value crops or niche commodities and generate surpluses; they are able to transition into 'enterprise' farming practices that can increase their income. When households are able to acquire extra food, their dietary diversity is improved. FAO (2016:xii) emphasises that food and agriculture must be central to global efforts ... through actions that address vulnerabilities and risks and promote agricultural systems that are resilient and sustainable. Proper functioning markets steer on household food security.

2.3.8.4 Market

Qureshi et al. (2015:393), observe that policies which influence consumer access to food depend on functional value chains, equitable market environments, infrastructure and stabilisation policies - and above all, creating enabling environments for business investment and engagement through incentives and regulations. Well-functioning global food markets can help increase incomes and improve food availability and affordability (Qureshi et al., 2015:397). For example, in China and India, improved incomes among the countries' populations contributed to increase in demand and the ultimate improved consumption of animal products. This is because increased incomes enhance food purchasing power, thus making access to dietary diversity of the most preferred food easier. As well, well-functioning markets can help both producers, as well as consumers improve household food security (Qureshi et al., 2015:397), especially through supply and demand. The availability of well-functioning markets offers food producers a platform to sell their produce and consumers access food in the markets. Global trade is necessary to balance supply and demand across regions (Godfray et al., 2010 in Qureshi et al., 2015:398).

With agricultural value chains becoming more complex, actions taken in one part of the world will no doubt affect smallholders or poor consumers in other parts of the world (Qureshi et al., 2015:397). Trader strategies that change over time, lead to intrinsic market price dynamical behaviours (Lagi, et al., 2015:200). For example, on the supply side, traders may hoard food commodities during seasons of the plenty. This action may put constraint on consumer access to the food. During seasons of high supply, it is ordinary for prices of the food commodities to be fair to consumers. On the other hand, some market conditions may trigger traders to release the hoarded food stock into the market and ultimately easing consumers' access to them - if the prices are conducive to consumers. Such food dynamics affect accessibility to food by vulnerable households, including FHHs, more so during the seasons of food shortage. For example, the current drought in Kenya has significantly skewed the balance of food supply and demand. The researcher is also of the opinion that if a country adds value to a commodity produced internally; its citizens may buy it at a lower price than a citizen of a country where it is exported. This therefore creates disparities in affordability. Furthermore, decision-makers should combine good market policies with consumer-friendly policies - including provision of value-added food subsidies, to make it possible for the poorest to access high quality food fairly. This is because, as stipulated by Qureshi et al. (2015:397), it is important for smallholder producers to participate in agri-business value chains, through equitable access to local, national or international markets. Lack of market participation can lead to poor household food security. Literature shows that poor farmers are less likely to participate in markets, as opposed to those with fair livelihood sources such as off-farm jobs. For example, results of research

carried among Ahero Irrigation Scheme (Kenya) among rice farmers to determine the extent of market participation revealed that off-farm income had a positive coefficient and significantly influenced the extent of market participation that, as the level of household off-farm income increased, the extent of participation also increased by 0.099 (Apind, Lagat, Bett & Kirui, 2015:359). This illustrates the need for smallholders to engage in off-farm employment so as to improve their market participation. Commodity value addition also plays a significant role in food market.

Commodity-based value addition is proposed as one of the mechanisms for Africa's structural transformation towards sustained development (Economic Commission for Africa, 2015:15). For example in Kenya, several counties have adopted it as a strategy to improve the market sector. For instance, the County Government of Taita-Taveta, in its Strategic Investment Plan (2015-2020), whose marketing plan aims at extracting maximum value-added through utilisation of a processing plant where tomatoes will be processed and repackaged (Republic of Kenya, 2015:22). The researcher of this study appreciates the plans for the value addition as a strategy to improve commodity prices by farmers and the counties. Literature illustrates the benefit of value addition, "grading enhances value and therefore fetches better prices for the farm produce" (Apind et al., 2015:159). Another benefit to this is the one illustrated for the Taita-Taveta County, that the processing of tomatoes would avert post-harvest losses by offering an opportunity to store the food for long periods and thus smooth out demand and supply conflicts, explore export markets and offer local consumers greater range of choices (Republic of Kenya, 2015:22). This tactic to averting post-harvest losses will assist farmers sell their produce at the most convenient time hence smoothening supply. Qureshi et al. (2015:398), says that smallholder farmers often are forced to sell at harvest when they have a poor cash flow and have limited access to real credit. The government can also reinforce the mitigation against post-harvest losses by policy formulation and implementation. Qureshi et al. (2015:397), say that policies which improve markets can promote efficiencies in post-harvest value chains; and agricultural markets can help in improving food security through strengthening producer market participation (Qureshi et al., 2015:394). The extent of market participation among smallholder farmers indicates the level of commercialisation of rural production since the marketed surplus reaches the urban consumers and other rural non-producers through market participation by the producing households (Apind et al., 2015:154).

Rural areas are often resource poor and characterised by under-developed markets, thus offering limited opportunities for small-scale farm households (Tibesigwa & Visser, 2011:18). Rural agriculture (in Africa) is mainly for self-consumption, and little is supplied

to either rural or urban markets (Tibesigwa & Visser, 2015:7). For example, among South Africa's households which engage in agriculture, 65% of them use it purely as a subsistence strategy to meet household food demand (Tibesigwa & Visser, 2015:2). This is likely to be the opposite in urban areas where agriculture output is supplied to urban markets and little is kept for self-consumption (De Bon et al., 2010 in Tibesigwa & Visser, 2015:7). For example, in Rwanda, rural farmers consume 80% of their produce, while in Kigali; urban farmers sold 40% of their produce to local markets (Thomas, 2012 in Tibesigwa & Visser, 2015:7). This means that the urban farmers of Kigali may be consuming 60% of their produce, which is a lower consumption and higher market participation compared to the rural areas. Access of smallholder farmers to local markets where they can participate in key services including market information, farmer group marketing, contract farming, enforcement of contract law, financing of small traders and local storage facilities, plays a significant role in improving food and nutritional security (Qureshi et al., 2015:398). A recent study by Kirimi et al. (2013), in Qureshi et al. (2015:398), identified factors that influence household food security for Kenyan rural smallholder households and in particular, and strived to determine whether household participation in agriculture markets affects food security. They found a strong association between household commercialisation and reduced risk of being chronically food poor (Qureshi et al., 2015:398). The researcher of this study is of the opinion that governments should assist in regulating market prices and policies of food commodities among rural populations in order to promote food commercialisation. Policies for commercial transformation of small-holder agriculture are often aimed at promoting household market participation (Gebremedhin & Jaleta, 2013 in Apind et al., 2015:155). Salami et al. (2010), in Apind et al. (2015:155), state that, improved market participation is a key precondition for transformation of the agricultural sector from subsistence to commercial production. Kirimi et al. (2013), as quoted by Apind et al. (2015:155), is of the opinion that commercialisation is often viewed as an avenue to improve household food security due to its comparative advantages over subsistence production. Such a transformation can help address the poverty and income challenges that confront many smallholder producers (Alene et al., 2008 in Apind et al., 2015:155). There is a need for market policies for food controls, including food subsidies.

Lower or subsidised food prices increase food demand and governments use this tool to make food more accessible to poor consumers (Qureshi et al., 2015:397). Additionally, well-designed market and trade policies can positively affect supply and demand and help stabilise commodity prices (Qureshi et al., 2015:397). To further make their market participation more sustainable, smallholder farmers should come up as a team and form marketing groups. Group marketing is considered a social capital that increases the farmers

bargaining power (Apind et al., 2015:159). The researcher of this study is of further opinion that consumer welfare should be considered in tandem with suppliers' bargaining power. The existing policies should cushion poor households including FHHs from being over-exploited by unscrupulous sellers. Qureshi et al. (2015:398), observe that market friendly policies can reduce the gap between how much consumers pay and how much producers receive; which ultimately improves the economy of a country and agriculture. For example, in December 2010, China's National Development and Reform Commission implemented a major agricultural policy reform that impacted both producers and consumers by removing all toll roads nationwide and including in the road network 'easy access' for fresh agricultural product transportation (Zhong & Kong 2014 in Qureshi et al., 2015:398). This decision was taken following soaring prices in 2008 and it helped to reduce the annual rate of vegetable inflation from a peak of 46 % in February to 22.7 % in March and by November that year it was 2.1 % (Chiang & Edwards, 2012 in Qureshi et al., 2015:398). Balancing supply and demand helps stabilise prices especially of staple food.

Staple food serves as a core source of diets to a community. The world's staple foods are corn, rice and wheat. Corn serves a wide variety of purposes in the food supply system and therefore has an impact across the food market, because corn prices also affect the price of other crops, due to substitutability at the consumer end and competition for land at the production end (Lagi et al., 2015:121). On that note, the researcher of this study emphasises for stabilisation of producer-consumer relations through policies that regulate staple food markets. Strong local agricultural markets and value chains where suppliers are connected to farmers and farmers to consumers can accelerate inclusive growth in the value of agricultural production and promote greater investment (Qureshi, et al., 2015:397). Market participation among FHHs should be boosted to bridge the gap between male and female market participation.

Countering gender disparities in market participation, requires designing new or tweaking already existing policing to bridge the gap (ESARO, 2015:19). An example is strengthening female farmer groups, which may allow women to not only scale up investments, but also access markets by reducing unit costs (ESARO, 2015:19). Group interventions have been found to allow women address labour shortages (including farm labour), by receiving help from others in the group (Hill & Vigneri, 2014 in ESARO, 2015:19). Other policy options are those which enable women to raise their productivity for the crops they already grow or for incentivising them to shift into more profitable crops (ESARO, 2015:19). The researcher of this study proposes agricultural extension services that address gender-based needs in

integration with climate smart interventions. Moreover, training female farmers on agri-business would boost incomes for their household welfare, including food security.

2.3.8.5 Supply

The food security pillar that touches on food supply is food availability which is: “ensuring adequacy of food supplies in terms of quantity, quality and variety of food” (Qureshi et al., 2015:394). The researcher of this study is of the opinion that food supply is important for provisioning or availability of food for nutritious diets. Global projection suggests that global food supply must increase by 60-70% by 2050 if projected food demand is to be met (FAO 2012 in Qureshi et al., 2015:398). The researcher is of the opinion that, if the global food demand is met, then it means that the world would have achieved total food security. It would be a happy ending for SDG2 of eradicating hunger, achieving total food security and improved nutrition, and sustainable agriculture; since all its targets will have been achieved. The 1974 World Food Conference held by FAO defined food security as, “sustaining a steady expansion of food consumption and to offset fluctuations in production and prices” whose focus was on the supply side of food (Qureshi et al., 2015:394). There are several factors which affect food supply. Crucial for food supply are better infrastructure, governance and institutions (Qureshi et al., 2015:399). The researcher is of the opinion that, infrastructure such as road and communication network helps in movement of food commodities to markets and boost intermarket communication. Peaceful governance environment is also crucial for stabilising food supplies. The absence of peace and prevalence of conflict hinders food supply, especially into the market. For instance, in Gaza Strip, because of constraints on movement of goods, the risk of insufficient or unstable food supply remains high (where the blockade had entered its seventh year) and in the West Bank seam zones, access to farm land remains restricted (WFP, 2012:7). The researcher of this study understands that the loss of farming, deprives farmers a main source of food for their households, therefore, there would be no food supplied to the market by the farmers. Producer supply can be enhanced by food production, proper rural infrastructural development, agricultural research and development, resource management, farm inputs and produce pricing (Qureshi et al., 2015:393). However, the researcher of this study observes that, food supply through production is sometimes hampered by climate change, especially drought. Moreover, FAO (2016:8) rightfully illustrates that, climate change affects food availability through its increasingly adverse impacts on crop yields, fish stocks and animal health and productivity, especially in sub-Saharan Africa and South Asia, where most of today’s food insecure live. For instance, the researcher is of the knowledge that, most countries in East Africa Sub-Region (especially in 2017) get affected by rampant droughts, therefore compromising local food supply. Most populations in the sub-region are

depending on food supply by governments and humanitarian organisations such as the WFP. Food supply can also be influenced by imports and exports.

Restrictions on import and export of food can affect food price and its accessibility (Qureshi et al., 2015:397), and more so the supplies of food. An illustration to this is by the crisis of the food supply experienced by food-exporting countries. In the 2008 food price spike, governments of some food-exporting countries (such as Argentina, India, Ukraine and Serbia) were concerned about the security of food supplies for their domestic consumers, and imposed restrictions on food export (Tangermann 2011 in Qureshi et al., 2015:397). The researcher is of the opinion that, the move should have helped to “smoothen” the countries’ domestic food supply. Local markets are significant in influencing availability of food supplies to both suppliers and purchasing consumers.

Local markets can bridge the gap between supply and domestic urban markets and trade and help both producers and consumers (Qureshi et al., 2015:398). Measures including: direct procurement of products at harvest for maintaining local food security stocks; advanced procurement of products at planting time; local procurement by local governments to be used in school feeding programmes; and a programme supporting milk production and consumption, benefit producers with limited production and bargaining power (Nehring & McKay 2013 in Qureshi et al., 2015:398). Price stabilisation also assists in increasing supplies available in local markets and providing safety nets to poor consumers, thus helps both producers and consumers (Qureshi et al., 2015:399). Local production is very critical in stabilising food supply, especially in rural areas.

When meals are provided which are sourced from local food supply, they can stimulate local production of nutritious foods, which have widespread health and livelihood impacts across the community (Qureshi et al., 2015:397). Additionally, the researcher of this study is of the opinion that increased local food production cushions consumers from food shortages associated with low purchasing power. Steady market participation by local producers enhances the sustainability of their income from food sales. This is because of the fair demand-supply homeostasis. Qureshi et al. (2015:398), while quoting Godfray et al. (2010), corroborate that the expansion of food production needs global trade to balance supply and demand across regions. Loss of stability in food supply causes food insecurity which may exacerbate violent conflicts.

Food insecurity, especially when caused by a rise in food prices, can be a threat and an impact multiplier for violent conflict (Qureshi et al., 2015:393). For example, through news bulletins in Kenya, the researcher has observed that, food insecurity in Baringo County of Kenya has fuelled ethnic conflict especially through cattle rustling and murder. This situation

had become too heightened in 2017, that the government had issued a crackdown on illegal weapons in the county. This crackdown has caused many residents of Tiaty (one of the most hit-by food insecurity sub-county) to flee from their homes for fear of harassment by security officers (Koech & Suter, 2017:11). The researcher of this study is of the opinion that the displacement of Tiaty residents will further escalate their household food insecurity, due to loss of sustainable food supply. This assertion is confirmed by Koech and Suter (2017:11) that a spot check by *the Nation Newspaper* revealed that trading centres in Tiaty, such as Chemolingot, Nginyang, Loruk, Churo and Tangelbei were deserted and shops closed. This means that no market operations in the Sub-county, and thus no supply of food commodities in these markets. Furthermore, the antagonistic communities are blockading trucks ferrying humanitarian food to the rest of Baringo County areas ravaged by food insecurity. The insecurity - as a result of violent conflicts in the county, has moreover caused the Kenya Red Cross to suspend its operations in the area, due to fear of attack by bandits.

2.3.8.6 Production

With regard to food production, the researcher of this study is of the perspective that, own food production plays the most integral role in local food security. According to the researcher, the own food production provides the best food sustainability and psychological stability than food procurement and/or food aid. Moreover, the food production is important in influencing food demand among local communities. Qureshi, et al. (2015:396), is of similar sentiment that, food demand, particularly of specific (food) commodities is determined by local production of the crop. Besides, Qureshi et al. (2015:396), found that, rural consumption of rice was directly correlated with production in the same province. Furthermore, literature reveals own food production whether of crops or livestock is the main livelihood among rural population, particularly in Africa. Tibesigwa and Visser (2015:6) observe that most of the rural inhabitants of Africa engage in agriculture. For example, FAO stipulates that the rural area of Malawi is home to 84% of the country's population, where the rural inhabitants access an average of only 0.23 hectares of arable land (Tibesigwa & Visser, 2015:6). This average land holding reveals that majority of the country's populations are smallholder farmers. Another illustration is that of Madagascar, whereby 73% of the rural population engage in subsistence farming (Tibesigwa & Visser, 2015:6). Moreover, more than $\frac{3}{4}$ of Kenyan population lives in rural areas and their households rely on agriculture for most of their income (KNBS, 2014:5). This demonstrates that agricultural production is the major source of basic needs among the rural populations of Africa, including Kenya. Furthermore, rural economy of the country depends mainly on smallholder farming, which produces the majority of Kenya's agricultural output (KNBS, 2014:5).

Smallholders face a broad range of barriers on the path to sustainable agriculture (FAO 2016:xi), including challenges posed by climate change.

By exacerbating poverty, climate change would have severe negative repercussions on food security (FAO, 2016:29). The researcher of this study is aware that climate change affects agricultural food production. For instance, drought and flooding associated with changes in rainfall patterns may reduce agricultural production, limiting the availability of food. Resource and input factors sometimes lead to an increase in grain production and sometimes the opposite (Qi, Vitousek & Liu, 2015:622). Farm inputs such as machineries, equipment and chemicals influence cost of farm production. This observation is summarised by Qi et al. (2015:622) that, natural disasters lead to a drop in grain production. Due to this observation, the researcher of this study feels that, there is critical need to cushion smallholder farmers against adverse effects of climate change to promote own food production for their households and those of non-agriculturalists households' food security.

The cost of production determines food prices, hence influencing food demand and supply. In this regard Kipsang and Otuki (2017:38) highlight:

High diesel prices push up cost of ploughing farms: rising diesel prices have steeply pushed up the costs of ploughing farms, setting consumers up for higher food prices. Farmers in the North-Rift – Kenya's bread basket – are grappling with higher costs of using their tractors or hiring them to cultivate farmlands ahead of the rainy season toward the end of this month. Hiring tractor is up to KSh2,500 per acre from KSh1,800 in the last planting season. High expenses are partly to blame for increased food prices as farmers sell their produce expensively to recoup costs.

Besides the drought ravaging the country, as shown previously, the cost of farm production has also influenced rise in prices of food commodities in Kenya. Likewise, Ngila (2017:38) also indicates that food prices have been increasing in the year (2017) in Kenya. To exemplify her observation, she illustrates a food seller, a Trizah Wesonga in Nairobi and indicates that, Trizah and other traders said food prices have been rising steadily lately. The rise in diesel prices is associated with rising global fuel prices (Kipsang & Otuki, 2017:38) which have also influenced the food price hikes. Besides crop production, livestock production is also important section of own food production, especially in ASALs.

The researcher is of the opinion that, livestock production promotes household food security through direct food provisioning of animal products such as milk and meat, and sale of the animals and their products to earn a household income. According to FAO, globally, more than 60% of rural households keep livestock, and smallholder livestock production in many developing countries provides income, food, fuel, building materials, draft power, and

fertiliser for the general population (McKune et al., 2015:1). In Kenya, most of livestock production is practiced among the pastoralist community of the country. KNBS (2014:6) highlights that livestock keeping is more predominant economic activity in North Eastern Province of Kenya. However, just like crop production, this form of food production is faced with a myriad of climate-related risks. In this regard MCKune et al. (2015:1), assert that, livestock holders experience increased food insecurity because of climate change.

Climate change affects livestock production in multiple ways, both directly and indirectly (FAO, 2016:23). The most important impacts are on animal productivity, animal health and biodiversity, the quality and amount of feed supply, and the carrying capacity of pastures (FAO, 2016:23). This is more so particularly due to increasing variability in rainfall; which leads to shortages of drinking water, an increased incidence of livestock pests and diseases, and changes in their distribution and transmission (FAO, 2016:23). McKune et al. (2015:1), add that, climate-change related risks to livestock-based livelihoods such as livestock loss, increased water scarcity, and destruction of other productive assets, pose vulnerability among pastoralists. McKune et al. (2015:2), associate climate variations to its contribution to the spread of infectious diseases in livestock, which compromises their health and limits the safety and availability of animal products for food. The salient adverse effect of climate change on livestock production in Africa is as a result of droughts.

Terrorism insurgency, famine and climate change, and poor governance are blamed for creating the world's humanitarian crises, especially in Africa (Ndi, 2017:31). This is because when populations get displaced from their homes, they have limited or no opportunity for production. The researcher advances that, terrorism insurgencies in the Middle East, Libya, Nigeria and Somalia have perpetuated food scarcity due to humanitarian crises. Likewise, Ndi (2017:31) highlights that the humanitarian crises caused by the Boko Haram in North Africa has affected over 20 million people across Cameroon, Chad, Niger and Nigeria. The researcher of the current study had moreover observed on the mass media that in 2017, rampant drought had affected several countries in Africa, particularly in the Eastern Africa Sub-region. The worst hit country in the Eastern Africa is Somalia due to rampant drought and civil conflict propagated by the terrorism militia, the Al-Shabaab. McKune et al. (2015:2), quote Battisti and Naylor (2009): "increased frequency and severity of extreme events affect fodder and water availability for livestock, and reduce access to food for people who rely on market exchange of animal products for grains". The drought in Somalia, not only has hampered crop production, but also curtailed animal production stability. Frequent displacement of Somali citizens propagated by the Al-Shabaab, has led to humanitarian crisis in the country. These factors combined with others have led to food

shortages in the country, that the government has now declared the situation a national disaster. Khalif (2017:37) illustrates that, the newly elected Somali President, Mohamed Abdullahi Farmajo has declared drought a national disaster. This declaration had come by barely a month after the President of Kenya has had also declared the same on Kenya. Khalif (2017:37) illustrates:

The World Health Organisation warned on Monday that Somalia was at risk of its third famine in 25 years. The last one in 2011 killed some 260,000 people. The agency said more than 6.2 million people – half of the population, needed humanitarian aid including almost three million who are going hungry.

The Horn of African nation is one of three countries, along with Yemen and Nigeria, on the verge of famine which has already been declared in South Sudan – an unprecedented food crisis (Khalif, 2017:37). Poor rainfall performance in Turkana County of Kenya (KNBS, 2014:11) makes the area a poor performer in crop production. The researcher observes that, just like most counties (counties in the Northern Frontier of Kenya being the worst hit), the Turkana County is also drought-stricken. Food production is also affected by gender-related circumstances.

Literature reveals that both urban and rural subsistence agriculture is dominated by women, who remain socio-economically disadvantaged in both areas (Tibesigwa & Visser, 2015:6). For example, Tibesigwa and Visser (2015:6), show that, in Nairobi, Kenya, 64.2% of urban farmers are women and 55% of urban farmers in Harare, Zimbabwe are also women. These statistics reveal that women are the key players in urban food production. Access to formal and informal credit is an important input that is more present in male farmers and male-headed households than female-headed households (Kameri-Mbote, 2006 in Tibesigwa & Visser, 2015:8), which is likely to be correlated to socio-economic positioning (Tibesigwa & Visser, 2015:8). Women are positioned in the lower ranking of economic ladder. Women, who make up around 43% of the agricultural labour force in developing countries, are especially disadvantaged, with fewer endowments and entitlements than men, even more limited access to information and services, gender-determined household responsibilities, and increasingly heavy agricultural workloads owing to male out-migration (FAO 2016:xi). Following these observations, the researcher of this study ascertains that females are more involved in food production, yet they do not have equal privileges with males in terms of outputs, credits, farm labour, and other resources necessary for optimum production. These disadvantages are further compounded by adverse effects of climate change. Literature reveals several strategies of mitigating loss of food production through climate change.

Mitigating effects of the climate change will improve sustainable development (including food security) – especially in Africa, which largely depends on goods and services derived

from its environment and natural resource base; including land, soil and water (Economic Commission for Africa, 2015:9). It will be difficult, if not impossible, to eradicate global poverty and end hunger without building resilience to climate change in smallholder agriculture through the widespread adoption of sustainable land, water, fisheries and forestry management practices (FAO, 2016:xi). Females are the key players in smallholder agricultural production and calls for designing policies that would protect them from the adverse effects of climate change. There are a number of policy options for either enabling women to raise their productivity for the crops they already grow, or for incentivising them to shift into more profitable crops (ESARO, 2015:19). The researcher of this study is of the opinion that policies of making small credits available to smallholder farmers specifically females will give them capital to expand their plot portions, purchase farm inputs and also hire farm labour such as male labour. The government should also subsidise for purchase of farm machineries by smallholders. Moreover, modern farm implements are necessary for scaling up farm labour. Sustainable intensification and wider adoption of improved technologies spur agricultural productivity and transformation (Economic Commission for Africa, 2015:5). Agricultural research and innovation are critical in the contemporary world grappling with climate change challenges.

Proper agricultural production requires agricultural research, development and extension (Qureshi et al., 2015:399), and innovation. For instance promoting national agricultural research and extension systems, largely domestically funded and also complemented by the International Consultative Group for Agricultural Research system, largely publicly funded (Qureshi et al., 2015:400), is a way out. Research should focus on strategies to mitigating effects of climate change on agricultural production. The transformation will need to involve millions of food producers in adapting to climate change impacts, which are already being felt in the agricultural sectors and especially so in tropical regions, which are home to most of the poor and food insecure (FAO, 2016:xi). Researchers should investigate on factors which could mitigate further depletion of the ecosystem, especially those leading to competing demands on the environment. Efforts by the agriculture sectors to contribute to a carbon-neutral world are leading to competing demands on water and land used to produce food and energy, and to forest conservation initiatives that reduce greenhouse gas emissions but limit land available for crop and livestock production (FAO, 2016:xi). Achieving the goal of mitigating climate change requires action and responsibility across sectors, and urgent action should be taken with respect to capacity-building and use of environmentally friendly technologies (Economic Commission for Africa, 2015:6). Agricultural extension services are critical in empowering farmers on proper production strategies.

A good example of capacity-building strategy has been done in China. FAO (2016:53) illustrates that Chinese farmers are trained on new water management techniques, in order to conserve irrigation water. Agricultural innovation is the key driver of agricultural productivity (World Bank, 2007 in Qureshi et al., 2015:399). Literature shows how innovation has transformed China's agricultural production.

China is involved in cultivation of drought-resistant crops to mitigate the effects of climate change (FAO, 2016:53). The practice is promoted through a water-saving irrigation system. The irrigation innovation project in the country helped establish 220 farmer associations and cooperatives and undertook a variety of research, experimental and demonstration activities. The focus was on adaptation measures and water-saving technologies, which were subsequently put into practice by farmers. Some 1.3 million farm families saw benefits in the form of reduced irrigation costs, less groundwater depletion and higher water productivity (FAO, 2016:53). Moreover, Qi et al. (2015:625), indicate that China's grain production has continued to grow over the past decade (increased by 120 metric-tonnes) as a consequence of sustained increase in sown area, effective irrigation area, chemical fertiliser inputs and agricultural machinery inputs.

Innovations such as greening the agriculture sector (especially in Africa) is necessary, to contribute to tackling the risks associated with agricultural intensification; and climate smart agricultural practices and overall agricultural efficiency improvements present important opportunities for climate change mitigation and adaptation, while increasing agricultural productivity and dealing with the issue of food and nutrition security (Economic Commission for Africa, 2015:5). For example, mixed farming systems enhance resilience and reverse soil degradation by controlling erosion, providing nitrogen-rich residues and increasing soil organic matter (FAO, 2016:52). For instance, in the Eastern Africa, Ethiopia and the United Republic of Tanzania practice drought-tolerant mixed farming systems which include a multipurpose legume such as pigeon pea, an indigenous nitrogen-fixing leguminous "tree" which provides pods palatable to livestock, and leaves used as organic fertiliser (FAO, 2016:52). The researcher of this study is of the opinion that, if mixed farming is complemented with diversification in farming, the benefits supersede the single approach. The combination of the two approaches is very advantageous, especially among agro-pastoralists in ASALs.

For example, FAO (2016:xiii) rightfully advocates for integration of production of crops, livestock and trees. The outcome of this strategy is: "some agroforestry systems use the leaves of nitrogen-fixing leguminous trees to feed cattle, use livestock manure to fertilise

soil, and grow pulses to provide extra protein during periods of seasonal food insecurity” (FAO, 2016:xiii). Diversified production provides better risk management, as well as a more stable source of income and food supply (Qureshi et al., 2015:396). FAO (2016:xiii) too agrees that diversification reduces the impact of climate shocks on income and provide households with a broader range of options when managing future risks. Similar with single livelihood, sometimes diversification is faced with climate related risks. Crops, aquaculture and livestock systems are subject to risk from instability in weather and damage from extreme events such as heat stress, drought, and flooding (Jones & Thornton, 2009 in McKune et al., 2015:1). Therefore, the researcher of this study advocates for the adoption of best practices of the food production. For example, in ASALs, drought-resistant crops, local tree varieties and local livestock breeds, should be prioritised during the diversification. In similar opinion, Qureshi et al. (2015:396), say that, there is a need to support dietary diversification and strengthen local food systems and incorporate local and traditional knowledge on food preparation and agricultural diversification. Institutions for agricultural resource management are critical enhancing production.

In order for sustainable consumption and production to go forward at an increased pace, more coherent policy frameworks that tackle both the supply and demand side of natural resource use are needed, coupled with improved implementation and enforcement of policies (Economic Commission for Africa, 2015:6). Improved conservation and management of natural resources, in particular, land and water resources will contribute to medium to long term supply sustainability (Qureshi et al., 2015:400). Land resource is the major driver of food production. Without land, there is no farming space. KNBS (2014:6) points out that Kenyan population derives their livelihood from an estimated 3 million agricultural holdings; which are mostly small family farms of between 0.2 to 12 hectares, which contribute 70% to the marketed agricultural production. The marketed agricultural production supplies food to urban populations, majority of them who are non-producers. Furthermore, small-holder sector is more oriented towards food crops, vegetables and dairy production constituting 95% of all the farms (KNBS, 2014:6). These food items are of high demand even in urban areas. The researcher of this study is therefore of the opinion that the government should establish institutions that oversee proper land use by farmers, so as to control soil erosion and biodiversity loss.

Establishing and management of water resource institutions is also necessity in agricultural production. Crops cannot germinate, develop or grow without moisture. With the advancing climate change, the researcher observes the need for irrigable agriculture. To control irrigation water wastage, some authors have suggested for pricing of the resource. For

example, Qureshi et al. (2015:400), recommend and agree with Crase and Gandhi (2009) in Qureshi (2015:400) that, the pricing of irrigation water will result in more efficient utilisation. They however note that the introduction of irrigation water pricing is often politically difficult, especially without clear definition of property rights. It is for thus Qureshi et al. (2015:400), observes that beyond strengthening of (water) institutions for irrigation management, improved institutions for the management of 'green water' (soil moisture in rain-fed crops, pasture and range) is an important. The effectiveness of this move is illustrated in Qureshi et al. (2015:400). Gaiha and Kulkarni (2005) in Qureshi (2015:400) found that Indian policy interventions such as water harvesting schemes significantly contributed to a higher likelihood of household food security. To avoid wastage of water resource, Qureshi suggests for decentralising water policies.

In both cases (irrigation and green water), institutions play a dominant role and decentralisation policies have had some degree of success, particularly in the transfer of irrigation management to communities or water user associations (Crase & Gandhi 2009 in Qureshi et al., 2015:400). For instance in Kenya, the Ministry of Agriculture (under which water services are placed) has been devolved to the county levels. WSP (2011:5) supports that the Constitution of Kenya 2010 complemented water structural reform efforts by making water supply a devolved function – the newly established counties are responsible for water supply and sanitation. In irrigated systems, water use efficiency can also be promoted through institutional changes, such as the creation of water users' associations, and infrastructural improvements, such as lining canals, more efficient drainage networks and wastewater reuse. Additionally, water-efficient irrigation technologies, such as drip emitters, and better maintenance of irrigation infrastructure, combined with appropriate training to build farmers' technical knowledge, can be effective in dealing with climate change impacts on water availability and food security (FAO, 2016:51) more efficiently. In controlling irrigation water usage, FAO (2016:53) offers an example of China's Huang-Huai-Hai Plain which is key region to the country's agricultural economy and national food security. In five of the region's provinces, a World Bank financed project has promoted water-saving technologies and other improved practices – such as the use of drought-resistant crop varieties – with the goal of improving water management on some 500 000 ha of farmland (FAO, 2016:53).

Another approach to promoting agricultural production is by supporting low-income smallholder farmers in strengthening their capacity to manage risks and adopt effective climate change adaptation strategies (FAO, 2016:xi). Farmers' capacity to produce well can be enhanced through governmental and voluntary efforts including subsidies on farm

inputs. Farm input subsidies are very common in Europe, North America and many developing countries, targeting seeds, fertilisers, credit, machinery and energy (Qureshi et al., 2015:400). In Africa, a well-known case is Malawi which provides heavily subsidised seed and fertiliser input packages, which have increased maize production dramatically in good seasons (Qureshi et al., 2015:400). The researcher of this study conversely observes that challenges to agricultural production are inevitable, such that, not all countries in the world are able to provide subsidies. The agricultural sector is beset with so many challenges which include inadequate access to productive inputs (Economic Commission for Africa, 2015:5). Furthermore, Qureshi et al. (2015:400), too say subsidies of farm inputs especially in Malawi are not financially sustainable. Gender disparities also compound the challenges in access to farm inputs. For example, Sheahan and Barrett (2014) in ESARO (2015:1) report that in a sample of six Sub-Saharan countries, female-headed households use and own less modern agricultural inputs, compared to male-headed ones; and that plots owned or managed by women are less likely to receive modern agricultural inputs and receive lesser amounts when applied (ESARO, 2015:1). Credit schemes are also significant in promoting food production. Credit schemes for farmers have received widespread subsidy support in many developing countries (Qureshi et al., 2015:400). Group credit systems, for example, those developed in Bangladesh by the Grameen Bank, have been widely adapted and adopted with significant success in many countries (Qureshi et al., 2015:400). Also in India, micro-credit lending to farmers is common. For example Vedamurthy, Dhaka and Sirohi (2015:282), indicate that:

Institutional credit plays a very important role in the development of agricultural sector. As a result of credit, Indian agriculture has developed over time and showed all signs of resilience to natural shocks like droughts and famines; such that the institutional credit acts as a means to provide control over resources to enable the farmers to acquire the required capital for increasing agricultural production, it facilitates technological upgradation and commercialisation of agriculture, has influence on the success of Green Revolution in Indian agriculture - to a large extent laid on institutional credit support to agriculture in terms of expansion in inputs like fertilisers, irrigation, private sector capital formation, and many others. Moreover, the institutional credit has even a greater role to play in India where 80% of the farmers are small and marginal who operate 36% of the land and are unable to generate enough farm surpluses to re-invest (Sidhu & Singh, 2006 in Vedamurthy et al., 2015:282).

Qureshi et al. (2015:400), too observe that, an integration of rural credit into the wider banking and financial systems has been tested. The authors illustrate an example with the Kenya's mobile money initiative, the M-Pesa money banking and transfer system. The researcher has observed people being lend money through the M-pesa money system, which may help them in purchasing farm inputs and farm labour. The mobile money lending services by M-pesa - whose product is called M-Shwari, and facilitated by Safaricom mobile

phone service provider, may enhance capacity of smallholder farmers in Kenya to access credit. Apind et al. (2015:157), notes that credit is necessary for acquisition of inputs and payment of casual labour that assist in the farm work; and thus improves the productive capacity of the farmers (Apind et al., 2015:159). Policy framework is also necessary in the promotion of food production.

There are many policies that can assist in improving crop and livestock production. Some may have direct and others indirect impacts. At the aggregate global level, it is expected that most of the required increase in production would be derived from more 'eco-efficient' use of agricultural resources and inputs (Keating et al., 2013 in Qureshi et al., 2015:399). The researcher of this study acknowledges the efforts made by the world leaders, especially in making legislations that aim to protect the environment. For example, the member countries of the UN have had several ratifications aimed at preserving our ecosystem. Recommendations of the SDGs, including the number 13, which aims at combating climate change and its impacts (UN, 2016:9), and number 15, which aims at protecting, promoting and restoring terrestrial ecosystem, sustainably managing forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss (UN 2016,10); are necessary to combat effects of climate change. If such global policies are further adopted and implemented at country levels, they will help steer up national food supplies in an environment of sustainable ecosystems. In Kenya, strategies for implementing these policies can be decentralised and localised to county levels and other smaller units of administration. This is because, according to the researcher's opinion, policies at grass-root levels work best for local communities, including household level. For example, Qureshi et al. (2015:397), say that policies aimed at better community and home food processing, preservation, storage and access to marketing facilities, can contribute to household food and nutrition security by alleviating seasonal shortages in food supply and stabilising market prices. Kenya is highly dependent on rural livelihoods for its food supplies. For this reason, the researcher of this study proposes for food production policies that address special needs of the rural inhabitants, including female-headed households.

It is proposed that rural people construct their livelihoods via three main strategies: agricultural intensification, livelihood diversification and migration (Hussein & Nelson, 2016:1). At the household level, five main pathways for improved livelihoods and food security have been identified: intensification of existing production mixes; diversification of farm enterprises; expansion of the farm operation; increased off-farm income; and exit from agriculture (Dixon et al., 2001 in Qureshi et al., 2015:399). If the country formulates and help facilitate the implementation of these policies at the grass-root levels, there will be

more sustainable livelihoods across the country, because of improved food production. Improving productivity would ensure increase in food security and increased income among smallholder farmers (Omondi & Shikuku, 2013 in Apind et al., 2015:154) of the rural livelihood in the country.

2.3.8.7 Education and knowledge

Food and nutrition know-how requires some formal and/or informal learning. Several benefits are associated with learning. Education is a key factor that influences food security status of household; because education provides greater employment opportunities and increases household income (Qureshi et al., 2015:396). Guterres (2017:15) highlights the significance of educating females, “An extra year in school can add up to 25% to a girls’ future income”. The researcher of this study is of the opinion that, when people are educated, they are more likely to get formal employment than those uneducated; and furthermore, if farmers get such employment, they are said to be in off-farm employment. Income from such employment supplements and/or complements farming. Hussein and Nelson (2016:8) rightly point out that, pursuing non-agricultural activities represents a risk minimisation strategy to achieve basic household subsistence needs. The researcher of this study therefore is of the opinion that extra income generated through off-farm work, is useful even for extra food purchase, which would ultimately cater for household diversified food preferences. Literature shows that the more dietary diversity a household has, the more food secure it is deemed to be.

Education plays also an important role in household awareness of nutritional and safety aspects of food, rather than merely obtaining sufficient calorific quantity (Qureshi et al., 2015:396). How well households utilise food, will depend on their food nutrition, safety and hygiene knowledge and willingness to ensure a healthy and nutritious diet for all household members (Anderson 2014 in Qureshi et al., 2015:396). For this reason, the researcher of this study is of the opinion that households with well-educated caregivers are likely to have proper hygiene and sanitation in food preparations and utilisation, including practices of dietary diversity. Most household caregivers are females. This highlights the need for educated female caregivers. Guterres (2017:15) rightly points out that women’s access to education and health services has benefits to their families that extend to future generations. Thus an educated female has better food and nutritional knowledge, including matters of dietary diversity. Diet diversity can be achieved through a range of interventions, including consuming greater quantities and varieties of vegetables, fruits and animal-sourced food, fortification, bio-fortification, nutrition education and behavioural change (Qureshi et al., 2015:397). The researcher of this study is of the opinion that, when

household heads, particularly the females, and caregivers have the know-how of their household members' dietary needs, they are at a better position to providing and preparing meals of good quantity and quality. Extension services are essential for empowering farmers on best agricultural practices.

Farmer education through extension services is one of the major sources of information to farmers (Apind et al., 2015:159). The researcher of this study is of the opinion that, if extension services are effectively disseminated to farmers, they can equip them with requisite knowledge about proper farming methods such as livelihood diversification, mixed cropping and other sustainable agricultural practices. Furthermore, literature reveals the need for group formation for extension services. While extension service is an important source of information to farmers, it can more effectively be done in groups (Apind et al., 2015:357). Belonging to a farmer group is important to farmers, as it is a major source of information sharing and adds bargaining power (Apind et al., 2015:159). Groups can share diversified agricultural practice information for their mutual benefit. Hussein and Nelson (2015:5) emphasises that, it is essential to be aware how different livelihood strategies complement one another, as rural producers make their way in what are often risky, resource-poor environments. Moreover, crop-livestock integration may form part of complex strategies to enable construction of sustainable livelihoods (Hussein & Nelson, 2016:6). Extension services can also equip farmers (including in groups) with market-based information.

Market information empowers farmers on the prevailing market prices, market opportunities and market demand (Apind et al., 2015:159). The researcher of this study is of the opinion that if properly disseminated, market information will encourage farmers to participate in marketing of their farm produce. This is because they will be aware of food prices and demand. Results of research by Apind et al. (2015:159), found that the source of market information had a positive and significant influence on the extent of market participation by 0.026 among Ahero Irrigation Scheme rice farmers in Kenya. The researcher of this study is of the opinion that education, especially agricultural-oriented learning adds innovation among its recipients.

Innovation often builds on and adjusts local knowledge and traditional systems, in combination with new sources of knowledge from formal research systems (FAO, 2016:50). Agricultural innovation system include the general enabling, economic and institutional environment required by all farmers (FAO, 2016:50). The researcher of this study is of the opinion that, when farmers have gone through formal education and specialise in agricultural career field, they are likely to come up with innovations that are likely to improve

food production. This is more so achievable through university research, including those funded by humanitarian and technical bodies such as FAO, the WFP and FANTA. Because of the benefits of formal education especially in the promotion of innovations; the researcher of this study, sees the need to sensitise farmers to invest more in formal education for their children and eradicate school drop outs. Education ensures that more wise production and marketing decisions are made by the farmers to develop more skills on off-farm income activities towards improving their productivity, generating more income from the crop and diversifying their income sources (Apind et al., 2015:159). Additionally, children should be taught and encouraged to practice proper feeding habits, and diets in schools should be improved to include dietary diversity. Diets of school children should (also) target specific nutritional gaps due to (limited) food supply at home (Qureshi et al., 2015:397). It is therefore imperative for school caregivers, to be informed or educated about such gaps in order for them to prepare quality meals for children at school. The multifaceted education programmes should be provided to females for improved household food security.

A changing climate means that there is a shrinking window of opportunity for action, and it is imperative that innovations in climate-smart approaches to agriculture, help close the gender gap and promote women's empowerment, economic development, and societal resilience to shocks (ESARO, 2015:vi). A report by UN Women, Eastern and Southern Africa Regional Office (ESARO), found that in Malawi, Tanzania and Uganda, female farm managers are have lower levels of education than male farm managers (ESARO, 2015:2). In Uganda, they average about two years less of schooling, than male managers (ESARO, 2015:2). The important link between a woman's level of schooling and her family's nutritional status is well documented (Qureshi et al., 2015:396). More educated mothers have the skills to compete for high-skilled and well-paid jobs and will therefore be in a better position to feed, care for and educate their children (Economic Commission for Africa, 2015:7). Empowering women and girls through education also allows them to be involved in decisions at all levels and influences the allocation of resources in a gender-sensitive manner (Economic Commission for Africa, 2015:7). Following these observations, the researcher of this study is of the opinion that gender inequalities in education should be eliminated to achieve sustainable food security across genders. Policies that remove gender barriers to learning and literacy and lead to the empowerment of women are critical for addressing food and nutrition insecurity (Qureshi et al., 2015:396).

2.3.8.8 Economic factors

Sustainable development encompasses the interlinkages of the three dimensions of economic growth, social development and environmental sustainability (Economic

Commission for Africa, 2015:2). Economic activities sustain social development (Economic Commission for Africa, 2015:2). Africa has the lowest levels of human and social development, with a large part of the population trapped in poverty, facing rampant unemployment and inequality (Economic Commission for Africa, 2015:5). To translate rapid economic growth into sustained and inclusive development, Africa must put in place development strategies that foster economic diversification, creates jobs, reduces inequality and poverty, and boosts access to basic services (Economic Commission for Africa, 2015:5). This can only be done through structural transformation (Economic Commission for Africa, 2015:5). Structural transformation will involve a shift in both employment and output from its dominant agriculture-based economies, with acute dependence on natural resources to an economic structure based on industrial development and modern services, with strong employment potential; more equitable distribution of income; diversified manufactured goods; commodity-based value addition; optimal and sustainable use of natural resources; enhanced resilience to global shocks; and greater regional integration (Economic Commission for Africa, 2015:5). The researcher of this study believes that employment opportunities, coupled with agricultural production, would bring better economic and social development to populations in Africa.

Several macro-economic factors such as fuel prices, food prices, inflation, cross-border trade, and exchange rates, influence food availability and access at Kenya's national level, and consequently, at the household level (KNBS, 2014:9). For example, in Kenya, between August and September 2013, household food access was limited by increasing fuel prices and marginal currency depreciation, that continued to keep imported food prices high (KNBS, 2014:9). There was also year-on-year increase of the consumer price index (+8.3% in September), as a result of Value Added Tax (VAT) Act, which influenced food prices (KNBS, 2014:9). The researcher of this study is of the opinion that when FHHs are exposed to price volatility and inflation, their capacity to purchasing food is constricted, because of myriad vulnerabilities these households grapple with. Furthermore, Raleigh, Choi and Kniveton et al. (2015:187), indicate that food price influences household food security, for it is a local and dynamic measure of scarcity and competition. Restricted free movement can hamper sustainable economic activities.

The researcher of this study is of the opinion that restricted movement such as curfew, are enforced when a country is experiencing civil strife, including acts of terrorism. For instance, recurrent civil strife in Palestine has had long history of food insecurity, among the besieged and the displaced populations. The 2012 results on food security in Palestine showed 34% (1.57 million) Palestinians were food insecure, compared to 27% in 2011 (WFP, 2012:2).

This increase was attributed to the occupation of Palestine which restricted free movement of the people and goods, inhibiting trade and therefore, the potential for sustainable economic growth. These macro-economic issues translated into high unemployment rates and low wages, which, coupled with the increasing cost of living and unstable wages, directly impacted on households' ability to access food (WFP, 2012:2). In Palestine food insecurity primarily stems from a lack of economic access to food, and as such is intrinsically correlated with poverty (WFP, 2012:7). Another important economic factor to household food security is the inclusion of women in paid employment, including in the off-farm sector.

Off-farm employment is critical in boosting food security, especially among non-farming households. The study by Tibesigwa and Visser (2015:18) reveals that, off-farm household income and number of household assets were the main determinant of household food security in South Africa. Amalgamating off-farm income and farm production doubles household food security benefits. This is because of the multifaceted capacity of the household to access food and increase food diversity. Literature reveals that this livelihood is advantageous especially among the vulnerable groups. The combined impact of increasing the incomes and agricultural productivity of the poor and lowering food prices could help improve nutrition, by enabling poor people to purchase more and better food, and by increasing their access to food from their own production (ESARO, 2015:3). The researcher of this study has explored literature with regard to recommendations for promoting economic factors, in order to boost food security, especially among vulnerable groups, including the FHHs.

In addition to impacts on overall national income, closing the gender agricultural productivity gap, could reduce poverty and improve nutrition: directly, because many poor people work in agriculture; and indirectly, because higher agricultural output may increase income for people employed in sectors linked to agriculture (ESARO, 2015:3). Since off-farm income is one of the main determinants of food security in male-headed households, promoting off-farm labour activities to female-headed households will likely boost their food security and narrow the gender gap (Tibesigwa, 2015:18). Promoting women in paid employment outside agriculture; cultural practices such as inequitable inheritance practices, early marriage and household power dynamics; and lack of equitable economic opportunities, continue to pose challenges (Economic Commission for Africa, 2015:9). However, despite the challenges, the researcher of this study proposes for strict policies that protect women from being economically disempowered via cultural and/or social barriers. Female-gendered policies are discussed in the subsequent chapter three.

2.3.8.9 Infrastructure development

Over 400 million people live in the dry lands and the majority of them are the rural poor (Economic Commission for Africa, 2015:10). The dry land is under threat from deforestation, soil erosion, nutrient mining, recurrent drought and climate change, all of which can potentially result in land degradation, desertification and aggravated poverty (Economic Commission for Africa, 2015:10). Improvements in public infrastructure to both rural areas and urban technologies, can improve food security and household nutrition (McKune et al., 2015:1). The FAO (2012) emphasises the importance of rural infrastructure for agricultural intensification and food supply, notably: transport, energy, irrigation and market infrastructure; since historically, infrastructure has been a driver of increased production (Qureshi et al., 2015:399). The Economic Commission for Africa (2015:6) also agrees that, rural infrastructure plays a key transformative role in food access. This is because the rural infrastructure notably, feeder roads and transmission lines that connect rural communities to national grids, allows individuals, households, communities, and small businesses, to embark on income-generating activities. The income empowers people to purchase more and diversified food for their households, and alleviate their household and community poverty. For instance, investment in infrastructure, more specifically secondary roads, is a major determinant of agricultural and rural development, and poverty reduction in China (Qureshi et al., 2015:399). Similarly in India, Fan et al. (2000), in Qureshi et al. (2015:399), estimates, high returns to rural road development in both irrigated and rain-fed farming systems - although the returns in rain-fed areas varied substantially across different farming systems. Moreover, in many countries, public investment in irrigation facilities has stimulated production and reduced rural food insecurity (Qureshi et al., 2015:399). Cumulatively, infrastructural development is a key driver in poverty alleviation and improved food security. Besides, Qureshi et al. (2015:399), offer an illustration of the Lao Peoples' Democratic Republic, which has had 13% of the decline in rural poverty during 1997-2003, which was attributed to improved road access (Qureshi et al., 2015:399).

Countries that have invested in rural infrastructure are at better socio-economic development. This is because its people are able to access basic goods and services easily. In corroboration with this assertion, Economic Commission for Africa (2015:6) indicates that infrastructure development is a critical key driver for progress across the African continent, as it allows for productivity and sustainable economic growth. The researcher of this study is certain that, when economy of a country thrives, its citizens' livelihood improves. This is because governments would be able to provide for basic services which would be much accessible to its citizenry. Energy infrastructure especially in urban areas facilitates easy access to farm input by farmers and food by consumers.

Infrastructural differences can cause differences in the access of goods and services; such that, in the Sub-Saharan Africa, people living in urban areas have better and quick access to market than those in rural areas. Literature further indicates that urban dwellers have easier access to market commodities, such as farm inputs. Tibesigwa and Visser (2015:7) while quoting De Bon et al. (2010), say that, urban farmers are likely to have more access to inputs than rural farmers due to close proximity to the market. Tibesigwa and Visser (2015:7) demonstrate their point of view by quoting Thomas (2012) that, Tunisia's urban farmers were found to have easier access to market information and inputs than the rural ones. The researcher of this study is of the opinion that urban-rural infrastructural gap can get bridged up, by the government 'ploughing' more resources to constructing and expanding rural infrastructure, especially feeder roads. Rural secondary roads are essential for facilitating transportation of crop products from farms in order to supply the food to urban markets. Establishing water infrastructure is also critical for enhancing food security.

Climate change alters rainfall and water availability patterns, the capacity to deal with water scarcity or water excess which are crucial in efforts to sustainably improve (food) productivity (FAO, 2016:51). The researcher of this study is of the opinion that establishing and expansion of water management institutions would play a bigger role in food development. FAO (2016:50), also proposes for improving water resource management for effective addressing of climate change impacts. It is projected that beyond 2030, the negative impacts of climate change on the productivity of crops, livestock, fisheries and forestry will become increasingly severe in all regions of the world (FAO, 2016:xi). Building water infrastructure is vital for all sectors and serves as an input to industry and is integral to among others, subsistence and commercial agriculture, fisheries and livestock production in Africa (Economic Commission for Africa, 2015:11). Africa is ranked as the most vulnerable continent to climate change and experiences effects of it more than any other continent (Tibesigwa & Visser, 2015:8). Moreover, rapid population growth in Africa as a continent has resulted in a tripling of water withdrawals over the past three decades due to food demands and escalating industrial growth, thus causing increasing water scarcity (Economic Commission for Africa, 2015:11). Water withdrawals hamper development by limiting food production (Economic Commission for Africa, 2015:11; Tibesigwa & Visser, 2015:3). The researcher of this study is of the opinion that water withdrawals deplete soil of moisture which deprives vegetation, including crops of water. The areas with the highest potential for water productivity improvements are those with a high incidence of poverty, including many parts of the world such as Sub-Saharan Africa (FAO, 2016:51). With the arrival of climate change, the strategy of using small-scale subsistence farming to promote food security continues to look bleak (Tibesigwa & Visser,

2015:2), particularly in the Sub-Saharan Africa. Furthermore, the researcher of this study through personal observation has seen Kenya, including Taita-Taveta County, experiencing failed rains in the March-May and October-December rainy seasons of 2016 which have resulted into the drought ravaging the country, even to the present day (March 2017). To counter this phenomenon, there is a need for intervention strategy of establishing or expanding water institutions that would facilitate both domestic and irrigation water supply for sustainable production. The researcher of this study prioritised an illustration to this by showing an example with Taita-Taveta County, the home county of the study area, the Voi Division. In the mixed farming livelihood zone in the Taita-Taveta County (food crops/livestock livelihood zone) – in which the study area is geographically situated, Republic of Kenya (2016:6) indicates that, most households experienced total food crop failure; while those who harvested got far much below normal produce due to failed season in March May Season. On the other hand, the same Republic of Kenya (2016:7) shows that, normal food yields were recorded in the areas under irrigation in similar livelihood zone. The researcher of this study is aware of few smallholder manual irrigation practices along rivers and streams and a little bucket irrigation, but not of any formal irrigation establishment in the study area. Besides, Räsänen (2015:i) observes: “Water reforms are only partially translated in the Taita Hills that the reforms contribute to improved access to water by poorer residents, it does not enable the redistribution of water to most marginalised areas due to its demand based regulation and inadequate consideration of local politics”. In regards to the observation by Räsänen, the researcher is also of the opinion that, any formal irrigation establishment elsewhere should be under TAVEVO Water Management Authority, since it is the only formal water management authority in the entire county. The good performance in crops under irrigation therefore reveals the advantage of putting agricultural land under artificial source of water in case of failure of rainfall. The researcher further proposes for green water resources management.

Rain-fed systems account for 95% of farmland in Sub-Saharan Africa, so better management of rainwater and soil moisture is the key to raising productivity and reducing yield losses during dry spells and periods of variable rainfall (FAO, 2016:51-52). The researcher of this study is of the opinion that, tapping and utilising ground water in watering crops is a vital infrastructural development which can raise agricultural productivity. HLPE 2015 in FAO (2016:52) and Oweis (2014) as cited by FAO (2016:52) observe that, using water-harvesting or shallow groundwater resources is an important but under-used strategy for increasing water productivity in rain-fed agriculture. The researcher of this study is of the opinion that constructing cisterns and drilling wells, digging Zai (planting) pits would help curb effects of drought on crops – the resources store water for usage in times of water

scarcity. Additionally, constructing dams and water pans will provide domestic water supply as well as water for livestock. Moreover, the proactivity among green-water management institutions is essential. The institutions could be governmental, private or voluntary. Cumulatively, infrastructural development contributes significantly to human development, poverty reduction, and is crucial to the attainment of the sustainable development goals (Economic Commission for Africa, 2015:6), including the goal number two of hunger eradication.

2.3.9 Consequences of food insecurity

Food security matters immensely; it is a topic of keen interest to policy makers, practitioners, and academics around the world, in large part because the consequences of food insecurity can affect almost every facet of society (Jones et al., 2013:481). This chapter explores the following consequences of food insecurity: exacerbates poverty, aggravates effects of climate change, deteriorates public health, causes conflict, has moral value, and affects females more than males.

2.3.9.1 Exacerbating poverty

Food insecurity, alone or combined with other factors, cause negative impacts in human populations including exacerbating poverty. Qureshi et al. (2015:395), says that hunger perpetuates poverty by reducing people's ability to work, to learn and to lead prosperous lives. The (global) population living in poverty could increase by between 35 and 122 million by 2030 relative to a future without climate change, largely due to its negative impacts on incomes in the agricultural sector (FAO, 2016:xi-xii). Most of the world's poor and hungry are rural people who earn meagre livings from agriculture (FAO, 2016:46). FAO (2016:46) shows that in 2010, some 900 million of the estimated 1.2 billion extremely poor lived in rural areas. Out of the 900 million, about 750 million worked in agriculture, usually as smallholder family farmers (Olinto et al., 2013 in FAO, 2016:46). Reports on Africa indicates that 48% of Africans live in extreme poverty and 72% of the youth population lives on less than \$2 a day (Economic commission for Africa, 2015:6-7). The increase in the number of poor would be biggest in Sub-Saharan Africa, partly because its population is more reliant on agriculture (FAO, 2016:xii).

Productivity declines would lead to low food supplies, which have serious implications for food security. Food supply shortfalls would lead to major increases in food prices, while increased climate variability would accentuate price volatility (FAO 2016:xi). Since the areas most affected would be those with already high rates of hunger and poverty, food price increases would directly affect millions of low-income people. Among the most vulnerable

will be those who depend on agriculture for their livelihood and income, particularly smallholder producers in developing countries (FAO, 2016:xi). The researcher of this study is of the opinion that with price fluctuations and increase in food prices, the poor in society may not afford to purchase food, their production decreases, as a result of lack of calories to their performance, hence earn no income for their households. For instance, Africa continues to record one of the highest income inequalities among all the regions (of the world), as indicated by the Gini coefficient and the proportion of the national income or consumption associated with different segments of the population (Economic Commission for Africa, 2015:7); such that the Gini coefficient for Africa was 44.2 in 2008, ranking it second highest regionally to Latin America and the Caribbean (Ortiz & Cummins, 2011 in Economic Commission for Africa, 2015:7). This means that the poor in Africa are increasingly becoming poorer, while the rich are becoming wealthier. Also, urban poverty is increasingly on the rise.

FAO likewise states that poverty and food insecurity have been considered for decades to be rural problems, but some analyses have however shown that urban poverty is also growing mainly because of lack of income which translates more directly into lack of food (Tibesigwa & Visser, 2015:2). The researcher of this study is of the observation that the urban poverty is increasing at a high pace because of rural-urban migration of people, particularly the youth and single mothers in search for wages. Due to rampant unemployment rates, some of the wage seekers end up in poorer livelihoods. Even those who may find the wages may end up in under-paid casual labour, which would make their earning get spent mainly to purchase food. FAO (2016:8) is of likewise assertion that, both urban and rural poor are the most affected by food insecurity as they spend much higher shares of their income on food. For example, the Palestine's rural and urban populations which had been displaced by conflict in 2012. Food consumption analysis of *the Socio-economic and Food Security Survey of 2012* shows that Palestinian households spent 50% of their cash income on food in 2012, an increase from 47% in 2011 (WFP, 2012:6). This ratio reached as high as 55% among the food insecure for both West Bank and Gaza Strip (WFP, 2012:6). In spite of food insecurity being caused by effects of climate change, on the other hand, food insecurity can aggravate the effects of climate change.

2.3.9.2 Exacerbating effects of climate change

Climate change may affect the nutrient density or the safety of food and fodder, even when food is available, accessible and consumed (McKune et al., 2015:2). The researcher of this study is of the opinion that when food and fodder quality is adversely affected, their nutritional content is reduced, and thus the ultimate reduced nutritional status of persons

and livestock consuming them. Literature emphasises that “dwindling livestock numbers, lowered agricultural productivity, and poor crop yields associated with climate change, can leave individuals and households in a calorie and nutrient deficient state” (McKune et al., 2015:2). McKune et al. (2015:2), in support of (Lloyd et al., 2011) further advance that, models predict that the effects of climate change will lead to a 55% increase in severe stunting in sub-Saharan Africa by 2050. This is due to food and nutritional insecurity brought about by effects of climate change, including drought which make food availability and access to the vulnerable difficult, and the poor quality of the available food, including animal products. Another impact of food insecurity is deterioration of public health.

2.3.9.3 Deterioration of public health

In cross-sectional analysis, a number of findings suggest that household food insecurity is linked to chronic disease (Laraia, 2013:203). For example, the HIV/AIDS pandemic has formed the world’s largest public health concern. Multiple interactive health-related problems which interact at biological and social level is of particular concern in public health because, it represents an aggregation of adverse conditions and the potential for multiple conditions to synergise and exacerbate burden of disease such as HIV/AIDS (Chen & Kalichman, 2014:398). Apparently, it is widely known that food and nutrition insecurity exacerbate complications among people living with HIV/AIDS (PLWHIV). Many studies show that in the presence of food insecurity, PLWHIV are very vulnerable to opportunistic syndromes. For instance, Palar, Kushel, Frongillo, Riley, Grede, Bangsberg & Weiser (2014:1527), stipulate that, “when food insecurity is prevalent among PLWHIV, it contributes to poor HIV outcomes ... such as increased depression.” Laraia (2013:203) hypothesises that stress can influence visceral fat accumulation and chronic disease. This hypothesis is validated through longitudinal association of food insecurity with symptoms of depression, using validated measures among participants living with HIV from *the Research on Access to Care in the Homeless Cohort in San Francisco* which found that, over half of participants (55%) were food insecure and 35.8 % had symptoms of depression. Moreover, in adjusted models, severe food insecurity in the previous period was associated with increased depressive symptom severity, and severe food insecurity was also longitudinally associated with a binary variable indicating probable depression (Palar et al., 2014:1527). Under severe stress conditions, both the hypothalamus-pituitary-adrenal axis and reward pathways can contribute to the release of cortisol, neuropeptide Y, and other substances, causing a desire to consume high energy-dense foods and altered metabolism, which would consequently promote accumulation of the visceral fat that plays a critical role in chronic disease (Laraia, 2013:203).

The researcher of this study believes that food insecurity further complicates the capacity to access medication among the poorest of PLWHIV. This is because the poverty they live in, coupled with food insecurity, hinders their purchasing power of antiretroviral drugs and the capacity to adhere to the medication routine. Chen and Kalichman (2014:397) postulate that food insecurity is closely connected in the context of poverty, and has been suggested to interfere with HIV antiretroviral medication adherence among PLWHIV. This was revealed in research which Chen and Kalichman (2014:397-398) conducted. The purpose of the study was: "Collecting longitudinal data on HIV medication adherence among PLWHIV in Atlanta, Georgia, to assess a possible synergistic effect between food insecurity and drug use, as factors affecting HIV medication adherence". They postulate thus: "Food insecurity is one of several co-occurring adverse conditions of poverty, which affects anti-retroviral therapy adherence" (Chen & Kalichman, 2014:397-398). Other consequences of food insecurity on public health, is that it can cause obesity and diabetes.

There are 870 million people worldwide consuming fewer calories than they require, thus experience myriad associated physical, mental, and health consequences of such deprivation (Jones, et al., 2013:482). A poorly nourished population is a less economically productive one (Jones et al., 2015:481). A possible pathway between household food insecurity and diet-related chronic disease is through weight gain and obesity (Laraia, 2013:205). In 1995, a medical case report by Dietz in Laraia (2013:205), hypothesised that food insecurity might influence weight gain through dependence on high-fat foods or physiologic response to cyclical food shortages (Laraia, 2013:205). Laraia (2013:203) adds that food insecurity has been significantly associated with type 2 diabetes. The researcher of this study believes that while undernutrition is more associated with the diabetes type 2, obesity is more associated with diabetes type 1. This is through a pathway of overdependence on high energy dense foods combined with deprivation to sufficient and quality food.

Household food insecurity has been previously hypothesised to promote dependence on inexpensive, highly palatable foods that are energy dense (Laraia, 2013:203). Such dependence, and the cyclical nature of having enough food in the beginning of the month, followed by food scarcity at the end of the month, could lead to weight gain over a short period of time; which may play a direct role in the development of a chronic condition such as obesity and its related complications (Laraia, 2013:203). The researcher of this current study is of the opinion that the households get enough food at the beginning of a month from end-month wage and salary payments. Thereafter, by the end of the month the money

is depleted causing food scarcity. This behaviour then predisposes the households to obesity.

The researcher adds that, food insecurity also causes food deficiency conditions in children. Conditions such as marasmus, kwashiorkor, scurvy and rickets, are associated with under-nutrition of one or many food nutrients. If children under five year old do not get a balanced diet, such as enough proteins, vitamin C and vitamin D, they are likely to get affected by the mentioned conditions. When children's health is affected at early stages, they fail to grow to their full capacity, and the growth is stunted and/or with physiological disabilities. The children's mental development may not be of full capacity, which ultimately limits their thinking and creativity. WFP (2012:6) on its profiling analysis shows that food insecure households are characterised by vulnerabilities such as high prevalence of chronic illnesses and disabilities. Lack of adequate food among populations, including FHHs causes and exacerbates conflicts.

2.3.9.4 Factors leading to/aggravating conflicts

While it might not be a direct cause and rarely the only cause, when combined with other factors, food insecurity could be the factor that determines whether and when violent conflicts will erupt (Qureshi et al., 2015:393). Recent increases in food prices are linked to widespread hunger and social unrest (Lagi, 2015:119). For example the 2008 global food price crisis, exposed the vulnerability of the global food system, and how quickly food insecurity can lead to significant civil unrest or food riots (Jones et al., 2013:481; Qureshi et al., 2015:393). The prices of food had tremendously risen from 2007 to early 2008, with the prices of grain including wheat, corn and rice rising by over 100% (Lagi, 2015:119). Drought in Kenya is causing conflict among the country's communities. In the recent news, nomadic pastoralists are said to invade sedentary farmers' holdings and ranches in search for pasture and water. For example, on the Sunday, 5th March of 2015, pastoralists invaded Sosian Ranch and shot dead the owner, Mr. Tristan Voorspuy (The Nation Team, 2017:1; Njuguna & Matara, 2017:10). This conflict follows the widespread drought in the country, which led pastoralists to invade private farms and ranches in search for pasture and water for their livestock. Kamau (2017:10), adds that the pastoralists were pushed South (from the North) by the debilitating drought, with thousands of their livestock. Besides being the cause of the violent conflicts, food insecurity may also aggravate levels of already existing violent conflicts.

FAO, IFAD & WFP Report on Food Insecurity 2015, contends that food insecurity can be a direct result of violent conflict and political instability and an exacerbating factor to violent

conflicts (FAO, IFAD & WFP, 2015:38). For example, the conflict between Israel and Palestine caused households in Palestine to relocate to other places, including to humanitarian camps. The relocation constrained the households' capacity to work for income, food production or food trade engagement. In the Eastern Africa, the famine in Somalia was mainly caused by conflict and drought, which resulted in the deaths of more than 250,000 people between 2010 and 2012 (FAO, IFAD & WFP, 2015:38). The food insecurity in Somalia further exacerbated conflict among clans competing for water and pasture resources, and cyclical terrorism. Such conflicts displace people from their residences, hence preventing them from practising any kind of food production and marketisation. In Kenya, pastoralist communities – which deem cattle rustling a culture, have had vicious clashes competing for sources of food, pasture and water. This notion is indicated by Republic of Kenya (2015:12) that, escalation of conflicts (especially in the Northern parts of Kenya) is because of grazing, resources, high food prices and reduced livestock productivity. When viewed from a human rights perspective, food security becomes imperative for everyone. All people including FHHs should access sufficient and quality food, as stipulated by the World Food Summit. This assertion points to food security having a moral value.

2.3.9.5 Moral value

Food security matters from a moral perspective; it has been broadly agreed upon as a basic human right since 1948, under *Article 25 of the Universal Declaration of Human Rights*: “Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care ...” (Jones et al., 2015:481). Furthermore, the definition by the WFS reveals the need to consider food security an aspect of morality - it is a violation of basic human right if any member of the society is denied the chance to have sufficient and quality food, including catering for the individual's food preferences. The WFS declaration has already influenced more than 40 countries to adopt food security as human right and further enshrined it in their constitutions (FAO, 2006:1). For instance South Africa's Constitution offers provisions for the Bill of Rights in its chapter two, which among other provisions include: equality; human dignity; and health care, food, water and social security (Constitution of the Republic of South Africa, Act 108 of 1996: 5-6, 11). The provision on food is that, everyone has the right to have access to sufficient food and water (Constitution of the Republic of South Africa, Act 108 of 1996: 5-6, 11). In *the Constitution of Kenya 2010*, the Bill of Rights is provided for in the chapter four of the constitution. On economic and social rights, the provisions include: human dignity; equality and freedom from discrimination, for example, women and men have the right to equal treatment, including the right to equal opportunities in political,

economic, cultural and social spheres; to be free from hunger, and to have adequate food of acceptable quality, and to clean and safe water in adequate quantities (The Constitution of Kenya, 2010:24, 25, 30). This means that “equality is all-round for everything” including gender and food equality. Therefore, all men’s, children’s and women’s right to food should be protected to protect their welfare, including self-esteem.

2.3.9.6 Effect on females more than males

In many parts of the world, a reality check shows that there are still cultural and other barriers to women empowerment (Dejak, 2017:15). It is not good that women have a marginalised role in the labour economy, mostly in the unpaid child care and household work (Dejak, 2017:15). Literature reveals that females are more disadvantaged as compared to males, including on poverty levels. For instance, Tibesigwa and Visser (2015:2), citing FAO notes that: “In all developing regions, female-headed rural households are among the poorest of the poor”. As noted earlier, food insecurity caused by malnutrition has myriad of damages. Sufficient reduction in essential nutrients can put women at risk of nutrient deficiencies, thus compromising women’s health (Laraia, 2013:204). For example, Mwendwa (2017:12) while reporting for the Daily Nation newspaper says:

A fifty year old woman in Marsabit County was admitted in a health facility for a third time with malnutrition and low blood sugar as a result of hunger and lack of balanced diet. The nurse in the clinic she was admitted said that the woman gave her children all the food, leaving herself malnourished.

Lower intake of fruits, vegetables and meat among women is associated with food insecurity among the households they come from (Laraia, 2013:204). Laraia (2013:204) indicates:

Using data from the Current Population Study, Rose and Oliveira assessed the association between food insufficiency and 15 nutrients and found that women and elderly adults from food-insufficient households had significantly lower mean intakes for the majority of nutrients assessed. Women from food-insufficient households had greater odds of intake of less than 50% of the recommended dietary allowance (RDA) for energy; vitamins A, E, C, and B-6; magnesium; thiamin; and niacin, whereas the elderly had lower intakes of protein; vitamins A and B-6; calcium; phosphorus; thiamin; riboflavin; and niacin.

In the Marsabit County, children, the elderly and women were found to be highly malnourished in absence of food supplements in local health care centres (Mwendwa, 2017:12). Furthermore, Laraia (2013:205) emphasises that many studies have shown an association between household food insecurity and lower fruit, vegetable intake and a lower dietary intake of a number of micronutrients across studies for women and older Americans.

Through press, humanitarian reports and the mass media, the researcher has observed besides children, women are the innocent victims of violent conflicts, including those

emanating from food insecurity. For example, the media in 2017 had been reporting that the Southern Sudan had the highest number of refugee ever in history and the majority is women and children have suffering from the effects of the civil strife, especially food insecurity. The gender-based discrimination is intensified by food insecurity, and intensifies pre-existing community adversity (McKune et al., 2015:6). The researcher of this study has been observing occurrences of domestic violence in Kenya as a result of household food insecurity. This is more so especially among the *de facto* FHHs where the female is actually acting as the head of the household, while her irresponsible husband subjects her to verbal abuse and/or to the extreme, murder. Other causes of domestic violence among households or families in the country are suspected infidelity and estrangements among domestic partners. Furthermore, Guterres (2017:15), the current UN Secretary General, on his visit to Kenya, has written an article to marking the International Women's Day, and laments that women's rights are being eroded, and that women are routinely targeted for intimidation and harassment.

2.4 Summary

The concept of food security has been formulated along generations, until the latest definition by the 1996 WFS. Most sectors adopt the definition. FAO's definition of food security comprises four interrelated pillars or metrics which are food availability, access, utilisation, and the stability of food over time. Nutritional insecurity is sometimes used interchangeably with food insecurity, but the former is broader because, nutrition security considers care, health, and hygiene practices in addition to food security. Research has suggested different approaches to measuring food security, which include: the HFIAS developed by FANTA, the SEFSec survey, the FANTA's triangulated method, IPC. There are several factors which influence food security, including public policies because they can provide resources needed for producing, storing and distributing food along the value chain; and can deliver institutions and regulations required to underpin equitable and safe food systems. The other factor is food demand. Global food demand in 2050 is projected to increase by at least 60% above 2006 levels, driven by population and income growth, as well as rapid urbanisation. Food access also affects food security either directly or by means of financial purchases. Well-functioning food markets are also essential for food security. This is because they can help increase incomes and improve food availability and affordability. Additionally, food supply is important for provisioning or availability of food for nutritious diet. According to the researcher, own food production plays the most integral role in local food security, since the own food production provides the best food sustainability and psychological stability than other sources. Food and nutrition know-how requires some formal and/or informal education. Education is a key factor in influencing

food security status of a household - it provides greater employment opportunities to the household heads. Economic factors are also a key player in food security, and they encompass interlinkages of three dimensions: economic growth, social development and environmental sustainability. Lastly but not least, improvements in public infrastructure in both rural areas and urban technologies can improve both food security and household nutrition. Consequences of food insecurity are myriad. Food insecurity, alone or when combined with other factors cause negative impacts among human populations, including exacerbating poverty. Climate change may affect the nutrient density or the safety of food and fodder, even when food is available, accessible, and consumed. Food insecurity could be the factor that determines whether and when violent conflicts will erupt. Moreover, food security matters from a moral perspective, since it is a basic human right, and the food insecurity affects females more than males.

The following chapter focusses on food security among female-headed households.

CHAPTER 3

FOOD SECURITY AMONG FEMALE-HEADED HOUSEHOLDS

3.1 Introduction

This chapter focuses on rights-based approaches to food security among female-headed households. Two key terms described in this chapter are female food security and rights-based issues. Female food security is a rights-based issue. In the chapter also dimensions of rights-based food security are under the following topics: food availability, access, utilisation and stability. Other issues in the section are significance of the rights-based food security, and the concept of female-headed household's food security.

The section on female food security as a rights-based issue, the following topics and sub-topics are highlighted and discussed: dimensions of rights-based food security, and significance of the rights-based food security. The section on the concept of FHHs food security focuses on the following general factors which affect food security among the FHHs: female poverty, female social reproduction, female labour, female production, female farming, and female nutrition education.

The chapter also focuses on the consequences of food insecurity among the FHHs including: jeopardising public health, exacerbating poverty, the cyclic relationship between conflicts and female food security, violation of girl-child rights, deteriorating effects of climate change, leading to coping strategies. The last section in this chapter is the summary.

3.2 Definition of key terms

There are two key terms described in this section, which are female food security and rights-based issues.

3.2.1 Female food security

As described in the previous chapters, the commonly ratified definition of food security is the one by the WFS of 1996 that: *“The existence of food security happens when all people at all times have physical and economic access to adequate, safe, nutritious food to meet their dietary needs and food preferences for an active life”*. Rights-based food adequacy requires that food satisfies dietary needs, be safe for human consumption, free of adverse substances, and culturally acceptable (De Schutter, 2014:4). With regard to this study, female food security draws its definition from the WFS, but focuses specifically on the FHHs.

3.2.2 Rights-based issues

Female food security is a rights-based issue. *“Rights-based issue is a social development approach founded on the constitutional principles promoting social and economic justice and the equitable distribution of resources favouring the most disadvantaged in the society”* (De Vos, Strydom, Schulze & Patel, 2011:23). The essence of this study is drawn from the researcher’s recognition that the FHHs are among the most vulnerable entities to food insecurity. The right to food requires the possibility either to feed oneself (including all household members) directly from productive land or other natural resources, or to purchase food (De Schutter, 2014:4). The researcher of this study is of the opinion that, females face myriad hardships which hinder them from feeding themselves and their households well, whether from their farms or procurement of food commodities. It is therefore vital to recognise the FHHs’ food security as a human right.

3.3 Female food security as a rights-based issue

The 1996 WFS agreed on the following definition of food security, which is used by FAO: *“Food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”* (FAO, 2016:9). This definition enshrines human rights aspects by stressing “all people’s all-round access to food”. The researcher of this study notes that, besides this definition which is currently on wide usage, the focus on food security is now clearly shifting to the human rights and ethical aspects. Literature reveals a history of food security as described in human rights perspective. The right to food was first recognised in the Universal Declaration of Human Rights in 1948 (De Schutter, 2014:4). The definition of the right to food is also enshrined in *the 1966 International Covenant on Economic, Social and Cultural Rights* (De Schutter, 2014:4):

The right to have regular, permanent and unrestricted access, either directly or by means of financial purchases, to quantitatively and qualitatively adequate and sufficient food corresponding to the cultural traditions of the people to which the consumer belongs, and which ensure a physical and mental, individual and collective, fulfilling and dignified life free of fear (Qureshi et al., 2015:393).

In 1996, the Right to Adequate Food was formally adopted (FAO, 2006:1). In cognizant of the efforts to legitimise food security as a human right, several international legal instruments that recognise the right to food are highlighted in this section. They include: *the Convention on the Rights of the Child (art. 24(2)(c) and (3); art. 27(3))*, *the Convention on the Elimination of All Forms of Discrimination against Women (art. 12(2))*, and *the Convention on the Rights of Persons with Disabilities (art. 25(f); art. 28(1))* (De Schutter, 2014:4). The researcher of this study observes that, due to increased global advocacy and

recognition of human rights, rights-based approaches to food security have become the contemporary discourse, even among nations. Therefore this study was designed to investigate into food security among female-headed households, as a right-based issue in community development.

FAO (2006:1) indicates that in 1996, the formal adoption of the Right to Adequate Food marked a milestone achievement by WFS delegates. This is because it pointed the way towards the possibility of a rights-based approach to food security, which has currently influenced over 40 countries to adopt food security as human right and further enshrine it in their constitutions (FAO, 2006:1). For instance, the researcher of this study has realised through perusal of literature that, South Africa's Bill of Rights, enshrined in the chapter two of its constitution, and Kenya's Bill of Rights in the chapter four of its constitution recognise food security as a human right. FAO estimates that the right to food could be judicial in some 54 countries (McClain-Nhlapo, 2004 in FAO 2006:1). The researcher of this study notes that FAO has put concerted efforts in making countries ratify food security as a human right. Moreover, in 2004, a set of voluntary guidelines supporting the progressive realisation of the right to adequate food in the context of national food security were elaborated by an Intergovernmental Working Group under the auspices of the FAO Council (FAO, 2006:1). In Kenya, *the Constitution of Kenya 2010* and *the NFNSP 2011* are the national working legislations on food security.

The researcher of this study recognises that food security is a human right and should be treated so, even on female-headed households. According to Article 25 of the Universal Declaration of Human Rights of the United Nations, food security is a fundamental human right for human development, economic development, peace and security (Qureshi et al., 2015:393). As a human right and a key priority of the post-millennial agenda, all aspects of food security among all sections of the world are inevitable.

Raleigh (2015:188) asserts that, food security is a key development priority for all African states since over 60% of Africans are episodically food insecure and one quarter are chronically food insecure. One major contributing factor to the food insecurity in Africa is rapid urbanisation, with slow or decline in economic growth, as Olielo indicates: "In Africa, urbanisation has occurred in an environment of consistent economic decline" (Olielo, 2013:5). The economic growth in Sub-Saharan Africa slowed from 5.1% gross domestic product (GDP) growth in 2014 to 3.8% growth in 2015 and more so, there was a slowed growth of 3.4% in 2015 from 5.8% in 2014 in the East Africa Community; which was mainly associated with political instability in Burundi and uncertainties associated with general

elections in Tanzania and Uganda (KNBS, 2016:4). In Kenya, food insecurity challenge is a menace persistent despite the legislations formulated to address the problem.

For example, according to Olielo (2013:3), between February and September 2009, Kenyans who required food assistance numbered 2.6 million (Olielo, 2013:3) out of the 38.6 million of Kenya's population (KNBS, 2012:20). The food insecurity situation continued to persist in the country even in the subsequent years. In 2011 the number of hungry Kenyans was 3.5 million (Olielo, 2013:4). Moreover, the KNBS (2014:8) indicates that Kenya's population who were in need of humanitarian assistance was 2.1 million in September 2012. Despite the prevalence of food insecurity among Kenyans, the researcher of this study recognises the importance of the legislations on food security in the country. For example, the researcher hypothesises that, the implementation of the provisions of the legislations combined with favourable weather in 2015 might have influenced the positive economic development in the country as illustrated by KNBS (2016:3): "The Kenya's GDP is estimated to have expanded by 5.6% in 2015 compared to a 5.3% growth in 2014". Though not optimum, the slow but positive GDP growth in the country is said to be influenced heavily by improved harvests in 2015. According to USAID (2015:1), the GOK interventions, the United States Agency for International Development (USAID) and other international humanitarian assistance, and near-normal rainfall during the 2015 March-to-May long rains resulted in relatively improved food security.

However, the researcher also recognises that the growth is not always stable nor always on upward trend. Moreover, the growth does not always translate to positive social welfare among all Kenyan communities such as the FHHs. Therefore she is of the opinion that, despite indicating positive economic growth, Kenya like most countries in the East African Community, is cumbered with the burden of slow pace of economic development complicated by the challenges droughts and food insecurity. According to USAID (2015:4):

Although cyclical drought has affected Kenya for years, droughts are becoming more frequent, limiting the ability of households to recover between drought cycles. Following unfavourable rainfall in late 2010 and early 2011, severe drought conditions resulted in sharply deteriorating food security conditions among pastoralists in northern Kenya and populations in rain-dependent marginal agricultural areas of the lower south-eastern regions. Affected populations experienced loss of livelihoods, lack of food and agricultural resources, and limited access to safe drinking water.

She thus recommends for Kenya as a country to expand its partnership with the global community to enhance food security among all segments of its communities. The concerted efforts by the multi-agencies will accelerate the growth among everyone and eradicate any kind of communal marginalisation, including with regard to food security.

The interventions should majorly focus on combating the effects of climate change, particularly droughts. FAO (2016:9) indicate that seasonal patterns of inadequate food availability and access are major causes of undernutrition among poor rural communities, and are accentuated by climate change which has impacts on livelihood security and on intra-family food distribution, affecting in turn the nutrition status of children and women in particular (Wijesinha-Bettoni et al., 2013 in FAO, 2016:9). Kenya has continued to experience food insecurity due to droughts precipitated by climate change. For example in Kilifi County of the Coastal Region of Kenya, more than 300,000 people are faced with starvation as over 1,000 animals have died as a result of the drought in the recent months (Ongala, 2017:22). Likewise, the drought has also ravaged the most part of the country including those deemed higher agricultural potential areas, including the Western Kenya Region.

Communities living in the Western Kenya are likely to be particularly vulnerable to the dry spell that has persisted since late last year (2015), even as attention is focused on more arid parts of Kenya (Ngethe, 2017:10). The food shortages in Kenya are precipitated by continuous erratic rains in the country, which according to the researcher, highlights the need for concerted efforts in counteracting the natural disaster. Therefore, the national and county governments in collaboration with humanitarian organisations should provide adequate emergency response to the food insecurity. An example of the intervention is by the County Government of Turkana which is responding by utilising its devolved unit funds from its budget to ensure consistency in relief food distribution (Lutta, 2017:10). However, the severing of the drought is advancing at an alarming speed - the Turkana County Steering Committee has reported that the drought is at the alert stage and was approaching emergency stage. This means partnership is required to alleviate its effects. It is on that realisation that the Turkana County Disaster Management Executive is appealing for extra support to feed the increasing number of people staring at starvation (Lutta, 2017:10). The researcher is of the opinion that food security as a human right can be achieved in Kenya through multi-agency partnerships with communities. As part of the Voi Community, FHHs' food security must be realised to eradicate food security inequalities.

3.3.1 Dimensions of rights-based food security

Santeramo (2015:68) provides a list of variables for food security composite indices as: availability, access (physical and economic), utilisation, and stability. According to the 1966 International Covenant on Economic, Social and Cultural Rights definition, three hierarchical dimensions of food security stands to be ensured. The nutritious and culturally appropriate food must be made available, accessible, and consumed (also called utilisation)

(McKune et al., 2015:2) appropriately. The researcher is of the opinion that, stability of food is also essential to ensure sustainable food security among everyone, including the FHHs.

3.3.1.1 Food availability

Several related definitions of food availability have been provided in chapter two. In addition, FAO describes availability of food as sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid) (FAO, 2016:9). De Schutter (2014:4) describes food availability as relating to there being sufficient food on the market to meet the needs. The researcher of this study observes the critical role domestic production (referred in this study as own production), food import and purchases play to ensure food availability. The researcher further emphasises that, the own food production is more sustainable than the rest of the sources, because there is more self-esteem in self-dependence in food provision. However, she reckons that in situations of massive food shortages, such as the national-wide food shortages in 2017 due to the drought stretching from 2016, the government in collaboration with food security partners should facilitate food aid to the vulnerable Kenyans. For instance, Famine Early Warning Systems Network (FEWS NET, 2018:1) indicates the following: “Following significantly below average March to May long rains (2017) across the majority of Kenya’s pastoral and marginal agricultural areas, large areas of the country are experiencing Crisis (Integrated Phase Classification Phase 3) outcomes and atypically high food assistance needs”.

The researcher of this study is aware of previous interventions of food assistance sponsored by the WFP, USAID and other humanitarian organisations, and facilitated by the GOK, Non-governmental Organisations (NGOs) and Faith-based Organisations (FBO). For example, USAID (2015:1) indicates:

On October 22, 2014, Ambassador Godec (US ambassador to Kenya) reissued a disaster declaration due to increased food insecurity and poor nutritional conditions in Northern Kenya and in the capital city of Nairobi. In response, USAID supported the implementation of nutrition and emergency food assistance activities for food-insecure and malnourished populations in affected areas.

However, the researcher is of the opinion that, the food aid is not sustainable enough to maintain food supply homeostasis or stability among “all people” or “everyone” as asserted by the WFS. The “everyone” include the FHHs. The food assistance is only a short-term endeavour, which may culminate into a vicious cycle of social provision-dependency among the vulnerable groups, including the FHHs under the assistance. Therefore, the researcher is of the opinion that food aid interventions are more appropriate when offered as short-term measures to avert food insecurity in times of emergencies. The other domain of the rights-based food security is food access.

3.3.1.2 Food access

From the definition of food security by the WFS of the 1996 (see section 3.2.1), food accessibility entails both physical and economic access. The physical accessibility means that food should be accessible to all people, including the physically vulnerable such as children, older persons or persons with disabilities, while the economic accessibility means that food must be affordable without compromising other basic needs such as education fees, medical care or housing (De Schutter, 2014:4). The researcher of this study is of the opinion that physical accessibility should facilitate fair physical distance proximity to food sources by everyone, while the economic accessibility should ensure all peoples' reach to food without compromising any aspect of socio-human ecology. With regards to economic access, Santeramo (2015:69) provides a synonym of it as food affordability. Rights-based access to food means individuals and/or households have adequate access (reach) to sufficient resources or entitlements for acquiring appropriate foods for a nutritious diet (FAO, 2016:9). Moreover, FAO (2006:1) indicates that, in order for individuals (who belong to households) to access food well, they need to have adequate entitlements which are the set of all commodity bundles over which a person can establish command; given the legal, political, economic and social arrangements of the community in which they live. The researcher is of the opinion that the interlinkages between assets and human's freedom are fundamental. It is in the same regard that, females as household heads should have entitlements including farmlands, under their command for good food access for their households. Qureshi et al. (2015:393), adds that the need for the access to sufficient food should be in line with the cultural traditions of the people to which the consumer belongs. Food culture (exo-system of human-ecology) entails acceptable and taboo foods of a community. Like everyone else, female household heads should have access to acceptable foods in their community, without having to digress to or adopt coping strategies such as providing their households with taboo foods. For example, the females should not have to provide carcass meat to her children, because she cannot afford to buy them staple foods. Furthermore Walsh-Dilley, Wolford and McCarthy (2016:11) indicate that, rights-based framework helps to generate the expectation that all people should have access to the resources they need to build resilience. The researcher of this study is of the opinion that, with food availability and access, food utilisation is made a reality to households, including the FHHs. This is because if food present and reachable is easy to consume.

3.3.1.3 Food utilisation

Through literature review, the researcher of this study has noted that "food utilisation" is the most commonly used term for "food consumption". This is exemplified among others, in

Bilinsky and Swindale (2010:1); FAO (2013:21); FAO (2008:1); Jones et al. (2013:483); Vaitla et al. (2013:48). As a human right, food utilisation entails eating adequate diet, using clean water, access to sanitation (and observing proper hygiene), and healthcare to reach a state of nutritional well-being where all physiological needs are met (FAO, 2016:9). In corroboration with FAO's observation, the researcher of this study supports that, FHHs should be entitled to adequate diet under basic hygiene and sanitation conditions; which ensure optimum health status of the household members. This therefore means, as the household members consume food of adequate quantity, quality of the food is also essential. Food of adequate quantity and good quality maintains calorific adequacy and enhances household and community health. Besides consuming balanced diets of good quantity and quality, the FHHs should moreover utilise the food under conducive food ecology through proper hygiene and sanitation. The researcher is of the opinion that, all the three dimensions of rights-based food security mentioned above should be maintained by the fourth domain, food stability.

3.3.1.4 Food stability

The researcher of this study conceptualises the concept of food stability as an emerging domain of food security. FAO (2016:9) asserts that, in the human rights perspective, food stability is a requisite in the availability of and access to food, regardless of sudden shocks such as economic or climatic crises or cyclical events such as seasonal food scarcity. Also Upton, Cissé and Barret (2016:135) in reference to FAO (2006, 2008), and Maxwell and Smith (1992) indicate that, more recently, focus has turned to the utilisation of foods through proper nutrition, preparation, and feeding practices, and the stability of these conditions over time. The researcher of this study would describe food stability as a right-based issue; as smoothed supply or availability of food to households throughout without failure or breaks. According to Santeramo (2015:68), lack of food stability symbolises vulnerability to food insecurity. To further emphasise on the meaning of stability, the researcher is going to revisit the definition of food access by Qureshi et al. (2015:393); as permanent and unrestricted access, either directly or by means of financial purchases, to quantitatively and qualitatively adequate and sufficient food. The researcher therefore conceives the word "permanent" to underscore continuous supply, reachability and utilisation of food without a failure.

As previously indicated in the sub-section 3.2.2, food security is a right-based issue, and hence is the stability. The frameworks of rights not only address the right to food itself, but the right to the social, political, and natural resources that allow them to determine and define their own systems of food production and consumption (Walsh-Dilley et al., 2016:11).

According to the researcher of this study, the social aspect of food security may embody social assistance. Santeramo (2015:68) indicates emergency food assistance as a policy intervention to food insecurity. The researcher is also of the opinion that, food assistance is most applicable in the time of emergencies emanating from catastrophes, including droughts. For example, Hendrix and Haggard (2015:2) illustrate the scenario of existence of food assistance in Kenya:

The number of people in need of emergency food assistance in Kenya decreased by approximately 33 percent between February and August (2015), from nearly 1.6 million people to approximately 1.1 million people (according to the GOK and humanitarian partners); which food security experts attribute the improved situation to the near-normal performance of the long rains in most of the country (in the year).

Moreover, Hendrix and Haggard (2015:145) while quoting Dreze and Sen (1989) still observe that, food is the most basic of all necessities and the one most likely to embody explicit or implicit political entitlements. Thirdly, the researcher is of the opinion that, natural aspect of food stability mostly entails availability of water resources, including rains. According to Hendrix and Haggard (2015:143-144), global warming could fundamentally alter the distribution of world agricultural output and exacerbate volatility in prices. The researcher is of the opinion that the social, political and, natural ecologies maintain food security among communities, including the FHHs. This is because rains or water resource influence the amount of food production which consequently have impacts on food prices. The food prices cyclically influence political stability of a country. Food price volatility can spring and spike up food-related civil uprising. It is therefore important to maintain homeostasis between social, political and natural ecologies for sustainable food security among all populations including the FHHs. Moreover, Upton et al. (2016:135), indicate that, there is need to have keen awareness of shocks to production and food prices. Availability, access, utilisation, and stability are now widely accepted as the four pillars of food security (Upton et al., 2016:135). So, it is clear that the food availability, access, and utilisation are maintained by the stability, and all the domains should be sustained as human rights.

3.3.2 Significance of the rights-based food security

It has been mentioned at the beginning of this chapter that several definitions of food security have tried to include food access as a human right (see FAO, 2016:9; Qureshi et al., 2015:393). There have been efforts, especially those facilitated by the UN, in addressing gender inequalities through formulating new, or tweaking strategic plans and legislations to meeting the need. An example to this is the convention on the elimination of all forms of discrimination against women (CEDAW). CEDAW is an international legal instrument that requires countries to eliminate discrimination against women in all areas and promotes

women's equal rights (Khanna, Kimmel & Karkara, 2016:1). CEDAW is often described as the international bill of rights for women (Khanna et al., 2016:1). Following this assumption, the researcher of this study is of the opinion that the convention meets the criteria of being an international legislation to address gender inequalities, including food security among the FHHs. The researcher is therefore of the opinion that, the critical significance of female food security as a rights-based issue is that there is recognition that there is a need to guarantee that women and girls enjoy their rights on an equal basis with men and boys in food security. The CEDAW Legislation is as a result of the UN's efforts to bridge such gender gaps.

The UN adopted CEDAW on 18 December 1979, and as of 2016, 189 countries have ratified it, which means that these countries have agreed to do everything they can to guarantee that women and girls can enjoy their rights on an equal basis with men and boys (Khanna et al., 2016:1). This coincides with food security definition. Upton et al. (2016:136), observe the definition of food security by the 1996 FAO Food Summit as entailing: "All people at all times have physical, social, and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life". CEDAW requires countries to eliminate discrimination against women in the public as well as the private sphere, including in the family, and recognises that traditional gender roles and stereotypes must be eliminated in order to end all forms of discrimination against women and girls (Khanna et al., 2016:2). It seeks to achieve 'substantive equality' or 'equality of results', which stresses that there should be equal access, equal opportunities, and equal results for women and girls (Khanna et al., 2016:2). It entails that countries are obligated to take all necessary actions that may be required to make sure women and girls actually experience equality in their lives (Khanna et al., 2016:2). Other related efforts by the UN have been the MDGs; the current operational SDGs and documents of UN Women, including ESARO. The researcher of this study is of the opinion that, in spite of these efforts, much is yet to be realised in ensuring gender equality in food security, particularly among the FHHs. The fact that the gender gap persists (in food security) suggests that the underlying constraints are still inadequately tackled in policy strategies and programs (ESARO, 2015:1).

Food and nutrition security and gender equality are closely linked and mutually constitutive (Brody, Hossain, Oswald & Smith, 2014:2). The fact that women and girls are among the most undernourished in the world and are often hardest hit by food insecurity which underlines this (Brody et al., 2014:2). Additionally, the researcher is also aware that, besides facing challenges of feeding themselves, adult females are cumbered with the

burden of nurturing children. These children require proper feeding if they are to have suitable physiological growth and development. This view is advanced by the global research community which according to (Qureshi et al., 2015:395), has recognised the role under-nutrition plays in creating and maintaining poverty traps, with maternal and child under-nutrition identified as the primary pathway by which poverty is transmitted from one generation to the next. Therefore the researcher further feels that in order to ensure food security as a human right, implementation of gender-based food policies and plans is inevitable. Thus rights-based food security must be supported to achieve gender balance in food systems. McKune et al. (2014:6), also observes that, women have varying roles in food systems, and thus effective planning for adaptation should anticipate the consequences on gender-specific workloads and effects on existing inequalities between men and women both within households and communities. Thus, the researcher of this study likewise agrees that structural changes are critical in bridging the gender gap. The rights-based approaches to food security reveal the need for female inclusion in decisions, planning and implementation of food security strategies. Bereuter et al. (2014), as quoted by Mckune et al. (2015:6), observes that, there is a need for institutional and social changes, since they are essential elements of adaptation.

3.4 The concept of female-headed household's food security

The goal of the SDG2 is to end hunger, achieve food security and improved nutrition and promote sustainable agriculture, by seeking to end hunger and all forms of malnutrition and to achieve sustainable food production by 2030 (UN, 2016:4). This goal is premised on the idea that everyone should have access to sufficient nutritious food, which will require widespread promotion of sustainable agriculture, a doubling of agricultural productivity, increased investments and properly functioning food markets (UN, 2016:4). The researcher of this study premises that, this formulation of the SDG follows the partial and mixed achievement of hunger and food insecurity alleviation by the MDG1, whose target was to half the proportion of the world's poor and hungry by 2015 (see sections 1.3 and 1.5 in chapter 1). The MDG1 sought to eradicate poverty and hunger (Olielo, 2013:3). Food security reports show that the target of the MDG1 had been achieved globally, excluding the Sub-Saharan Africa. The researcher of this study however, feels the need for concerted efforts in implementing the targets of the SDG2, since the target of the MDG1 of halving the people suffering from hunger was not enough in ensuring total food security. Salient gaps still linger in hunger and food insecurity eradication among the global society, more especially the Sub-Saharan Africa.

The UN report on SDGs indicate that the proportion of the population suffering from hunger globally is 11% in 2014-2016, and nearly 800 million people worldwide lack access to adequate food (UN, 2016:4). Still, there are 870 million people worldwide consuming fewer calories than they require; thus experience myriad associated physical, mental, and health consequences of such deprivation (Jones, et al., 2013:482). The situation of food insecurity is worse in the Sub-Saharan Africa. FAO (2015:1) has indicated in chapter one of this study that the overall decline of hunger prevalence in the Sub-Saharan Africa by 2015 was only 30%. Moreover, more than half of the adult population in the region faced moderate or severe food insecurity in 2015, while the level was severe for a quarter of adults in the region (UN, 2016:4, 14). Likewise, the situation is not any better in Kenya.

The National Drought Management Authority (NDMA) has reported that the number of Kenyans in need of relief food has risen to 2.7 million (in 2017) from 1.3 million in 2016 (Wanzala, 2017:10). FAO cites Kenya as one of the countries where prices of basic food commodities are at abnormally high levels and has also observed that the cost of grain in Kenya has risen by around 30%, driving most households on the brink of food insecurity (Omondi, 2017a:29). As informed by statistics, the researcher of this study deduces that the proportion of adult females is higher than males in Kenya. Out of a total population of 38,610,097 Kenya's population enumerated in 2009 Population and Housing Census, 19,417,719 were females and 19,192,378 were males (KNBS, 2012:20). The higher number of females implies that proportionally, the majority affected by the food insecurity in the country are females, which could possibly influence vulnerabilities associated with the female gender.

3.4.1 Factors affecting female-headed household food security

Literature reveals that the vulnerabilities to food insecurity among female-headed households are precipitated by myriad factors such as poverty, social reproduction, labour, production and farming.

3.4.1.1 Female poverty

The world leaders in their ratification for the 17 SDGs prioritised poverty eradication as goal number one. The goal is to end poverty everywhere in all its forms by 2030 (UN, 2016:3). This is in the hope that by the 2030, all forms of poverty among everyone and everywhere will have been eradicated. The list of SDG1 targets agreed upon by the UN Statistical Commission in March 2016 (UN, 2016:3) indicates:

Target 1: ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic

services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance. Target 2: create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender-sensitive development strategies, to support accelerated investment in poverty eradication actions. Target 4: reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions.

Several UN reports indicate that overall poverty was halved by the end of the MDG year, 2015. Statistics indicate that the proportion of the global population living below the extreme poverty line dropped by half between 2002 and 2012, from 26% to 13%; which means one in eight people worldwide were living in extreme poverty in 2012 (UN, 2016:3). Despite this commendable achievement, the world leaders have realised the need to accelerate efforts to ending poverty altogether. This is because the 13% of global population that still remains in the poverty is still significant. The UN reports that in the decade (from 2002 to 2012), the proportion of the global population living below the general poverty line dropped by half, as with the extreme poverty - from 26% to 13% (UN, 2016:12). The researcher observes and agrees that some sections of the world's populations are still experiencing the poverty, and therefore concerted efforts are needed to emancipate them from the problem. This is more particularly the Sub-Saharan Africa.

Literature reveals that prevalence of poverty is the highest in the Sub-Saharan Region than any other region in the world. Poverty remains widespread in the Sub-Saharan Africa, where more than 40% of people lived on less than 1.90 US dollars a day in 2012 (UN, 2016:3, 12). The poverty situation in Kenya is worse and is above the average of the Sub-Saharan Africa. In 2007, about 56% of Kenyans were poor and hence their households had no income to afford basic needs including food of 2250 kilocalories per adult equivalent per day (Olielo, 2013:3). An analysis regarding poverty levels based on provinces in Kenya indicated the following findings: Nairobi - 29.5%, Central - 31.4%, Nyanza - 46.1%, Rift Valley - 49.5%, Eastern - 45.2%, Western - 51.1%, Coast - 63.5% and North Eastern - 66.5% (Olielo, 2013:3). Moreover, the current data on devolved counties show that four out of five unequal counties and five of the most unequal 10 are at the Coast; while the most unequal county measured by Gini coefficient, is Tana River with a value of 0.617, followed by Kwale, Kilifi, Lamu and Migori (Ngethe, 2017:10). The data also reveals that Turkana County, which is the poorest was also the most unequal; while the most unequal constituency is Teso South in Busia, followed by Galole, Bura, Garsen and Magarini, all from the Coast (Ngethe, 2017:10). The researcher of this study observes that, the Coast has startling statistics which is an indication that much is yet to be done in ending the poverty scourge in the area. UN (2016:3) rightly asserts that, more efforts are needed to

ensure that “all people everywhere, including the poorest and most vulnerable, should enjoy a basic standard of living...”

- **Elements of female poverty**

This section explores elements or factors which influence poverty among females, namely: rural-urban nexus, labour remuneration, culture, unemployment, insufficient feeding and nutrition programmes, and illiteracy.

- **Rural-urban nexus**

Through literature search, the researcher of this study observes with concern that, females, especially those residing in rural areas are more vulnerable to poverty than males. Relatively recent, FAO noted that: “In all developing regions, female-headed rural households are among the poorest of the poor” (Tibesigwa & Visser, 2015:2). FAO further stated that poverty and food insecurity have been considered for decades to be rural problems (Tibesigwa & Visser, 2015:2). Through personal experience the researcher has been observing males migrate to urban areas in search of jobs, leaving behind their wives or other close females at rural homes. This is more so because of cultural beliefs that the man retains kinship honour if he marries and the wife remains at close proximity with his close relatives. These females remain behind mostly to tend for farms (livestock and crops). According to Braunstein (2015:30), in low-income agricultural economies, women have high labour force participation rates but their work is concentrated in the agricultural sector than men’s. While this practice may enhance own food production, the researcher is of the opinion that it limits the females from being productive elsewhere. Worse still, the impacts of climate change are hindering the agricultural production; therefore, the need for economic activity diversification among the females. Other strategies of eradicating poverty among females are suggested.

The strategy of expanding agricultural job sector will provide more employment to the females. Some countries are shown to have fair achievements in using farm jobs as sources of incomes for their populations. For example, evidence shows that agriculture employs more than two thirds of Malawi, Tanzania and Uganda populations; including some of the poorest citizens in the countries (ESARO, 2015:8). Therefore increasing agricultural production in these countries can make a significant contribution to reducing poverty (ESARO, 2015:8). The researcher of this study is also of the opinion that, the income citizens of these countries earn from the agricultural sector boosts their household food purchasing power. Conversely for females, despite their larger contribution to farm labour, they do not easily access the farm employment. ESARO (2015:6) indicate that, the female’s lower access to farm labour is one of the most important constraints contributing to the

gender gap in Malawi and Tanzania. The researcher therefore is of the perspective that, this situation evidences that women's major contribution in farm labour is concentrated on household food provisioning rather than for monetary gain. Gender gaps in labour remuneration are also daunting challenges influencing female poverty.

- **Labour remuneration**

Braunstein (2015:15) while providing a report on the United States of America (USA) says:

Gender gap in median earnings of full-time employees in the USA was at 18.8% in 2010, which was among the highest in the advanced industrialised economies. The median for the 28-country Organisation for Economic Co-operation and Development (OECD) is 14.3%; the United States ranks 7th from the bottom. One of the results is that poverty rates for single female-headed households are extremely high, reaching 34% in 2011.

The gender inequality in the labour market means that when women do work for pay, whether they parent with partners or alone, it is financially challenging to replace their unpaid care work with high quality substitutes (Braunstein, 2015:15). This is more so especially among single mothers. Braunstein (2015:15) observes that becoming a mother, especially a lone mother, increases the risk of poverty as the financial and time demands of the household increase simultaneously. The researcher of this study agrees that these females are cumbered with a myriad of household demands and chores. Their domestic engagements take most of their time hence leaving little or no extra time for seeking employment. Increased income in women's hands has implications for intergenerational transmission of hunger and malnutrition, as women tend to spend more of their income on children's health and education (Ruel, Alderman, and the Maternal and Child Nutrition Study Group 2013 in ESARO, 2015:5-6; Smith et al., 2003 in ESARO, 2015:5-6). Owing to this observation, income among female household heads translates to countering hunger and its effects among the FHHs.

- **Culture**

The researcher of this study is additionally of the opinion that the issue of "concealed" poverty among females may be culturally instigated. A religious or class culture may influence the prevalence of this kind of poverty "unknowingly". This is whereby social cultural norms may stipulate gender roles that seem "right" but cause trouble "underneath". For example Braunstein (2015:16) illustrates the 'traditional' case, where men contribute primarily financing and women contribute primarily time to social reproduction. The researcher of this study has also previously mentioned the role of males migrating to urban areas for jobs while leaving behind females in the rural areas. Moreover, the popular belief that the chief role of a male is financial provisions and that of females are caregiving. This

structure most often reflects family systems centred on paternal power and the conjugal bond, embedded in cultural rules that prescribe male authority over, as well as responsibility for the protection and provisioning of women and children (Kabeer 1994 in Braunstein, 2015:16). Basing this argument on the ecological systems perspective, such cultural rules are the macro-systems that inhibit sustainable food security among FHHs. The researcher is of the opinion that the 'sweet sugar' of females having to wait on men for financial provision can be cut short with the male's death, incapacitation or termination of his job. In order to empower the females for self-financial reliance, the researcher proposes for progressive capacity-building among the females, complemented with structural adjustments. The effectiveness of this is illustrated with regards to Taiwan by Braunstein (2015:16) that:

In Taiwan, strong patriarchal traditions and inter-generational obligations created high degrees of intra-family stratification based on gender and age, with unmarried daughters the lowest class in the family hierarchy (Greenhalgh 1985 in Braunstein, 2015:16). The early years of Taiwan's export-led boom were fuelled by the entry of these women into export factories. In the 1970s, when Taiwan faced labour shortages, a state-sponsored satellite factory system made industrial work more consistent with traditional female roles, enabling increases in the labour supply of wives and mothers (Hsiung 1996 in Braunstein, 2015:16). This sort of structural flexibility relative to women's work and family roles is a feature that persists in Taiwanese labour markets today, and dovetails with expectations that women contribute financially to their families (Yu 2009 in Braunstein, 2015:16). As a consequence, increases in female labour force participation have been large and sustained, going from 35.5% in 1970 to 44.5% in 1990 and 50.2% in 2012. Compared to other East Asian economies - which typically have some of the largest gender wage gaps in the world; women in Taiwan experience a gender wage gap closer to the norm for liberal advanced industrialised countries. The gender wage ratio for average monthly earnings in industry and services was 81.2 in 2012.

- **Unemployment**

General lack of employment plays a crucial role in maintaining or exacerbating female poverty. In South Asia and Sub-Saharan Africa, service sectors tend to be quite limited as generators of employment and care commodities, proffering few substitutes for women's time (Braunstein 2011 in Braunstein, 2015:30). The researcher of this study is of the opinion that the lack of employment among females, particularly household heads continually exposes them to poverty, which ultimately leads to lack of food access. She however, recognises efforts by international bodies in the efforts to ensure equitable employment opportunities. The CEDAW has been a key tool for advancing women's rights and gender equality around the world, providing the basis for judicial decisions, and constitutional, legal and policy reforms at the country level (Khanna et al., 2016:4). In many countries, the CEDAW has helped strengthen provisions in constitutions guaranteeing equality between women and men, and providing a constitutional basis for the protection of women's human

rights (Khanna et al., 2016:4). Legislation prohibiting discrimination in general, and in regard to specific areas such as employment, has become a standard component of legal frameworks (Khanna et al., 2016:4). Despite the proposal for the gender legislations by the countries, socio-cultural patriarchal beliefs may hinder the full realisation of the legislation. The researcher is of the opinion that in order to address gender-based challenges that cannot be directly addressed by legislations, partnership between the government and non-governmental stakeholders is vital for advocacy and capacity-building with indigenous communities, whose beliefs are majorly patriarchal-oriented.

- **Insufficient feeding and nutrition programmes**

Besides the caregiving as mentioned previously, female household heads are cumbered with the burden of having to solely meeting their dependents' basic and luxury needs. In situations where the female is too poor to afford the provisions, the dependents (mostly her children) suffer immensely, especially from the effects of food insecurity. The outcome of the food insecurity among the children may be stunted growth. Globally, in 2014, an estimated 158.6 million children under age 5 were affected by stunting (UN, 2016:15). More so, Sub-Saharan Africa has highest stunting prevalence among other regions in the world. UN (2016:15) indicates that in the Sub-Saharan Africa, population growth outpaced progress that, the number of stunted children increased from an estimated 50.1 million in 2000 to 57.3 million in 2014 (UN, 2016:15). Moreover, food insecurity among the FHHs leads to poor health among the household members.

Chronic undernutrition puts children at greater risk of dying from common infections, increases the frequency and severity of infections and contributes to delayed recovery; and it is also associated with impaired cognitive ability and reduced school and work performance (UN, 2016:15). The researcher of this study is of the opinion that besides the pain from sickness, delayed recovery slows pace in the child's physical development, and the impaired cognitive development further enhances a vicious cycle of disability and intergenerational poverty. Additionally Qureshi et al. (2015:395), observe that, the food insecurity is associated with production of an offspring with lower birth-weight, which allows the cycle of poverty to continue. According to the definition of food security by the WFS (see sections 1.1, 2.1 and 3.2.1), acceptable food security entails quantitative and qualitative food provisioning comprising of enough macro and micro-nutrients. However, food insecurity is still prevalent, including among the adolescents of the FHHs.

In situations of the food insecurity, adolescents, more particularly girls; are especially at risk of low levels of iodine, iron, zinc and vitamin A, which are the big four micro-nutrients essential for a functioning immune system and cognitive development into adulthood

(Qureshi et al., 2015:395). Besides the food insecurity affecting young children and adolescents of the FHHs, the adult females, including the household heads themselves are also at risks.

Women of reproductive age are often nutritionally vulnerable because of the physiological demands of pregnancy and lactation (FAO & FHI 360, 2016:1). Requirements for most nutrients are higher for pregnant and lactating women than for adult men (National Research Council, 2006 in FAO & FHI 360, 2016:1; World Health Organisation [WHO]/FAO, 2004 in FAO & FHI 360, 2016:1). Apart from pregnancy and lactation, other than for iron, requirements for the women of reproductive age may be similar to or lower than those of adult men, but because women may be smaller and eat less (fewer calories), they require a more nutrient-dense diet (Torheim & Arimond, 2013 in FAO & FHI 360, 2016:1).

Insufficient nutrient intakes before and during pregnancy and lactation can affect both women and their infants (FAO & FHI 360, 2016:1). Low cognitive performance and physical underdevelopment among children may be attributed to mother's poor nutrition during pregnancy and due to poor infant nutrition. Evidence reveals that in many resource-poor environments, diet quality for the women of reproductive age is very poor, and there are gaps between intakes and requirements for a range of micro-nutrients (Arimond et al., 2010 in FAO & FHI 360, 2016:1; Lee et al., 2013 in FAO & FHI 360, 2016:1). The researcher of this study is of the opinion that transitory food insecurity caused by sudden calamities requires emergency response, especially through food aid.

However, literature reveals that any form of social assistance is very low in developing countries. About one in five people received any type of social assistance or social protection benefits in low-income countries compared with two in three people in upper-middle-income countries (UN, 2016:3). The researcher of this study is of the opinion that food assistance also rates poorly among the low income countries. The lack of social assistance exacerbates vulnerabilities among the FHHs, which may predispose members of the FHHs to using coping strategies to survive. On the other hand, effects of the food insecurity can be mitigated through introduction of school feeding programmes.

For example, Nicaragua has school feeding programme for school-going children, which has shown astounding results. The pre-school and child nutrition and school retention programmes in Nicaragua have recently expanded which many are dependent on external funding and the mothers of the targeted children providing volunteer labour (UNRISD 2010 in Braunstein, 2015:30). The researcher is of the opinion that the nutrition effects influences retention of learners at the schools. Consequently, the school retention promotes school

progression by the children for potential future employment when they reach adulthood. Besides, the learners are also cognitively prepared to learn. According to Qureshi et al. (2015:395), proper nutrition is associated with cognitive development into adulthood. Moreover, Olielo (2013:4-5) is of the opinion that, women's secondary education correlates with almost 43% in reduction of child malnutrition in developing countries.

- **Illiteracy**

The researcher of this study is of the opinion that illiteracy contributes highly to poverty cycles, such that the majority of the poverty stricken are the semi-literate and illiterate populations. Besides, nutrition knowledge among such segment of the community is insufficient. Education plays an important role in household awareness of nutritional and safety aspects of food rather than merely obtaining sufficient calorific quantity (Qureshi et al., 2015:396). Moreover, education is vital in maintaining proper hygiene and sanitation. Food safety is compromised by an increase in food-borne pathogens (FAO, 2016:9). Therefore, as the principal caregiver, if the female household head is not literate enough, her household members may suffer from ailments (due to contracting pathogens) associated with poor hygiene and sanitation. The poor health (children's stunted growth and poor cognitive development), compounded with poor diets exacerbate cycles of poverty and food insecurity among the FHHs.

3.4.1.2 Female social reproduction

At the UN headquarters, New York, in 2015, world leaders formally adopted a new agenda for sustainable development with goals and targets for the next 15 years with the 2030 Agenda for Sustainable Development and the 17 SDGs (see sections 1.3 and 1.5); and the stand-alone goal for gender equality, as previously highlighted in this chapter, focuses on achieving gender equality and empowering all women and girls, and includes ending all forms of discrimination against all women and girls everywhere as its first target (Khanna et al., 2016:5; UN, 2016:5). The household is an entry point into the system as well as a key location for social reproduction (Braunstein, 2015:10). For such, following Braunstein's point of view, households, particularly the female's serve as the entry point into which communities, markets and state contribute through human resources. This is because it is to the household which communities, markets and the state may contribute by production of human capacities (Braunstein, 2015:10). In this context then, the FHHs are the micro-systems of human development in food security. Inputs into social reproduction are combined to produce human capacities, which in the short term refer to the daily maintenance of the labour force and in the longer term to investments in both quality and quantity (Braunstein, 2015:10). The researcher of this study is of the opinion that human

capacities from both males and females are critical for economic advancement of any society. Inputs into the social reproduction function are of three types: time, commodities and infrastructure (Braunstein, 2015:10).

- **Time**

The researcher of this study infers that, time management in human's work is a necessity in any kind of production, including food security. This is particularly the time females spend in domestic work, employment and even agricultural production. Time is correlated with the quantity and quality of outputs, which ultimately influences food security status. A woman with increased demands on her time may spend less time breastfeeding or initiate complementary feeding at an earlier age, consequently reducing consumption of appropriate food by younger children (McKune et al., 2015:2). The researcher further is of the perspective that, market time is also important in ensuring food security through income earning. Income helps in non-farm food access. For instance, as indicated previously, a female cumbered with domestic chores such as caregiving may not have sufficient time to work elsewhere. This exo-system scenario may create her household vulnerability to food insecurity as a result of the lack of income. According to Braunstein (2015:11), on the input side of the social reproduction function, non-market time is marked by women, men, children and networks of kin or community being important contributors of unremunerated time into social reproduction. The second input into social reproduction is commodities.

- **Commodities**

Physical commodities such as household assets are associated with human capacities. Commodities are financed by income from work or public and private transfers (Braunstein, 2015:12). It is therefore the researcher's perspective that, populations or segment of communities with income has better access to extra household assets than those without. The assets determine social outcomes, including status of food security. If a female household head is in labour market or private income generating endeavour, then she is at a position to acquire assets necessary to facilitate provision of adequate food to her household. For example, a public servant single mother in a rural area has easier economic and physical access to food through her capacity to purchase the food and being able to drive herself to the food market. This is converse with unemployed single mother in the similar location. Besides the physical commodities, finances are essential commodities for the reproduction too.

Financing the monetary costs of social reproduction is a gender issue touching on two key questions: what proportion of incomes is devoted to reproduction and what these contributions actually purchase (Braunstein, 2015:12). These financial decisions are the

result of intra-household bargaining (Braunstein, 2015:12). The researcher of this study is of the opinion that, the amount of income a woman earns determines the kind and amount of assets she can afford to provide her household members. This means that the level of her household food security is correlated with the amount of money she earns. For example the employed single mother described above is able to economically access food in the market through her earning.

The impact of income on human capacities depends not only on how much is earned and spent, but also on what is purchased and whether these commodities provide good substitutes or complements for unpaid care time (Braunstein, 2015:12). Think of professionalised and well-paid versus informal and underpaid care sector workers, purchasing a refrigerator versus a television set (Braunstein, 2015:12). Following the Brausten's point of view, the researcher agrees that, it is easier for a professional woman to purchase quality commodities (including food), than a woman working as a casual labourer. Finally, the third input to social reproduction is infrastructure.

- **Infrastructure**

Public infrastructure refers to roads, electricity, sanitation and water; that decrease the opportunity cost of market work, not only by lowering the time intensity of care work by women, but also by lowering the price and increasing the availability of care commodities (Agénor & Agénor 2009 in Braunstein, 2015:12). The researcher of this study is of the opinion that, good infrastructure makes cost of commodities fairer, minimises production time and work intensity, thus making food security sustainable. For instance, improved road infrastructure reduces the span of time taken to reach the market, thus making food accessibility easier. If consumers have easy access to food market, the demand for food increases. Infrastructural development also translates into reduced cost of transporting food commodities to the market, thus increasing food supplies (availability). The overall economy of the food chain is improved through food affordability. Power availability and affordability affects cost of food production. This is especially with regards to processed foods or food products.

Through experience, the researcher of this study is of the knowledge that, electricity provides operating power in manufacturing of food products such as canned meat, biscuits, bread, and other food commodities. Moreover, proper water and sanitation provision determines the outcome of food preparation and utilisation. For example, a caregiver preparing food for their household will require water to wash, cook and drink. Washing water controls pathogens from infesting the food, while drinking water helps in digestion of food ingested. Sanitation facilities such as toilets and latrines ensure safety in human waste

disposal, hence preventing spread of communicable ailments. Moreover proper garbage maintenance equally controls community health. Braunstein (2015:12) rightly observes that modes of delivery of care commodities determine these issues (infrastructural development) as well.

Whether goods and services are provided through primarily public or private channels, by government, community or for-profit institutions relates to both their quality and price as well as affecting the gender division of reproductive labour (Braunstein, 2015:12). For instance, through experience, the researcher of this study has observed that, in Kenya, roads have boost movement of food from rural to urban markets. For example, in Meru County, Ntharene Market serves as a rural collection point for food commodities, especially horticultural food. This market serves as an assembly point for the foods. Middlemen pick these commodities and pack them in lorries and transport them to markets mostly in Nairobi City. From these markets, retail grocers purchase the food commodities and further transport them in *matatus* (public transport taxis) or *boda boda* (public transport motorcycle) to residential-area-retail sale points. On the other hand, the researcher is of the opinion that, private mode of transport works best for private companies, especially food processing companies that use their own vans and lorries to deliver finished products to distributors and supermarkets. She however notes that, the private transport mode increases consumer pricing for the food commodities. The ultimate increased consumer pricing puts pressure on females, particularly those not earning an income. Modes of delivery are thus not merely a technical detail; they also fundamentally shape the gender content and consequences of the marketisation of care (Braunstein, 2015:12).

3.4.1.3 Female labour

UN Women stipulate that social reproduction is defined in terms of the time and money it takes to produce, maintain and invest in the labour force, so it includes both paid and unpaid care work (Braunstein, 2015:i). Continued, inclusive and sustainable economic growth is a prerequisite for global prosperity (UN, 2016:7). It is for thus that the SDG8 aims to provide opportunities for full and productive employment and decent work for all, while eradicating forced labour, human trafficking and child labour (UN, 2016:7). Labour is characterised by a division of labour between women and men (Braunstein, 2015:10). Division of labour influences labour supply. Labour supply is the result of intra-household negotiations: women and men bargain over the time each will spend on reproductive labour, by weighing its opportunity cost, namely the wage each could earn, along with social norms, individual objectives and the family's provisioning needs (Braunstein, 2015:11). The researcher of this study is of the opinion that women supply the most household labour, yet are

disproportionately at the lower edge of the paid labour. This is because literature reveals that women spend most of their time on unpaid labour, yet they earn lower than men and the wage gap between male and female is very high. This therefore means females earn less while working more.

- **Female paid labour**

Empowering women and girls to reach their full potential requires that they have equal opportunities to those of men and boys (UN, 2016:20). Discrimination against women and girls means different treatment from men and boys that prevents them from enjoying their human rights (Khanna et al., 2016:7). The researcher of this study is of the opinion that low income earning among females is a vexing issue, because it is a concealed form of gender discrimination. Eliminating all forms of discrimination and violence against females entails protecting them against all violence ... (UN, 2016:20). Therefore, the researcher is of the viewpoint that female earning should be boosted in all sectors to equalise their earning capacity with those of males.

- **Female discrimination in labour market**

Females face a myriad of discrimination issues in labour market. Braunstein refers to these challenges as a low road regime. In the low road regime, higher female labour force participation has been associated with a decline in human capacities production (Braunstein, 2015:12). Some of the challenges faced by the females include low pay and poor working conditions. The negative association between human capacities production and female labour force participation is driven by low wages and poor working conditions for women in general and care sector workers in particular, set against a backdrop of little public support for social reproduction (Braunstein, 2015:12-13). Statistics reveal a daunting situation of gender discrimination against females in labour force.

In 2015, the unemployment rate for women was 6.7% versus 5.8% for men (UN, 2016:7). Gender disparities were most striking in Western Asia and Northern Africa, where the unemployment rate of women was more than twice that of men (UN, 2016:7). The researcher of this study is of the opinion that unemployment among females disempowers them from food access especially through purchase. The UN (2016:20) offers that ensuring women have better access to paid employment ensures that development is equitable and sustainable. Low wages also are likely to demotivate women into continuous working, especially among care workers.

Low wages for care workers have been linked with higher rates of turnover, deskilling and increasing overall work burdens for women; all of which lower their effectiveness at

providing care (Appelbaum & Leana 2011 in Braunstein, 2015:13; Razavi & Staab 2010 in Braunstein, 2015:13). The researcher of this study predicts that, low remuneration scares away adult females from care job sector. This situation is worsened by weak demand for care work by employed persons. Braunstein (2015:13) asserts that, weak demand for care services, both from workers who can ill afford them and paltry public provision, keep their prices - and the wages of these workers low.

The researcher also agrees with Braunstein (2015:13) that, low wages for women mean, that they can ill afford to purchase care commodities to compensate for the decline in the nonmarket work time that market participation induces. For instance, a female with a priority to pay school fees for her children would be prompted to do so at the expense of purchasing food. It also suggests that the care commodities they do purchase are likely to be inferior substitutes for unpaid time, as the quality of these commodities reflects the poor labour market conditions in which they are produced (Braunstein, 2015:13). The researcher of this study is of the opinion that, such females may afford only poor quality food commodities. Besides direct discrimination, women experience indirect discrimination in paid labour, which the researcher refers as “concealed discrimination”.

Indirect discrimination may happen when a job selection criterion, such as police officer selection, may have a minimum height and/or weight criteria that many women may not be able to meet (Khanna et al., 2016:7). This would therefore mean that the females are disqualified from acquiring the job. The researcher of this study is thus of the opinion that such job-related discrimination denies the females a chance to get jobs they would possibly perform well in labour market. Gender discrimination against single mothers aggravates their food access capability.

The researcher of this study is of the opinion that low income is a form of gender discrimination especially among lone females without a productive male adult. Such discrimination plunges them into more poverty, which culminates into more vulnerability to household food insecurity. For example one third of South African households are headed by women, and by 1996, only 52% of them spent a mere R1000 per month on food, compared to 35% of male-headed households who spent the same amount (Tibesigwa & Visser, 2015:2). Besides, while 25% of male-headed households spent R3500 per month, only 8% of female-headed households could afford to pay this amount on food (DOA, 2002 in Tibesigwa & Visser, 2015:2).

To promote gender equality especially in employment, gender disparities should be adequately addressed. FAO reinforces that gender issues need to be addressed, including

social norms which often prevent women from pursuing off-farm activities (FAO, 2016:xiii). Literature shows that agriculture is the mainstay of rural populations (than off-farm employment) and contributes to household food security. The agricultural livelihood is mainly subsistence among the females and earns them no or little money. This implies the need to promote off-farm employment among females. For example, the government should promote more off-farm jobs among both urban informal settlements and rural areas populations to increase income generation among these communities. Shisana et al. (2014), in Tibesigwa and Visser (2015:2) reveals how urban informal (32.4%) and rural formal (32.8%) South Africans are more food insecure compared to those in urban formal areas (19.0%). Increasing income (especially among females) promotes consumption of diverse foods and facilitates change in diets from basic staples such as maize, to foods that require less preparation such as fruits and processed foods (Olielo, 2013:2). Another labour-related gender issue jeopardising food security among females is female-male wage gap.

- **Female versus male wage gap**

In the labour market, women's collective bargaining power vis-à-vis capital is presumably lower than men's, a point consistent with the prevalence and persistence of the gender wage gap across all sorts of economies (Braunstein, 2015:10). The researcher of this study observes that, females get low wages thereby hampering their full participation in and benefitting from social reproduction. Low wages are a particularly vexing issue in paid care sectors, especially where workers are not only predominantly female but are also paid less than other types of workers with similar skill levels (Budig & Misra, 2010 in Braunstein 2015:10; England et al., 2002 in Braunstein, 2015:10). Women's wages are systematically lower than men's which means, all else equal, women will contribute more unpaid time to household work (Braunstein, 2015:11). However, Braunstein (2015:10) conversely cautions that some of the contradictory forces at work in the system may be higher wages for women which are desirable from the perspective of gender inequality, but may raise the price of care and put pressure on reproduction; but at the same time, buoyant demand for paid care from either the private or public sector is key to supporting higher wages for care workers. Independent of the wages on offer, social norms might discourage women's market work or condition them to be strongly time-altruistic, which lowers the responsiveness of female market labour supply to wages (Braunstein, 2015:11). These include social norms which condition women to be out of market labour for long durations.

Legal rules that ensure long parental leaves from employment have also been associated with lower female wages because of the frequent career interruptions among mothers that

use them and persistent identification of women with caring labour (Braunstein, 2015:11). The researcher further quotes Ivanka Trump from her facebook page:

Today, on #MothersDay, we must confront that motherhood is now a greater determinant of pay inequality than gender. To finally eliminate the pay gap, we need real changes to take place in public policy and the workplace in support of American working families.

She demonstrates her point pictorially by a drawing of a woman whose focus is on her baby's pram, and the husband whose focus is laptop. The researcher of this study deduces that, the neonatal mother's earnings are interrupted due to the legal leave of absence (maternity leave). The researcher therefore proposes for a no cut of single mothers' earnings because of the maternity leave. Besides, governments should formulate and implement policies which ensure sustainable remuneration among female household heads.

- **Unpaid labour**

Females often carry heavy home and farm work burdens (Qureshi et al., 2015:395). In every region, women and girls do the bulk of unpaid work, including caregiving and household tasks such as cooking and cleaning (UN, 2016:21). The researcher of this study is also of the agreement that females are the most involved in household and farm work. Women perform the bulk of unpaid household work, whether or not they also participate in paid work (Budlender, 2008 in Braunstein, 2015:11; Charmes, 2006 in Braunstein, 2015:11; Folbre, 2006 in Braunstein, 2015:11). The responsibilities of unpaid care and domestic work, combined with paid labour, mean that women and girls work longer hours than men and boys and have less time for rest, self-care, learning and other activities (UN, 2016:21). Statistics indicate that female labour in unpaid employment is higher than that of males. Based on time-use surveys conducted between 2000 and 2014 in 59 countries, women said they spend 19% of their time each day on unpaid labour versus 8% for men (UN, 2016:5, 21). This shows that the involvement of women in unremunerated work is twice that of men. This situation manifests itself saliently in the Sub-Saharan Africa, whose populations' livelihood is mainly agriculture. For example, ESARO (2015:1), while citing Christiaensen and Kilic (2015) indicates that, using individual-disaggregated, plot-level labour input data from nationally representative household surveys, the female share of agricultural labour in Malawi, the United Republic of Tanzania (thereafter referred to as Tanzania), and Uganda are 52%, 52%, and 56%, respectively. Kenya is also an agricultural country and most labour is concentrated in farm work. Ngethe (2017:10) while referring to *the National Drought Early Warning Bulletin* for January 2017 observes that, a third of the Kenya's labour force earns a living by growing crops and raising animals on family land. A

study published by the Society for International Development and the Kenya National Bureau of Statistics (KNBS) found that, six out of the forty seven counties in Kenya largely located in the North and West of the country, had at least half the employed people working on family land holdings. The counties were: Nyamira (53%), Busia (52%), Kisii (51%), Bungoma (50%), Turkana (50%) and Nyandarua (50%) (Ngethe, 2017:10). Moreover, the study also found that five constituencies have more than 2/3 of their labour force working on family land (Ngethe, 2017:10). The report notes that working on family land is associated with reliance on uneven weather and a lack of certainty in earnings (Ngethe, 2017:10). The researcher of this study is of the opinion that, female work most in family land than males due to patriarchal cultures that place females as domestic workers. Other findings indicate that females are more engaged in unpaid labour than males, which include offering voluntary work.

The Nicaragua school feeding programme, where mothers of the targeted children offer voluntary work, depicts how lack of payment compounds the vulnerability to food insecurity among female households. This is because the mothers spend most of their time in voluntary endeavours with little access to paid market labour. Due to lack of time for the mothers to venture into paid labour, they get disempowered in food access, particularly purchase. Braunstein (2015:12) while citing Razavi and Staab (2010) says when public care services rely on volunteers, as they do in a number of low and middle-income countries; pay is low, quality questionable and few women increase their work participation as a result. Likewise, women offer an array of voluntary work in research. For example, field research in Tanzania on community care programmes for HIV and AIDS patients found that volunteers did a lot of work without getting paid, and that the structure of external finance challenges the sustainability and ultimate effectiveness of these programmes as organisations, shift provisioning to attract funds (UNRISD 2010 in Braunstein, 2015:30). The lack of or little income translates into low food security status among FHHs. McKune et al. (2015:2), observes that the time women allocate to household labour is associated with choices about childcare and has direct effect on household nutrition. The researcher of this study recommends for some monetary gifting of persons participating in voluntary work, so as to facilitate access to their basic commodities, which include food.

3.4.1.4 Female production

This section discusses elements of female production under the following topics: contribution of social reproduction to female production, contribution of domestic production in female production, contribution of market labour production in female production, and climate change contribution to female production.

- **Contribution of social reproduction to female production**

Social reproduction has been defined in terms of the time and money it takes to produce, maintain and invest in the labour force (Braunstein, 2015:14). This aspect has been comprehensively described in a previous section, 3.4.1.2 focusing on female social reproduction. This section provides a summary of the same. One element characterising female-headed households' social reproduction is limited male participation in domestic work, and/or complete lack of the male participation. The reasons for the lack of participation range from unwillingness to participate and male out-migration from households. Braunstein (2015:13) asserts that, factors that increase the likelihood of low road scenario include significant out-migration of adult household members who will no longer be able to contribute any time to social reproduction (though they may make up for some of that through financial contributions). The researcher is of the opinion that the out-migration is caused mainly by rural-urban migration of males in search of jobs or family strife such as separation or divorce. As mentioned severally earlier, the females left behind will get cumbered with the burden of having to carry out household work alone or with the help of children only. ESARO (2015:14) rightfully asserts that, the women production will have fewer people in the household to draw on for (household work), such as farm labour. The researcher is of the inference that, the out-migration has worse impacts on elderly females than younger ones such as the women of reproductive age. For instance, if an elderly widow's children emigrate away from her household, she is so very much predisposed to extreme poverty and food insecurity against the backdrop of no labour assistance. Through news and personal experience, the researcher of this study has been observing situations of elderly females having been alienated by their grown up children, the situation which exposes them to extreme poverty, food insecurity, and labour burden, among other catastrophes like rape. The researcher is of the opinion that the elderly widows' human and constitutional rights should be expanded, and senior citizens' studies introduced and expanded in institutions of learning including universities.

- **Contribution of domestic production in female production**

The researcher has been observing that, most housework is mostly done by females. Women bear the most burden of caring for children and/or the elderly, sick and disabled (Braunstein, 2015:15). This is because women bear most of the responsibility for the time costs of children (Braunstein, 2015:15). This limits their capacity to be productive elsewhere. The significant contribution of female labour at home does not only affect single female parents, but also married women. The following illustration on Taiwan illustrates the complexity of all kinds of females' contribution to domestic labour:

In Taiwan, childrearing in marriage is the predominant norm, and fathers help financially support the family, which make Taiwanese men contribute very little time to domestic labour (Yu 2009:19 in Braunstein, 2015:15). This translates to Taiwanese women taking the biggest share of time spent at home, and less on time spent in other productive sectors; which illustrates the complexity of meeting time costs for production among women, irrespective of their marital status (Braunstein, 2015:15).

In Baringo County of Kenya, even in the ravaging drought and famine (which extended from 2016-2017), women were forced to stay home to care for children and the elderly, while their husbands searched for water. Chepkwony (2017:28) while reporting for the Standard Newspaper quotes a Chepwoge Jofri, a female resident of the Baringo County thus, “our husbands left home, they went digging by the river in search of water while we stay at home with our children and nurse the old”. Single, never-married females also experience the most burden of the caregiving.

The researcher of this study is of the opinion that, single motherhood is on the rise with the increasing modernity and the “Femalism Discourse”. For instance, in the US an increasing proportion of children live with single mothers and in 2012, 24.4% of children younger than 18 lived in single-mother households up from 11% (Braunstein, 2015:15). The researcher is of the opinion that females who are single by choice may also experience similar difficulties, especially in financing childcare services outside their households. According to Braunstein (2015:15), due to low pay, financing childcare is a significant challenge for most families with for instance, day care being more expensive than rent in 22 states of the US. The researcher construes that, the high cost of the day care may hinder the single mothers from getting the services; therefore, are forced to care for the children by themselves at their households. The time spent caring for the children ultimately limits their capacity to be productive elsewhere. Braunstein, 2015:15) supports that, there is increasing share of the monetary costs, which is reflected in rising rates of single motherhood and the lack of public support for childrearing. Among such females, the working ones face the pressure of juggling work and domestic work. This situation would cause her a lot of fatigue and may also make her ignore essential elements of food security. They may fail to prepare meals for their household members due to fatigue associated with the multitasking market labour and domestic work. The researcher of this study proposes for policy reviews to accommodate both single and married mothers in labour market without having to comprise their working time. For example, employers should provide childcare services and the government should subsidise the childcare. This strategy is working in Kenya. Safaricom Corporation provides day care services to children of its working mothers. Likewise, the government can also provide childcare services among working mothers in public sector.

- **Contribution of market labour production in female production**

UN reports on the SDG8 indicate a dichotomy of labour productivity among developed and developing regions. While labour productivity increased in the developing regions from 2005 to 2015, the value for developed regions was still more than twice that of any developing region, and around 20 times greater than the values for Sub-Saharan Africa and Southern Asia (UN, 2016:7). The reports also reveal a relatively huge proportion of working communities living in poverty. In 2015, 10% of the world's workers and their families were living on less than 1.90 US dollars per person per day (UN, 2016:3). In the developed countries female participation in the labour market is fair. According to Braunstein (2015:15), the US has a relatively high female labour force participation rate among mothers. About two thirds of the US women with preschool-aged children and three quarters of those with school-aged children work for pay (Braunstein, 2015:15). The situation however, is converse in the developing countries. The researcher of this study is of the opinion that low labour productivity in the developing countries, not only has it stagnated the progress of economies but also lead to slow pace of tackling poverty and food insecurity.

The structure of production in low-income agricultural economies (LIAEs) is that most of the labour force is engaged in informal agrarian work that generates low earnings (Braunstein, 2015:30). Ngethe (2017:10) too, reckons that agrarian work is associated with lack of certainty in earnings. This is particularly true for women whose mainstay is subsistence food production in LIAEs but face unequal access to land, credit and agricultural inputs (FAO 2011 in Braunstein, 2015:30). Low market labour production is also existent among both parents'-households.

In households with two parents, mothers spend about twice as much time caring for children as fathers, whether they work for pay or not (Parker & Wang 2013 in Braunstein, 2015:15). The researcher of this study is of the opinion that, despite the mother having to do twice as much work as the father, she also faces a responsibility of attending to job responsibilities. These responsibilities may jeopardise her performance at work, thereby predisposing her to the risk of getting sacked. The loss of the job would further exacerbate her vulnerability to extreme poverty and food insecurity. Voluntary work also affects market labour production.

The LIAEs' programmes that do exist often rely on voluntary work from the family and community, which in turn is dependent on unpaid, mostly female labour (Braunstein, 2015:30). In the LIAEs, particularly the Sub-Saharan Region, almost all of women's work is informal, with women participating in production most often as smallholders, casual wage

workers or contributing family workers (UNRISD 2010 in Braunstein, 2015:30). The researcher agrees with Braustein because she has seen it is mostly females who are engaged in agricultural work in Kenya. Moreover, in the Voi Division, it is mostly females who are engaged in casual labour for pay. Gender-based violence destroys working capacity among females.

The researcher has read on print and virtual media about gender-based violence on females, including at their work places. The violations range from sex-related to physical violence. They include: indecent talk and/or touch, rape, verbal insults, physical assault and many more. The researcher reckons that such violations may lead to increased turnover in female production in the market labour.

- **Climate change contribution to female production**

In the previous sections, females have been found to be the most engaged in smallholder farming activities. However, the effects of climate change are posing serious challenges upon agricultural production. In agriculture, the climate, rainfall and/ or irrigation for adequate soil moisture are necessary for growing crops (Olielo, 2013:4). The effects of climate change are however depleting water resources, consequently affecting many aspects of the female production, including the ones discussed henceforth.

- **Effects of climate change on female food security production**

Climate change poses a major and growing threat to global food security (FAO, 2016:4). The expected effects of climate change are higher temperatures, more frequent extreme weather events, water shortages, rising sea levels, ocean acidification, land degradation, the disruption of ecosystems and the loss of biodiversity which could seriously compromise agriculture's ability to feed the most vulnerable, impeding progress towards the eradication of hunger, malnutrition and poverty (FAO, 2016:4). Climate change has already significantly impacted agriculture (Lobell et al., 2011 in FAO, 2017:5) and is expected to further impact directly and indirectly food production (FAO, 2017:5). As seen previously, females are the most engaged in farm work, and therefore are the most affected by the effects of climate change. ESARO (2015:v) rightfully indicate that, women form a large proportion of the agricultural labour force in Sub-Saharan Africa and thus play a vital role in ensuring family nutrition and food security. Increase of mean temperature, changes in rain patterns, increased variability both in temperature and rain patterns, changes in water availability, the frequency and intensity of 'extreme events', sea level rise and salinisation and perturbations in ecosystems, all will have profound impacts on agriculture, forestry and fisheries (FAO, 2017:5). The impacts of climate change are therefore deemed to be worse among the females than males, since the former are more engaged in agricultural

production. According to Aw-Dahir (2018:18), most of Africa's poor and hungry populations live in rural areas and depend on agriculture for their daily income and livelihoods. Similarly, agricultural production of females inhabiting rural areas will be worse.

UN (2016:9) also corroborates that climate change presents the single biggest threat to development, and its widespread, unprecedented effects disproportionately burdens the poorest and the most vulnerable. FAO (2017:6), adds that, among the most affected areas are the economically vulnerable countries already food insecure and some important food exporting countries. Kenya as a developing country is vulnerable to food insecurity and is also dependent on food imports to feed its population, including FHHs. According to the International Food Policy Research Institute (IFPRI) (Nelson et al., 2010 in FAO, 2015:6), climate change will cause an increase of between 8.5 and 10.3% in the number of malnourished children in all developing countries, relative to scenarios without climate change (FAO, 2017:6). In Kenya, malnutrition is prevalent. Out of the total under-five-year old children of 7 million, 1.82 million children (26%) are suffering from chronic malnutrition (KNBS, 2015 in USAID, 2018:1).

On a positive perspective, the effects of climate change may increase agricultural production in temperate regions. Broadly speaking, with everything else being equal, climate change may lead to an increase in both crop and livestock productivity in mid to high latitudes (IPCC, 2007a in FAO, 2017:6). However, the high production would be skewed towards a small section of the global population, since tropical regions would be experiencing the worst scenarios. The FAO (2017:6) illustrates this converse situation that, a decrease in agricultural production would be prevalent in tropical and sub-tropical areas of the world. This is particularly in Africa as exemplified with Morocco. A prospective study in Morocco (World Bank, 2009a in FAO, 2017) points to gradually increasing aridity due to reduced rainfall and higher temperatures with negative effects on agricultural yields especially from 2030 onwards (FAO, 2017:6). Besides, according to UN (2018:10), the Sub-Saharan Africa's 30% of its population are in food insecurity, mainly attributable to water scarcity in agricultural production. Moreover, in Kenya, climate change is also putting pressure on rain patterns. The researcher of this study, being a citizen and resident of the country has witnessed a prolonged duration of drought in the country stretching from mid-2016 to almost mid-2017. This substantiates Ngethe (2017:10) that, no county in Kenya recorded normal rainfall during the short rainy season (October to December 2016). The effects of the failed rainfall were livestock starvation and partial or total crop failures in the country. In the retrospect, FHHs whether globally, regionally or nationally are more affected by these effects and hence their productivity.

Agriculture is the engine of economic growth in Kenya, and a valuable source of income for the majority of Kenyans (USAID, 2016 in KNBS, 2016:3). Agricultural sector accounted for 30% of Kenya's GDP in 2015 (KNBS, 2016:3), and also provides employment to an estimated 70% of the total labour force (KNBS, 2016:6). Through experience, the researcher of this study has observed that Kenya's agricultural production is highly dependent on rainfall. Therefore, in the occurrence of a drought, agricultural yields are adversely affected. This insinuates the need for irrigable agricultural production. The Daily Nation emphasises the need of irrigable agriculture by highlighting a case of West Pokot County, where residents are pleading for the Kenya hydroelectric power firm, KenGen to provide them with irrigation water to counter the effects of drought in the county. This report was compiled by Kakai (2017:10).

Rain-fed crops are expected to be particularly affected by the effects of climate change (FAO, 2017:6). In areas around Lake Victoria, parts of Western and Central regions, significantly below normal rainfall affected crop performance, resulting in decline in yields; that maize yields dropped by 50%, beans 40-50%, and sorghum by 30% compared to 2015 (Wanzala, 2017:10). Moreover, crop failure is expected for most parts of Embu County and near total crop failure in Kitui; the early warning also predicts below average crop production in Makueni, Meru, Nyeri, Tharaka-Nithi, Kilifi, West Pokot, Baringo and Isiolo Counties (Ngethe, 2017:10). The Kenya Food Steering Group reports that the drought (of 2016 to 2017) was also rapidly increasing its impacts particularly in nine arid counties: Turkana, Marsabit, Samburu, Tana River, Isiolo, Mandera, Garissa, Wajir and Baringo (Wanjala, 2017:10). The researcher is of the opinion that due to gender-based inequalities, crop production among FHHs in these counties is disproportionately affected. In addition to poor crop production, the effects of climate change affect livestock production as well, particularly fonder and water availability, as subsequently highlighted:

A survey carried out by the University of Nairobi's Institute of Development Studies and Afrobarometer has shown that at least 47% of Kenyans said have gone without "enough food" at least once during the past one year (Lang'at, 2017:3). If the current drought in the country persists, the vulnerability to food insecurity among females is likely to increase. According to the *National Drought Early Warning Bulletin* for January 2017, no county in Kenya has recorded normal rainfall during the short rainy season - October to December 2016 (Ngethe, 2017:10). The warning also says the short rains were too brief to significantly influence improvement in crop and animal production and summarises effects on particular counties: the number of people affected by drought in Kenya represents approximately 18% in marginal agricultural areas 20% of the population in pastoral areas (Wanzala, 2017:10).

- **Effects of climate change on food trade**

Climate change impacts also induce significant changes in trade, impacting prices and the situation of net food importing countries (FAO, 2017:6). Raleigh et al. (2015:188), observe that lower than expected levels of rainfall directly increase food price and indirectly increase conflict through its impact on food price. For instance Chepkoech (2017:24) says that in Kenya, food shortage and inflation has seen the prices of commodities double. The researcher of this study is of the opinion that price volatility leads to unstable business environment, whereby consumer food demand decreases ultimately declining supply by traders. The FHHs are among the most vulnerable groups in the community hence price hikes decrease their demand for food, which could lead to food insecurity.

- **Effects of climate change on the ecosystem**

Climate change has a ravaging effect on the natural ecosystem. It leads to exploitation of the ecosystem due to low agricultural productivity. Moreover, low agricultural productivity can lead to more intense farming, resulting in over-cultivation, soil erosion, and land degradation - which in turn further undermine agricultural productivity and environmental sustainability (ESARO, 2015:8). The researcher of this study is of the opinion that intense farming and its effects are most prevalent among the poor and less educated. This is particularly among females whose literacy levels are lower than males. Poor people who are affected by hunger and limited understanding, lack self-initiative to utilise resources in development opportunities and therefore, make no strategies for sustainable productivity but attack and deplete available resources from the environment and from other persons (Olielo, 2013:4). The researcher has seen on Kenyan media news that, climate change also causing conflicts in the declining ecosystem, particularly grazelands. For instance, the Citizen TV 19.00 News on Thursday, 30th March, 2017 reported a case of arson by invaders (pastoralists) in one of ranches in Laikipia County of Kenya. The conflict was a result of pastoralists migrating from their local grazelands to private ranches. This is due to depletion of pasture and water at their local lands, and hence invaded the ranches in search of the pasture and water. In order to mitigate the effects of climate change on the natural ecosystems, the researcher is of the opinion that, establishing and sustaining irrigation infrastructure serves as an alternative to rain water, more so in rural areas where many females reside. This can be enhanced through international co-operation and national efforts.

At national level, crop production requires increased investments through international co-operation to bolster the productive capacity of agriculture in developing countries (UN, 2016:14). Promotion of sustainable agriculture entails improving the productivity and

incomes of small-scale farmers by promoting equal access to land, technology and markets, sustainable food production systems and resilient agricultural practices (UN, 2016:14). Household (in this study the FHHs) nutrition may benefit from both the price and the income effect of increased agricultural productivity (ESARO, 2015:9). The researcher is of the opinion that the partnerships at the national macro-system levels should equally spread out among grassroots levels including the FHH micro-systems.

- **Effects of climate change on livestock production**

Besides depletion of the general ecosystem, effects of climate change have direct and indirect impacts on livestock production. The most important impacts of climate change on animal productivity are animal health and biodiversity, the quality and amount of feed supply, and the carrying capacity of pastures (FAO, 2016:23). Increasing variability in rainfall leads to shortages of drinking water, an increased incidence of livestock pests and diseases, and changes in their distribution and transmission (FAO, 2016:23). It also affects the species composition of pastures, pasture yields and forage quality (FAO, 2016:23). The researcher is of the opinion that poor livestock productivity translates into poor animal food poverty directly and on foodstuff purchases indirectly. Females being the principal caregivers experience the impacts directly because they would prepare poor meals for their households.

While food insecurity is a growing concern across the developing nations, accentuated by climate variability and change, it could be even worse for pastoralists given their unpredictable exposure to climate risks (Megersa, Markemann, Angassa & Zárate, 2014:15). For instance, in Ethiopia, the Borana herders experience food insecurity as a result of recurring droughts causing huge losses of cattle, and are thus increasingly shifting from cattle pastoralism to multi-species herding (Megersa et al., 2014:15). In Kenya's pastoralist counties, particularly the Baringo, drought is causing children to abscond from attending school to help parents care for livestock. Children are dropping out of school to help their parents search for water and pastures (Nation Team, 2017a:11). The effect of the drought on livestock has necessitated some voluntary agencies to come in for social assistance. For example, the Citizen TV 13.00 News on 31st March, 2017, reported that the Kenya Red Cross has been distributing animal fodder to livestock farmers in Kilifi County. The researcher commends the intervention, and additionally recommends for multidimensional emergency responses across all affected counties in Kenya, since the drought was prevalent in other counties as well. For example the situation of Turkana County is subsequently explored as follows:

Hundreds of livestock in Turkana County have died with thousands of people facing starvation as the drought intensifies. The drought has left sheep, goats and cows emaciated while others have been dropping dead as they struggle to access pasture. With water pans, boreholes and rivers in the sun baked fields having dried up, most of the herders have been forced to move to Ethiopia, Uganda and South Sudan (Letting & Shanzu, 2017:9).

- **Effects of climate change on females**

The researcher of this study is of the opinion that climate change has more adverse effects on females than males. Women are the traditional caregivers of everyone in their household, so they experience the most pressure from the effects of climate change. As discussed previously, the effects of climate change on crop and livestock production affect females more than males hence their vulnerability to food insecurity supercedes that of males. Dankel-man 2002 in McKune et al. (2015:5) ascertains that, extreme weather events can reduce the local availability of food increasing women's workloads and undermining their ability to support the household. Furthermore, their vulnerability is also accentuated by cultural macro-systems that do not favour their full productivity. Local gender dynamics shape the contours of vulnerability and the effects of climate change at the community, household, and individual level (McKune et al., 2015:5). For example, social norms preventing women from owning land hinder them from sustainable crop and livestock production.

Men and women play distinct, yet dynamic, roles in livestock holding communities, expressing control and decision-making authority over different animal resources, economic tasks, and even bodies of knowledge, all of which vary with local context (McKune et al., 2015:5). Women in pastoral communities can be vulnerable when they have limited decision-making or economic power and/or occupy a marginal social position (McKune et al., 2015:5). There are female livestock holders who are acutely vulnerable to the effects of climate change on resource availability (McKune et al., 2015:5). McKune et al. (2015:5), while quoting Wangui (2014) note that, women are the most vulnerable to climate change effects including among the Maasai Community, are individuals with limited power and agency, and bear significant responsibility for procuring and preparing household food resources. However, the experiences of Kenyan women in livestock-holding communities do not represent the experience of all women (McKune et al., 2015:5). Urgent action is needed not only to combat climate change and its impacts, but also to build resilience in responding to climate-related hazards and natural disasters (UN, 2016:9). The loss of female (agricultural) productivity can be mitigated by designing policies that directly reduce inequality in access to male farm labour (ESARO, 2015:15).

One of the most critical approaches to mitigate loss of labour in female production is to tackle constraints related to women's access to household male labour, and another option is to think about policies that help women farmers' access substitutes for household labour, such as hired workers and labour-saving technologies (ESARO, 2015:15). Another intervention measure is formulating and inculcating policies concerning childcare expenditure.

Public policies would legitimise mobilisation of public resources to help defray (childcare) costs for families, by combining the value of tax breaks, direct services and cash grants, public spending on family (Braunstein, 2015:15). Focusing on direct public supports for childcare, the US spent 0.4% of its GDP on childcare and pre-school in 2009 (Braunstein, 2015:15). The researcher of this study is of the opinion that other countries, including Kenya can use such policies to defray loss of male labour among female-headed households. Another "avenue" to controlling effects of climate change on women is by increasing income among females.

Indeed, raising returns to women's work could well expand investments in both human and non-human capital as women use higher incomes to expand agricultural productivity as well as investments in human capacities (Seguino & Were, 2013 in Braunstein, 2015:31). The researcher of this study is of the opinion that when women are on income, they can be innovative on strategies to combating climate change. For instance, they can be able to fund for installation of irrigation infrastructure in their farm plots. General infrastructural development is also critical in combating the impact of climate change on females.

Following the SDG9 of particularly the promotion of infrastructure, production can be accomplished through enhanced international and domestic financial, technological and technical support, research and innovation, and increased access to information and communication technology (UN, 2016:7). It is therefore critical for countries to embrace international co-operation, even on financial lending, modern technology such as the application of software programmes, utilising requisite expertise in skills, promote research including in universities to stimulate innovation and promotion of efficient communication channels even at the work place. These improvements will make work more efficient and effective and/or working environment for females will be more user-friendly. In order, to accelerate rural women's access to technologies, UN Women ESARO, in partnership with the African Union (AU), the FAO, the International Fund for Agricultural Development (IFAD), and the WFP, organised the first Sharefair in 2014, Sharefair for Rural Women's Technologies in Eastern and Southern Africa. The Sharefair promoted technologies and innovations that support rural female smallholder farmers, and brought together rural

women farmers and innovators, policymakers, academicians, food producers, investors, financial service providers, and other technology innovators (ESARO, 2016:40). The challenge to this however, is not strategic planning but the implementation of the plans. If all the stakeholder countries involved in the Sharefair facilitated the implementation of the recommendations of the fair, there would be better improvements on female welfare in smallholder farming than it is currently. The researcher is therefore of the opinion that governments should besides ratifying the international recommendations, they should also translate and implement them at the basic levels of the community, including divisional levels and among FHHs.

Articles 3 and 11 of the CEDAW provides for countries to take all appropriate measures to guarantee that women and girls can enjoy their human rights and fundamental freedoms in every aspect of society, including in the political, economic, social, and cultural fields (Khanna et al., 2016:7); and that countries must eliminate discrimination against women in employment, including ensuring equal opportunities to choose one's profession and receive equal pay for work of equal value (Khanna et al., 2016:10). Besides the CEDAW, other internationally recognised write-ups or documents may also provide policy guidelines for further adoption by countries of particular regions. For example, ESARO of UN Women provides evidence of costing gender gap in Malawi, Tanzania and Uganda. The evidence presented in the report addresses gender inequalities and offers guidelines to policy makers on how to increase agricultural productivity and national economic growth, support poverty reduction, and strengthen food security across the Sub-Saharan Africa (ESARO, 2015:1). ESARO is also involved in facilitating the adoption of rural agricultural technologies. The researcher of this study also recommends for fixing of biodiversity losses, especially through afforestation. The forest would help holding soils and prevent rainwater wastage through flash floods.

3.4.1.5 Female farming

FANTA defines farmers (including herders and fishers) as men and women who have access to a plot of land (even if very small) about which they make decisions about what will be grown (ESARO, 2015:9; FANTA III, 2015:100), how it will be grown, and how to dispose of the harvest; and/or men and women who have animals and/or aquaculture products over which they have decision-making power (FANTA III, 2015:100). Plots can be managed by women and men jointly, by men only, or by women only (ESARO, 2015:9). It is quite possible that women become plot managers entirely because of their head-of-household status (ESARO, 2015:14). Farmers produce food, feed, and fiber, and they may engage in processing and marketing of food, feed, and fiber and may reside in settled

communities, mobile pastoralist communities, or refugee/internally displaced person camps (FANTA III, 2015:100;110). In this study, the possible farmers are all female household heads residing in the Voi Division of the Taita-Taveta County in Kenya. Farming plays a critical role in Africa's food security and economy.

The vast majority (90%) of food consumed in Africa is from domestic producers (Raleigh et al., 2015:188), and agriculture is the main source of livelihood for about two thirds of the Sub-Saharan Africa's population, and it contributes about one third of GDP and employs about 60% of the region's population (Economic Commission for Africa, 2015:5). With this recognition, agricultural improvement is critical for the continent. Enhancing agricultural performance is central to food security and sustainable poverty reduction (Economic Commission for Africa, 2015:5) in the region. Agriculture is the major mainstay of rural Africans especially females, who provide most of labour input into farming.

Globally, women provide 43% of agricultural labour, with percentages as high as 60%, in some African countries (FAO, 2011 in Qureshi et al., 2015:395). Rural women represent a quarter of the world's population and they make up around 43% of the agricultural labour force in developing countries (FAO, 2016:49). Moreover, they also form a large proportion of the agricultural labour force (particularly) in Sub-Saharan Africa and thus play a vital role in ensuring family nutrition and food security (ESARO, 2015:v). FAO (2011) estimates that the women labour force in the Sub-Saharan Africa ranges between 30 to 80% (ESARO, 2015:1). Kenya is a country in the Sub-Saharan Africa and has females providing most of the agricultural labour. In Kenya, women's role in agricultural production constitutes up to 80% of all labour in food production (KNBS, 2014:6). In addition to their labour contribution, women are increasingly acting as farm managers and heads of farm families. It is estimated that over 40% of all smallholder farms in Kenya are managed by women (Kenya Country Gender Profile, 2007 AfDB in KNBS, 2014:6). The large involvement in farming is also prevalent among employed females. FAO (2016:49) indicate that in South Asia, more than two out of every three employed women work in agriculture. Whether employed or not employed, literature reveals that females in rural areas are more vulnerable to farming constraints than males.

Globally, with few exceptions, every gender and development indicator for which data are available reveals that rural women fair worse than rural men and urban women, and that they disproportionately experience poverty, exclusion and the effects of climate change (United Nations, 2010 in FAO, 2016:49). Despite their major contribution in food sector, women are disadvantaged in various issues such that they experience lower access to resources, inputs and land; and also lack voice in decision-making processes including in

agriculture research; and “time poverty” caused by the drudgery of agricultural and household tasks, amongst others (Qureshi et al., 2015:395). The researcher of this study is of the opinion that gender-based policies that stress the importance of gender equality would address female production particularly in agriculture. These policies should inculcate in the communities the need for female participation in agricultural decision-making and resource ownership including the land possession.

- **Elements of female farming**

This section explores elements of female farming under the following sub-headings: female land ownership, male family labour, female farm inputs, and female crops.

- **Female land ownership**

Rural food security is mainly from own food production. In South Africa, agriculture contributes to food security of female-headed more than male-headed households, especially in rural areas (Tibesigwa & Visser, 2015:1). Rural areas are characterised by communal and traditional land, so the main issue here is tenure security (Kameri-Mbote, 2006 in ESARO, 2015:2) which has been shown to affect agriculture productivity (ESARO, 2015:2). Lack of land ownership among females is widespread in Africa’s rural areas. Women who head households are more likely to be disadvantaged in terms of land security (Crush et al., 2012 in ESARO, 2015:2). For example, ESARO (2015:2) says Hasna (1998) found that (lack of) ownership of land in rural Ghana limited or prevented women from participating in agriculture (ESARO, 2015:2). Similarly, in Kenya, women have access to land but not ownership of the land (Kameri-Mbote, 2006 in Tibesigwa, 2015:6) since they are often mere guardians of family land (Heyer 2006 in Tibesigwa, 2015:6). Moreover, Kenyan women hold only 1 to 5% of land titles and therefore have least access to land of their own (KNBS, 2014:6). The researcher of this study is of the opinion that, provision of title deeds to female farmers help secure land into their possession hence will boost their confidence in initiating and carrying about farming production. This view is corroborated by KNBS (2014:6) that, title deeds enable farmers to cultivate without fear of eviction and they can use the land as collateral against financial loans. According to the researcher, in Kenya, social norms propagate gender discrimination in land ownership and decision-making on family property matters. This situation was found and is supported by Apind et al. (2015:156), that, single never-been married females do not own nor inherit, but rent land for growing rice in Ahero Irrigation Scheme in Kenya. The low possession of land by the single females was attributed to cultural marginalisation that limited them the rights of accessing land (Apind et al., 2015:356).

In Kenya, local cultural norms allow boys to inherit land from their parents, but expect girls to use their husbands' land for farming. If the girl never gets married at all, the society expects her to buy her own or rent plot for the agricultural production. *The Constitution of Kenya 2010* contains some adopted international provisions on combating gender discrimination by providing for equal rights in access to land by both males and females. However, many communities in Kenya are not sensitised or are not willing to adhere to the provisions. Declining portions of land are aggravating the apathy by the communities into accepting fully the gender equity policy provisions.

Ngethe (2017:10) while referring to the findings by a 2013 study titled *Exploring Kenya's Inequality* says that, in many cases, family lands are small in size and are under pressure to feed ever growing families. The researcher construes from literature already covered that, the main source of paid income among FHHs is low-paying wages, besides the agricultural production. The low income makes it hard for the females to purchase or rent farm plots; which pushes them into more food insecurity vulnerabilities. However, the females who may afford to buy or purchase may acquire small-sized portions.

In Tanzania, women managers cultivate about 0.6 hectares of land on average as compared to all other managers who cultivate more than 1 hectare - a difference that is statistically significant (ESARO, 2015:2). The situation is similar in Uganda. Women farm managers in the country cultivate plots that are on average about 0.23 hectares smaller than those managed by males (ESARO, 2015:2). The literature further reveals that land size imbalance is more pronounced in urban areas than rural.

Plot ownership competition puts urban farmers at the bottom of all other plot production. It is stated that access to land is one of the main obstacles of urban agriculture (Rogerson, 2003 in ESARO, 2015:2; Horvoka, 2005 in ESARO, 2015:2), affecting female more than male farmers (May & Rogerson, 1995 in ESARO, 2015:2; Jacobi et al., 2000 in ESARO, 2015:2; Crush et al., 2011 in ESARO, 2015:2). The researcher of this study infers that the reason for the less land ownership by the females in urban areas is because most of them rent residential house or flat; or if she works on a plot, either she had rented or most probably it is owned by her husband. Most females living in urban areas reside in rental flats or are living in homes registered under the names of their spouses. Therefore for single mothers, urban land ownership is almost non-existent. Sometimes women and men who belong to the same household may cultivate different plots (ESARO, 2015:9).

For example, in Malawi, women make decisions on about 26% of all agricultural plots (ESARO, 2015:9). This translates into males making most decisions (74%) with regards to

agricultural plots. Among the 26 percent, 76% of these plots are actually owned by the female only, suggesting a strong relationship between ownership and decision-making power (but there is no one-to-one correspondence between plot management and land ownership or household headship) (ESARO, 2015:9). From this statistic, it is clear that women make decisions to plots they jointly own with males at only 24%. Plots managed by women may be less productive than those managed by men due to observable factors such as differences in experience and education, land quality, quantity of agricultural inputs used, and the choice of crops grown (ESARO, 2015:13). Furthermore, smallholder women farmers are more exposed than men to climate risks, and for many of the same reasons that female farmers' productivity is lower than men's – they have fewer endowments and entitlements, have more limited access to information and services, and are less mobile (FAO, 2016:49). Moreover, FHHs' food security may be aggravated by lack or loss of male labour in farming activities.

- **Male family labour**

Agricultural production among the FHHs is also influenced by male labour. Braunstein (2015:10) indicates that; time, commodities and infrastructure are the inputs into the social reproduction function. There is a large part of gender gap attributed to differential access to male family labour in Tanzania and Malawi (ESARO, 2015:14). For example, 97% of the gender gap is related to unequal access to male family labour in Tanzania (ESARO, 2015:14). This could potentially be linked to a number of factors including the segregation of tasks, rural women's limited voice and agency, their lack of access to finance or to hire male labour and invest in machinery, and limited time-saving infrastructure (ESARO, 2015:14). Male outmigration also depletes male labour among the households.

In Nepal, there is a growing pattern of outmigration of male population from villages to urban areas and overseas in search of better opportunities (Tamang, Paudel & Shrestha, 2014:20). The researcher of this study deduces that, the male outmigration from their households has left Nepalese females as *de facto* household heads, which cumpers them with a myriad of domestic and farm work. Braunstein (2015:13) postulate that outmigration of adult household members, makes them no longer be able to contribute any time to social reproduction (though they may make up for some of time through financial contributions). The male outmigration in Nepal has led to a situation where women, in addition to looking after children and the elderly, have to take additional responsibilities in farming, within the traditionally male-dominant farming practices (Tamang et al., 2014:20). This is not only inappropriate and unfriendly to women, but also has lowered the use and productivity of land; hence perpetuating, if not exacerbating, food insecurity (Tamang et al., 2014:20).

Another key reason that women farm managers have less access to male family labour is that the majority of them are widowed, separated, or divorced (ESARO, 2015:14). ESARO (2015:14) indicates:

This is the case for 67% of sole female plot managers in Tanzania. In fact, it is quite possible that these women became plot managers entirely because of their head-of household status. These high rates of widowhood, separation, and divorce mean that women have fewer people in the household to draw on for farm labour. In Tanzania, the households of female farm managers have an average of one fewer person than all other households.

Loss of male labour in farming among the FHHs decreases farming productivity. For example, in Tanzania, crop production is marked by low male labour. As indicated above, the households of female farm managers in the country have an average of one fewer person than all other households (ESARO, 2015:14). This means a lack of adult male means the female heads must look for a way to fill this gap. ESARO (2015:14) says that one way women try to compensate for their lower use of male family labour is by more intense use of female labour, including themselves and other times their children. However, these additional inputs are not sufficient to offset the lost productivity brought about by lower use of male family labour (ESARO, 2015:14). Despite women being the major contributors to agricultural labour, literature reveals that their productivity is lower than those of males.

Generally, farmers are said to be more productive on smaller plots, and one reason postulated for this is that they are able to use physical and labour resources to cultivate their plots more intensely (ESARO, 2015:7). But despite the cultivation of smaller plots relative to men, women are still less productive (ESARO, 2015:7). This implies that the gender gap would be even larger if we take the smaller size of their plots into account (ESARO, 2015:7). Women farmers are consistently found to be less productive than male farmers (ESARO, 2015:1). The gender gap in agricultural productivity measured by the value of agricultural produce per unit of cultivated land, ranges from 4 to 25%, depending on the country and the crop (World Bank & ONE, 2014 in ESARO, 2015:1). This gap exists because of factors such as: women frequently have unequal access to key agricultural inputs such as land, labour, knowledge, fertiliser, and improved seeds (ESARO, 2015:1). The researcher is of the opinion that, the low inputs consequently translate into low agricultural outputs. Low agricultural productivity tends to reduce per hectare yields and leads to more intense farming, resulting in over-cultivation, soil erosion, and land degradation; which in turn further undermine agricultural productivity and environmental sustainability (ESARO, 2015:1). The low production hence predisposes the FHHs to food shortages, owing to the fact that environmental degradation leads to a vicious cycles of food insecurity. FAO (2016:4) asserts that widespread land degradation and increasing

water scarcity limit the potential for yield increases (FAO, 2016:4). The poor agricultural performance can be mitigated by employing various intervention measures.

The researcher of this study is of the opinion that, in spite of their status, the FHHs require male labour input into farming in order to increase crop output. However, FHHs are faced by lack or loss of male labour, since most of FHHs are single-parent, divorced/separated, widowed, or even senior female citizens living with orphaned or poor children of their relatives. Therefore the lack of male adult to promote labour in the farm is a challenge among these households. This has left the female household head with the burden of being a sole source of adult labour for all her household demands. On a similar perspective, Tamang et al. (2014:20), say that, the burden of both farming and looking after the household have now become a part of women's responsibility. While women have increased their period of work in agriculture, they have to complete their other household and off-farm work as well (Cornhiel, 2006 in Tamang et al., 2014:20). This point is also supported by Braunstein (2015:14) that, women's increasing responsibility for maintaining their families' well-being, and women's lack of choice in doing so is an apt reflection of the increasing share of reproductive and economic responsibilities borne by women in "low road" case. The researcher is of further perspective that, policies that strive to bring gender equality should be implemented even focusing on male labour. Equalising the access to male family labour would reduce the estimated gender gap (including that of Tanzania) which stands at 97% (ESARO, 2015:14). This will help alleviate the composite demand on females for both farm work and other domestic chores. Besides limited land ownership and the male family labour, cumbering female farming, the female farmers practice minimal mechanisation and rely on crude farm equipment and less fertiliser on their farms.

- **Female farm inputs**

One strategy for implementing the SDG2 is through promotion of sustainable agriculture, a doubling of agricultural productivity, increased investments and properly functioning food markets (UN, 2016:4). The researcher of this study observes that, besides inequalities associated with low plot ownership and lack of male labour, the FHHs experience gaps associated with farm inputs. This gap exists because women frequently have unequal access to key agricultural inputs such as land ... fertiliser, and improved seeds (ESARO, 2015:1). This situation exists in many places, especially in the Sub-Saharan Africa. The researcher is of the opinion that high prevalence of female poverty is the main reason for poor mechanisation of their farms. For example, in Malawi, Tanzania and Uganda, women's access to agricultural implements and machinery is significantly lower than that of men (ESARO, 2015:15). This is even worse in areas where access to input market is constrained

by poor infrastructure, the prices of the inputs are high or even cultural norms do not allow females to use some tools.

The researcher is aware through experience and one-on-one observation that, most rural roads in Kenya are quite inaccessible. An example of poor road infrastructure challenge in the country is illustrated by ESARO (2016:23) of a Catherine Mbondo in Makindu: *Initially, she grew local vegetables on her farm but transport became expensive, the vegetables would go bad in a very short time, and her suppliers did not offer her favourable terms.* The researcher construes that, the transport was expensive for Catherine because of rough and muddy earth roads which could not facilitate easy transport for her farm produce. The poor transport might have placed inappropriate prices contrasting with prevailing market prices of similar commodities at the time. The volatility of the prices might have diminished her chance of surviving in the farm produce trade, hence making her seek alternative sources of income such as casual labour. Low wages for women mean that they can ill afford to purchase care commodities; and if they can, the commodities they do purchase are likely to be inferior (Braunstein, 2015:13). This means that, female farmers may fail to purchase efficient farm implements and other inputs, or if they did, the inputs could be of poorest quality since they are the cheapest. Patriarchal cultural norms too advance gender gaps in the access to farm input by females.

In Malawi, women own fewer agricultural implements and machinery, such as weighing machines, spraying pumps, panga knives, axes, and irrigation equipment (ESARO, 2015:15). In Tanzania, ownership of livestock, spraying machines, water pumps, and ploughs is lower among women (ESARO, 2015:15-16). Differences in the use of implements and machinery explain the 18% of the gender gap in Malawi, 8% in Tanzania, and 9% in Uganda (ESARO, 2015:15). The situation is also similar in Kenya. Through researcher's personal experience, some communities in Kenya do not allow women to use implements perceived to be men's.

In support of increasing access to farm inputs, ESARO (2015:6) suggests that one priority should be improving women's access to agricultural machinery and other production technologies. The researcher of this study has observed that unlike before, Kenya is showing some progress in creating equal opportunities in economic occupation. For example, a few females in the country have been found to operate big farm machineries such as ploughing tractors and combined harvesters. But nonetheless, the progress is very slow since it is only few females who train to operate the machines. The researcher therefore recommends for sensitisation among the rural communities (including the FHHs) on the need for females to train in farm mechanisation by the females.

Secondly, policies that eliminate patriarchal cultures but promoting female empowerment would promote the input affordability among the FHHs. According to FAO, an increase in resources by women to the same level as men could increase yields by 20–30% (Qureshi et al., 2015:395). This could raise total agricultural output in developing countries by 2.5–4%, which could in turn reduce the number of hungry people in the world by 12–17% (Qureshi et al., 2015:395). Since females are among the poorest, the interventions of promoting farm input would greatly improve their food security status, especially among rural FHHs.

3.4.1.6 Female nutrition education

Sanitation is addressed by the SDG6 which addresses the issues of drinking water, sanitation and hygiene (UN, 2016:6). The UN says that the goal is very critical for the survival of both people and the planet (UN, 2016:6). The UN report further indicates water as a scarce resource: “Water stress affects more than 2 billion people around the globe, a figure that is projected to rise” (UN, 2016:6). The lack of enough water protracts households’ vulnerability to communicable diseases including cholera, dysentery and typhoid. The researcher of this study is of the opinion that, Voi Division being an ASAL, experiences water shortages hence FHHs in the division are at risk of contracting the communicable diseases. The SDG4 encourages for among other issues, training throughout life (UN, 2016:5, 19) and enhancement of knowledge, skills and values needed to function well and contribute to the society (UN, 2016:5). The researcher of this study is of the opinion that training females on issues of nutrition is critical for promotion of their household food security through proper nutrition and disease control. This view is influenced by the researcher’s personal experiences with females who may possess bounties of food but lack requisite knowledge on proper feeding and care habits. Such females are ignorant of the need for dietary diversity, and proper hygiene and sanitation for their household members. Education, particularly women’s secondary education correlates with almost 43% in reduction of child malnutrition in developing countries (Olielo, 2013:4). Additionally, dietary diversity is associated with child nutritional status and growth as seen in Kenya (Olielo, 2013:5). Nutrition knowledge among females plays critical role in the overall nutritional status of FHHs.

Children from dietary misinformed households are predisposed to an array of dietary related conditions (UN, 2016:5). The commonest is malnutrition, a broad term for nutritional status that includes both under-nutrition and over-nutrition (McKune et al., 2015:2). Under-nutrition stems from inadequate calories, protein, or micronutrients for growth and maintenance or

inability to fully utilise nutrients (McKune et al., 2015:2). Over-nutrition stems from excess calories, and nutrients beyond what the body requires for normal growth and metabolism (UNICEF, 2009 in McKune et al., 2015:2). The researcher retrospectively notes that undernourished children are likely to be raised in poor households, that they do not get enough food to eat thus their calorie intake may be too low for normal growth and development. Conditions such as stunting, kwashiorkor and marasmus are common among such children. Conversely, the over-nourished children mostly hail from wealthier households with ignorance about proper nutrition habits. However, in other instances the latter children may hail from poorer households. Due to lack of the nutritional knowledge, these families are likely to be consuming energy-dense foods, especially with high fat and sugar content. One consequence from the over-nutrition among the children is obesity. Global statistics indicate that the share of overweight children under age 5 increased by nearly 20% between 2000 and 2014, which was approximately 41 million worldwide in 2014 (UN, 2016:4).

Basing on these reports, the researcher of this study is of the opinion that early and continuous education among females inculcates sustainable nutritional knowledge and skills. Furthermore, as mentioned previously, education correlates positively with nutritional knowledge (see Olielo, 2013:4, 5). In addition to providing greater employment opportunities and increasing household income (Qureshi et al., 2015:396), education is a key element for promoting nutritional knowledge among the FHHs. Moreover, basic education lays foundation for advanced education. By the end of (at least) lower secondary school, learners should be able to master subject-related knowledge and skills, possess personal and social skills (UN, 2016:19). The important link between a woman's level of schooling and her family's nutritional status is well documented (Qureshi et al., 2015:396). The researcher proposes that, in order to inculcate nutritional knowledge among all people including females, the Kenya Institute of Curriculum Development (KICD) should re-introduce Home Science Subject in primary and secondary schools as it were previously in 1990s. The re-introduction would inculcate nutritional knowledge to learners early enough as "community value". The researcher is of the opinion that learning introduced in childhood is more sustainable because the children will retain it up to adulthood. Literature shows high prevalence of illiteracy among the females.

Illiteracy is the anticlimax of the SDG4 of ensuring equitable quality education and lifelong learning for all. In 2013, fifty nine million children of primary school age were out of school and there were still 757 million adults (aged 15 and over) unable to read and write, of whom two-thirds were women (UN, 2016:5). The illiteracy may have led and continues to lead to complications associated with malnutrition which may have long-term impact upon children,

especially the under-fives. UN reports that globally, one in four children under age 5 had stunted growth in 2014, which was an estimated 158.6 million children (UN, 2016:4). It is therefore, the researcher's suggestion that all females should be assisted in acquiring both basic and advanced learning for better nutrition in their households. Opportunities associated with learning such as a good career acts as "poverty eradicator" and "food and nutrition security booster" among the females. Besides the nutritional knowledge, education also helps break the vicious cycle of intergenerational poverty.

Moreover, children, especially girls, from households headed by someone with less than a primary education were more than four times as likely to be out of school as children from households headed by someone with a secondary or higher education (UN, 2016:18). This shows that not only for nutrition knowledge, but education is important for continuity of educated generations and the ultimate continued food and nutrition security. To ensure this, the researcher of this study is therefore proposes that, governments should implement educational ratifications, including those concerned with addressing gender inequalities.

To tackle the issue of girl-child education, CEDAW proposes that countries should address factors that contribute to school drop-out for women and girls, and should help women and girls who have left school early to return and complete their education, and also eliminate gender stereotypes and discrimination in schools, including by revising textbooks, curricula, and teaching methods (Khanna et al., 2015:9). The researcher is of the opinion that, in order to facilitate this; governments should address geographical and social constraints to school access by both boys and girls. In the bid to address gender inequalities, the governments and other development partners should also facilitate building better infrastructure, more particularly in rural areas to make educational institutions more accessible. Children are less likely to attend school if they live in rural areas, are poor or have parents with little or no education (UN, 2016:18). Poor roads in the rural areas do not facilitate easy transport especially among girls whose educational institutions are farther from their households. Some of risks the girls face while traversing through rush bushes very early in the morning or evening are mostly gender-based violence such as rape. The researcher has observed media reporting on rape and murder of girls going to or coming from schools. Gender-based policies would address the barriers to female education.

Policies that remove gender barriers to learning and literacy and lead to the empowerment of women are critical for addressing food and nutrition insecurity (Qureshi et al., 2015:396). How well households utilise food that is accessible to them will depend on their food nutrition, safety and hygiene knowledge and willingness to ensure a healthy and nutritious diet for all household members (Anderson 2014 in Qureshi, Dixon & Wood, 2015:396). The

researcher is of the opinion that the nutritional knowledge, affordability of a variety of food, and their willingness to consume certain foods, and observing hygiene and sanitation are all guided by nutritional education among household heads and caregivers.

3.4.2 Consequences of food insecurity among female-headed households

The world is producing enough food, but in 2010-2012 there were still almost 870 million people estimated to be undernourished (FAO et al., 2012 in FAO, 2017:5). Another billion people are malnourished, lacking essential micronutrients (FAO, 2017:5). This shows that despite efforts to ensuring food security (including among FHHs), food insecurity still remains rampant in the world. The researcher is of the opinion that, the FHHs are the highly if not the most affected by the food insecurity among adult-headed households. Various consequences of food insecurity discussed in this section are as follows: jeopardises public health, exacerbates poverty, cyclic relationship between conflicts and female food insecurity, violation of girl-child rights, deteriorates effects of climate change, leads to coping strategies.

3.4.2.1 Jeopardises public health

Despite many populations being affected by food insecurity, other populations have enough food, which poses the world with a paradox. The paradox is that at the same time a large number of people – mainly in richer countries - are over-eating, causing long-term health problems (FAO, 2017:5). According to Hopkins, Gibbons, Caudwell, Blundell and Finlayson (2016:1875), a heightened liking (the perceived pleasurable sensory properties of food) and wanting (the attraction towards a specific food over available alternatives) for high-fat, high-sweet foods has been noted in overweight and obese individuals and those who demonstrate binge eating. The researcher of this study is of the opinion that though binge eating may be demonstrated by individuals among food insecure households (for example Laraia (2013:203) observes that, household food insecurity is hypothesised to promote dependence on inexpensive, highly palatable foods that are energy dense); most of the practice is common among the wealthy households that have fair economic access to food. These improper feeding habits by people in either food secure or food insecure households cause food related disorders such as high blood pressure and diabetes among them. Evidence suggests that a diet high in saturated fat increases the concentration of total cholesterol ... in the blood-stream, which is strongly associated with increased risk of high blood pressure (Peacock, Stanley, Calder, Jebb, Thies, Seal et al., 2010:1689). On the other hand, malnutrition (especially the aspect of undernutrition) has been found to affect the poor, including food producer communities. According to UN (2016:15), chronic undernutrition puts children at greater risk of dying from common infections, increases the

frequency and severity of infections and contributes to delayed recovery; and it is also associated with impaired cognitive ability and reduced school and work performance. Sixty percent of the malnourished actually are food producers, smallholders and pastoralists, with 20% living in cities and 20% landless rural people (FAO, 2017:5). As mentioned before, the effects of climate change, especially droughts in the Sub-Saharan Africa – including Kenya are putting a lot of pressure on the food producers. For example the ravaging drought of 2016 to 2017 across all East African countries is distressing both pastoralists and sedentary farmers. The effects of the undernutrition also cause health disorders among household members. In chapter 2 of this study, Laraia (2013:203) indicates that, food insecurity is associated with type 2 diabetes. Women and girls have unique physiological requirements through pregnancy and breastfeeding (Qureshi et al., 2015:395). The researcher is of the knowledge that food insecurity among pregnant and lactating mothers is harmful to foetuses and infants. As mentioned before, improper feeding among children cause poor physiological and cognitive development. The disorders include nutritional deficiency conditions such as kwashiorkor, marasmus, rickets; and stunted growth which is associated with poor cognitive development. These series of the effects of malnutrition maintains the vicious cycle of intergenerational household poverty, more especially among the FHHs.

3.4.2.2 Exacerbates poverty

Hunger perpetuates poverty by reducing people's ability to work, to learn and to lead prosperous lives (Qureshi et al., 2015:395). For the poor producers, food is not only a basic need, it is the single and often fragile support they have for maintaining their livelihood. What is true at the household level is also true at the macro-economic level (FAO, 2017:5). There are 32 countries, 20 of them in Africa, facing food crises and in need of international emergency support; and in most of these countries paradoxically, agriculture is an important, if not the major part of economy (FAO, 2017:5).

Out of media news and literature, the researcher of this study is aware that, following the post-MDG agenda and the formulation of the SDGs, there has been also the formulation of development priorities for Africa: These are sustainable development priorities for the five sub-regions of Africa: North Africa, West Africa, Central Africa, Eastern Africa and Southern Africa (Economic Commission for Africa, 2015:3). For example one of the top priorities for Eastern Africa Sub-region is to achieve sustainable and inclusive growth and economic transformation (Economic Commission for Africa, 2015:4). Over the past decade, Africa has recorded sustained and impressive economic growth rates, whereby in 2013, growth rates averaged 4% (Economic Commission for Africa, 2015:5). This impressive growth, however, presents a puzzling paradox: notwithstanding the slowing GDP figures, because,

Africa has the lowest levels of human and social development with a large part of the population trapped in poverty, facing rampant unemployment and inequality (Economic Commission for Africa, 2015:5). The researcher links “to achieve sustainable and inclusive growth and economic transformation” and “lowest levels of human and social development” as conflicting “input” and “outcome”. Women in Africa still continue to wallow in poverty due to gender-based socio-cultural exclusions which include decision-making on matters of agricultural production. These discriminations disempower women in accessing proper food for their households. The researcher is of the opinion that women are yet to experience social and economic opportunities enjoyed by their male counterparts. Even the wealthiest countries have yet to fully empower women or eliminate discrimination (UN, 2016:3). Ensuring that women have better access to paid employment, sexual and reproductive health and reproductive rights, and real decision-making power in public and private spheres will further ensure that development is equitable and sustainable (UN, 2016:20).

3.4.2.3 Cyclic relationship between conflicts and female food insecurity

Food insecurity can be a direct result of violent conflict and political instability (FAO, IFAD & WFP, 2015:38; UN, 2016:14), such that famine caused by conflict and drought resulted in the deaths of more than 250,000 people in Somalia between 2010 and 2012 (FAO, IFAD & WFP, 2015:38). Another illustration is the “Arab Spring” that began in 2011. The anti-government action that swept across countries in North Africa and the Middle East beginning in 2011 as part of the so-called ‘Arab Spring’ is generally viewed as arising from dissatisfaction with autocratic rule, high unemployment, and economic stagnation (Cunningham & Lemke, 2014:328).

While it might not be a direct cause and rarely the only cause, when combined with other factors, food insecurity could be the factor that determines whether and when violent conflicts will erupt (Qureshi et al., 2015:393). Researchers generally find positive links between food price and violence (Raleigh et al., 2015:187). For example, the 2008 global food price crisis exposed the vulnerability of the global food system and how quickly food insecurity can lead to significant civil unrest or food riots (Jones et al., 2013:481; Qureshi et al., 2015:393, Raleigh et al., 2015:187). Protests and riots related to food prices took place in over 30 countries in 2007-2008 (Brinkman & Hendrix, 2011), including: the import-dependent Middle East, which witnessed food riots in Egypt, Jordan, Yemen, and Morocco; in Ethiopia, Burkina Faso, Senegal, Mozambique, Mauritania, Cameroon, Côte d’Ivoire, and Guinea; in Asia, Bangladesh, India, the Philippines, Cambodia, and Thailand (Hendrix & Haggard, 2015:143). Smith (2014) as cited by Raleigh et al. (2015:187) found that sudden monthly increases in domestic prices of ‘food baskets’ increases the probability of urban

unrest. Bellemare finds that food prices are a significant determinant of protests and riots in which food prices were among the stated motivations of demonstrators (Hendrix & Haggard, 2015:144). There is also the possibility that food prices might be related not only to food riots but to other forms of social unrest as well, such as increase in antigovernment demonstrations and riots in low-income countries (Hendrix & Haggard, 2015:144). The underlying presumption is that poor populations protest how governments expose them to high, unpredictable prices that create scarcity and competition for necessary, but limited, resources (Raleigh et al., 2015:188).

Besides being a cause, food insecurity may also aggravate levels of violent conflicts. *FAO, IFAD and WFP Report on Food Insecurity 2015* contends that, food insecurity can be an exacerbating factor to violent conflicts (FAO, IFAD & WFP, 2015:38). High inflation rates are related to compounded urban unrests. For example, in 2010-2011, food price-related protests recurred in several African countries including Algeria, Guinea-Bissau, Kenya, Libya, Mauritania, Mozambique, Senegal, Somalia, Sudan, Togo, and Uganda (Salehyan et al., 2012 in Hendrix & Haggard, 2015:143) as well as Bangladesh, China, and India; and across North Africa and the Middle East. Spiraling food prices were among the stated grievances of Arab Spring protesters in 2011 (Hendrix & Haggard, 2015:143). Besides food price inflation, over the longer run, global warming could fundamentally alter the distribution of world agricultural output and exacerbate volatility in prices (Hendrix & Haggard, 2015:143-144). The researcher of this study is of the opinion that most food insecurity-related challenges in the Sub-saharan Africa are influenced by droughts as an effect of climate change.

Further, the researcher is of an observation that, during civil unrests, people get displaced from their homes, people flee and fail to cultivate their lands, and food markets get disrupted due to conflicts. The whole situation precipitates food price increase. High prices are a function of short-run market dynamics, structural changes in world agricultural production, trade, and climate (Hendrix & Haggard, 2015:143). Rareigh et al. (2015:188), agrees with Devereux and Maxwell (2001 in Rareigh et al., 2015:188), and Auyero and Moran (2007 Rareigh et al., 2015:188) that, in unstable states, a feedback between food price and conflict is expected to occur as political violence exerts a negative effect on local market functioning and leads to higher food prices and volatility. UN (2016:14) propositions that, political instability has resulted in food insecurity affecting large swathes of population.

The researcher is of the viewpoint that, populations of countries that have experienced civil demonstrations and war have been in critical shortage of food. This is because its people are not able to be productive in any way. They cannot hold jobs, cultivate nor engage in

business. Let's take an example of a country experiencing the "Arab Spring" such as Syria. Humanitarian crisis in the country has displaced thousands of individuals and their families, of which the majority are women (Usta, Masterson & Farver, 2016:2). This scenario alienates females (the women) from productive activities and thus they over-depend on food aid. International humanitarian law protects the access of civilians and prisoners of war to food and water during armed conflicts and prohibits the deliberate starvation of civilians as a method of warfare; such that under international criminal law, violations of such protection constitute war crimes and deliberate starvation, whether in war or peace, may also constitute genocide or a crime against humanity (De Schutter, 2014:4). In spite of the stipulation, the females face a myriad of challenges during war conflicts. During wars and within conflict zones, women face violence both outside and inside their homes (El-Jack, 2003 in Usta, Masterson & Farver, 2016:2) as societal order breaks down (Usta, Masterson & Farver, 2016:2). Multiple forms of gender-based violence (GBV) stem largely from women's subordination with regard to men across many societies (United Nations General Assembly, 1993 in Usta et al., 2016:2). These forms of violence range from armed group violence, domestic violence inflicted by a spouse, intimate partner, and/or any other family member (Usta et al., 2016:2).

Violent conflicts also influence emergency food intervention which influences food price volatility. Food aid found in high conflict areas will corrupt market costs and keep prices artificially low (Maxwell et al., 2010 in Raleigh, 2015:188). This suggests that price volatility, rather than price increases, is more likely in conflict affected regions (Raleigh, 2015:188). Tensions associated with hunger can result into gender-based violence.

The researcher of this study is of the opinion that, if a female is experiencing GBV in whatever form, their performance including in activities that generate income and food provisioning for her household get jeopardised. This is because they may fail to attend work due to shame and stigma associated with visible physical bruises or even may be bed-ridden at hospital. The UN is also of the following opinion with regards to GBV on females:

Different forms of violence, including physical, sexual, psychological and economic, as well as trafficking and other forms of sexual exploitation affect millions of women and girls worldwide. This not only constitutes a grave violation of human rights, but also hinders the process of development (UN, 2016:21).

Available comparable data from 52 countries (including only one country from the developed regions) indicate that 21% of girls and women interviewed aged 15 to 49 years experienced physical and/or sexual violence at the hands of an intimate partner in the previous 12 months (UN, 2016:21). Moreover, as people are dislocated from their daily routines, lifestyles, and support networks, they must secure alternative shelter, food, and

income for themselves and their families. With limited resources or access to viable employment, young women may drop out of school, marry young, accept low-paid jobs, or take on risky work, such as prostitution (Usta et al., 2016:2).

3.4.2.4 Violation of girl-child rights

UN reports that child marriage is declining slowly but the levels are still worrying. Child marriage is most common in Southern Asia and sub-Saharan Africa, with rates of 44% and 37% respectively (UN, 2016:20). The researcher of this study is of the opinion that, when girls are married very young, they may face gender-based violence the longest than those who are married in their latter ages.

Reports from the Human Rights Watch noted increased levels of domestic violence during the second *Intifada* (the Palestinian uprising against the Israeli occupation) in the West Bank and Gaza (Human Rights Watch, 2006 in Usta et al., 2016:2), and extensive domestic violence against refugee women in Tanzania (Human Rights Watch, 2000 in Usta et al., 2016:2) and Nepal (Human Rights Watch, 2003 in Usta et al., 2016:2). There were high rates of domestic violence during the war in South Sudan (Jok, 1999 in Usta et al., 2016:2) and in post-war Peru where the incidence of interpersonal violence (IPV) differed between low (47%) and high conflict areas (54%) (Gallegos & Gutierrez, 2011 in Usta et al., 2016:2). Usta et al., 2016:2 illustrates the findings of a study carried out in Lebanon that:

Married couples were surveyed in Palestinian refugee communities. The results showed that 30% of the couples reported at least one experience of domestic violence, while 10% reported an episode in the previous year (Khawaja & Tewtel-Salem, 2004). A survey of 310 women displaced by the 2006 war in Lebanon revealed that 39% had at least one encounter with violence perpetrated by soldiers. Thirty-seven percent reported at least one incident of domestic violence during the conflict; with 13% of those reporting at least one incident of violence perpetrated by their husbands or other family members in the 6 weeks following the conflict (Usta, Farver, & Zein, 2008). Overall, domestic violence worsened and became more frequent following the 2006 war (Kvinna till Kvinna, 2010).

The 2016 to 2017 drought in Kenya was also found to exacerbate domestic violence on women. “Man stabs wife to death over ugali as children watch” was the heading on the Standard Newspaper of May, 18th 2017. What started as an argument over a small portion of delicacy ended up taking away the life of a young mother ... the father stabbed their mother to death after being served a small portion of *ugali* (starch food prepared with maize flour) in Ruaraka’s Laundry Slums, Nairobi (Wambu, 2017:3). Usta et al. (2016:2), say that at the individual level; loss of income, insecurity, compromised psychological functioning, and coping mechanisms influence an occurrence of gender-based violence.

3.4.2.5 Deteriorates effects of climate change

The 2014 Intergovernmental Panel on Climate Change Assessment Report identifies warming, increasing aridity, and increasing climatic variability as some of the main consequences of global climate change (Hendrix & Haggard, 2015:143-144). The Intergovernmental Panel on Climate Change (IPCC) predicts with medium confidence that food prices may rise as much as 84% by 2050 as a result of climate change, with increasing volatility and some risk of precipitous increases (IPCC, 2014 in Hendrix & Haggard, 2015:144). These pressures are likely to be greatest in poor countries, where substantial shares of the population already face food insecurity (Hendrix & Haggard, 2015:144). The researcher of this study is of the opinion that price volatility perpetuated by climate change affects FHHs unfavourably. This is more so among unemployed rural female household heads whose major livelihood is subsistent farming.

3.4.2.6 Leads to coping strategies

Coping strategies are related to a community's cultural food beliefs and taboos and these detect or determine what to call a coping strategy and what not (Chagomoka et al., 2016:2). In order to exemplify how coping strategies are found to be used in Africa, Chagomoka et al. (2016:2), demonstrates:

Various coping strategies have been reported in Africa such that in Nigeria 95.8% of the entire population rely on less preferred food, 83.5% rely on limiting food portion at meal times; in Ghana poor rural families rely on food remittances to cope with chronic hunger, form household members who migrate to distance agriculture-rich hinterland; in Rwanda, the sale of cattle during peace time was due to shift in assets of households and during genocide of 1994, the sale of cattle was driven by the need to buy food, in Nairobi in Kenya slum dwellers were reported to use frequent strategies related to reduction in food consumed (69%) and credit (52%).

This section explores how food insecurity leads to coping strategies among females. The sub-headings for the section are: poor females, rural-urban setting, case of conflict zone- Palestine, and Kenyan context.

- **Poor females**

Poor people (particularly females) may use adverse coping strategies that deplete of the environmental resources (Olielo, 2013:4). The coping strategies are meant to mitigate effects poverty (Olielo, 2013:4). The strategies include: overgrazing, deforestation and overexploitation for fuel wood which result in soil degradation and reduced rainfall, making and selling charcoal, seeking employment, child labour, child marriages, begging, and selling assets like land and cows to buy food (Olielo, 2013:4). Other coping strategies are: abandoning responsibility of paying debts, trespassing, engaging in crime, corruption, stealing, prostitution, selling voters' cards, seeking financial assistance from government or

non-government organisations, migrating and waiting for food aid or death by starvation (Olielo, 2016:4). These strategies are not self-sustaining and perpetuate vicious cycle of poverty (Olielo, 2013:4). The researcher of this study is of the opinion that the coping strategies are the survival mechanisms among the poor communities including the FHHs, and as Olielo asserts, they are not sustainable hence should not be seen as alternatives for food security.

- **Rural-urban setting**

People are active participants in responding to risks they face in life, including in food shortages (Chagomoka, et al., 2016:1). Results of coping strategies in food shortage vary along the continuum of urban-rural settings, such that in peri-urban and rural areas, gathering of wild food and selling of charcoal are widely practised, while in urban areas households reduce the number of meals as a more frequent coping strategy (Chagomoka, et al., 2016:1). Chagomoka, et al. (2016:1), identified the following coping strategies along the continuum of urban-rural as the most severe in times of food insecurity in the northern Ghana: skipping a whole day without food, borrowing, buying food on credit, consuming seed stock and restricting adult intake in favour of children. Hunting, consuming less preferred food, taking occasional jobs and engaging in small trading were considered not as severe (Chagomoka, et al., 2016:1). In this study, the study area is comprised of urban and rural segments of the FHHs therefore the study population may be employing different coping strategies depending on their residential nexus.

- **Case of conflict zone, Palestine**

A socio-economic and food security survey of 2012 in Palestine indicated general reliance on coping strategies which had remained higher in the Gaza Strip than in the West Bank. Yet in the West Bank, 77% of households reported resorting to one or more coping strategies during the second half of 2012, with purchasing food on credit being the most frequently chosen option, followed by a reduction in the variety and cost of food consumed and by the consumption of stored food (WFP, 2012:6). By comparison, in the Gaza Strip, the share of households that reported resorting to one or more coping strategy reached 89%. Borrowing from relatives and friends, purchasing lower quality of food and reducing the number of daily meals, were identified as the three most frequently used strategies to manage economic hardship in Gaza (WFP, 2012:6). The researcher is of the opinion that, despite the fact that the current study area is a socially cohesive community, it could be using some of the coping strategies found in the Palestine. For example, purchasing food on credit cuts across many communities.

- **Kenyan context**

KNBS (2014:12) illustrates the following household coping strategies for food insecurity used in Kenya: reduction in the quantities and frequencies of meals; borrowing and sharing of food; charcoal burning, and selling of firewood particularly in Turkana; petty trading, purchasing food on credit; borrowing food from relatives; skipping meals, and reducing meal sizes especially in Tana River and Isiolo respectively.

Residents of drought-stricken areas in the North Rift have resorted to feasting on dying livestock and wild fruits (Nation Team, 2017b:10). The worst hit areas by drought are Tiaty Sub-county in Baringo County, Turkana and West Pokot counties (Nation Team, 2017b:10). The following excerpt from *the Daily Nation Newspaper* illustrates coping strategies usage as reported by (Kakai, 2017:10): “The food and water crisis is worsening in the West Pokot County as the dry spell persists with hundreds of livestock perishing. Residents have resorted to eating wild fruits and vegetables locally known as *sokoria* and *sodhi* to survive”. A resident says, “We depend on eating wild fruits from trees. The leaves are bitter; we start boiling them from 3am to 10am” (Kakai, 2017:10). Mr. Korkimul, a chief in the county added that some residents migrated to the neighbouring country Uganda with their animals (in search of pasture and water) (Kakai, 2017:10). The residents are also depending on relief food to the more than 320,000 hungry residents (Kakai, 2017:10) in the county.

In Baringo County people have abandoned their villages to other areas in hope of finding water in an area where one person has starved of hunger - people had moved from their homes and camped along river banks particularly women and children; children in the county are also abandoning school to accompany or help their parents to search water and pastures (Nation Team, 2017a:11).

Furthermore, breastfeeding mothers had a rough time taking care of their young ones. They had no milk to offer their babies and are living in fear of death. To cope with the food deficit, children crying for water were given empty bottles by their mothers in hope of soothing them for a little while; families have been forced to split up: men had left home to dig for water by rivers” (Chepkwony, 2017:28).

Likewise, the Taita-Taveta County in which the Voi Division is located is also experiencing the hardship of food insecurity precipitated by the drought. The researcher thinks that communities in the Voi Division, including the FHHs could be employing some of the strategies found to be used in the other counties. Therefore, the use of the coping strategies implies that the communities (in Kenya) are employing survival tactics to endure through the hunger and food insecurity precipitated by the drought. Hence, emergency and long-term intervention strategies through research, policy formulation, planning, and programme implementation are required to ensure the achievement of the SDG2 of hunger and food insecurity eradication, including among the FHHs.

3.5 Summary

This chapter generally explores the concept of food security among FHHs. The commonly ratified definition of food security is by the WFS of 1996. Female food security is a rights-based issue. The significance of female food security as a rights-based issue is that the world has recognised the need to guarantee females enjoy their rights to food security on an equal basis with males. In this study, the concept of female food security is informed by the knowledge that, the proportion of adult females is higher than that of males, especially in Kenya. This naturally means that, the majority affected by food insecurity in the country are the females. Moreover, vulnerabilities associated with female gender expose them to food insecurity more than males. The vulnerabilities to food insecurity among FHHs are precipitated by a myriad of factors which include: poverty, challenges in social reproduction, gender inequality in the labour market, hindrances to general production, and challenges faced by females in farming.

Food insecurity has several impacts on the FHHs. A consequence of the food insecurity is that, it poses risks to FHHs' public health, including disorders of overfeeding and undernutrition. The lack of food similarly exacerbates poverty by reducing people's ability to work, to learn and to lead prosperous lives, including among the FHHs. There is also correlation between conflicts and food insecurity. Food insecurity can be a direct result of violent conflict and political instability, it might not be a direct cause and rarely the only cause, but when combined with other factors, it could be the factor that determines whether and when violent conflicts will erupt. Food insecurity can also aggravate levels of violent conflicts. Another outcome of the food insecurity is that, it has a moral value and therefore its prevalence insinuates a violation of human right. This is particularly if a female has to experience gender-based violence as a result of the food insecurity in her household. Food insecurity also leads to a deterioration of effects of climate change especially among the FHHs. The last but not least impact of food insecurity among the FHHs is that it leads the households into employing coping strategies to survive through the scourge. In order to ensure equality and the right to food, multi-agency partnership in collaboration with communities, including the FHHs are needed. Therefore, emergency and long-term intervention strategies through research, policy formulation, planning, and programme implementation are required to ensure the achievement of the SDG2 of hunger and food insecurity eradication, including among the FHHs.

The next chapter provides a discussion of the ecological systems perspective and food security among female-headed households.

CHAPTER 4

ECOLOGICAL SYSTEMS PERSPECTIVE AND FOOD SECURITY AMONG FEMALE-HEADED HOUSEHOLDS

4.1 Introduction

This study is underpinned by the ecological systems perspective by Urie Bronfenbrenner as theorised in 1979. The perspective explains how five systems influence human development, particularly on food security. Härkönen (2007:1) contends that, at the time when we are so much engaged to defend our physical environment against the curses of technology, we have not done a thing to reach a similar state of security in the environment of our social life. In this study, human development is in the form of food security. The development focuses on FHHs as the population (or persons) of the study. Darling (2007:207) discusses what Bronfenbrenner and Crouter (1983) described as a “person-process-context model” in which variability in a developmental process was studied as a function of context (for example home) and person (for instance gender). A female as a gendered person interacts with other members of her household within the home or household. Critically, the gender difference was seen to derive not from some biological difference in males and females, but from the different meaning the task had for males and females (Darling, 2007:207). Literature explored previously, particularly in chapter 3, discusses a female as a person commonly perceived as of “lower standards” than a male. The literature has shown how the female is cumbered with the burden of caregiving, but on the other hand earns lower remunerations.

Contextualising this study on the ecological perspective draws the limelight on how systems in social settings affect the development of FHHs, particularly on food security. With regards to the ecological systems perspective in relation to food security among the FHHs, this chapter discusses the concept in the following sequence: definition of key terms, ecological systems perspective and food security among female-headed households, aspects of human ecology and physical ecology in food security and the domains of food security and the ecological perspective.

4.2 Definition of key terms

The following key terms are subsequently explored in this section: ecological systems theory, setting and ecological environment.

4.2.1 Ecological systems theory

This theory was developed by psychologist Urie Brofenbrenner (in 1979) (Ettekal & Mahoney, 2017:2; Härkönen, 2007:2), and as defined in the publication, *The Ecology of Human Development* (Härkönen, 2007:2; Neal & Neal, 2013:723), ecological systems theory (referred to as perspective in this study), explains how human development is influenced by different types of environmental systems (Ettekal & Mahoney, 2017:2). Friedman and Allen (2011:9), explain that:

... the theory consists of the scientific study of progressive, mutual accommodation throughout the life cycle between an active, growing human being and the changing properties of the immediate settings in which the developing person live and are affected by the relations between these settings and the larger contexts in which the settings are embedded (see section 1.4 in chapter 1).

In its traditional formulation, different levels of ecological systems are viewed to be nested within one another (Neal & Neal, 2013:722, 723). The researcher of this study has realised that circles characterise the concept of the tradition of nesting the ecological systems (Ettekal & Mahoney, 2017:3; Härkönen, 2007:15; Neal & Neal, 2013:725). Neal and Neal (2013:723) argue that, ecological systems theory should be conceptualised as “networked” rather than “nested” (nested obscures relationships between systems), where each system is defined in terms of the social relationships surrounding a focal individual, and where systems at different levels relate to one another in an overlapping but non-nested way (Neal & Neal, 2013:723). With this regard, Neal and Neal (2013:728) conceptualise the perspective as nested in a diagram with both circles and triangles. The researcher of this study too has drawn a framework with both circles and triangles to implicate the networks that different ecological systems form (see figure 4.1). Whether the key word of the theory is “nested” or “networked”, this study adopts the traditional conceptualisation of the theory, but also considers the importance of the word “networked” since networks, particularly the collaborations among FHHs and external environments, such as development agencies which are mandatory in the realisation of sustainable food security among everyone, including the FHHs.

In this study, food security among the FHHs is conceptualised as a human right as stipulated by the WFS definition of food security (see section 1.1, and sub-sections 2.2.1 and 3.2.1). In order to realise food security as a human right sustainably, it is important to consider the role of networking among different stakeholders in development. An advantage of considering the network conceptualisation is highlighted by Neal and Neal, (2013:723) that, defining ecological systems in network terms ... yields a form of ecological systems theory that more closely matches Brofenbrenner’s (1945) early recognition of the role of

social networks in shaping development. Moreover, Etekal and Mahoney (2017:2) also observe that, modern theories of human development propose that development occurs over time (chrono-system) as part of a complex process involving a system of interactions within the individual and between the individual and the environmental context of which he or she is part of. These observations therefore emphasise the significance of contextualising the ecological systems theory not only traditionally (nested systems), but also in network terms. The ecological systems theory is widely recognised for underscoring interdependent and multi-level systems on individual development (Neal & Neal, 2013:723). The “individual” in context of this study is the entire household belonging to the female - the micro-system; which interacts with other human ecologies (particularly development agencies) and physical ecology (physical environments surrounding the FHHs). The researcher is of the opinion that the FHHs and development agencies’ collaborations towards the food security should not undermine both human and ecological systems. The ecological systems perspective fits in this study, in explaining how the FHHs are embedded within other systems, and how the interactions between the FHHs and the other systems influence food security, and their development.

Subsequently, the second key term, setting is defined.

4.2.2 Setting

“As ‘nested’, setting is a place where people can readily engage in face-to-face interaction” (Neal & Neal, 2013:724). In this study, the FHHs members interact within their households as their immediate or the most proximal setting and other social institutions as secondary settings (including the Voi Division as the broader setting in which the FHHs interact within). *“As ‘networked’, setting is a set of people engaged in social interaction, which necessarily occurs in, and is likely affected by the features of a place”* (Neal & Neal, 2013:724). On the other hand, considering the “network” aspect of setting, the FHHs members can be viewed as the immediate setting, for they are a network of the persons involved in direct interactions within the households. All the members of the FHHs are involved in interactions which influence their households’ food security welfare. Consequently, the households themselves are a networked “group” whose interactive dynamics are affected by food security statuses, within the Voi Division as a place they are bounded in. They share roles and responsibilities as well as meals. Therefore, the FHHs and their interactive nature are the most proximal or immediate settings in which the household members are involved in face-to-face interactions, and the Voi is the broader setting in which the FHHs are embedded.

4.2.3 Human development

Bronfenbrenner's (1979:27) own definition of human development is:

... the process through which the growing person acquires a more extended differentiated, and valid conception of the ecological environment, and becomes motivated and able to engage in activities that reveal the properties of, sustain, or restructure that environment at levels of similar or greater complexity in form and content (Härkönen, 2007:4).

In this study, development is perceived to be achieved when sustainable food security has been attained among FHHs, including those residing in the Voi Division. In the context of the ecological perspective, Härkönen (2007:4) highlights Bronfenbrenner's' view that, developing is the result of interaction between person and environment. This once more underscores the importance of the "networked" concept of the ecological systems perspective. The FHHs are perceived to be in interactive relationships with environmental factors that influence food security among their households.

Next, the key term, ecological environment is discussed.

4.2.4 Ecological environment

Bronfenbrenner (1979) observed that there are a number of environmental factors in human social systems, which he referred to collectively as the ecological environment (Friedman & Allen, 2011:9). *"Traditionally, ecological environment refers to a nested arrangement of structures, each contained within the next"* (Friedman & Allen, 2011:9; Neal & Neal, 2013:724). On the other hand, *"as a network, it (ecological environment) is an overlapping arrangement of structures, each directly connected to the others by the direct and indirect social interactions of their participants"* (Neal & Neal, 2013:724). There are four interrelated types of environmental systems in Bronfenbrenner's rendition of ecological systems theory, namely, the micro-system, meso-system, exo-system, and macro-systems (Ettekal & Mahoney, 2017:2; Neal & Neal, 2013:723). These levels range from smaller, proximal in which individuals directly interact to larger, distal settings (setting refers to a place where people can readily engage in face-to-face interaction) according Neal and Neal (2013:723, 724) in which that indirectly influence development (Ettekal & Mahoney, 2017:2). In this study the basic micro-system are the FHHs. Examples of the meso-system are interactions between the FHHs and other proximal environments, such as workplaces of the female household heads and the school in which the children of the FHHs learn in. The exo-system is the FHHs' food security statuses, and the macro-system is the FHHs' physical and socio-cultural environment of the Voi Division. Hong and Espelage (2012) classify the systems as five, and they say: "There are various systems that shape individuals, which are: micro-

system, meso-system, exo-system, macro-system and chrono-system levels” (Hong & Espelage, 2012:312). The addition of the chrono-system makes the ecological environment systems to be five. Härkönen (2007:13) also highlights and discusses chrono-system as the fifth system. The chrono-system for this study is life transitions which influence the existence of the FHHs, such as single-motherhood, divorce, and widowhood.

Generally, the ecological environment is layered into five systems, as illustrated in Figure 4.1, which include: micro-system, meso-system, exo-system, macro-system, and chrono-system. The ecological environment systems in this study enshrine the FHHs as the primary ecological environment system (micro-system); the interactive nature of the four domains of the food security (availability, access, utilisation, and stability) as influenced by micro-systems, are the second ecological environment system (meso-system); food security statuses are the exo-systems; the geographically bounded area or the socio-cultural setting of the Voi Division is the macro-system, while the life transitions of the females (which influence their marital statuses) are the fifth ecological environment system, the chrono-system.

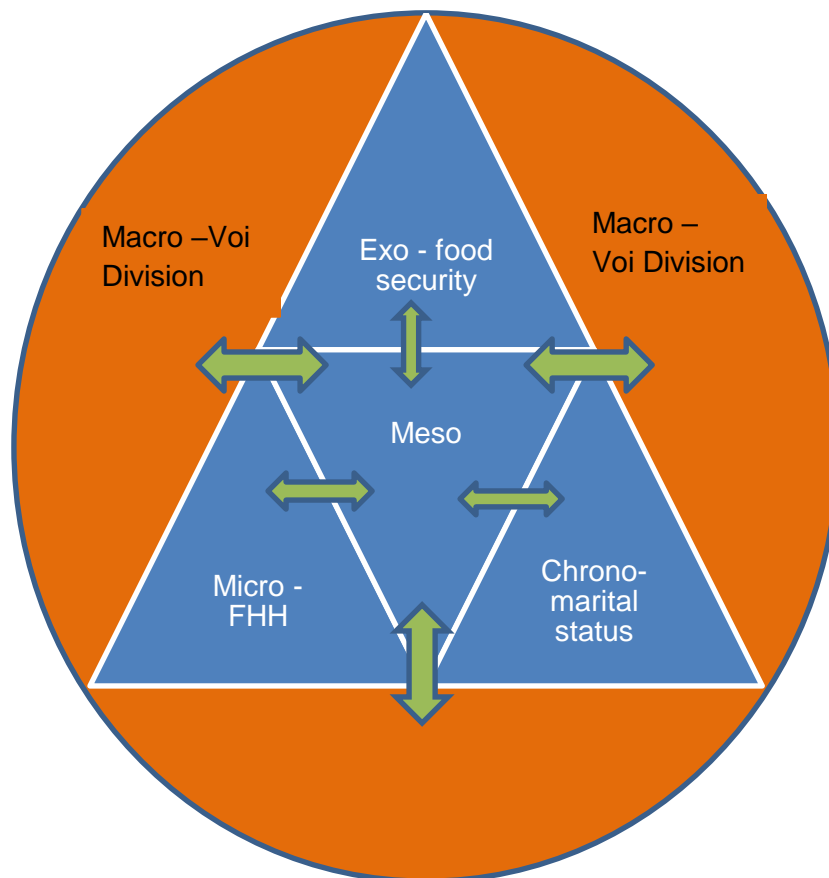


Figure 4.1: Ecological systems perspective framework

Below is also a critique on the ecological systems perspective.

4.3 Critique on the ecological systems perspective

In sub-section 4.2.1, two main description of ecological systems perspective have been explored. Firstly, in its traditional formulation, different levels of ecological systems are viewed to be nested within one another (Neal & Neal, 2013:722, 723). Secondly, Neal and Neal (2013:723) argue that: “Ecological systems theory should be conceptualised as “networked” rather than “nested” (nested obscures relationships between systems), where each system is defined in terms of the social relationships surrounding a focal individual, and where systems at different levels relate to one another in an overlapping but non-nested way”. This study considers the importance of the word “networked” since networks, particularly collaborations, especially among FHHs and external environments, such as development agencies are essential in the realisation of sustainable food security among everyone, including the FHHs.

Through perusal of literature, the researcher realises that, the major critique of the ecological systems perspective is on its traditional basis of “nesting” the systems. For example, Elliott and Davis (2018:10) observe that, in particular, the theory in its traditional perspective views the child (a growing individual) as both influenced and influential within the nested social systems. This initial model is frequently described as contextually focused acknowledging the diverse social contexts influencing human development, which (social contexts) Bronfenbrenner depicted as concentric nested circles comprising the micro-system, meso-system, exo-system, and macro-system (Elliott, 2018:10). To mitigate for this limitation, the researcher of this study included the aspect of networking by including interrelations between multiple environments. The networking approach gives rise to the aspect of human ecology as well as physical environment (see sub-section 4.5). The relevance of the physical ecologies is emphasised through the critique.

Bronfenbrenner’s model (1979) stands as an anthropocentric model of human development; thus, it is not conducive to understanding or underpinning matters concerned with global issues and global futures in the current epoch that is defined by the now dire and detrimental impacts of humans on the Earth (Elliott & Davis:2018:3). The researcher is of the opinion that in the post-modernism era, the traditional theory should be improved to upgrade its efficacy in addressing contemporary issues sustainably. Further, Elliott & Davis (2018:3) retrospect that, the biodiversity index has fallen by more than 50% (World Wildlife Fund, 2016 in Elliott & Davis, 2018:3) as populations of nonhuman species continue to decline, greenhouse gas emissions have almost doubled, and diverse climate change impacts have become increasingly apparent (Howes, 2017 in Elliott & Davis, 2018:3;

Oppenheimer & Anttila-Hughes, 2016 in Elliott & Davis, 2018:3). This demonstrates the significance of triangulating both human and physical environmental development to mitigate continued destruction of the physical ecology. “We argue that Bronfenbrenner’s (1979) more human-centered systems model works against sustainability - and, by extension, the development and well-being of children – in that it reinforces the socio-cultural, political, and economic dimensions of being human at the expense of human-environmental interconnections” as stated by Elliott and Davis (2018:4). This study strived to ensure that food security development revises the need for human and physical environment interconnections. This viewpoint is demonstrated by Elliott and Davis (2018:10) who argue that, although he (Bronfenbrenner) aligned the model with nested Russian babushka dolls (Bronfenbrenner, 1979:3 in Elliott and Davis, 2018:10), the various systems or structural levels are not discrete, but integrated throughout the course of human development. Moreover, Tudge, Payir, Merçon-Vargas, Cao, Liang, Li, and O’Brien, (2016: 428) state: “In ecological research, the properties of the person and of the environment, the structure of environmental settings, and the processes taking place within and between them must be viewed as interdependent and analysed in system terms” (Bronfenbrenner, 1979:41 in Elliott & Davis, 2018:10). Tudge et al. (2016:430) further observe that: “Overton has argued that contextualism, lacking the idea of a developmental end point, is not an appropriate paradigm for developmental science, and that in its ‘strict contextualist’ form - namely one in which context and individual are treated as separate, having an impact via efficient causes (Overton, 2013 in Tudge et al., 2016:230) - it should be linked with mechanism”. Treating Bronfenbrenner’s theory as one of the effects of the context on individual development is thus to treat it as a mechanist theory (Tudge et al., 2016:229). Again as stressed earlier, this study inculcated the paradigms of human and physical ecological perspectives by tweaking them together through network concepts as shown in figure 4.1. The network concept is meant to mitigate the negative implications of the traditional perspective. The tweaking has been applied elsewhere.

For example, the following extract from Cumming and Allen (2017:1710) demonstrates the application:

One of the most potentially useful emerging frameworks for conservation biology is that of social-ecological systems (also termed coupled systems, or coupled human-natural systems [Berkes et al. 2003 in Cumming & Allen, 2017:1710]). People depend on ecosystems in a wide variety of ways. This dependency often requires modifying or managing ecosystems to enhance the delivery of ecological goods and services, particularly given human population expansion and increasing demand for ecosystem-derived products.

There is also a call for sustainable application of the paradigms. Cumming and Allen (2017:1715) while advocating for the application of both the human and physical paradigms say: “If protected areas are expected to provide ecosystem services in addition to achieving their fundamental goal of biodiversity conservation, measures of conservation success will require not only ecological but also social and economic data that show whether service production is meeting goals and whether or not ecosystem production of potential services is being used (that is, whether potential services are actually benefitting the communities that they are supposedly provided for)”. Protected area managers can expect to need a wider and much more interdisciplinary range of data in the future (Reyers et al. 2013 in Cumming & Allen, 2017:1715). Likewise, this study calls for multi-stakeholder collaborations in order to achieve food security development sustainably.

Subsequently, food security is contextualised with the ecological perspective.

4.4 Ecological systems perspective and food security among female-headed households

This study contextualises ecological systems theory in terms of the five ecological environment systems as illustrated by Darling (2007:204) and Härkönen (2007:7), namely: micro-system, meso-system, exo-system, macro-system, and chrono-system.

4.4.1 Micro-system

The most proximal ecological level is the micro-system, which includes the settings in which individuals directly interact (Ettekal & Mahoney, 2017:3). In this study, the FHH is the immediate micro-system in which the household members directly interact. As mentioned earlier, the micro-system is composed of individuals or groups of individuals within immediate setting such as home (household) and school (Härkönen, 2007:8; Hong & Espelage, 2012:315). The researcher contextualises the FHHs as the home or immediate setting in which all its members interact through food dynamics such as sharing meals. Ettekal and Mahoney (2017:4) emphasise that families are central micro-systems in an individual’s development. In this study, the members of the FHHs are directly impacted by food security statuses within their households, which ultimately impact their general development, including health statuses. Development is largely induced by proximal processes that occur on a regular basis over extended periods of time (Ettekal & Mahoney, 2017:5). The researcher is of the opinion that sustainable development in food security among FHHs should be realised continuously without sudden shocks in between. It is therefore assumed that, occurrences within the life cycle of a female (including single motherhood or widowhood) should not be factors causing jeopardy in the FHHs’ food

security, but their food security status should be good and stable all the time. However, multiple resources should be put in place to ensure food security among the homes or households of the females. Darling (2007:209) remarks that proximal processes promoting development, will be most effective in environments with many resources. The micro-system (FHH) plays as focal point for this study.

The second level of the ecological systems is also discussed below.

4.4.2 Meso-system

Moving outward in Bronfenbrenner's ecological levels is the meso-system, which involves processes that occur between the multiple micro-systems in which individuals are embedded (Ettetal & Mahoney, 2017:3). Neal and Neal (2013:724), refer to the meso-system as the interrelations between two or more settings in which the developing person actively participates. Härkönen (2007:10) offers an example of a meso-system as, the relations between home and school. The key point is that what happens in one micro-system affects what happens in another micro-system (Ettetal & Mahoney, 2017:3). In this study, an example of a meso-system is the interactions which occur among the FHHs and other micro-systems such as the schools of the FHHs' children in relation to food security. For instance, if a FHH is in a state of acceptable food security status, then the children are well-fed, and in good health status to concentrate in curricula and co-curriculum activities at school. Micro-systems interact with activities to affect development (Ettetal & Mahoney, 2017:3). Conversely, if a FHH is in a state of food insecurity, the children's production at school will be poor. Improper feeding due to food insecurity causes poor physiological and cognitive development, especially among children (see sub-sections 2.3.9.3 and 3.5.1). Another example of the meso-system is the interaction between the female's workplace where she is directly employed and her household. The researcher is of the opinion that a well-paid female has the power to purchase a variety of food for her household. The researcher hypothesises that, motivation or good salary correlates positively with FHHs' food security. The acceptable food of the FHH will bolster the household's general improvements, including healthwise.

Thirdly, the researcher recognises the significance of own food gardens, and markets as sources of food for the FHHs. The four dimensions of food security, namely: food availability, access, utilisation, and stability are realised, mostly from own production and markets. The FHH as a micro-system, interacts (through cultivation) with their food garden as a second micro-system. Yields from the garden consequently will determine the FHH's food security status. For instance, instances of droughts can jeopardise the yields, thus

predisposing the household into vulnerability to food insecurity. On the other hand, enough soil moisture, whether from rainfall or irrigation will boost the yields, hence making the FHH more food secure. Therefore, physical ecological sustainability is important to ensure household food security. Markets are also micro-systems in the context of this study. This is because the FHHs are involved in food purchases directly from the markets. Steady food supply in the markets will balance food demand by the FHHs as long as the food is affordable. Consequently, the food availability at the market (supply) will stimulate the demand (accessibility), and the ultimate proper utilisation (consumption) of the food. The affordability of the food can be clarified as establishing the stability of the other 3 aspects of food security, through human ecology.

On the positive side, the interaction among the FHH or its members with the sources of food (by ensuring all the dimensions are met), puts the FHHs in a state of acceptable food security. Consequently, the good food security status makes the members of the FHHs reap the benefits of food security, such as being in good health and having foods they prefer. On the other hand, if the interactions between the FHHs and the food sources are poor, the FHHs' food security will be poor, which ultimately will jeopardise the household members' production and development (including health). Hong and Espelage (2012:317) emphasise that, the meso-system level requires an understanding of the interrelations between two or more micro-systems, each containing the individual. Therefore, the FHHs interactions with school, workplace, and food sources have been highlighted as determinants of the FHHs' development in food security.

4.4.3 Exo-system

Exo-system is the next outermost level and includes the micro-systems in which individuals are involved but not directly embedded (Ettedal & Mahoney, 2017:4). It refers to one or more settings that do not involve the developing person as an active participant, but in which events occur that affect, or are affected by what happens in the setting containing the developing person (Neal & Neal, 2013:724). As indicated in chapter 1, this level is composed of interactions between two or more settings, but the individual is in only one of the settings (Hong & Espelage, 2012:317). The exo-system, encompasses the linkage and processes taking place between two or more settings, at least one of which does not ordinarily contain the developing person, but in which events occur that influence processes within the immediate settings that does contain that person (e.g. for a child, relation between the home and the parent's work place; for a parent, the relations between the school and the neighborhood group) (Bronfenbrenner 1989:227 in Härkönen, 2007:11). The definition leads to an observation that numerous environments where the person is a participant, but

not a member in at least one or even more environments, may be under study simultaneously (Härkönen, 2007:11). The example of the exo-system in this study is a situation of an impoverished caregiver (the female household head) who may not have much control over food access - not having finances to purchase food for her household; but she can be in control of her moods towards her supervisor at work. This is because the caregiver is not directly involved in decision-making with regard to her salary. The exo-system “trickles down” to influence development through the other people involved in individual’s lives (Ettekal & Mahoney, 2017:4). Since the effects of her meagre salary will trickle down to influence food access in her household (in which she participates directly in decision-making), the researcher is of the opinion that the household will be impoverished in terms of the food security. However, if the working female household head gains promotion at her workplace, which would consequently increase her earnings; she can afford to purchase the food. Moreover, the researcher is also of the opinion that, although broader national food policies are mostly externally formulated, with little inputs by the FHHs, the policies influence food security among the FHHs anyway.

The exo-system considers aspects of the environment beyond the immediate system containing the individual (Hong & Espelage, 2012:317). According to this system, individual’s development is influenced by events occurring in settings in which the individual is not present (Hong & Espelage, 2012:317). In the context of this study, food security is achieved through the interaction of direct and indirect involvement or control of situations by the FHHs. Again as networks, there should be collaborations between external agencies and FHHs in decision-making with regard to food security.

4.4.4 Macro-system

Macro-systems are the fourth ecological environment, which Neal and Neal (2013:724) define as consistencies, in the form and content of lower-order systems that exist, or could exist, at the level of sub-culture or culture as a whole, along with any belief systems or ideology underlying such consistencies. It is a set of overarching beliefs, values, and norms as reflected in the cultural, religious and socio-economic organisation of the society (Ettekal & Mahoney, 2017:5). The macro-system level is regarded as a cultural “blueprint” that may determine the social structures and activities that occur in the immediate system level (Hong & Espelage, 2012:317). As indicated in the chapter 1, Härkönen (2007:12) also observes that, the macro-system can be thought of as a societal blueprint for a particular culture, sub-culture or other broader social context. For example, cultural beliefs, opportunity structures, and hazards which ultimately affect the particular conditions and processes which occur in the micro-system (Hong & Espelage, 2012:317). The macro-system consists of the

overarching pattern of micro-, meso-, and exo-systems characteristic of a given culture, subculture, or other broader social context, with particular reference to the developmentally-investigative belief systems, resources, hazards, life styles, opportunity structures, life course options, and patterns of social interchange that are embedded in each of these systems (Härkönen, 2007:12). In this study, the FHHs are embedded in cultures that define their position in the society. For example, it is common especially in Africa for females to be regarded “inferior” to males. It is mentioned in chapter 3 that, “family systems are mostly centred on paternal power and the conjugal bond, embedded in cultural rules that prescribe male authority over women” (Kabeer 1994 in Braunstein, 2015:16). The macro-system of this study is the Voi Division within which the FHHs are embedded socio-culturally. The Voi Division as a geographical area is a feature of physical ecology, and as community-bounded system is a feature of human ecology. The macro-system influences development within and among other systems and serves as a filter or lens through which an individual interprets future experiences (Ettetal & Mahoney, 2017:5). The cultural values in which the FHHs are embedded influence their social and the ultimate economic wellbeing. Culture influences people’s behaviour (Hong & Espelage, 2012:317). If a society’s culture places a female as inferior to males, then there is a high likelihood that the FHHs development will be lesser than males, which includes food security. Neal and Neal (2013:725) say that macro-systems include broad cultural influences or ideologies that have long-ranging consequences for the focal individual. In this study, the disempowerment of the females predisposes them to underdevelopment, such as putting them in food poverty. Bronfenbrenner (2002:266) reiterates that the behavioral and conceptual models that are characteristic of the macro-system are transferred from one generation to another by the means of different cultural institutions like family, school, congregation, workplace and administration that intermediate the processes of socialisation (Härkönen, 2007:12-13).

4.4.5 Chrono-system

As highlighted in the chapter 1, chrono-system is the final level of the ecological framework which includes consistency or change in historical or life events, of the individual and the environment over the life course; such as changes in family structure (Hong & Espelage, 2012:317). Härkönen (2007:13) defines the chrono-system as a description of the evolution, development or stream of development of the external systems in time. Chrono-system denotes dynamic system changes over the human life span (Elliott & Davis, 2018:10). The researcher is of the opinion that, FHHs exist because of life events that occur within the lifecycle of a female. For instance, single motherhood (never-married female), divorce, or/and widowhood are major life events that may cause a female being the head of a family. Chrono-system is the influence on the person’s development of changes (and continuities)

over time in the environments in which the person is living (Neal & Neal, 2013:724). In 2006, Bronfenbrenner revised his original theory, adapting the name to bio-ecological, emphasising the active role of the individual in the developmental process. Ettekal and Mahoney (2017:5-6) while referring to the revised bio-ecological theory (2006) argues that, time is conceptualised at the macro-level as the chrono-systems and is concerned with the historic changes in society across generations. In general, greater intensity (minutes or hours per week) and larger durations (consistency across months or years) of participation are found to predict larger programme effects than does less exposure (Ettekal & Mahoney, 2017:6). Besides, life events among the FHHs, socio-political events can change with time. New food policies can be formulated, existing policies modified, hence affecting food security dynamics among the FHHs. Furthermore, Härkönen (2007:4) highlights that, development means change, a process, and it takes place in time. The researcher is of the opinion that the policies that are geared towards sustainable food security, results in improved development among everyone, including the FHHs; and should extend over lifetime (this is human ecology dynamics). Additionally, physical environment transitions such as climate change affect food security in the long run too, especially through ecosystem depletion, hence efforts to counter it should be established. This means interaction between human and physical ecologies is necessary for sustainable food security (SDG2) among the FHHs.

4.5 Aspects of human ecology and physical ecology in food security

Overcoming prominent conservation and development challenges of the 21st century requires an understanding of the complex and evolving links between ecosystems and human societies (Fischer, Gardner, Bennett, Balvanera, Biggs, Carpenter, Daw, Folke, Hill, Hughes, Luthé, Maass, Meacham, Norström, Peterson, Queiroz, Seppelt, Spierenburg & Tenhunen, 2015:144). The current study was designed to investigate food security among female-headed households in Voi Division in Taita-Taveta County, Kenya. Both human ecology and physical ecology are intertwined in the ensuring the food security in the study population, and the study area. It is therefore important to understand different factors that affect food security, in the context of the human-physical ecologies (see sub-sections 2.3.4 in chapter 2 and 3.4.1 in chapter 3). These factors form a network of relations to influence the food security among the FHHs and the community in which the FHHs are embedded. This view is emphasised by Fischer et al. (2015:145), that, socio-ecological systems are complex adaptive systems characterised by feedbacks across multiple interlinked scales that amplify or dampen change. The researcher is of the opinion that the factors can influence the food security either positively or negatively. The aspect of human ecology (including social structures) and physical ecology (such as rainfall) is further emphasised in

literature. In this regard, equilibrium between social environment and physical environment should be ensured.

Subsequently, the human ecology and physical ecology as relating to food security are discussed herein.

4.5.1 Human ecology and food security among female-headed households

The researcher is of the opinion that social justice to food security among the FHHs is realised through stable social structures that ensure sustainable food availability, access, utilisation, and stability. It is of great essence for socio-political and economic structures in society to ensure equitable distribution of food resources not only in the rural areas, but also urban habitations. Own food production through crop cultivation or livestock farming are the primary sources of food to everyone. Food markets serve as secondary sources of food, since markets arise within the food chain. These markets should be accessible to everyone, including among urban dwellers through proper balancing of demand and supply along the food chain. Moreover, socio-political structures should inculcate justice in food access through commodity affordability. Food policies should address matters of food justice, through multi-agency implementation. In this regard, Härkönen (2007:16) observes that, Bronfenbrenner underlines the influence on development of different level and size environments, in the first place, social and cultural environments. Therefore, the researcher of this study is of the opinion that, the socio-cultural dynamics surrounding the FHHs help shape their destiny of human development in terms of sustainable food security.

4.5.2 Physical ecology and food security

The researcher is of the opinion that, besides food markets which are mostly characterised by human ecological factors; the primary determinant of food security is agricultural production. The agricultural production can be practiced through crop cultivation and animal husbandry. Either way, own food production requires soil moisture. As seen in chapter 3, Olielo (2013:4) observes that, rainfall and/or irrigation for adequate soil moisture are necessary for growing crops. The researcher is of the opinion that livestock production also requires soil moisture for proper fodder yields. The researcher is of further opinion that, effects of climate change and food security are inversely related. Droughts are major direct effects of the climate change especially in Africa. As indicated in chapter 2, climate change may affect the nutrient density or the safety of food and fodder, even when food is available, accessible and consumed (McKune et al., 2015:2). In order to address this incongruence, concerted efforts are needed to address the physical ecological factors, including of soil moisture.

As indicated previously, multi-sectoral networks in human development should be intertwined with both human and physical ecologies.

4.5.3 Integrating human and physical ecologies for food security among the female-headed households

More than ever, integrated approaches of interventions for food security are needed to foster sustainable development - that is, an equitable advancement of human well-being, which does not compromise ecosystem integrity (Fischer et al., 2015:144). Food security sustainability should be in tandem with environmental sustainability. Therefore, the researcher of this study is of the opinion that, food security among the FHHs in the Voi Division, can be ensured through multi-sectoral collaborations between the FHHs themselves and external development stakeholders. Multi-faceted nature of sustainability ... may include research involving stakeholders ..., policies and institutions ..., funding bodies ..., stakeholder engagement and practical impact (Fischer et al., 2015:146). The researcher is of the opinion that external change agencies and FHHs should collaborate in research, decision-making for food policies and practice in food security. Research on families highlight the importance of coordination across settings (Ettetal & Mahoney, 2017:4). The researcher of this study is of the opinion that harmonious coordination of the interactions between the micro-systems (FHHs) and other food security settings is needed to realise sustainable food security. For instance, sectoral programmes and household activities should work harmoniously to achieve the ideal food security status.

There are benefits associated with multi-sectoral collaborations. Fischer et al. (2015:146), are of the opinion that, the lessons learnt from socio-ecological research are influencing not only researchers, but also policymakers. On a global level, the latest draft of the UN Open Working Group on Sustainable Development Goals, recognises the linkages between economic, social and environmental aspects of sustainable development. For example, the proposed Goal number 2 - 'End hunger, achieve food security and improved nutrition, and promote sustainable agriculture' combines the socio-economic target of achieving food security with the environmental target of maintaining resilient ecosystems (Fischer et al., 2015:146). Similarly, the United Kingdom commissioned a report on food system priorities, which recognised linkages between society and ecosystems, including aspects ranging from food production to consumer values and ethics (Fischer et al., 2015:146). The researcher is of the opinion that collaborations in food security are inevitable to realise the second Sustainable Development Goal (SDG2). Fischer et al. (2015:147), observes that, interactions among power relations, equity, justice and ecosystem stewardship, need to be better understood in the realisation of sustainable development. Key considerations to

include are distributive justice and the sharing of costs, benefits and risks, but also procedural justice, access to decision-making and contextual equity linked to the histories of injustices and cultural domination (Fischer et al., 2015:147). From this observation, food security among FHHs should be ensured through distributive justice by development partners, the FHHs themselves should work towards ensuring their household food security, proper procedures should be planned and implemented accordingly, and the female household heads should be actively involved in food security decisions. There should be elimination of gender discrimination in all stages of food security among everyone in the community. To effectively navigate these issues, better knowledge is required about which conditions enable successful co-governance of natural resources, and about the roles played by new or external change agents, to effectively redress historical injustices, while also promoting ecosystem stewardship (Fischer et al., 2015:147). A key challenge will be to identify the mechanisms and conditions that influence outcomes for marginalised communities, including instances where differences in interests among actors cannot readily be resolved through collaboration (Fischer et al., 2015:147). Better understanding of how power and knowledge mobilise public discourse, and how different world views and values interact with ecosystem governance is also required, and is increasingly becoming subject to research (Fischer et al., 2015:147). Finally, it will be important to consider more deeply the role that scientists themselves play as actors, and the consequences that research may have on distributive, procedural and contextual justice (Fischer et al., 2015:147).

Addressing new socio-ecological problems requires the collaboration of researchers with policy makers, practitioners and citizens, in order to develop effective policies, practices, and knowledge in a socially acceptable fashion (Fischer et al., 2015:147). Longer-term commitments of funding and political support are vital for allowing such initiatives to flourish and to ensure that institutional memory is protected against a constant cycling of people and short-term projects (Fischer et al., 2015:148). Härkönen (2007:5) mentions development as a series of such processes that intermediate the interaction of the qualities of person and environment, in order to produce permanency and change in a person's qualities in the course of life. The researcher is of the opinion that permanency in food security among the FHHs will ensure sustainable development as advocated for in the SDGs.

Food security, in turn, depends not only on securing environmentally sustainable agricultural production, but also requires institutions that ensure a more equitable distribution of agricultural products (Fischer et al., 2015:144). There are many ways in which

science and society can be more tightly and constructively coupled, including through increased outreach, professional capacity building and cross-sectoral secondment opportunities, as well as through closer participation of practitioners in the identification of research priorities and in the research process itself (Fischer et al., 2015:148). Darling (2007:210) is of the opinion that Bronfenbrenner emphasised that processes operating at each of these levels (micro-system, meso-system, exo-system, and macro-systems) could not be looked at independently of one another, but their interrelationship needs to be respected. These arguments underscore that, sustainable food security cannot be achieved at only one aspect or one level of the ecology (not even at the FHH micro-system), rather through multi-ecology and multi-level collaborations of both human and physical factors.

4.6 Domains of food security and the ecological perspective

There are three main domains of food security, but a fourth emerging aspect is gaining ground too. The domains are: food availability, access, utilisation, and stability (see sections 2.3.4 and 3.3.1 in chapters 2 and 3 respectively).

4.6.1 Ecological perspective and food availability among female-headed households

As defined in chapter 2, food availability refers to the availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports, including food aid, (Bilinsky & Swindale, 2010:1; FAO, 2006:1) which is consistently available to the individuals, or are within reasonable proximity to them, or are within their reach (Bilinsky & Swindale, 2010:1). Members of FHHs are the individuals embedded within the household micro-system and food availability plays a key role to their household food security. The researcher is of the opinion that physical and social (human) ecologies are essential for food security, including among the FHHs. There is a need to ensure food availability through sustainable food production strategies which rhyme with sustainable social development. It is already indicated in chapter 2 (sub-section 2.3.4.1) that, FAO (2012) emphasises the importance of rural infrastructure for agricultural intensification and food supply; notably transport, energy, irrigation and market infrastructure (Qureshi et al., 2015:397). Human ecology dynamics should ensure physical ecology, such as infrastructure for food production and supply in markets.

4.6.2 Ecological perspective and food access among female-headed households

In chapter 2, food access has been defined as, a situation whereby individuals or households have adequate incomes or other resources to purchase or barter to obtain levels of appropriate food needed to maintain consumption of an adequate diet/nutrition

level (Bilinsky & Swindale, 2010:1). Also as mentioned in chapter 3, definition of food security by the WFS of the 1996, entails both physical and economic access. In the context of the ecological perspective, households and their members are the micro-systems, and are supposed to have proximal nearness to food sources such as markets (physical accessibility), and also economic capability (food affordability) to purchase food. The researcher has opined in the chapter 3 that, the physical accessibility should facilitate fair physical distance proximity to food sources by everyone, while the economic accessibility should ensure all peoples' reach to food without compromising any aspect of physical ecosystem.

FAO (2006:1) indicates that, in order for individuals (including those belonging to FHHs) to access food well, they need to have adequate entitlements, which are the set of all commodity bundles over which a person can establish command; given the legal, political, economic and social arrangements of the community in which they live (see sub-section 3.3.1.2). In the context of this study, females as heads of families are seen to lack adequate entitlements, which link their households to food access. The socio-cultural settings (in this study, referring to the Voi Division as the macro-system) in which FHHs are embedded, do not favour FHHs empowerment for proper food accessibility, because of patriarchal sub-cultures. The patriarchal sub-cultures are human ecologies which should be worked upon, to create equilibrium between both male and female genders.

4.6.3 Ecological perspective and food utilisation among female-headed households

As indicated in chapter 2, food utilisation means that food is properly used, properly processed and proper storage techniques are employed, adequate knowledge of nutrition and child care techniques exist and is applied, and adequate health and sanitation services exist (Bilinsky & Swindale, 2010:1). The researcher of this study is of the opinion that food utilisation among the FHHs should be the linking factor (meso-system) to FHHs optimum health. Also in chapter 2, food utilisation focuses on ... the ability of individuals to absorb and retain nutrients (Vaitla et al., 2015:48). In chapter 3, food utilisation has been discussed and “entails eating an adequate diet, using clean water, access to sanitation (and observing proper hygiene), and health care to reach a state of nutritional wellbeing where all physiological needs are met” (FAO, 2016:9). The researcher is therefore of the opinion that the utilisation of food should ensure that the FHHs, as the micro-system, should contribute to sustainable community development of the Voi Division, as the broader macro-system. This is because if the FHHs are healthy, they will contribute to socio-economic, as well as physical production to propel development in the division.

4.6.4 Ecological perspective and food stability among female-headed households

As an emerging domain of food security, food stability is achieved when there is steady food availability, access, and utilisation without seasonal shocks or breaks. As indicated in chapter 3, food stability is a requisite in the availability of and access to food, regardless of sudden shocks such as economic or climatic crises or cyclical events such as seasonal food scarcity. Economic shocks depict a human ecological barrier to food stability; while climatic crisis depicts a physical ecological barrier to food access. In the context of the ecological systems perspective, like food availability, access, and utilisation; food stability is a meso-system that links the FHHs with food security. The four domains of the food security interact in a network manner to maintain sustainable food security. As per the ecological systems perspective, food availability, access, utilisation, and stability are meso-systems that link the FHHs as micro-system to the food security exo-system. The micro-system, the meso-system, and the exo-system also work together as networks that bring sustainable development in the Voi Division as the macro-system. The FHHs come about as the result of lifetime dynamics, referred to as the chrono-system. These life dynamics influences the females' marital statuses such as never-married single mothers, divorced/separated females and widows.

4.7 Summary

The discussions provided above highlight the importance of contextualising food security among the FHHs within the ecological systems perspective as a theory of human development, which underpins this study. The key terms, namely: ecological systems theory, setting, human development, and ecological environment have been discussed in order to help the reader understand food security in the context of the theory. The critique of the perspective has also been provided. The FHHs is the immediate micro-system in which the household members directly interact. As meso-system, the FHHs interactions with school, workplace and food sources, have been highlighted as determinants of the FHHs' development in food security. Likewise as an exo-system, food security has been highlighted as achievable through the interaction of direct and indirect involvement or control of situations by the FHHs. The macro-system of this study is the Voi Division within which the FHHs are embedded socio-culturally. The chrono-system of the study is the FHHs life events that occur within their lifecycle. The need for integrating human and physical ecologies has also been discussed. The discussion underscores that, sustainable food security cannot be achieved at only one aspect or one level of the ecology (not even at the FHH micro-system), rather through multi-ecology and multi-level collaborations of both human and physical factors. As per the ecological systems perspective, food availability,

access, utilisation, and stability (as the domains of food security) are the meso-systems that link the FHHs as the micro-system to the food security exo-system. These levels of the ecological systems perspective should work together as networks to bring sustainable development in food security among FHHs, including in the Voi Division. The next chapter describes the research methodology applied in this study.

CHAPTER 5

RESEARCH METHODOLOGY

5.1 Introduction

The term methodology refers to the way in which we approach problems and seek answers (Taylor, Bogdan & DeVault, 2016:3). In social sciences, the term applies to how research is conducted (Taylor et al., 2016:3). This study is a social science study which applied social science research methodologies in the investigation of food security among FHHs in Kenya. The aim of the study was to investigate food security among the FHHs in the Voi Division, Taita-Taveta County, Kenya.

This chapter discusses research methods applied on this study under the following concepts: research approach; type of research; research designs for the quantitative and qualitative phases; study area, population and sampling (both quantitative and qualitative); data collection tools and procedures of both the quantitative and qualitative phases of the study; data analysis for both the quantitative and qualitative phases, reliability and validity for quantitative phase, quality of data and trustworthiness for the qualitative data; pilot study; and ethical considerations.

5.2 Research paradigm and approach

Barker (2003:312) in De Vos and Strydom (2011:40) define paradigm as a model or pattern containing a set of legitimised assumptions and design for collecting and interpreting data. The quantitative and qualitative paradigms in research come to mind in this regard (De Vos & Strydom, 2011:40). The researcher prioritised the paradigm of pragmatism, which involved combination of both quantitative and qualitative approaches in collection and analyses of data. Quantitative data-collection methods often employ measuring instruments ... such as structured observation schedules, structured interviewing schedules, questionnaires, checklists, indexes and scales (Delpont & Roestenburg, 2011:171). The researcher utilised a structured questionnaire in collection of data on the quantitative phase. Qualitative research persuades through rich description and allows strategic comparison across cases (Chagomoka et al., 2016:2-3). The researcher collected data on the qualitative aspects through key informant interviewing, observations, and photograph-taking. After the data collection, the researcher scrutinised, analysed, presented, and then triangulated both numerical and textual data to arrive at an interpretation. This study therefore employed the mixed methods approach.

A research paradigm of mixed methods involves collecting and analysing both quantitative and qualitative data (Delpont & Fouchè, 2011:434). The mixing of both quantitative and qualitative data for this study was relevant to increase the study's validity. Creswell (2014:219) states that the use of the mixed methods adds the benefit of increased validity and reliability of results. Additionally, Yeasmin and Rahman (2012:156) assert that by triangulating, different sources of data and viewpoints are integrated to bring about the validity and reliability. The researcher therefore had the conviction of combining both the numerical data and the qualitative data to arrive at a valid and reliable interpretation and conclusion.

5.3 Type of research

Applied research refers to scientific study and research that seeks to solve practical problems (Cherry, 2014:1). This study is an applied research, whose purpose was to investigate real life phenomenon of food security among FHHs. Besides, applied research also seeks to investigate possible solutions to the problems (Roll-Hansen, 2009:5), and uses the data directly for real world application (Hale, 2011:1). In addition to findings of the study, the researcher formulates practice guidelines and recommendations for solving challenges of food security among the FHHs. The researcher is optimistic that the findings, practice guidelines and recommendations will be useful in policy formulation and implementation of food security intervention strategies in Kenya, counties and the Voi Division. Through experience, the researcher has observed some social assistance interventions by the GOK, with orphans and vulnerable children (OVC) and elderly persons in Kenya, and particularly in the division. This has been through monthly stipend of monetary value. However, she is not aware of social assistance or direct food security interventions that have specially focused on FHHs in the country or the division. Therefore, the current study may act as a benchmark to making plans and implementing food security intervention strategies on FHHs in Kenya, including the Voi Division.

5.4 Research design

Some authors refer to "design" as all those decisions a researcher makes in planning the study (Fouché & Schurink, 2011:307). This mixed methods study, used the convergent parallel mixed methods design, where the quantitative and qualitative phases are done parallel and merged or separately with the quantitative informing the qualitative phase. Convergent parallel mixed methods design occurs when the researcher uses concurrent timing to implement the quantitative and qualitative strands during the same phase of the research process, prioritises the methods equally, and keeps the strands equally, and keeps the strands independent during analysis and then mixes the results during the overall

interpretation (Creswell, 2014:219). It involves the concurrent, but separate, collection and analysis of quantitative and qualitative data in order to compare and contrast the different findings to see the extent to which they do or do not agree with each other (Delpont & Fouché, 2011:442).

The researcher prioritised the convergent parallel mixed methods design in this study in order to save on time taken on empirical research; which was in line with the assertion of Delpont and Fouché (2011:443) that, triangulation-designed studies reap from the advantage of taking less time to complete than sequential designs. Separately, the quantitative and qualitative phases utilised a randomised cross-sectional survey design and a collective case study design respectively. Both designs were prioritised on equal measures in order to arrive at overall interpretation of the findings. According to Fouché, Delpont and De Vos (2011:142), researchers can combine selected designs or elements of designs in a design suited to their particular research goal or objectives. Therefore, the researcher used these specific designs, and also utilised concurrent timing in collection of data of the both phases. The concurrent timing helped the researcher to save on the time of having to collect the data longitudinally. This is in accordance with Delpont and Fouché (2011:443) postulation that: "Triangulation has the advantage of taking less time to complete than sequential designs". Therefore, this study combined both quantitative and the qualitative phases concurrently in applying the convergent parallel mixed methods design. Both designs were given equal priority in the study and are subsequently described.

5.4.1 Research design for quantitative phase of the study

In quantitative studies, design refers only to those groups of small, worked-out formula from which quantitatively oriented researchers can select or develop one (or more) that may be suitable for their specific research goal (Fouché & Schurink, 2011:307). Cross-sectional survey design enables researchers to investigate research problem at a point in the time (Barratt & Kirwan, 2009:5). This research prioritised the design for the survey in the quantitative phase, owing to its advantage of shortening time taken in conducting surveys. This is because the essence of the study was not allowing it to develop over an extended period of time (the aspect of longitudinal designs), but to investigate the problem as it occurred in the then present situation. Moreover, randomisation was a major element in the phase. Randomised cross-sectional survey design is usually associated with exploratory and descriptive studies which examine several groups of people at one point in time (Fouché, Delpont & De Vos, 2011:156). Randomised cross-sectional survey design was suitable for the quantitative phase because of the research methods used, of random selection of the sample and questionnaire-administered survey at one point in time. Fouché

et al. (2011:156), further posit that the design can be used to determine whether a particular problem exists within a group of participants and what the level of the problem is. They give the example of needs assessments, used by community development workers to identify neighbourhood problems and service gaps. This research sought to investigate the state of food security which is a community need and further determine its status among the FHHs in the Voi Division, in Taita-Taveta County, Kenya. Finally, data collection of the quantitative phase was done through a survey.

Randomised cross-sectional surveys provide a numeric description of the trends, attitudes, or opinions and use a sample to generalise and draw conclusions about the population as represented in the sample (Barrat & Kirwan, 2009:5; Dao & Schwarz, 2010:2; De Clark, Willems, Timmerman & Carling, 2011:3). The findings are presented and discussed in chapter 6 of this report and could be generalised to the FHHs in the entire Voi Division. The researcher is also optimistic that the findings, practice guidelines and recommendations will be useful elsewhere, besides the study area.

5.4.2 Research design for qualitative phase of the study

In qualitative studies, terms such as strategies, traditions of inquiry and approaches are related to the concept of design (Fouché & Schurink, 2011:308). Unlike the quantitative paradigm, the qualitative paradigm requires the design of the research to be more than a just worked out formula; because the qualitative researcher is concerned with understanding rather than explanation, with naturalistic observation rather than controlled measurement, with the subjective exploration of reality from the perspective of an insider as opposed to that of an outsider predominant in the quantitative paradigm (Fouché & Schurink, 2011:308). The qualitative phase of this study utilised the case study design to explore the FHHs' food security through descriptive viewpoints of key informants, naturalistic observations of the FHHs and photographs, and prioritising the subjective findings in data interpretation. Baxter and Jack (2008:544) state that a qualitative case study facilitates exploration of a phenomenon within its context using a variety of data sources which ensures that the issue is not explored through 'one lens', but rather a variety of 'lenses' which allow for multiple facets of the phenomenon to be revealed and understood.

The collective case study was chosen, as it is an instrumental case study extended to a number of cases (Fouché & Schurink, 2011:322). This phase studied the following groups of subjects, which included: key informants and the FHHs. In the qualitative phase of this study, three research methods were used as the multiple lenses through which food security among FHHs in the Voi Division were revealed. They included: key informants' interviews,

observations and photograph-taking. Exploration and description of the case takes place through detailed, in-depth data collection methods, involving multiple sources of information that are rich in context (Fouché & Schurink, 2011:321). These may include interviews, documents, observations, or archival records (Fouché & Schurink, 2011:321). Fouché and Schurink (2011:321) further assert that, the exploration and description of the case takes place through detailed, in-depth data collection methods, involving multiple sources of information that are rich in context.

The researcher used several data collection instruments in the case study, which were: semi-structured interview schedule and cell-phone audio-recorder in collecting interview data with the key informants, observation checklist in collecting data from the FHHs food security aspects, and a digital camera for taking photographs on food security phenomena among the FHHs. A case study design strives to describe, analyse and interpret a particular phenomenon (Yin, 2003 in Fouché & Schurink, 2011:321). Fouché and Schurink (2011:322) further illustrate the advantage of the design as, “it helps the researcher to understand particular characteristics of the case and provide (rich) descriptions”. The collective case study yielded rich qualitative data from both the key informants and the FHHs, which are thematically described, presented and discussed in chapter 7 of this study report. According to Fouché and Schurink (2011:321), the product of the qualitative phase is an in-depth description of cases and case-based themes.

5.5 Study demarcation, population and sampling

This section discusses the study area, population and quantitative and qualitative sampling used in this study.

5.5.1 Study demarcation

This study was conducted in the physical location of Voi Division in Taita-Taveta County, Kenya. The researcher is of the observation that Voi Division lies in the livelihood zones of mixed farming (food crops and livestock), casual waged labour and trade & business according to livelihood stratification by the NDMA (2016:1). The researcher through observation is of the knowledge that, residents or households in Sagala Location in the Voi Division, and a rural area, practice crop farming and livestock keeping, hence the livelihood of the area is the mixed farming. Additionally, some households in the division rely on casual labour – during the randomised cross-sectional survey, the researcher had encountered some respondents working as brick-makers for their well to do neighbours. On the other hand, the Voi Location is urban which is characterised by trade and business, and casual labour as well.

The geographical demarcation of this study is the Voi Division. The Division is divided into two administrative locations. The urban Voi, is administratively known as Voi Location and has two sub-locations, namely: Kaloleni Sub-Location and Mwangea Sub-Location. The rural Voi, Sagala Location has the following sub-locations: Ndara, Teri, Kishamba, and Talio. It borders Voi Location to the North-West and spreads outwards to the South-East. The location is vaster than the Voi Location but more sparsely populated.

5.5.2 Study population

The target population of the study was all female-headed households in the division, while the accessible population was the females who were the legal and customary heads of the households (also referred to as *de jure* in sub-section 1.2.3 of chapter 1). The number of the target population in the Urban Voi was provided by office of the Kenya Red Cross in Voi Location. The organisation had conducted a recent household enumeration survey which provided the information. Moreover, the target FHHs in Sagala Location were provided by village headmen. There were a total of 1254 and 787 FHHs populations in Voi Location and Sagala Location respectively. This made a total of 2, 041 FHHs. The researcher however, went further to screen female household heads who met the inclusion criteria for this study and arrived at an accessible population of 850. No woman with a husband whether unemployed, working, or staying away from the household was considered for the accessible population. Women in polygamous marriages, young women living alone (like college students) and single adult ladies were also excluded. Single mothers cooking together with parents (with any kind of a man as household head) were also put under exclusion. The researcher arrived at this decision out of noting that information provided by the mentioned offices was inflated with households that did not meet the inclusion criteria for this study. The sample for this study was derived from the accessible population.

5.5.3 Quantitative sampling

The researcher used purposive sampling in selecting five sub-locations from the six sub-locations in the division. Purposive or judgmental sampling is based entirely on the judgment of the researcher, in that a sample is composed of elements that contain the most characteristic, representative or typical attributes of the population that serve the purpose of the study best (Grinnell & Unrau 2008:153 in Strydom, 2011b:232; Monette et al., 2005:148 in Strydom, 2011b:232). As mentioned earlier, there are two sub-locations in the Voi Location and they are Kaloleni and Mwangea sub-locations. In the Sagala Location are four sub-locations, namely: Kishamba, Teri, Ndara and Talio. All the sub-locations in the Voi and Sagala locations were included in the sample, apart from Talio. The researcher felt that the five out of the six were representative enough of the division. According to Strydom

(2011b:231), the more clusters are included in a study, the more representative of the population the sample naturally is. There were 51 villages in the sampled sub-locations. The researcher of this study used simple random sampling in selecting 35 out of the 51 villages. Strydom (2011b:226) defines random sampling as a method of drawing a sample of a population so that all possible samples of fixed size (n) have the same probability of being selected. The following procedure was used in the selection of the villages.

Without following any logical order, the researcher keyed in the names of all the villages in Ms Excel computer programme and then randomised the names using *Random-Between Key Function* of the Excel. The researcher further used computer cursor to blindly point at any position on the randomised list to come up with the 35 villages. Although the placing of the cursor was “blindly” done, the researcher strived to achieve the representativeness by trying to target a cluster 3 names that appeared consecutive on the spreadsheet, and point at one name by chance. This was done from the top of the spread sheet to the bottom end. In the instances where the same village was re-selected, the researcher blindly moved the cursor across the spread sheet and selected any name that got pointed by the cursor. This practice was meant to infuse heterogeneity of the villages. This practice was in line with Grinnell and Unrau (2005:162-163) as quoted by Strydom (2011b:231) that cluster sampling is at least two-stage procedure where random sample of clusters is firstly drawn and then a random sample of elements within each cluster is selected. This consists of the creation of a number of externally homogenous but internally heterogeneous clusters in the relevant population and subsequent random selection of one or another of these clusters in the sample (Strydom, 2011b:231). After sampling the villages, the researcher then selected the sample of respondents from the sampled villages.

The researcher used the following inclusion criteria in selecting the sample for the quantitative phase, from the accessible population:

- Female household heads must have been aged 18 years and above;
- The female household heads must not have been attached to any male household headship;
- The female household heads must have had dependents; and
- The female household heads must have been functionally proficient in either English or Kiswahili.

In selecting the number of respondents for the survey, the researcher began by determining the sample size of the study and then making a sampling frame containing names of all the accessible female household heads so as to extract the names of the survey units. The

Stoker's (1985) table offers 14% sample size from a population of over 500 up to 1000 (Strydom, 2011b:225). As indicated earlier, the accessible population was 850 FHHs. From the 850, the researcher extracted the 14% of the 850 as the sample for the study. The resultant sample size was 119 FHHs. The researcher considered the sample size adequate for the study because, according to Strydom (2011b:225), Grinnell and Williams contend that 30 is sufficient to perform basic statistical procedures, while others feel that a minimum of 100 is enough. Furthermore Grinnell and Williams (1990:127 in Strydom, 2011b:225) state that in most cases 10 per cent sample should be sufficient for controlling for sampling errors. The researcher however increased the 119 to 140 FHHs to cater for natural attrition. Since a certain number of respondent mortality occurs in any research project, it is wise to draw a larger sample than may eventually be needed (Strydom, 2011b:224-225). The formula below illustrates how the sample size was calculated:

$$\begin{aligned}
 &14\% \text{ of } 850 = 119 \\
 &14\% \text{ of } N = n \\
 &N = \text{accessible population} \\
 &n = \text{sample size}
 \end{aligned}$$

As discussed earlier, there were 51 villages in the sampled sub-locations. However, as also illustrated previously, the researcher selected 35 leaving out 16 villages. Within the 35 villages, the number of FHHs which met the inclusion criteria was 631. The researcher began the process of extracting 140 FHHs from the 631 through the following procedure: compiling a sampling frame ranging 1 to 631 on Ms Excel; entering all names of the 631 female household heads into the Ms Excel spreadsheet; randomised them (the names) by applying the *Random-Between 1 to 631 Function Command*. Additionally, the researcher used systematic random sampling in selecting the 140 sample size of FHHs (the names of household heads represented the FHHs) from the 631 randomised names. In order to achieve this, the researcher divided the 631 working population by the sample size (140) to get sampling interval (K). The resultant sampling interval was 4.50, which was rounded up to 5. The list of the names did not follow a systematic sequencing since the names of household heads had been randomised earlier. Thereafter, the researcher identified starting point of identifying sampling units by 'blindly' selecting any number from the sampling interval, 1 to 5. In doing this, the researcher moved computer cursor with no pre-determined criteria along the interval of the name that appeared at the top of the spreadsheet, up to around or at the fifth name in a "top-down" movement. Number 4 was selected as the starting point of counting up to the 140th number. Every 5th number from the number 4 was selected to get the 140 respondents. In systematic sampling only the first

case is selected randomly, then all subsequent cases are selected according to a particular interval, for example every fifth or tenth case on a list of names ... (Strydom, 2011b:230). The formula below illustrates how the sampling interval was determined:

$$K = N/n$$

K=sampling interval, N=working population size, n=sample size

$$631/140=4.50$$

Thus the total number of respondents selected for the quantitative phase of this study was 140.

5.5.4 Qualitative sampling

In this study, qualitative sampling was used in the selection of the study area and units of qualitative research. As illustrated in the previous sub-section, Voi Division was the study location or area and was purposively identified because it illustrated salient characteristics relevant to the objectives of this study: the division is ASALs that are characterised with droughts, poverty, hunger, and other socio-economic challenges, which culminate into food insecurity. The second reason is because the area was deemed to have a substantial large population of FHHs, which were the target units for the study. In non-probability purposive sampling a particular case is chosen because it illustrates some feature or process that is of interest for a particular study (Strydom & Delport, 2011:392).

The researcher further selected key informants through multi-stage sampling by utilising purposive and convenient-purposive sampling on the organisations or institutions the key informants worked with, and in selecting the key interview participants, respectively. Firstly, the institutions with which the key informants worked were purposively identified. Secondly, the participants were convenient-purposively identified among the staff of the organisations, while considering gender representation. Prior to the study, the researcher made a pre-visit to the organisations sampled for the key informants' interview. She requested the senior officers or managers of the institutions for permission for conducting the interview in future. The researcher further elaborated the intent of the study to the officers and requested them to allow and inform other employees in the organisations, who meet the selection criteria that the researcher wished to do an interview with them in the subsequent days. Some of the senior officers met the selection criteria and thus were also included as participants. Those officers who gave consent for the interview provided the researcher with their personal phone numbers for future communication regarding the date of the research. As mentioned earlier, the second phase of identifying the key informants' interview participants involved the researcher convenient and purposively identifying them among the workers in

the sampled organisations. The key informants were relevant in the study because of their knowledge and expertise in food security in the study area. De Clark et al. (2011:6), rightfully assert that key informants have broad knowledge of the research settings or deep knowledge, and skills of important aspects of the research topic. The researcher sampled 15 key informants.

The key informants were selected according to the following selection criteria:

- Informants of both genders (male and female);
- A person aged 18 or above holding a permanent or contractual career with the targeted organisation(s), and;
- Persons with at least one year work experience, in the field of food security including with FHHs.

The researcher conducted the semi-structured interview with the 15 participants. Saturation of information refers to where researchers start to collect the same information repeatedly and no longer learn anything new (Monette et al., 2005:242; Seidman, 1998 in Greeff, 2011:350). During interviews with the key informants, the researcher was supposed to know that she had acquired adequate data, even without having interviewed them all, if the data saturation was reached.

The organisations from which the key informants were derived were: the World Vision NGO, the NDMA, Mwatate District Stakeholders' Forum Community Based Organisation, Reach out Centre Trust NGO, the Kenya Red Cross, Voi District Social Development (this was exempted in the final analysis), Office of the County Commissioner (Voi), Ministry of Agriculture (Voi), and the Ministry Water and Irrigation (Voi).

As mentioned before, the researcher used convenient sampling to select the 15 key informants. This was made possible by the organisation senior management officers who helped the in identifying officers who portrayed the characteristics of the study topic. Mugenda and Mugenda (2003:51) describe convenient sampling as a technique which involves selecting cases or units of observation as they become available to the researcher. The researcher of this study acquired the sample of the key informants by getting instructions from organisation managers on which staff members were relevant for the key interview. Strydom and Delpont (2011:394) refer to this technique of sampling as key informant sampling; and say that its strategy is to interview these experts (the key informants) systematically after they have been identified. The issue of non-probability comes into the limelight because of uncertainty in representativeness. In convenient

sampling, there cannot be certainty whether the identified participants actually are the total spectrum of possible participants (Strydom & Delpport, 2011:394). This was true for this study because there was no available data indicating the total number of key informants in the organisations and relevant for this study.

The second aspect of the qualitative sampling was selecting units for observations and photographs. The sample for the observations and photographs were the same FHHs with those of the survey, but only if they illustrated characteristics of interest for the observations and photographs. The observations were done on food available, any cooking activity, and water sources. In situations whereby the household head allowed, photographs were taken, but not of persons. Important aspects which were intended for the photograph-taking include: food, food storage and cooking facilities, available food, water and sanitation and crops cultivated.

5.6 Data collection

This section describes data collection tools and procedures of both quantitative and qualitative part of the study.

5.6.1 Data collection for quantitative phase of the study

The researcher and research assistants collected data for quantitative phase of the study via a randomised cross-sectional survey design, whose main instrument was a researcher-administered structured questionnaire. The questionnaire was structured according to recommendations by FANTA. The FANTA is a UN body which offers technical guidance on how to generate food and nutrition survey questions (Swindale & Bilinsky, 2009a:3; 2009b:15). The structured questionnaire was useful to this study because it mainly comprised of closed questions, with advantage was that, the respondents did not lose focus about responses and the research objectives. This ultimately eased data analysis. It, however, has a disadvantage of the questions getting misunderstood or misinterpreted by the respondents which was overcome by the researcher or research assistant explaining the actual meaning of the questions. The researcher and research assistants also inculcated a little probing with the respondents to make ideas clearer to them. This was in line with Delpport and Roestenburg (2011:188) who recommend that the researcher should be available to help respondents in case problems are experienced during a survey.

The researcher-administered questionnaire was divided into four sections. Section A: demography, Section B: food provisioning, Section C: food consumption patterns (household dietary diversity, household food consumption frequency) and food sources,

and Section D: coping strategies. The study respondents were the female household heads, who were also the principal household caregivers. Besides being the heads, it was necessary to ask them food security questions since they were responsible for food preparation or were the overseers of food preparation and meals in their households. The questions (about food security) should be directed to the person in the household who is the responsible with food preparation and meals; and this person answers on behalf of the household and all its members (Coates, Swindale & Bilinsky, 2007:11).

Before the actual randomised cross-sectional survey, the researcher trained her research assistants on data collection procedures. She trained them on strategies of approaching the respondent, how to administering the questionnaire and helping respondents who would experience difficulties especially in writing down the answers to questions. The following activities characterised the training: each research assistant filled a questionnaire, and then the researcher scrutinised the questionnaires for completeness and clarity of the answers. Out of the responses, the researcher clarified and elaborated on questions that the research assistants seemed not to understand their concepts clearly. Thereafter, the research assistants signed confidentiality (non-disclosure) agreement in readiness for the research. The research commenced with the researcher or research assistants visiting the respondents at their households and convenient places they had agreed to respond at, to administer the questionnaire. The survey was cross-sectionally administered.

During the commencement of the survey; firstly, the researcher or research assistants did self-introduction to the respondents, then explained to the respondent the intent of the survey and thereafter availed the letter of informed consent and read through it with the respondents. The researcher or an assistant explained to the respondents that they were free to participate or withdraw from answering question(s). Coates et al. (2007:8), support that respondents (of a survey) should be informed of the option to participate or not, and should be informed that they can choose to leave or refuse to answer a question at any time. The respondents then appended signatures as a sign of consent in answering the questionnaire. For those who could not write or were not willing to write the signatures on their own, the researcher or research assistant filled their names and the date but were requested to put a signature or a symbol of a signature on their own.

The researcher or an assistant thereafter read them the questions, and wrote down responses on behalf of the respondents. The researcher and research assistants used list-based method of posing questions. This method is employed by the enumerator informing the respondent that they should respond “yes” for each food or beverage consumed during the specified recall period of the previous day and night and then the enumerator continues

by reading a list of foods organised in groups, giving multiple examples for each food group (FAO & FHI 360, 2016:1). Mostly, the questionnaire was researcher-administered since most respondents showed unwillingness to write. They explained that they were not accustomed to writing in surveys but were comfortable in responding orally. Subsequently, literature review on tools for measuring food security quantitatively is explored.

5.6.1.1 Tools for measuring food security quantitatively

Literature reveals various tools for measuring food security quantitatively. However, the application of each tool depends on context. Several literature sources recommend adaptation of various tools according to their relevance to measurement context. For example, the FANTA website, <https://www.fantaproject.org> provides various literature and recommendations on food security measurement tools and how they can be adapted to fit different geographical and cultural settings. For instance, the most recent guide on food security item construction by FANTA provides such an insight. Another example is a guide by the FAO's Food Security and Nutrition Analysis Unit (FSNAU) for Somalia, which developed the Integrated Phase Classification System (now referred to as the Integrated Food Security Phase Classification (IPC), in 2004, for use in classifying the severity of food insecurity in Somalia, (Vaitla, Coates & Maxwell, 2015:4-5). In its own words, the IPC is "a set of standardised tools that aims at providing a 'common currency' for classifying the severity and magnitude of food insecurity" (Vaitla et al., 2015:5). According to Delport and Roestenburg (2011:181), the choice of data collection methods for the researcher working from a quantitative approach can be categorised into structured observation schedules, structured interview schedules, questionnaires, checklists, indexes and scales. The researcher of this study used a self-constructed survey questionnaire as the principal instrument in the collection of quantitative data from the FHHs. as noted earlier, the questionnaire comprised of four sections, namely: Section A: biographical details, Section B: food provisioning, Section C: food consumption and Section D: coping strategies.

5.6.1.2 The organisation of the questionnaire

Measuring the experiences of food security is both an objective and a subjective matter in the sense that while portions of the aggregate experience can be directly (objectively) measured (for example, comparison of calories consumed against an established minimum threshold for caloric intake), while other portions of the experience rely on (subjective) measures (for example, perceptions of severity and worry) (Vaitla et al., 2015:17). Examples of objective measures are HDDS and the FCS. This research included objective measures of HDDS through the use of the 24 hour recall schedule and FCS through the 7 day food consumption frequency score card. Other objective questions were the

biographical details of the respondents and food provisioning to indicate months of adequate food provisioning (MAFP).

Literature reveals that the subjective measures are also known as experiential measures and include coping strategies index (CSI), reduced coping strategies index (rCSI), HFIAS, and household hunger index (HHS). In this study, the subjective measures were aggregated into composite coping strategies and all are referred to as the CSI. The researcher investigated into the measures by aggregating their question items in Section C of the survey questionnaire. The researcher aggregated the items into the composite coping strategies since all the indicators portray hardships in food access, and insecurity, and display commonalities in their outlook. Vaitla et al. (2015:52) refer to them as items of behaviours related to experiences associated with “coping with inadequacy”. As mentioned in the previous sub-section, the structured-questionnaire of this study comprised of four sections, namely: Section A: biographical details, Section B: food provisioning, Section C: food consumption and Section D: coping strategies. Subsequently, this sub-section discusses the tools of measuring food security as objective and subjective indicators.

- **Months of adequate food provisioning**

“Months of adequate food provisioning” refers to an objective tool in measuring food security. MAFP were identified during the development of *USAID Office of Food for Peace (FFP)*'s *FY05-08* strategy, through a process of consultation and discussion with implementation partners, researchers, and other technical groups; and inputs from the *FAM Monitoring & Evaluation Working Group* and the *FFP Performance Management Plan (PMP) Working Group* (Bilinsky & Swindale, 2010:1). As a household manages its resources over the course of a year, the ability to meet its food needs may vary due to any number of factors such as inadequate crop production by the household due to poor soils or lack of labour, loss or decrease in income sources such as employment, social obligations or natural disaster (Bilinsky & Swindale, 2010:1-2). The researcher included the aspect of food provisioning in section B of the questionnaire to gauge the periods or months the FHHs had enough or inadequate food around or during time of the study. The findings on this aspect are for descriptive purposes. Measuring the MAFP has the advantage of capturing the combined effects of a range of interventions and strategies, such as improved agricultural production, storage and interventions that increase the household's purchasing power (Bilinsky & Swindale, 2010:1). As part of this study's findings, the findings on MAFP among the FHHs in Voi Division will inform research, policy, planning and interventions into food security.

Questions based on the MAFP are a population-based survey instrument and are applied to all the households in the sample (Bilinsky & Swindale, 2010:3). In this study, the MAFP questions were, “Which are the latest 3 months that your household has had enough food?” and “which are the latest 3 months that your household has not had enough food?” Literature reveals that food provisioning is vital to capture data on food access domain. To most accurately capture data in household food access over time, an investigator should collect data for MAFP during the period of greatest food shortages (such as immediately prior to the harvest); so as to increase the accuracy of recall of the months when the household did not have sufficient food (Bilinsky & Swindale, 2010:3). In the similar perspective, this research was carried at a time of food shortage in the Voi Division: non-rainfall season (July to October 2016), therefore, the researcher believes that the data captured have highest accuracy levels of indicating food access in the period.

Moreover, Bilinsky and Swindale (2010:3) recommend for adjusting the months (of food provisioning) according to when the survey is conducted, so that the current month appears first. In this study, the most current 3 months prior to the July up to October 2016. Bilinsky and Swindale (2010:3) reveal the following procedure in assessing whether a household had enough food provisioning or not:

For programmic survey, data for this indicator are collected by first screening out those households that were able to provide for their household food needs throughout the entire year. If the household heads under survey are unable to adequately provide (food) for the household (as asked by question number one); the researcher should then proceed to question number two, where the respondents are asked to identify the months which they did not have access to sufficient food to meet their household needs. The purpose of these questions is to identify the months in which there is limited access to food regardless of the source of the food - whether from production, purchase, barter or food aid.

Despite the fact that this study was for academic purposes, it is an action research hence may be applied for programme purposes to solve FHHs real problem of food insecurity. Therefore these procedures are also applicable in the current study. The researcher of the current study asked respondents to mention the latest 3 months that their households had enough food. This question was followed by question number two which asked the respondents which were the latest 3 months that their households had not enough food. The researcher additionally included a third question by asking the respondents what determined their food acquisition habits. The researcher asked this question because during the piloting phase of the study, the pilot respondents explained reasons they could provide or not provide food for their households, even without being asked. These question items were contained in the section B of the questionnaire.

MAFP questions should be asked of the person (adult) who is responsible for food preparation in the household; and if the food was prepared by a child/youth, the question should not be asked of the child/youth who actually prepared food but rather of the adult (usually a woman) who makes the daily decisions about what will be prepared and eaten (Bilinsky & Swindale, 2010:3). The whole questionnaire for the study survey was administered to the female household head who was an adult female. The household head was also the principal household care-giver. No children or non-household heads responded to the questionnaire. Additional caution was taken not to ask for food provisioning of an individual household member, but for the all household members. Bilinsky and Swindale (2010:3) say the questions refer to the food needs of the household as a whole, not any single member of the household.

- **Dietary diversity score (DDS)**

Dietary diversity has been measured in many different ways, in both research and programmatic contexts, and only a few simple food group diversity indicators have been promoted for wide population-level use in resource-poor settings, which include the HDDS, the minimum dietary diversity (MDD) and the Women's Dietary Diversity Score (WDDS), the minimum dietary diversity for women of reproductive age (15-49 years) indicator (MDD-W) (FAO & FHI 360, 2016:4), and infants and young children aged 6–23 months (IYCF MDD) indicator (FAO & FHI 360, 2016:5). They are the current advocated for use at a population sampled (FAO & FHI 360, 2016:5). Due to its applicability with the FHHs, the HDDS is the most relevant and has been prioritised as the DDS of this study. The advantage of using HDDS is that it shows economic access to food by a household. According to FAO (2011:23) the HDDS is meant to provide an indication of household economic access to food. The researcher is therefore of the opinion that the tool is relevant for the micro-level (household) food security assessment in this study. This is because the indicator takes into account the food welfare of all household members. In this study, a household was deemed to be comprised of more than one member belonging to different age groups; hence the HDDS was the best qualitative indicator of dietary diversity among all the members of each household of the study.

FANTA's *FFP Indicators Handbook 2015* is in affirmation that the principal household caregiver is asked HDDS questions, and states that - the HDDS consists of one question asked of the household food preparer: "Did you or any member of your household consume foods from a set of 12 different food groups in the day preceding the survey (24-hour recall period)?" (FANTA III, 2015:14). The researcher prioritised 24-hour recall period since

publications of food security assessment indicate that it is less subject to recall error. Example of such is FAO (2010:10).

The Section C of this study questionnaire contains question items on the HDDS. The household principal caregiver was the respondent of the whole survey including the HDDS. Various food items to represent the twelve food groups were the proxy indicators of this assessment tool. The researcher requested the respondents to indicate the foods their households had consumed in the previous day preceding the survey. FANTA III (2015:14) advocates that the question is however not the end but is further followed by enlistment of the 12 food groups. The researcher of this study arrived at the 12 food groups by aggregating food items mentioned to have been consumed by the FHHs' members into their respective food groups. Vaitla et al. (2015:7), indicate that the HDDS sums the total number of the food groups (out of 12 possible groups) that any member in the household has consumed over the previous 24 hours. The 12 food groups are illustrated in Vaitla et al. (2015:7) and FANTA III (2015:14), and they include: cereals; root and tubers; vegetables; fruits; meat and poultry; eggs, fish and seafood; pulses and legumes; milk/dairy products; fat and oil; sugar and honey; and other miscellaneous foods. Likewise, HDDS in this study comprised of the same food groups. The FANTA III (2015:14) gives the examples of miscellaneous items such as tea, coffee, condiments. Similarly, the miscellaneous food group of this study included consumables such as: tealeaves, drinking cocoa or chocolate, coffee, salts, spices including other food items which could not be categorised into the preceding eleven food groups. For instance, if a FHH's members had consumed tea for breakfast and ingredients for the tea were milk, sugar and tealeaves, the researcher classified the milk food item into milk/dairy products food group, then sugar food item into sugar/honey food group, and the tealeaves into the miscellaneous food group.

In spite of the questionnaire being mostly close-headed, the researcher had structured HDDS question entries in an open-ended design. This was to offer the respondents a chance to respond without restrictions, hence making sure they did not omit any food item they may have consumed. FANTA III (2015:14) recommends that, as appropriate, locally available foods should be added into the 12 food groups. It is for this reason that the researcher of this study utilised open-ended questions to capture data on any food item she was unaware of the FHHs or the local community to be consuming. Several researchers recommend a general rule of considering only the food groups prepared in the household (FANTA III, 2015:14). This study adhered to this principle.

The researcher emphasised on the respondents to enumerate only the foods prepared at the households. No foods prepared and consumed outside households of the respondents

were considered in this study. This practice has been used elsewhere and is exemplified by the IPC study in Somalia which illustrates the use of foods consumed at home (Vaitla et al., 2015:7). Moreover, FANTA III (2015:14) recommends that, the respondent should be instructed to include the food groups consumed by household members in the home or prepared in the home for consumption by household members outside the home (for example, at lunchtime in the fields). FAO and FHI 360 (2016:5) also confirm that foods prepared and consumed outside the household should not be included in the HDDS. This research did not capture data on foods consumed outside homesteads, including those that might have been prepared at home; because there seemed to be no indication of the practice by the respondents.

According to FANTA III (2015:14), this practice may result in an underestimation of the dietary diversity of individual family members who may, for example, purchase food in the street, notably; the HDDS is designed to reflect household dietary diversity, on average, among all members. This therefore portrays the guideline of measuring HDDS of all household members and not individual member's dietary diversity (FANTA III, 2015:14) as a standard approach to assessment of household food security. Besides avoiding the underestimation of the HDDS, the study also reaped from controlling for overestimation of the HDDS. Including (counting) food purchased and consumed outside the household by individual members may lead to overestimating HDDS overall (FANTA III, 2015:14). However, in situations where consumption outside the home of foods not prepared in the household is common, survey implementers may decide to include those foods (FANTA III, 2015:14). This study prioritised food preparation and utilisation in the homes, since meal-purchase was not a common practice among the study population. Besides the MAFP and HDDS, household food consumption score was also used as an objective indicator of food security among the FHHs in the Voi Division.

- **Household food consumption score**

Food consumption score (FCS) is a composite score based on the number of food groups, out of 8 possible food groups, that any household member has consumed over the previous 7 days, multiplied by the number of days that the food group was consumed (FANTA, 2015 in Vaitla et al., 2015:7-8). The salient question in measuring FCS is demonstrated in Vaitla et al. (2015:49), thus: Firstly, the researcher should ask, in the previous 7 days, how often the households had consumed staples (grains and tubers); any pulses; any vegetables; any fruits; any meat, fish, or eggs; any dairy products; any sugar or honey; any oils, fat, or butter. The FCS question of this study was asking the respondents to enlist food items their household members had consumed in the previous 7 days preceding the survey. In the

Section C of the questionnaire, the researcher had listed several food items deemed commonly consumed in the Voi Division. The inclusion criterion was informed by the researcher's experience with the local community and feedback from the pilot study. The researcher made the food items the primary indicators of the question because she deemed the female household heads did not possess technical know-how with regards to food groups. The researcher henceforth grouped the food items into the 8 food groups.

Secondly it (the first question) should be followed by frequency-of-occurrence question of how often the food group had been consumed. As mentioned in previously, Vaitla et al. (2015:7-8), while quoting FANTA (2015) say, the FCS is a composite score based on the number of food groups, out of 8 possible food groups, that any household member has consumed over the previous 7 days; multiplied by the number of days that the food group was consumed; weighted by the nutritional importance of the food group; for a total possible score ranging from 0 to 112 (Vaitla et al., 2015:7). In this study, the FCS tool sheet had entry spaces for the frequency-of-occurrence as "none" to mean non-consumption, once, twice, 3 times, 4 times, and 5 or more times. Additionally, the researcher weighted the 8 food groups according to their technically determined weights during data analysis.

The food groups are as well illustrated in Vaitla et al. (2015:7) and their associated FCS weights include: main staples - weighted at 2, pulses - weighted at 3, vegetables - weighted at 1, fruits - weighted at 1, meatfish and eggs - weighted at 4, milk and dairy products - weighted at 4, sugar - weighted at 0.5, and oil - weighted at 0.5, and condiments (or the miscellaneous) can also be captured but are weighted at 0 (see section 6.2.3 in chapter 6 for the weighting in this study). Just like the HDDS, only food prepared and consumed in the households were considered for the FCS indicator. This is advised by (Vaitla et al., 2015:7), "only foods consumed in the home are counted in this indicator".

- **Coping strategies index**

All the tools mentioned above are objective indicators. Besides their inclusion in the quantitative phase of this study, as a composite of specific indicators, CSI as a subjective tool can also be investigated quantitatively.

The CSI, developed by the humanitarian organisation CARE and the WFP, is one example of a participatory approach to assessing food security (Jones et al., 2013:496; Maxwell & Caldwell, 2008:18). The CSI as it has been developed can be applied, as part of a quantitative household survey, in which exactly the same questions are asked of each household so that results are comparable at the household level (and averages are comparable at higher levels such as location or district) (Maxwell & Caldwell, 2008:18). The

researcher of this study structured CSI question items in section D of the survey questionnaire. The CSI is constructed from a list of coping strategies that households rely on in times of food deprivation (Jones et al., 2013:496). In this study, food deprivation means food shortage. According to Jones et al. (2013:496), the final CSI score for any given household is not very meaningful by itself. However, when compared with CSI scores calculated for other households in the same community or region using the same adapted index or when comparing scores on the same households over time, the CSI serves as a comparative indicator of household food security (Jones et al., 2013:496). There are several purposes of CSI in food insecurity assessments.

The CSI can be used for determining the causes and consequences of food insecurity, early warning, and identifying households with food insecurity (Leroy, Ruel, Frongillo, Harris & Ballard, 2015:182). If incorporated into Early Warning Systems (EWS), the CSI can provide household level information that complements other information, and gives an accurate picture of the household situation (Maxwell & Caldwell, 2008:18). In this study, CSI was used to identify the FHHs that were experiencing food insecurity. Moreover, the CSI correlates well with more complex measures of food security (Maxwell & Caldwell, 2008:2). The CSI, both in its original and reduced forms, has been shown to be positively correlated with household assets, total expenditure per capita, and percentage of expenditures on food in several sub-Saharan African countries (68,70,71) (Jones et al., 2013:496). The CSI was used in this survey to investigate strategies of survival used by the female-headed households in food inadequacy, due to loss of assets and reduced expenditure on food. The CSI are the behaviours people engage in when they cannot access enough food (Leroy et al., 2015:182). Following the Bronfenbrenner's perspective of ecology, the CSI in this study's context, is in the third level of the ecological system, the exo-system. The exo-system are the links of social settings in which an individual do not have an active role and which they have an active role. For instance, an incapacitated female household head may not have the stamina to do casual labour, to earn herself income to purchase food for her household. However, she may use coping strategies, such as skipping some meals in a day, so as to spread out the available food stock for a longer period. In this section, the CSI is an aggregate of the following specific indicators: the specific CSI, rCSI, HFIAS and HHS.

- **The specific CSI**

Efforts to measure food insecurity (the component of access) have sometimes relied in part on an index of coping strategies (Vaitla et al., 2015:8). Originally developed as an alternative to a food consumption survey questionnaire, the CSI enumerates context-specific coping behaviours that household members rely on when they do not have

adequate food to consume and weight these behaviors according to their locally perceived severity (Vaitla et al., 2015:8). This study utilised coping behaviours that are known to be employed in Kenyan context when there are food shortages according to Maxwell and Caldwell (2008:11). The CSI (referred to as specific CSI in this study) key themes are: gather wild food, hunt or harvest immature crops, consume seed stock held for next season, send household members to eat elsewhere, send household members to beg, feed working members at the expense of non-working members, household having to skip entire days without eating (Vaitla et al., 2015:49). The CSI measure counts the frequency of identified behaviours and multiplies the frequency by the determined severity weight, summing the results of each item to produce an index score (Maxwell 1996 in Vaitla et al., 2015:8; Maxwell & Caldwell 2008 in Vaitla et al., 2015:8). In this study the CSI is the composite one which includes in them the other subjective measures, as shown in the subsequent discussions. The researcher structured 21 coping behaviours in section D of the questionnaire as its question items. Their frequency-of-occurrence were assessed by the use of the following variables: “never” to denote that a household had not employed the identified coping behaviour, “hardly” to signify that a household had used a coping mechanism very few times (1 to 2 times), “sometimes” to indicate that a household had used a certain coping strategy a few times (3 to 10), “often” to denote that a household had been used to using a coping behaviour but not every day (more than 10), and “always” to indicate that a household used a coping behaviour all the time (every day).

Vaitla et al. (2015:8), indicate that because of context specificity, there were original standard CSI scores, but could not be relied upon in all geographical and social contexts. The original CSI were not comparable across different contexts, and the CSI does not have universal thresholds for different categories of food in security but rather suggested measures against a location-specific baseline (Vaitla et al., 2015:8). The researcher of this study considered context-specificity of the CSI coping behaviours found to be used in Kenya through a pilot study, but derived weights across all the subjective measures. The CSI was based on a 30 day recall period. According to Vaitla et al. (2015:8), the IPC used the CSI on a 30-day recall period. This study used the specific CSI in aggregation with other experiential indicators to form the original composite coping strategies. The other indicators are the rCSI, HFIAS and HHS.

- **Reduced coping strategies index**

Literature review on rCSI is explored from the recent 2016 FANTA publication authored by Vaitla et al. (2015:8, 13). It indicates:

To address the issue of the CSI's context specificity, Maxwell, Caldwell and Langworthy (2008) in Vaitla et al. (2015:8) identified a subset of coping

behaviours and their related severity levels that were similar across all empirical contexts in which the CSI had been measured In an attempt to identify and test a more “universal” indicator based on coping strategies, Maxwell et al. (2008), as quoted by Vaitla et al. (2015:13) identified five coping behaviors from the original CSI that appeared in all the context-specific instruments that had been developed by 2008. From their analysis, they suggested a “reduced” CSI (rCSI) that was more universally applicable and included only five behaviours and associated standard weights. In particular, this indicator captures how many times in the (reference period) days household members engaged in the following behaviors: eating less preferred and less expensive foods -weighted at 1, reducing the number of meals per day - weighted at 1, limiting portion size at meal time - weighted at 1, prioritising consumption for certain household members (for example, limiting adult intake) - weighted at 3, and borrowing food/money from friends and relatives -weighted at 2. This is done for a total possible index score ranging from 0 to 56.29. Re-analysing the data based on an index consisting of only these five indicators produced results that correlated with other indicators as well as or better than the “full” CSI (Maxwell & Caldwell, 2008 as cited by Vaitla et al., 2015:8). The rCSI has been widely adopted, and it has very close connection with CSI but it is perceived to have more universal applicability than the CSI (Vaitla et al., 2015:8-9).

The researcher of this study included question items of the rCSI in the composite CSI. The rCSI items were captured in the Section D of the study questionnaire as items 6, 1, 3, (4 & 5) and 7 respectively. Furthermore, these items were found to be used in Kenya as composite coping strategies, according to a previous study illustrated by Maxwell and Caldwell (2008:11).

- **The household food insecurity access scale**

The HFIAS grew out of a decade-long initiative of scale development and validation testing sponsored by FANTA (Swindale & Bilinsky, 2006 in Vaitla et al., 2015:9). The first phase (of the development) involved multi-year validation studies in Bangladesh (Coates, Webb & Houser, 2003 in Vaitla et al., 2015:9) and Burkina Faso (Frongillo & Nanama 2003 in Vaitla et al., 2015:9). The results of these studies and others were harmonised to produce a nine-item indicator that measures the frequency (rarely, sometimes, often) with which specific behaviours have occurred across the previous 30 days (Vaitla et al., 2015:9). The HFIAS is conceptually similar to the CSI, except that it was intentionally developed to reflect the four key underlying dimensions of food insecurity that appeared to be universal from a review of ethnographic work on the subject: quantity, quality, preference, and worry/uncertainty (Coates, et al., 2006 in Vaitla et al., 2015:9). The key themes of HFIAS are: feelings of uncertainty or anxiety over food (situation, resources, or supply); perceptions that food is of insufficient quantity (for adults and children); perceptions that food is of insufficient quality (includes aspects of dietary diversity, nutritional adequacy, preference); reported reductions of food intake (for adults and children); reported consequences of reduced food intake (for adults and children); and feelings of shame for

resorting to socially unacceptable means to obtain food resources (Coates, Swindale & Bilinsky, 2007:1).

In the earlier versions of the HFIAS, questions about a household's strategies to augment its resource base, such as taking a loan, were included in the scale along with questions about consumption-related coping strategies that ask about reductions or redistribution of food within the household such as skipping meals or eating less preferred foods (Coates, 2005 in Coates et al., 2007:3). In the current study, the researcher included HFIAS questions on resource base augmentation by asking the respondents whether they had purchased food on credit (item 8), were selling household assets (item 19); and the consumption-related ones were whether the households were skipping food for an entire day (item 2) and whether the households had changed consumption to less preferred and/or cheaper foods (item 6). According to Vaitla et al. (2015:9), the HFIAS underwent validation testing for cultural invariance, which led to the creation of HHS. The HHS is a relatively common measure of food insecurity and can be easily derived from HFIAS (Vaitla et al., 2015:9). Next, the indicator HHS is discussed.

- **Household hunger score**

Vaitla et al. (2015:2), describe HHS as cross-culturally validated questions on extreme food insufficiency, based on parent HFIAS. HHS is a tool to measure the prevalence of household hunger in food insecure areas (Bilinsky & Swindale, 2010:1). The creation of HHS emanated in the efforts to develop a generic, universally applicable measurement instrument that can be used to measure the access component of household food security in a range of country and cultural contexts (Bilinsky & Swindale, 2010:1). This indicator is a food deprivation scale that measures the percent of households experiencing moderate to severe hunger, and is designated a score of 2 or more based on the following categories of food deprivation: little to no hunger, moderate hunger, and severe hunger (FANTA III, 2015:15). The HHS questions are illustrated in Vaitla et al. (2015:9), which shows that in the IPC, the HHS consisted of the last three questions from the HFIAS: the ones capturing experiences that proved to be the most universal in terms of interpretation but also the most severe (Deitchler, Ballard et al., 2010 in Vaitla et al., 2015:9). These experiences include: having no food of any kind in the household, going to sleep hungry because there was not enough food, and going a whole day and night without eating (FANTA III, 2015:15; Vaitla et al., 2015:9).

FANTA III (2015:15) proposes that in collecting data for this indicator (HHS), the person in the household in charge of food preparation is asked about the frequency with which three events of (household hunger severity levels) were experienced by any household member

in the last four weeks (30 day-recall period). The respondent of the entire survey of this study was the female household head who was also the principal caregiver.

- **The relevance of aggregating experiential indicators**

The researcher used an amalgamation of the different dimensions of coping strategies (specific coping strategies, rCSI, HFIAS and HHS) to capture the multi-faceted experiential indicators for the following reasons. Resource augmentation coping strategies are important to consider in gaining a more detailed picture of the experience of food insecurity (access) in any particular context (Coates et al., 2007:3). Secondly, different measures of coping strategies indicate varying vulnerability to food insecurity, therefore variety of questions on hardships should be asked to bring out a prediction of the vulnerability. For instance Coates et al. (2007:3), observe that households that resort to unsustainable coping strategies such as selling productive assets or taking high interest loans represent a crucial area of concern for the most food insecure populations. Coates et al. (2007:3), further add that these household strategies, along with behaviours such as migration or begging, indicate the nature of the household's vulnerability. Thirdly, the composite themes of coping strategies overlap therefore measure similar concepts of dealing with food inadequacies.

- **Question-response procedures of the composite coping strategies**

The composite coping strategies comprising of the specific CSI, rCSI, HFIAS and HHS are the subjective indicators of household food insecurity in this study. The key themes in the CSI questions are whether the households: gather wild food, hunt or harvest immature crops, consume seed stock held for next season, send household members to eat elsewhere, send household members to beg, feed working members at the expense of non-working members, household having to skip entire days without eating (Vaitla et al., 2015:49). While the questions on rCSI alone include if the household had to: borrow food or rely on help from a relative, limit portion size at mealtimes, restrict consumption by adults in order to allow children to eat, reduce the number of meals eaten in a day, rely on less preferred or less expensive food, purchase food on credit (Vaitla et al., 2015:48). These questions are validated to be appropriate in the Kenyan context. HHS questioning is illustrated by Vaitla et al. (2015:49), "ask a respondent how often was there ever no food in the household, whether any household member had to go to sleep at night hungry, if any household member had to go a whole day without eating."

FANTA recommends that questions on measuring food security using coping strategies be asked on a recall period and that the respondent is asked an occurrence question - that is whether the condition in the question happened at all in the past recall period. If the respondent answers yes to an occurrence question, a frequency-of-occurrence question is

asked to determine whether the condition happened rarely (once or twice), sometimes (three to ten times) or often (more than ten times) in the recall period (Coates et al., 2007:5). This research also used these variables in addition to “always” as frequency-of-occurrence questions.

The CSI can be asked for either a 7-day or 30-day recall period (Vaitla et al., 2015:8), the rCSI captures information in the past 7 days (Vaitla et al., 2015:8), the HFIAS recall is 30 days (Coates et al., 2007:10; Vaitla et al., 2015:9), and HHS recall period was 30 days (FANTA III, FHI 360, 2015:16; Vaitla et al., 2015:9). The recall period for the composite coping strategies in this research was 30 days. The respondent, who was the female household head, was asked whether their household had used a coping strategy in the past 30 days. The question should address the situation of all household members not distinguishing adults from children or adolescents (Coates et al., 2007:6). Likewise, the questions for this study asked whether the household as a whole had employed the enlisted coping mechanisms.

If they responded “never” the researcher highlighted the code zero to indicate the response. The coding of the frequency-of-occurrence was made consecutive according to literature recommendations. “Never”, “hardly”, “sometimes”, and “always” were coded 0, 1, 2, 3, 4 respectively. The responses of frequency-of-occurrence items in the questionnaire of this study were: “never” to indicate that the household had not used the coping strategy itemised, “hardly” (which meant rarely), sometimes, often, and always (to mean it was used all the time). As mentioned severally earlier on, the list of coping strategies for this study were locally-contextualised with the Voi Division, and the pilot study conducted in Kenya, as presented by Maxwell and Caldwell (2008:11).

- **Relationship between the objective and subjective indicators**

Researchers offer an observation that despite the different aspects of food security as defined by different bodies, not all indicators of food security cover every of the dimensions in the definitions. This observation is illustrated in Vaitla et al. (2015:48), that, the indicators examined in the FANTA’s IPC research did not necessarily cover all of these dimensions. For example, the measurement of HDDS provides different dimension with CSI. HDDS reflects economic access to a diet with higher kilocalories per capita (FAO & FHI 360, 2016:5). Conversely, the researcher is of the opinion that the CSI provides data on experiences with food hardship. Inorder to create a balance in food security or insecurity investigations, the researcher is of the opinion that it is vital to triangulate both the objective and subjective tools to complement each other. The researcher assessed the food security among the FHHs in the Voi Division by measuring the access and utilisation components

through the use of the HDDS and FCS (objective indicators). The objective and subjective measures were mixed in the measurement of food security for this study concurrently. Furthermore, all the indicators of food security for this study were triangulated and investigated at the same time, hence the applicability of the convergent parallel mixed methods design, and the cross-sectional design of the quantitative phase.

5.6.2 Data collection for qualitative phase

Qualitative paradigm requires the qualitative researcher getting concerned with understanding rather than explanation, with naturalistic observation rather than controlled measurement, with the subjective exploration of reality from the perspective of an insider as opposed to that of an outsider predominant in the quantitative paradigm (Fouché & Schurink, 2011:308). Likewise, data collection for the qualitative phase of this study comprised of 3 methods, namely: key informants' interviews, observation and photograph-taking. The research instruments for these methodologies were one-to-one interviews, semi-structured interview schedule, cellphone audio-recorder, observation checklist and digital camera, respectively. The research utilised the following qualitative data collection procedures.

5.6.2.1 Interviews with key informants

The researcher conducted qualitative interviews with the key informants, sampled from humanitarian organisations and government institutions dealing with food security in the Voi Division including any other part of Taita-Taveta County. The key informants were significant for the study because they were deemed to have requisite knowledge on food security in the study area. Coates et al. (2007:7) corroborate that, key informants are the persons familiar with conditions and experiences of household food insecurity in the areas where surveys are conducted, who could be among others, private voluntary organisation staff members, government officials, academics, prominent community members, or other knowledgeable individuals.

Having booked appointment with the key informants, the researcher visited the officers at their offices and introduced herself to them. She also explained the intent of the research. This is because it is recommended for an interviewer to introduce themselves and familiarise the research to participants prior to commencing the actual interview. It is always good to explain to the key informants for what they are consulted for (Coates et al., 2007:7). The subsequent step was, the researcher leading the participants through the contents of the letter of informed consent. She explained to them that the participation in the interview was purely voluntary, and that the participants were at liberty to participate or withdraw from

the interview if they so wished. When they agreed to participate voluntarily, the participants appended their signature on the voluntary consent form. Key informants should be given the option to participate or not, and should be informed that they can choose to leave or refuse to answer a question at any time (Coates et al., 2007:7).

The researcher conducted one-to-one interviews with the key informants' using a semi-structured interview schedule. Greeff (2011:342) quotes DePoy and Gibson (2008:108) concerning interviews: "Researchers obtain information through direct interchange with an individual or a group that is known to possess the knowledge they seek". For these one-to-one interviews, the researcher was guided by open-ended questions in an interview schedule. Themes of the interview schedule were in tandem with question items of the quantitative survey. This was in accordance with the assertion of De Clark et al. (2011:12) that semi-structured interviews combine the flexibility of the unstructured and open-ended interview with the directionality and agenda of the survey instrument.

The challenges that face the researcher when using qualitative research interviewing, (Greeff, 2011:343), are establishing rapport in order to gain information from participants. Greeff (2011:350) offers the following suggestions on what to do after doing self-introduction:

After introductory pleasantries, confirm once again the general purpose of the research, the role that the interview plays in the research, the approximate time required, and the fact that the information is to be treated confidentially. Explain the manner in which the researcher will be recording responses and obtaining permission for tape recording. Finalise the signing of voluntary consent forms and inform the participants that if they wish to withdraw at any time, they are free to do so.

The researcher conformed to these recommendations by explaining to the participants the process of the whole situation using the letter of informed consent and the participants signing the letter before commencing with the interview. After the introduction pleasantries, the interview commenced. During the interview process, with the participants' consent, the researcher recorded the interviews on a cellphone audio-recorder. She also made brief notes on the interview schedule to complement the audios. The interview session commenced and progressed normally except for a few interruptions during the interview with three key informants. One of the participants received a client and the other two received phone calls during interview sessions. This however, did not influence the participant to lose the focus, but only extended the duration of the interview. Greeff (2011:346) observes that interruptions distracts participants, so that thoughts are lost and time must be spent regaining the level of intimacy established prior to the interruption – the

telephone is the most common interrupter. At the adjournment of the interview, she debriefed the participants on any query they had raised, and then thanked the participants for their participation. Finally, the researcher reviewed the field notes to detect any omissions. This kind of recommendation is made by UCLA Center for Health Policy Research (Sa) that it is important to review the notes immediately after the interview, so as to avoid losing valuable information if the review is delayed. The interview yielded benefits. For example, according to Greeff (2011:351, 360), an advantage of using the semi-structured interview is that the researcher will obtain in-depth data from experts, while gaining a detailed picture of the topic. On the other hand, it posed a limitation to the research. The limitation is when participants are unwilling to share vital information to the study (Greeff, 2011:360). The researcher mitigated this disadvantage by creating a rapport with the participants and assuring them of utmost privacy, as was in the content of the letter of the informed consent. The audio-taped conversations were the primary data from the interviews and were transcribed verbatim on computer at the end of the whole process.

5.6.2.2 Observations and photographs

Observations were done concurrently along with the quantitative survey. As indicated earlier in this chapter, Delpont and Fouchè (2011:443) indicate that, triangulation-designed studies reap from the advantage of taking less time to complete than sequential designs. The observation and photograph-taking were done at the same phase, which also emphasises the convergent parallel mixed methods design of this study. As mentioned earlier, the research instrument for the observations was the observation checklist. The researcher recorded observations in the checklist during the concurrent time with the quantitative survey, but at the end of each survey session. As mentioned in section previously, mixed research methods involves concurrent, but separate, collection and analysis of quantitative and qualitative data in order to compare and contrast the different findings to see the extent to which they do or do not agree with each other (Delpont & Fouchè, 2011:442). The advantage of using an observation checklist is that it helps the researcher to stay on track and be able to distinguish between what is important and what is not (Strydom, 2011:335). In this study, the observation checklist was designed to specifically focus on food security variables. Strydom (2011:335) further observes that ideally field notes should be taken down while observing, but the disadvantage of it is that it might inhibit participants. To counter this limitation, the researcher recorded the observations after she was done with the survey, but still with the permission of the female household heads. It was not likely to lose the observable behaviours and phenomena – they had some permanency of occurrence before they could be deemed to disappear. During the observations, the researcher concurrently or later on filled field notes in the

checklist. According to Strydom (2011:335), it is difficult to write down all of the observed material, thus the researcher has to make accurate and systematic notes as soon as the observation session has ended. Therefore, the researcher and research assistants filled data regarding the observed food security behaviours as field notes in the observation checklist. The variables of the observations were: household's main shelter, food items, time of meal, behaviour of household members (suggesting coping strategy), presence of garden, crops, nearby market and water supply. She also, with the consent from female household head, took photographs during the survey and observation phases using a digital camera.

With the consent of the household heads, the researcher or research assistant took photographs of food security situations as they occurred at the time of the observation and not of any person. One limitation of observation is manipulation of the situation by participants. If people know they are being observed and studied, the natural situation is automatically changed and the researcher will not be able to achieve the purposes of his study objectively (Strydom, 2011a:331). The researcher strived to overcome this limitation by recording some observations at the moment in time whenever a relevant situation occurred. Additionally, the researcher did not observe such manipulations by the participants. The researcher did not take photographs where there was no consent from the head and this was considered non-participation. If participants are reluctant to get involved in visual data collection, their non-participation is accepted without comment (Theron, Geyer, Strydom & Delport, 2010:87). After the photograph-taking, the researcher transferred the photographs from the digital camera to laptop computer during and after the end of the data collection. She saved the photographs in one folder on the laptop. At the end of the entire data collection, the researcher retrieved the photographs from the folders for the qualitative photograph analysis.

As mentioned previously, the overall research design for this study is the convergent parallel mixed methods, whereby the quantitative and qualitative phases were carried out at the same period, and given equal priority. Subsequently, the summary of the research methods are summarised in table 5.1.

Table 5.1: Summary of research methods

Phase	Research design	Sample	Data collection methods
Quantitative	Randomised cross-sectional surveys	134 female household heads	Researcher-administered structured questionnaire
Qualitative	Collective case studies	15 key informants	One-to-one interviews Interview schedule Audio-recording
		Targeted 134 FHHs	Observation checklist
		Targeted 134 FHHs	Digital camera

From the table, the research methods can be clearly seen for both the phases of research, depicting the overall convergent parallel mixed methods design.

5.7 Data analysis

In this study, computer software packages the *Ms Excel* and *Statistical Package for Social Sciences (SPSS)* were used in organising and analysing quantitative data. This is consistent with Baxter and Jack (2008:554) observation that, a computerised data base is useful to organise and manage voluminous amount of data. Moreover, Coates et al. (2007:17), say that responses from food insecurity measure should be entered into a data base, spread sheet, or statistical software like *Epilinfo* or *SPSS*.

Qualitative data collection and preparation sometimes occurred concurrently, but the main analysis was at the end of the field research. Its findings are presented and discussed in chapter 7. Additionally, following the convergent parallel mixed method design, both the quantitative and qualitative data findings were triangulated in the final analysis. Therefore the study reaped from benefits associated with data triangulation, including reliability or credibility and the ultimate generalisability of the findings. An advantage of the triangulation is to increase credibility of the findings by improving both internal consistency and generalisability (Yeasmin & Rahman, 2012:161).

The data analysis team comprised of the *SPSS* expert, the supervisor and the researcher. The *SPSS* expert provided instruction and expertise in data organisation, input and output. The supervisor provided guidance on the output presentation and discussion. The researcher was involved in the data entry, analysis and presentation in line with the expert and supervisor's instructions, and literature review. The strategy of involving experts ensured that the researcher remained true to the topic. Baxter and Jack (2008:555) say that data analysis team is important in providing feedback on the researcher's ability to integrate

the data sources in answering the research questions. The sub-sections below present the discussion of the quantitative and qualitative analyses.

5.7.1 Data analysis for quantitative phase

Quantitative data collected was analysed using the *Ms Excel 2010* and *IBM* SPSS* hereafter referred to as *Ms Excel* and *SPSS* respectively. The researcher entered the survey variables into the *SPSS* for primary descriptive and inferential analyses. Most of the data were analysed on the *SPSS*; but the summing and weighting of the *HDDS*, *FCS* and *CSI* were manually done and entered on *MS Excel*. The weighted data was thereafter transferred to *SPSS* for easier analyses along with the other variables of the study. Besides, the researcher also used *Ms Excel* for generating visual data presentation figures (graphs and charts). Additionally, in addition to frequency tables generated via the *SPSS* analysis, the researcher in some instances inserted tables from *MS Word* for further data presentation.

The process of the analysis involved the following activities by the researcher: scrutinising the questionnaires for completeness and clarity of responses, identifying variables, coding the variables, entering the variables onto the *SPSS* in accordance with their subsequent codes, and finally operationalising the analysis for descriptive and/or inferential results. Descriptive univariate statistics such as percentages, frequencies, and the mean were used in data presentation and discussion. The main variables of the analyses were biographical characteristics of the *FHHs*; *HDDS*; *FCS*; food security statuses according to *HDDS*, and *FCS*; overall food security status; *MAFP*; and *CSI*. These computer programmes aided in the analysis of the quantitative data for production of accurate results, superseding manual methods. The data presentation and discussion are in chapter 6 of this study. The analysis took the following general steps: data preparation, data entry, data processing and the actual analysis.

5.7.1.1 Data preparation

After having collected the data, they must be prepared for data entry (Fouché & Bartley, 2011:252). According to Sarantakos (2005:364) in Fouché and Bartley (2011:252), data preparation includes checking and editing collected data and eventually coding them. The researcher prepared the survey data by coding the questionnaires and thereafter verifying the coding or recoding the responses. The importance of the coding is illustrated by Fouché and Bartley (2011:252) that, all responses must be coded consistently for any analysis to be valid.

5.7.1.2 Data entry

Tabulation of responses is a tally that can be done by hand and/or with the aid of computer software such as a database or software (Bilinsky & Swindale, 2016:5; FANTA III, 2015:21). The computer software used for the quantitative data entry were the Ms Excel and SPSS. Most computer programmes designed for data analysis need the data in a grid format, such as spreadsheet (Fouché & Bartley, 2011:253). The researcher did data entry of the quantitative data in the grid formats of the Ms Excel and SPSS. Data in sections A and B, having been coded, were entered directly on the *IBM SPSS Statistics 20* (henceforth referred to as SPSS). The data on the remaining sections C (24-hour and 7-day recalls) and D (coping strategies) of the questionnaire were firstly manually coded, assigned weights, the weights multiplied by the frequency of their occurrences; then tabulated in the *Ms Excel 2010* (henceforth referred to as Ms Excel). This process was carried out by the researcher, who passed on the data in the Ms Excel to the SPSS expert for tabulation and analysis on the SPSS. According to FANTA III (2015:21), tabulation of variables can be done by hand and/or with the aid of computer software.

5.7.1.3 Data processing and analysis

Quantitative methods of analysis fall into four main categories, according to Blaikie (2000) as quoted by Fouché and Bartley (2011:251), namely: descriptive, association, causation and inference. The biographical data in section A of this study's questionnaire were mainly processed and analysed using descriptive methods. Fouché and Bartley (2011:251) say the following concerning descriptive statistics:

Descriptive methods are used to report the distribution (or spread) of a sample or population across a wide range of variables. The aim of these methods is to produce a scope of characteristics of such distributions through frequencies, measures of central tendency and measures of dispersion. The methods are univariate in nature.

In addition to the descriptive methods of analysis in section A, some variables were inculcated into association and causation with other variables in the rest of the sections, using inferential analysis. The associations and causations were illustrated by the use of Pearson correlation, Spearman rank correlation, Chi square, partial correlation and multiple regression (see chapter 6). Fouché and Bartley (2011:251) say:

Techniques of association are used to establish whether positions on one variable are likely to be consistently associated with positions on another variable, though depending on the level of measurement and the number of variables analysed by using correlation, analysis of variance or regression. The search for causation involves the use of factor analysis, path analysis or regression in an attempt to determine the network of relationships between variables.

Responses (to HDDS) produce a household dietary diversity score ranging from 0 to 12 (FANTA III, 2015:14). Similarly, the responses to the 24-hour recall indicator for this current study varied from 0 and 12. The analysis involves the following steps:

- First, the HDDS variable is calculated for each household and the value of this variable will range from 0 to 12, which is equals the total number of food groups consumed by members of the household (FANTA III, 2015:21). However, as indicated earlier, care should be taken not to consider food groups consumed outside the household consumption. FAO and FHI 360 (2016:5) also cautions that foods consumed outside the home should not be included in the tabulation.
- Values for non-consumption and consumption of each food group are coded “0” and “1” respectively. Similarly, the researcher of this study coded the non-consumption of food groups as “0” and consumption as “1”.
- This is then followed by the calculation of adding the scores for all the 12 food groups consumed in a household (FANTA III, 2015:21). This research considered the following food group for the HDDS: cereals, root and tubers, vegetables, fruits, meat and poultry, eggs, fish and seafood, pulses and legumes, milk/dairy products, fat and oil, sugar and honey, and miscellaneous as recommended by FANTA. The researcher recorded the total number of food groups each household had consumed in the last 24 hours following the survey.
- Afterwards, the average HDDS indicator is then calculated for the sample by dividing the sums of food groups in the household with the number of the total household under study (FANTA III, 2015:21). Many authors indicate that HDDS is measured among samples derived from general populations. For example FAO (2010:10). The average HDDS for this study is 6 food groups.
- Likewise, associations were established through correlations, Chi square and regression in the other sections of the questionnaire of this study.

Additionally, the researcher prepared the data on the FCS by grouping food items into eight food groups: main staples; pulses; vegetables; fruits; meat, fish & eggs; milk & dairy products; sugar & honey; and fat & oils. She thereafter assigned them frequency-of-occurrence codes ranging from a count of 1 to 5. Zero code represented food group non-consumption. The researcher multiplied these counts with standard weights of the food groups. The weights are thus: 2 to main staples, 3 to pulses, 1 to vegetables, 1 to fruits, 4 to meat/fish/eggs, 4 to milk, 0.5 to sugar & honey and 0.5 to fats & oils.

The researcher also manually prepared the data on coping strategies by recoding the frequency of occurrence as 0 for never which means the FHH did not use the enlisted coping strategy at all, 1 for hardly, 2 for sometimes, 3 for often and 4 for always. She further used rCSI weights plus assigning weights to other coping strategies basing on feedback from the empirical study, personal experience and literature viewpoints. The rCSI weights are: 1 to reduction in the number of meals per day, 1 to reduction in size of meals, 3 to restrict consumption of adults to allow more for children and/or feed working members at the expense of non-working, 1 to changed consumption to less preferred and cheaper foods, 2 to borrow food from a friend or relatives. After assigning the weights, the researcher multiplied each weight corresponding to its frequency-of-occurrence. This process is illustrated by Leroy et al., (2015:182) that, a continuous score is calculated by summing the frequency of each coping strategy as used, multiplied by its severity weight in order to get the CSI.

5.7.1.4 Data and result interpretation

Univariate statistics describe one variable (Fouché & Bartley, 2011:254). The simplest form of data analysis is univariate analysis, which means that one variable is analysed, mainly with a view of describing that variable (Fouché & Bartley, 2011:254). In this study, univariate analysis was mainly applied to biographical data (section A of the survey questionnaire), and the MAFP. The biographical variables for the analysis were: area of residence, age of the household head, occupation of the household head, education level of the household head, number of FHH members, marital status of the household head, source of livelihood for the FHHs, and source of income for the FHHs. The other variable that was analysed only by use of the univariate statistics is the MAFP to illustrate the months of adequate and inadequate food provisioning in the FHHs. Other variables, the HDDS, FCS, and CSI combined both the univariate and multivariate analysis.

There are various ways in which frequencies may be displayed, such as bar graph, histogram, frequency polygon, pie chart and pictogram (Fouché & Bartley, 2011:254; Mugenda & Mugenda, 2003:126). In the presentation of the quantitative findings of this study, the descriptive data results are displayed in frequency tables, bar graphs and pie charts. The interpretation of the results is done in forms of mean, range, standard deviation and percentages.

The analysis of the section B was done using the following procedure. First, the MAFP for each household in the sample was determined and categorised into two – months of adequate food provisioning and months of inadequate food provisioning. The data on the both categories were presented in a frequency table, and the findings were described in

ranges and percentages. Bilinsky and Swindale (2016:5) assert that, first, the MAFP is calculated; then secondly, an average MAFP for all the households in the sample is calculated; and the denominator should include all households interviewed, even those who did not experience any months of inadequate household food provisioning (Bilinsky & Swindale, 2016:5). Bilinsky and Swindale (2010:6) however, observe that no research has been done to assist in setting targets for the MAFP. In this study, this indicator was analysed as mentioned above.

Having been prepared manually and on the Ms Excel, the actual data analysis of the question 1 of section C of the questionnaire was computed on the SPSS computer programme for results on HDDS. The analysis of HDDS was validated against the 12 food groups of the HDDS, through conversion of food items into the 12 food groups. The HDDS is meant to provide an indication of household economic access to food (FAO, 2010:23). Thresholds of HDDS are suggested in determining household dietary diversity status.

The original HDDS methodology does not prescribe thresholds, although thresholds have been introduced for IPC analysis and various authors have suggested HDDS cut-off points that they used (Hedlund et al., 2013 in Vaitla et al., 2015:viii). The HDDS guidelines state that normative data on ideal/target scores for the indicator are usually not available, but that context-specific thresholds can be developed (Swindale & Bilinski, 2006 in Vaitla et al., 2015:7). For instance, the current acute IPC indicator thresholds for HDDS in Somalia are: HDDS of ≥ 4 with no recent deterioration (Phase 1), recent deterioration/loss of one food group from a typical HDDS (Phase 2), severe recent deterioration of HDDS/loss of two food groups from typical HDDS (Phase 3), HDDS < 4 (Phase 4), and HDDS of 1-2 (Phase 5) (IPC Partners 2012) (in Vaitla et al., 2015:7). This study, the levels of food security according to the HDDS are categorised according to the following ranges of the scores of the twelve food groups: 0-3 as severe food insecurity, 4-5 groups as moderate food insecurity, and 6-12 as food secure/mild food insecure (see chapter 6).

Question 2 of the section C of the survey questionnaire captured data on FCS, through 7-day food frequency. The current IPC indicator thresholds for FCS are: acceptable consumption or stable (Phase 1), acceptable but deteriorating consumption (Phase 2), borderline (Phase 3), poor consumption (Phase 4), and below poor consumption (Phase 5) (IPC Partners, 2012 in Vaitla et al., 2015:8). The FCS has “universal” thresholds as provided by FANTA (Vaitla et al., 2015:17). The standard FCS-based food consumption cut-offs and categories are: <21 = “poor,” $21-35$ = “borderline,” and >35 = “acceptable”; and in areas where oil and sugar are regularly consumed, the thresholds are adjusted as follows: <28 = “poor,” $28-42$ = “borderline,” and >42 = “acceptable”; and † 42 to 112 is for populations

consuming oil and sugar daily, ‡ 13 to 41.5 is for populations consuming oil and sugar daily (Vaitla et al., 2015:viii). This study utilised the latter cut-offs. Thresholds are imposed on the continuous score to differentiate households into one of three categories: acceptable (>35, >42 in areas where oil and sugar are consumed regularly), borderline (21-35; 28-42 in areas where oil and sugar are consumed regularly), and poor (<21; <28 in areas where oil and sugar are consumed regularly) (WFP, 2008 in Vaitla et al., 2015:7). These are the standard universal cut-offs as asserted by Vaitla et al. (2015:viii). The researcher prioritised the higher thresholds for this study because oil and sugar are commonly consumed in the study area (see chapter 6 for sugar and oil consumptions). The second reason for using the latter classification is because it is the recommended universally. The categories are: <28 as poor, 28-42 as moderate, and >42 acceptable.

The weighted coping strategies were analysed on the SPSS for CSI. The CSI results were continuous. In order to categorise FHHs according to levels of food insecurity, the researcher divided the continuous CSI into quartiles. The quartiles were: 0-22, 23-44, 45-66 and 67-86. The higher the score, the more coping reported, and therefore the more food insecure is the household (Leroy et al., 2015:182). Similar, in this study, the households that had the highest CSI were deemed severely food insecure.

The analyses on HDDS, FCS and CSI produced both continuous and categorical data for description, comparison, association and causation of food security. Cross-tabulations and inferential statistics are used to report these relationships.

Whenever we classify subjects in relation to two separate variables simultaneously for the purposes of determining their degree of association, Fouché and Bartley (2011:266), explain that we create what is known as a cross-tabulation. In this study, cross-tabulations are used in the chapter 6 to visually present findings on levels of food security according to both the HDDS and FCS, and partial correlations between the HDDS, FCS and CSI. Besides the partial correlation, Pearson and Spearman rank correlations are also used in reporting relationships between variables. Craft (1985) in Fouché and Bartley (2011:268) asserts that correlation involves both a relationship and the concept of quantification of the strength or degree of relationship. Other inferential statistics used in the presentation of the findings of this study include: t-tests, Chi square and multiple regression.

Subsequently, the quantitative findings (see chapter 6) are presented in the following format:

- **Biographical characteristics of the female-headed households**

The presentation of biographical findings is mainly done using descriptive statistics, which include: frequency distributions, the mean, range and standard deviation. Additionally, inferential statistics are also utilised in the presentation, namely: measures of mean difference (t-test), and association (Pearson correlation, Spearman's rank correlation).

- **Household dietary diversity score**

As indicated many times previously, the tool for measurement of the HDDS is the 24-hour recall. Data analysis on the tool is usually done by converting all food items in the 24-hour data collection sheet into the 12 technical food groups. FANTA III (2015:14) has indicated previously that, the food groups are: cereals, root and tubers; vegetables; fruits; meat and poultry; eggs, fish and seafood; pulses and legumes; milk/dairy products; fat and oil; sugar and honey; and other miscellaneous foods. Likewise, in this study data presentation on HDDS is done accordingly. The data is presented in descriptive statistics (distribution frequency) and inferential statistics (Chi-square) as well.

- **Food consumption score**

Just like the HDDS, the FCS is an objective indicator of food security. Its inclusion in the presentation of the findings was therefore inevitable. Descriptive statistics (frequency distribution and percentages) are used in the presentation of its findings. The descriptive statistics are used in the description of consumption of the 8 food groups of the FCS.

- **Overall status of food security among the female-headed households**

In order to arrive at overall food security status of the FHHs, the researcher triangulated the HDDS and FCS statuses of food security, through Pearson correlation coefficient and cross-tabulation. Additionally, descriptive findings on MAFP and CSI are included in the section to describe and explain in more detail how the FHHs food provisioning was like and how they coped with food shortages, respectively. In order to arrive at the overall food security status, the researcher analysed the levels of food security according to the HDDS, FCS and CSI in disaggregated form; then thereafter aggregated the objective measures (HDDS and FCS) to arrive at the overall status. The findings of the overall status are presented in descriptive and inferential statistics.

- **Months of adequate food provisioning**

This variable was included in the overall food security statuses for description purposes. It shed light into the presence or absence of adequate food provisioning among the FHHs. Its recall period was longer than the HDDS and FCS, and was 3 months prior to the study. The researcher analysed this variable by prioritising the current-to-the-study 3 months

(preceding July 2016). The presentation on MAFP data is through descriptive statistics - in percentages.

- **Coping strategies index**

The final variable to be presented in the section of the third objective is the CSI. As a subjective indicator of food security, the CSI findings are presented in quartiles of percentages. Moreover some inferential statistics are also used in the presentation. Partial correlation and multiple regression tests were computed to establish its association with the objective indicators, the HDDS and FCS.

5.7.2 Data analysis for qualitative phase

Data analysis for qualitative phase was continuum from data collection to actual analysis. Qualitative research covers a spectrum of techniques, the centrepiece of which is formed by observation, interviewing and documentary analysis (Schurink, Fouché & De Vos, 2011:397). The qualitative phase of this study involved key informants' interviews, observation and photograph-taking as research techniques. The disadvantage of qualitative data analysis is that it is messy, ambiguous and time consuming, but it is also a creative and fascinating process (Schurink et al., 2011:398). The researcher strived to overcome this disadvantage by organising and coding qualitative data into themes, sub-themes and categories, and transcribing audios verbatim and then organising and coding them too. In order to reap from its advantage of insightfulness, the researcher prioritised meanings of the data as displayed by participants. The openness of qualitative researchers to new ways of thinking is very impressive and it is very clear that there is a great deal more to come (Schurink et al., 2011:398).

In this study, the analysis of qualitative data involved thematic analysis of key informants' interviews, observational analysis, and visual material (photographs) analysis.

5.7.2.1 Thematic analysis of interviews

Schurink et al. (2011:397), observe that, qualitative data analysis involves reducing the volume of raw information, sifting significance from trivia, identifying significant patterns and constructing a framework for communicating the essence of what the data reveal. In this study, the semi-structured interviews with the key informants yielded raw data, which was transcribed and reduced into verbatim quotes. From the quotes, the researcher made a discussion of the findings. The analysis process of the data was in accordance with Schurink et al. (2011:403-419), instruction that the analysis is continuous and spiral. The researcher transcribed the audio-recorded data onto *Ms Word 2010* computer programme

at the end of each interview day. At the end of the entire interview period, the researcher replayed the audio-records for comprehensive verification of the transcriptions. Any omitted data was inserted. The data was presented in patterns of themes and sub-themes, which were substantiated by verbatim quotes. Thereafter, the researcher presented the discussion of the findings according to each theme.

5.7.2.2 Observational analysis

The researcher started the process of observational analysis by scrutinising the contents of the observation checklist. On familiarising herself with the contents of the checklist, she derived the variables from the observational notes and coded them accordingly; and then entered the data on the SPSS for analysis. The findings were presented thematically on tables, pie charts, bar graphs, 3-D cone graph, and bar graph.

5.7.2.3 Visual analysis

For visual analysis, the researcher retrieved photographs from the digital camera and transferred them to a folder in the laptop computer. She then scrutinised them to acquaint herself their content and assigned them themes of presentation. Theron et al. (2010:87), postulate the importance of perusing visual data several times to familiarise oneself with it, and then thematically analyse them by grouping together similar contents and explanations and coding them to form general themes. The researcher was keen to note photographs that were not consistent with ordinary categories. According to Theron et al. (2010:88), while quoting Gilgun (2005) and Merriam (2008), in qualitative analysis, it is important to be vigilant for contents which are inconsistent with emerging general categories. The findings then presented according to the general themes and sub-themes with the visual representation of the concepts through grouped photographs (referred to as photo albums in chapter 7) and discrete photographs.

Generally, the qualitative analyses involved the following steps:

- Data preparation.
- Data reduction.
- Coding.
- Recording the researcher's impressions separately.
- Grouping the comments by theme.
- Clearly articulating a label for each theme.
- Testing emerging understandings, and searching for alternative explanations.
- Interpreting and developing typologies.
- Visualising, presenting and displaying the data.

- **Preparing and organising data**

The researcher began the preparation for qualitative analysis by availing the audios, field notes and photograph folder. Although she had done preliminary preparation of the data, a fresh detailed analysis was vital. The preparation for the comprehensive analysis at the end of the entire field work involved transcription of audio conversations onto Ms Word, scanning through the notes and photographs, writing memos by highlighting key points through shading. These memos formed impressions of patterns and themes regarding the findings.

- **Reducing the data: Generating categories and coding data**

The researcher scrutinised the data in detail by reading and rereading through the scripts. In this phase, the researcher should be aware of the data, and should pay attention, and be open to the subtle, tacit undertakings of social life in order to identify the salient, grounded categories of meanings held by study participants as advocated by Schurink et al. (2011:410). From the understanding of the contents, the researcher revised, added and modified the earlier memos into clearer ones. The researcher then derived themes from the impressions highlighted in the latter memos.

- **Assigning codes to each theme**

The researcher continued to categorise data to themes, sub-themes and/or categories depending on each case. The researcher coded the themes and sub-themes on the format of presentation of the findings.

- **Recording the researcher's impressions separately**

The researcher highlighted her own impressions of the data by indicating aside the main data that the impressions were her own opinion.

- **Grouping the comments together by theme**

The different indicators of food security were the general themes for this study (see chapter 7). The researcher carefully evaluated comments and grouped them according to the broad themes, then proceeded to group them to more specific themes referred to as sub-themes in this study.

- **Clearly articulating a label for each theme**

The findings of the qualitative phase are presented according to each tool of the data collection in the following order, as indicated in chapter 7: thematic analysis of key informants' interview, observational analysis and visual analysis.

- **Testing emerging understandings, and searching for alternative explanations**

This (testing) entails a search through the data during which one challenges understanding, searches for negative instances of the patterns and incorporates these into larger constructs, as necessary (Schurink et al., 2011:415). The researcher tested for emerging understandings regarding the themes by re-reading the transcripts while reflecting on them, and looking for alternative explanations in case of any omissions, while evaluating the usefulness of the themes to the study.

- **Interpreting and developing typologies**

Interpretation involves making sense of the data, the “lessons learned” (Schurink et al., 2011:416). The researcher of this current study strived to make sense of the data by comparing similar responses to a particular question and then draw interpretation on the most salient theme to be used for the presentation of the findings. More especially on the key informant’s interviews, similar responses were grouped under one sub-theme. The responses were presented in verbatim quotes.

- **Visualising, presenting and displaying the data**

The thematic findings of the qualitative phase are presented in the form of patterns of themes, sub-themes and/or categories where necessary. The themes and sub-themes are summarised in tables before the comprehensive presentation (see chapter 7).

5.7.3 Reliability and validity of quantitative data

This section describes how reliability and validity of the quantitative data was ensured.

5.7.3.1 Reliability

When scientists can reproduce a previous research study and generate the same results, it is verifiable (Bein & McCarthy, 2018:11). Something that is reliable will perform in the future as it has in the past (Delpont & Roestenburg, 2011:177). In other words, it refers to a measuring instrument’s ability to yield consistent numerical results each time it is applied (Delpont & Roestenburg, 2011:177). The researcher is of the opinion that this study is a social science one, therefore it followed scientific procedures of research thus its findings are as reliable and verifiable as possible. Delpont and Roestenburg (2011:177) while citing Neuman and Kreuger (2003:179-180) as well as Salkind (2006: 108) say that, although it is rare to have perfect reliability, the following procedures to increase the reliability measures can be applied:

- *Increase the number of items or observations/use multiple indicators of a variable.* Use two or more indicators (e.g. two or more questions in a questionnaire) to measure each aspect of a variable.

- *Eliminate items that are unclear.* An item that is unclear is unreliable; people may respond to it differently at different times.
- *Increase the level of measurement.* Indicators at higher or more precise levels of measurement are more likely to be reliable than less precise measures, because the latter pick up less detailed information. Try thus to measure at the most precise level possible.
- *Standardise the conditions under which the test is taken.*
- Moderate the degree of difficulty of the instrument. Any test that is too difficult or too easy does not reflect an accurate picture of one's performance.
- Minimise the effects of external events.
- Standardise instructions
- Maintain consistent scoring procedures.
- Use pre-tests, pilot studies and replications. Develop a draft or drafts, or preliminary versions, of a measure and test these before applying the final version in hypothesis-testing situation.

Following these instructions, the researcher used pilot study method to test the reliability of the instrument. The researcher terminated the piloting of the questionnaire at the fourteenth respondent because the saturation of data had been reached. After pre-testing the questionnaire, the researcher did several adjustments to the questionnaire. She increased the number of items in Section B of the questionnaire and inserted new variables that worked for the responses. This was so especially on the Section C of the questionnaire. The researcher also rephrased unclear instructions and items. These activities enhanced the reliability of the quantitative data and hence the findings.

5.7.3.2 Validity

The definition of validity has two aspects, as follows: "That the instrument actually measures the concept in question and that the concept is measured accurately" (Delpont & Roestenburg, 2011:173). Validity is the extent to which a concept, conclusion, or measurement is well-founded and corresponds accurately to the real world (Headey & Ecker, 2013:2). Validity is whether a test is measuring what it is intended to measure (Drost, 2011:114). Bollen (1989) in Drost (2011:118) defines content validity as a type of validity where the domain of the concept is made clear and the analyst judges whether it measures and fully represents the domain. Jones et al. (2013:484), support that validity of a measurement tool is inseparable from the purpose for which it is intended. High content validity of the questionnaire was ensured by making it conventional to the relevant technical domains of measuring food security, and seeking guidance from supervisor. Drost

(2011:118) advocates for the opinion of an expert in the study as a way of ensuring this. Face validity concerns the superficial appearance or face value of a measurement procedure (Delpont & Roestenburg, 2011:173). To guarantee this, the researcher structured and formatted questions in a logical order, and utilised relevant questions to the study in tandem with literature and general practice. The study supervisor also provided instruction, and the pilot test respondents' provided opinions on the relevance of the items in the questionnaire.

5.7.4 Data quality and trustworthiness of qualitative data

Trustworthiness is established when findings as closely as possible reflect the meanings as described by the participants (Lietz & Zayas, 2010:191); therefore qualitative researchers must describe research findings in a way that authentically represents the meanings as described by the participants to legitimise qualitative findings (Lietz, Langer & Furman, 2006:444). Unlike quantitative researchers, who apply statistical methods for establishing validity and reliability of research findings, qualitative researchers aim to design and incorporate methodological strategies to ensure the trustworthiness of the findings (Noble & Smith, 2015:34). The researcher ensured data quality and trustworthiness of qualitative data by employing the following:

Credibility refers to an alternative to internal validity (of quantitative data), in which the goal is to demonstrate that the inquiry was conducted in such a manner as to ensure that the subject has been accurately identified and described (Schurink et al., 2011:419-420). Credibility of the key informants' interview data was ensured by selecting 15 key informants from organisations and institutions intervening for food security in the Voi Division. Correct research instruments were used for each data collection method. These included a semi-structured interview schedule and audio-recorder, observation checklist, and a digital camera. In order to ensure that interview data was captured accurately, the researcher listened to the audio-records multiple times while transcribing them verbatim. The meaning of the data was analysed according to the meanings elicited by the key informants. The accuracy of observations and photographs was ensured by sticking to relevant variables or behaviours of food security among the FHHs. Credibility of the observations and photographs taken was ensured by the researcher and research assistants focusing on food security naturalistic behaviours and correct application of the observation checklist to guide the observable behaviour. The accuracy of these instruments were ensured by the researcher, doing an extensive literature review, linking with themes from food security technical guides and input from supervisors.

To ensure that the researcher biases were removed from the data interpretation and presentation, emic interpretation was prioritised, the data from the three data collection methods were **triangulated** for comparison, and an independent coder was used to ensure credibility

Transferability refers to whether the findings of the research can be transferred from a specific situation or case to another (Schurink et al., 2011:420). The authors emphasise that since transferability deals with generalisability of the data, they point out that, its applicability in qualitative studies may be difficult. Therefore, in this study, the qualitative data may not be generalised to other contexts, since the units of the qualitative phase were not representative of the FHHs population in the Voi Division. However, these findings can be compared to other studies with similar populations.

To counter the challenges, the researcher can refer back to the original theoretical framework to show how data collection and analysis will be guided by concepts and models (Schurink et al., 2011:420). Therefore, the researcher strived to achieve the overall transferability of the qualitative data, by using a collective case study design with different data collection methods, and **triangulating** these rich and thick qualitative findings from the multiple data sources (namely interviews, observations and photograph-taking), to decipher their similarities or contrasts. According to Schurink et al. (2011:420), designing a study in which multiple cases, multiple informants or more than one data-gathering method are used, greatly strengthens the transferability of the study. Moreover, both the semi-structured interview schedule and the audio-recordings of the key informants' interviews, helped "to keep it real". Semi-structured audio recorded interviews allow for repeated revisiting of the data to check emerging themes and remain true to participants' accounts ..., and use of rich and thick verbatim extracts ... assists the reader to make judgements about whether the final themes are true to participants' accounts (Noble & Smith, 2015:35). Similarly, in this study, the researcher extracted the **rich and thick** data from the transcribed verbatim interviews to support the generated themes.

Confirmability captures the traditional concept of objectivity ... whether the findings of the study could be confirmed by another (Schurink et al., 2011:421). To ensure confirmability of the data, the researcher of this study gave precedence to meanings elicited by participant responses. The responses of the key informants' interviews were analysed as direct interview quotes used to support themes and sub-themes. The findings from observations and photograph-taking were also categorised into themes linked to the technical guides on food security. However, the researcher had inculcated some etic or own interpretation because she possessed knowledge on how to delineate items intertwining thematically.

In order to remove her self-bias in the etic interpretation, she did considerate self-reflexivity on issues that would hinder her objectivity in the interpretation. Moreover, personal biases were removed through member checking by the researcher and her research assistants, and involving an external peer reviewer. Lietz and Zayas (2010:198) define **reflexivity** as a thoughtful consideration of how a researcher's standpoint can influence the research. The researcher countered her personal bias on the findings by keeping a journal where she reflected her feelings and thoughts. Through the self-reflexivity, the researcher prioritised emic interpretation and made her own opinions (etic interpretation) secondary. She always highlighted her opinion as belonging to her by using such phrases, "the researcher is of the opinion ...", "according to the researcher ..." Schurink et al. (2011:420), are of the opinion that, the researcher asks if there is a match between research participants' views and researcher's reconstruction and representation of them.

Moreover, the researcher always contextualised the findings with her experience at the field and during the time of the study. Additionally, she presented the discussion of the findings in comparison with literature and/or other previous findings from different researchers to substantiate the findings. The study also reaped from the supervisors' inputs as the second opinion, and that of an external peer reviewer. Lietz et al. (2006:447), say, "Reflexivity can be ensured through ... data analysis by inclusion of a third party because a third person in data analysis may be able to uncover hidden meanings in narratives; look for connections and contradictions especially in comparative narratives and identifying problems that may arise when analysing a narrative along with another".

Dependability: here the researcher asks whether the research process is logical, well documented and audited (Schurink et al., 2011:420). Data collection and analysis of the qualitative phase of this study was carried out in cyclical but logical manner. Furthermore, the application of collective case study of using multiple research instruments to capture concepts of food security is evidence that the qualitative phase was scientifically done and not fabricated. The findings emanating from these instruments were triangulated for similarities and contrasts, which means that interpretations were not forced to produce similar responses.

Divergent responses were acknowledged and practice guidelines formulated to address the inconsistencies. Additionally the researcher highlighted emic interpretation as the primary interpretation, but where her own views were present (etic interpretation) she acknowledged so. The researcher therefore believes that observing the scientific research

techniques and applying objectivity in the research process enhanced dependability of the qualitative findings of this study.

The research design of this study is convergent parallel mixed methods and the qualitative phase employed a collective case study design. The main feature of the design is data **triangulation** from multiple sources. Data triangulation is combining data from multiple sources (Lietz & Zayas, 2010:198). In this study, there are several sources of qualitative data. They were the key informants' interview, observation, and photograph data. Researcher triangulated the findings from these sources to arrive at the overall qualitative data interpretation. Commonalities and/or differences of the findings are discussed in accordance with literature review, and practice guidelines formulated. Commonalities are beneficial by highlighting the strength of the study, while the differences highlight gaps that need future interventions to correct, hence the formalation of the practice guidelines.

The researcher provided for an audit trail, by saving all relevant documents and data used and gathered in the research process for this purpose. **An audit trail** is keeping a detailed written account of the research procedures (Lietz & Zayas, 2010:198). The importance of an audit trail is that it allows the researcher to follow their own research procedures consistently and also helps a qualitative project to be open for critique by the research community as the research procedures are fully described (Lietz et al., 2006:450). Researcher kept a file with the reflexivity journal, as well as a self-record on the analysis procedures, to act as a point of reference and reminder for actions of the study. The reflection journal assisted in countering any personal bias that would emanate in the process of the study processes. She saved all the qualitative data (transcripts, field notes, check lists on observations and photographs) in both hard and soft files, as well as the research assistants' non-disclosure agreements.

Member checking: Noble and Smith (2015:35) assert that member and peer debriefing assists the researcher to uncover taken-for-granted biases, or assumptions. Debriefing consists of explaining what happened and what people felt, thought and did during a situation (Macquet, Ferrand & Stanton, 2015:32). After the interview session with each key informant, the researcher gave them a quick overview of what she understood from what came out in the interview, allowing them to confirm whether it was a true reflection of the contents, or wanted to add anything, ask questions or make queries over anything from the interview or study.

5.8 Pilot study

Pilot testing means finding out if your survey, key informant interview guide, voice recorder or observations will work in the main study by trying it out first on a few people (Tobacco Control Evaluation Centre, 2011:1). Pilot testing is important because it gives a researcher background knowledge on the research by enabling them to orientate themselves to the project ... and it increases precision of the study (Strydom, 2011c:236).

The piloting for this study helped the researcher get acquainted with the research conditions, methods and procedures. Additionally, the results of the questionnaire pre-testing enabled the researcher to increase the accuracy of research data collection instruments by adapting them to more precise conditions. The feasibility study and pre-testing of research instruments are subsequently discussed.

5.8.1 Feasibility study

It is necessary to obtain an overview of the actual, practical situation in which the prospective investigation will be executed (Strydom, 2011c:239). The researcher had prepared adequately for the study by arranging for logistics, materials and resources for the study. She had visited research site prior to the main study, and made available study materials and resources which included pencils, rubbers, research instruments, camera, and recording phone for the study. She also had visited key informants offices in advance or called the offices, and trained research assistants. The advantage of the feasibility study was that it orientated the researcher with the research environment. Another advantage of the feasibility study is in corroboration with (Sarantakos 2000:293 in Strydom, 2011c:240) that, the researcher can ascertain facts about the neighbourhood where investigation is to be done, accessibility of respondents, safety. The researcher made prior visits to the villages selected for the study and found out that in Voi Location, the neighbourhood were fairly accessible but was difficult to identify the sampled households. This is because the households in the urban areas were more private and vulnerable to changing houses. The researcher countered this limitation by obtaining information from neighbours and local headmen. However, households in Sagala Location were far flung from each other but easy to locate because the rural people knew each other relatively well.

The researcher also did organisational mapping for key informant interviews by enquiring from area administrators of the government and non-governmental organisations that deal with food security in Voi Division. It was revealed that some of the organisations were located in the study area while others without. The researcher strived to get relevant

organisations from those outside the study area by screening out those that dealt with food security including Voi Division.

5.8.2 Pilot pre-test of research instruments

By definition, pilot pre-testing involves simulating the formal data collection process on a small scale to identify practical problems with regard to data collection instruments, sessions, and methodology (Hurst, Arulogun, Owolabi, Akinyemi, Uvere, Warth & Ovbiagele, 2015:56). The total instrument or only a section of it can be tested during the pilot study in order to increase its reliability (Neuman 2003:181 in Strydom 2011c:242). Pre-testing a measuring instrument consists of carrying out all aspects of the total data collection process on a small scale (Grinnell & Unrau 2008:336; Monette, Sullivan & DeJong, 2005:9 in Strydom, 2011c:237). The practice of pre-testing is highly regarded as an effective technique for improving validity in qualitative data collection procedures and the interpretation of findings (Bowden, Fox-Rushby, Nyandieka, & Wanjau, 2002 in Hurst et al., 2015:56; Brown, Lindenberger, & Bryant, 2008 in Hurst et al., 2015:56; Collins, 2003 in Hurst et al., 2015:56; Drennan, 2003 in Hurst et al., 2015:56; Foddy, 1998 in Hurst et al., 2015:56).

The researcher conducted the quantitative survey questionnaire pre-test among 14 female household heads in Mwatate Division who were not part of the main survey. Similar to the main study, the pre-test respondents were female household heads. Furthermore in refining HFIAS questions, it is recommended to choose to identify individuals who are representative of the main survey and are not part of the survey sample (Coates et al., (2007:8). However, the respondents were not included in the main study since they were from outside the study area. Strydom (2011c:237) asserts that participants of a pilot study are not supposed to participate in the main inquiry.

The researcher commenced the pilot study by administering the questionnaire to the respondents; and started off a timer to indicate the start and the end of the completing the piloting session in order to assess the duration it was take the respondents to finish answering the whole instrument. The researcher was keen to observe any hesitations by the respondents and noted them down. This helped her to evaluate whether the questions were vague, ambiguous or difficult to answer. At the end of the piloting, the researcher conducted a step by step evaluation of the data collection instrument and recorded any inconsistencies expressed by the respondents. This helped in enhancing its internal validity and reliability. The participant's opinions were sought on the survey questions and queries noted down for future corrections.

After the piloting, the researcher modified the questionnaire appropriately. The researcher modified the questionnaire by deleting irrelevant items and inserting relevant ones. She also sought to gauge the clarity of the respondent's letter of informed consent by asking the respondents whether the instructions were clear to them, or if they had concerns about the letter. The researcher terminated the piloting of the questionnaire at the fourteenth respondent because the saturation of data had been reached. After the pilot pre-testing, the researcher did several adjustments to the questionnaire. One advantage of pre-testing is discovering possible flaws in survey measurement variables (Hurst et al., 2015:56). She increased the number of items in section B of the questionnaire and inserted new variables that worked for the responses; and also rephrased unclear instructions and items in section C. Mwatate Division was a neighbouring division to the Voi Division and was prioritised for the piloting, because it had similar socio-economic and environmental conditions with the study division, yet providing independent results for exclusion from the main study.

The researcher pre-tested the qualitative key informants' interview schedule, cellphone audio-recorder among 2 key informants. These 2 participants were sampled using the same criteria as in the main study, namely, purposive-convenient identification. Hurst et al. (2015:56) observe the following:

A typical pre-test in qualitative research involves administering the interview to a group of individuals that have similar characteristics to the target study population, and in a manner that replicates how the data collection session will be introduced and what type of study materials will be administered (consent forms, demographic questionnaires, interviews, ...) as part of the process. Pretesting provides an opportunity to make revisions to study materials and data collection procedures to ensure that appropriate questions are being asked and that questions do not make respondents uncomfortable and/or confused because they combine two or more important issues in a single question. It is vital that pre-tests be conducted systematically and include practice for all personnel who will be engaged in data collection procedures for the eventual main study.

The purpose of interviews with experts is to bring unknown perspectives to the fore or to confirm or reject the researcher's own views, and the utilisation of experts can thus help the researcher to delineate the problem more sharply and gain valuable information (Strydom, 2011c:239). The researcher conducted pilot pre-testing of the interview schedule through personal interviews with two key informants identified according to the same selection criteria as the key informants for the main study. The importance of personal interviews with the key informants was that, apart from validating the interview schedule; Strydom (2011c:239) stipulates that it is used in qualitative research for the purpose of identifying themes for further investigation. The findings of the interview pre-test validated themes of the qualitative findings.

Researcher made no alterations to the qualitative interview schedule, but noted that the audio recorder worked best when put at a closer proximity with the participant. The digital camera had been pilot-tested along with the questionnaire, through photograph-taking of food related observations from the check-list, as a pre-study activity. The researcher conducted pre-testing of the qualitative instruments to enhance the quality of the data.

5.9 Ethical considerations

Ethics is a set of moral principles which is suggested by an individual or group, is subsequently widely accepted, and which offers rules and behavioural expectations about the most correct conduct towards experimental subjects and respondents, employers, sponsors, other researchers, assistants and students (Strydom, 2011d:114). The researcher of this study prioritised the following ethical issues: informed consent and voluntary participation; privacy and confidentiality; avoidance of harm; actions and competence of the researcher; and debriefing of participants.

5.9.1 Informed consent and voluntary participation

One of the most important issues associated with research with people is that you need to inform them about the risks and benefits of the project - one way of recording the fact that you informed the participants and that they voluntarily agreed to take part in the study is through the informed consent form (Beins & McCarthy, 2018:35). The researcher set up a letter of informed consent which illustrated the aim of the study, voluntary participation and non-remuneration of respondents in the quantitative study and the participants in the qualitative study. The researcher read the letter of informed consent with all involved and henceforth explained that the study entailed an academic investigation of food security, and that they would not be paid for participating, and their participation was purely voluntary and out of own will. When they expressed understanding of the conditions of the study, they wrote their names and appended signatures on the letter of the informed consent accordingly. They were given copies of the letter.

5.9.2 Privacy and confidentiality

The UNESCO Universal Declaration on Bioethics and Human Rights (UDBHR), adopted in 2005 by the UNESCO General Conference, indicates:

Article 9: Privacy and confidentiality – The privacy of the persons concerned and the confidentiality of their personal information should be respected. To the greatest extent possible, such information should not be used or disclosed for purposes other than those for which it was collected or consented to, consistent with international law, in particular international human rights law (Martin, 2014:119).

Privacy, in its most basic meaning, is to keep to oneself that which is normally not intended for others to observe or analyse (Strydom, 2011d:119). The researcher ensured privacy and protection of the identity of the respondents in the quantitative study and the participants in the qualitative study, by not labelling research instruments with their names or any description that could reveal their identity, instead using pseudonyms to protect their identity. Moreover, the researcher did not take photographs of persons/participants, but only of food related items. Confidentiality can be viewed as a continuation of privacy, which refers to agreements between persons that limit others' access to private information (Strydom, 2011d:119). Confidentiality of information obtained from the participants was ensured by securely keeping the completed instruments away from public access. It was only the researcher and the supervisors who had access to the data in storage.

5.9.3 Avoidance of harm

The researcher has an ethical obligation to protect participants within all possible reasonable limits from any form of physical discomfort that may emerge from research project (Creswell, 2003:64 in Strydom, 2011d:114). Bein and McCarthy (2018:33) advise that the experimenter must be free to terminate a research project if he believes that continuing the study will lead to injury or death. Strydom (2011:115) further recommends that respondents should be informed beforehand about the potential impact of the investigation. The researcher therefore informed the respondents that the purpose of the study was to investigate into food security among their households for research purposes and academic knowledge. She further clarified that the research intent did not entail any physical or emotional harm, and urged them not to fear participating. Additionally, she highlighted that they had options of either participating in the study voluntarily or had an alternative of withdrawing from the study altogether (or in part) if they so wished. Such information offers the respondents the opportunity to withdraw from the investigation if they so wished (Strydom, 2011:115). The researcher did not encounter instances of physical or serious psychological injuries emanating from the study, hence she never did any referrals during the empirical investigation. In this regard Greeff (2011:360) states that when distress occurs with the participants, it is necessary to refer the participant to a counsellor or therapist for support, which was not necessary in this study.

5.9.4 Actions and competence of the researcher

The entire research project must run its course in an ethically correct manner (Strydom, 2011d:123). The researcher is of the opinion that prudence is a vital principle in any research undertaking, thus she was truthful to requirements of the study and honest with

the participants. She also truthfully clarified any queries which participants raised and was truthful during debriefing sessions. Moreover Bein and McCarthy (2018:27) caution that using somebody else's words without attributing them to that person is unethical. The researcher strived to overcome any attempts of plagiarism by citing and referencing other authors' ideas contributing to her study. The researcher is of the opinion that any research should be conducted by a competent person in methodologies and topic of the investigation. Researchers should be informed about the topic they investigate to maximise the likelihood that the results will be useful (Bein & McCarthy, 2018:33). The researcher is well versed with the study methodologies and the topic of this study because she has had applied similar research skills in her master degree. The researcher was also guided by her supervisors. She also conducted an extensive literature review on the study, with assistance from the study supervisors, which additionally enabled her to become more informed with the topic.

5.9.5 Debriefing of participants

Debriefing refers to informing research participants at the conclusion of a research project of the purpose of the research, including disclosure of any deception and providing an opportunity for participants to ask questions about the research (Bein & McCarthy, 2018:40). According to McBurney (2001:60) in Strydom (2011d:122), debriefing sessions are sessions during which subjects get the opportunity, after the study, to work through their experience and its aftermath, and where they can have their questions answered and misconceptions removed. The researcher clarified queries raised by participants and got new insights from the participants during the debriefing. One drawback to immediate debriefing is that participants might discuss the research with others ... who would later take part in your study (Bein & McCarthy, 2018:40). Being of the convergent parallel mixed methods design, the survey was done cross-sectionally hence there were no recurrent visits to same FHHs after empirical study had been concluded. Moreover, the researcher did not revisit the same area she had already conducted the survey, therefore chances of respondents sharing information was too minimal or none. The advantage with debriefing according to Bein and McCarthy (2018:40) is that, there seem to be few negative effects of deception when researchers take debriefing seriously. During debriefing sessions, the researcher did not encounter participants who confessed to have given willful false responses or appeared to have deceived the researcher.

5.10 Summary

This study is a social science study which applied social science research methodologies in the investigation of food security among FHHs in Kenya. The aim of the study was to

investigate food security among the FHHs in the Voi Division, Taita-Taveta County, Kenya. The research paradigm was pragmatism, which involved combination of both quantitative and qualitative approaches in collection and analyses of data. The type of the study is an applied research, whose purpose was to investigate real life phenomenon of food security among the FHHs. The study used convergent parallel mixed methods design, where the quantitative and qualitative phases are done parallel and merged or separately with the quantitative informing the qualitative phase. The study was conducted in the physical location of Voi Division in Taita-Taveta County, Kenya. The target population of the study was all female-headed households in the division, while the accessible population was the females who were the legal and customary heads of the households. Sample size of the quantitative phase was 119 FHHs which was the 14% of 850 (the accessible population) FHHs. It was further increased to 140 FHHs to cater for natural attrition. The researcher used systematic random sampling in selecting the 140 FHHs. However, actual research was conducted on 134 FHHs. For the qualitative phase, the researcher selected key informants through multi-stage sampling by utilising purposive and convenient-purposive sampling on the organisations or institutions the key informants worked with, and in selecting the key interview participants, respectively. The sample for the observations and photographs were the same FHHs as those of the survey, but only if they illustrated characteristics of interest for the observations and photographs.

The researcher and research assistants collected data for quantitative phase of the study via a randomised cross-sectional survey design, whose main instrument was a researcher-administered structured questionnaire. Data collection for the qualitative phase of the study comprised of 3 methods, namely: key informants' interviews, observation and photograph-taking. The research instruments for these methodologies were face to face interviews, semi-structured interview schedule, cellphone audio-recorder, observation checklist and digital camera, respectively. Quantitative data collected was analysed using the *Ms Excel 2010* and *IBM* SPSS*. Quantitative findings are displayed descriptively and inferentially. Qualitative data analyses were done in accordance with data from the key informants' interviews, observations and photographs taken. The semi-structured interviews with the key informants yielded raw data, which was transcribed and reduced into verbatim quotes. The data is presented in patterns of themes and sub-themes, which were substantiated by verbatim quotes. Observational analysis yielded observational notes which were analysed on the SPSS, and also presented thematically. In visual analysis, the researcher retrieved photographs from the digital camera and transferred them to a folder in the laptop computer. The findings are presented according to the general themes and sub-themes with the visual representation of the concepts through grouped photographs and discrete photographs.

Generally, the thematic findings of the qualitative phase are presented in the form of patterns of themes, sub-themes and/or categories where necessary. The researcher also ensured reliability and validity of quantitative data, and data quality and trustworthiness of the qualitative data. She conducted pilot study through feasibility study and pre-test of research instruments. She also inculcated ethical consideration through the following principles: informed consent and voluntary participation of participants, privacy and confidentiality of the participants and information they provided, avoidance of harm to the participants, actions and competence of the researcher, and debriefing participants.

The following chapter focusses on the quantitative findings.

CHAPTER 6

QUANTITATIVE FINDINGS

6.1 Introduction

As indicated in chapter one, the goal of this study was to investigate and describe the statuses of food security among FHHs in Voi Division in Taita-Taveta County, Kenya. The study is contextualised on the human-ecological systems perspective by Urie Bronfenbrenner (1979) (see chapter 4). This chapter contains presentation and discussion of quantitative findings focusing on 3 objectives of the study, which are:

- Determine the status of dietary diversity among female-headed households in Voi Division, Kenya by utilising dietary diversity score as an indicator of food security.
- Measure food consumption frequency among female-headed households in Voi Division, Kenya by utilising food consumption score as an indicator of food security.
- Determine the overall status of food security among female-headed households in Voi Division, Kenya.

The research design and method of data collection for this phase was randomised cross-sectional survey. The research instrument for the phase was a researcher-administered structured questionnaire. The questionnaire was technically constructed in accordance with the recommendations of the technical bodies regarding food security. Examples of such organisations are the FANTA (FANTA III, 2015:14; Vaitla, Coates & Maxwell, 2015:7-8), and FAO (FAO, 2010:10; FAO & FHI 360, 2016:5; Vaitla et al., 2015:4-5). The sample size of the quantitative phase was 134 FHHs, and the respondents were the female household heads who were also principal caregivers of the FHHs.

The data analysis for the phase was analysed using both the SPSS and Ms Excel computer packages. Most of the data were analysed on the SPSS; but the summing and weighting of the HDDS, FCS and CSI were manually done initially, and then entered on Ms Excel. The weighted data was thereafter transferred to SPSS for easier analyses along with other variables of the study. This chapter presents and discusses quantitative findings of the empirical study in accordance with the three objectives mentioned earlier. The presentation is mainly in descriptive statistics, and with inferential statistical analysis where applicable. The inferential statistics are t-test, Pearson correlations, Spearman rank correlation, Chi-square test and multiple regression.

6.2 Quantitative findings

Quantitative methods of analysis fall into four main categories, according to Blaikie (2000:236-237), namely descriptive, association, causation and inference (Fouché & Bartley, 2013:251). Similarly the quantitative findings are analysed in the descriptive and inferential statistics. Subsequently, the presentation is done in the following logical sequence: biographical profiles of the respondents, household dietary diversity score, food consumption frequency, months of adequate food provisioning, and coping strategies index.

6.2.1 Biographic profile of female-headed households

The structured questionnaire was the research instrument for the survey, and was administered to respondents of 134 FHHs in the Voi Division, in Taita-Taveta County of Kenya. According to Urie Bronfenbrenner's systemic-ecological perspective, a human being lives in a system, which is affected by relations between smaller elements in context to the larger system. Similarly, the FHHs are embedded in the larger system of the Voi Division, and are affected by food security dynamics. This section discusses biography of the FHHs including the female household heads as the smaller elements, which are affected the food security dynamics. Descriptive statistics are mainly used in presenting the findings. Descriptive methods are used to report the distributions (or spread) of a sample or a population across a wide range of variables, whose aim is to produce a scope of characteristics of such distributions through frequencies, measures of central tendency and measures of dispersion (Fouché & Bartley, 2011:251). In this study they include frequency distributions, the mean, range and standard deviation. Additionally, inferential statistics are also used in the section, namely, measures of mean difference (t-test) and association (Pearson correlation, Spearman's rank correlation). The default significance levels of the measures were 0.05. Techniques of association are used to establish whether positions in one variable are likely to be consistently associated with positions on another variable (Fouché & Bartley, 2011:251). In this chapter, the respondents' biographic profiles are presented in the following order: area of residence, age, occupation, education levels, and number of household members, marital status, source of livelihood, and sources of income.

6.2.1.1 Area of residence of the female-headed households

Figure 6.1 represents the area of residence of the female-headed households:

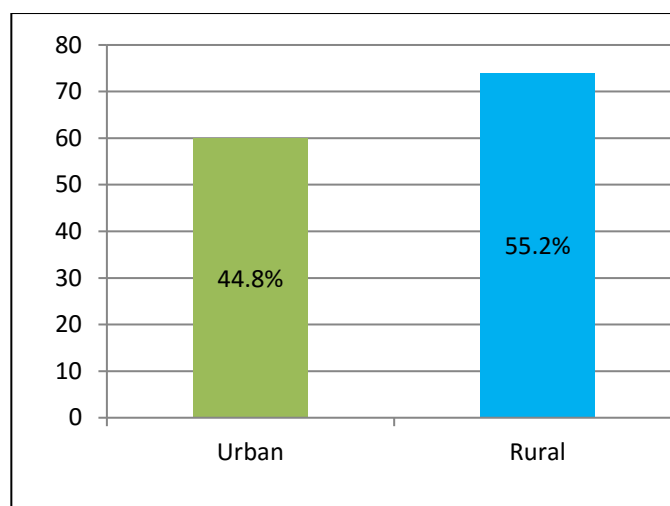


Figure 6.1: Area of residence (n=134)

The researcher coded the 134 FHHs according to types of areas they resided in. The essence of classifying the households was to analyse their performance on other food security variables. Out of the 134 households surveyed in this study, 44.8% (60) and 55.2% (74) resided in the urban and rural areas of the study area respectively. This finding is comparable with (FAO, 2013c:5), that globally, 50% of people are either residing in urban or rural areas. However, the finding is divergent with the KDHS (2015:20) report that, 34% and 66% of the Kenyan population live in urban and rural areas respectively; or more than $\frac{3}{4}$ of Kenyan population lives in rural areas (KNBS, 2014:5). The researcher is of the opinion that the inconsistency between this study and the KDHS findings is because the current study's area of investigation is a smaller administrative unit (division), while the latter is a countrywide survey. Additionally, the researcher wished to know the difference between dietary diversity patterns between the areas of residence. She computed an independent sample t-test analysis on the HDDS means of urban and rural FHHs.

- **Independent sample t-test of HDDS means of urban and rural FHHs**

Subsequently, table 6.1 presents the findings of independent sample t-test of HDDS means of urban and rural FHHs:

Table 6.1: An independent sample t-test on HDDS means of urban and rural FHHs

		t-test for equality of means	
		Sig. (2-tailed)	Mean Difference
HDDS means	Equal variances assumed	.000	.864
	Equal variances not assumed	.000	.864

	Area of residence	N	Mean	Std. Deviation
HDDS	Urban	60	6.85	1.039
	Rural	74	5.99	1.188

The descriptive mean of the HDDS for the urban and rural dwellers was 6.85 (with a standard deviation of 1.039) and 5.99 (with a standard deviation of 1.188) respectively. In this section, the mean refers to the average number of the 12 HDDS food groups, consumed by either the urban or rural FHHs. Standard deviation is used to measure dispersion of a series (from the mean) (Kothari & Garg, 2014:133). In this section, the standard deviations (of the HDDS scores of the both urban and rural FHHs), refers to how the food groups of each variable deviated or separated themselves from the means, 6.85 and 5.99.

The t-test results as shown in Table 6.1 were as follows: the mean difference between the urban and rural HDDS was 0.864 at $p=0.000$. This means a difference existed between the urban and rural HDDS, since the p value (0.000) in this case is less than the set significance level (0.05). The findings on the difference (lower rural than urban HDDS), corroborates with the following assertions: “poverty and food insecurity have been considered for decades to be rural problems ... in all developing regions, female-headed rural households are among the poorest of the poor” (Tibesigwa & Visser, 2015:2). Furthermore, KDHS (2015:19) indicates parity between rural and urban food security: 13.1% are either food poor or at borderline food security in rural areas; while 8.7% are either food poor or borderline in urban areas of Kenya. This study also explored age of household heads as a biographical variable.

6.2.1.2 Ages of the female household heads

Table 6.2 presents ages of the female household heads:

Table 6.2: Age of household heads (n=134)

Minimum age	Maximum age	Mean age	Std Deviation
20	90	44.64	14.843

The researcher of this study wished to understand how food security would reveal itself among the female household heads of different ages, and how it related with specific variables of food security covered in the study. The age range of the respondents was 20 to 90 years and the mean was 44.64 years, with a standard deviation of 14.843, as reflected in Table 6.2. The researcher has not included actual ages of the respondents owing to the fact that they were so diverse and stranded very long in the frequency table. However, from the SPSS table (not indicated here), the majority of respondents (86 or 64.2%) were women

of reproductive age (15-49 years). The ages of rest of the female household heads (48 or 35.8%) were 50 to 90 years. Following the subsequent findings of the quantitative survey that food security among the FHHs in the study area was resilient; the researcher is of the opinion that this was so, because being a woman of reproductive age is predictive of good biological and social reproduction. This then supports the idea that the females were productive enough for engaging in paid and non-paid work, to earn themselves income. The income is deemed having had empowered the household heads to purchase food for their households. Pearson coefficient of correlation (normally symbolised by r) can be used to compare (linear) relationships between two pairs of variables, and it takes r values of -1 to +1 (Kothari & Garg, 2014:139-140).

- **Pearson bivariate correlations between age of household heads, and HDDS FCS and CSI**

The researcher is of the opinion that Pearson's correlation coefficient can be used in the measurements of both positive and negative associations. The advantage of Pearson's coefficient correlation is that it is not affected by change in scale or by change in location, therefore is helpful in comparing relationships between two pairs of variables (Kothari & Garg, 2014:139). Table 6.3 illustrates Pearson bivariate correlations between age of household heads, and HDDS FCS and CSI:

Table 6.3: Pearson bivariate correlations between age of household heads, and HDDS, FCS and CSI

		Age of the head	HDDS	FCS	CSI
Age of the head	Pearson correlation		-.308	-.388	.350**
	Sig. (2-tailed)		.000	.000	.000
	N	134	134	133	134

** Correlation is significant at the 0.01 level (2-tailed).

In this study, Pearson correlation findings revealed moderate negative relationships between age with both HDDS and FCS ($r=-.308$, $p=.000$ and $r=-.383$, $p=.000$) respectively. Negative relationship in this study means that, as the age of the female household head increased, the more both the HDDS and the FCS decreased. This is in line with Kothari and Garg (2014:141) assertion that negative association depicts disassociation of variables. Francis (2004:194) says, "Negative correlation exists when increases in a value of one variable tend to be associated with decreases in the value of the other". This means that the more aged a household head was, the less HDDS and FCS for their households. As discussed in the chapter 5 of this study, CSI refers to an index of coping strategies employed by a household when it experiences food shortage. The researcher also

computed Pearson's correlation coefficient between the ages of the household heads and the CSI to reveal their relationship with each other. The correlation was of moderate positive relationship ($r=.350$, $p=.000$); which means, advanced age of a household head was associated with increased use of coping strategies by her household. This interpretation follows Fouché and Bartley (2011:273) assertion that, correlation examines 3 aspects of the relationship:

- The presence or absence of correlation.
- The strength of the correlation.
- In the case of ordinal and interval variables, the direction of the correlation.

In this study, the age of the household head and CSI were the ordinal and interval variables respectively.

6.2.1.3 Occupation of the female household heads

Table 6.4 shows occupation of the female household heads:

Table 6.4: Occupation of household heads (n=134)

Occupation	Frequency (<i>f</i>)	Percent (%)
Farming	42	31.3
Casual labour	40	29.9
Formal employment	14	10.4
Business	35	26.1
Other	3	2.2
Total	134	100.00

The question on occupation of the respondents was important for this study, as it served as a proxy for source of income. The researcher is of the opinion that occupation predicts household expenditure on food. Increased expenditure is strongly correlated with increased income (FANTA III & FHI 360, 2015:130). The table above shows that, the major occupation of the female household heads was farming (42 or 31.3%). It is followed by casual labour (40 or 29.9%), business (35 or 26.1%). Formal employment was 14 or 10.4% and other unspecified occupation at 3 or 2.2%. This finding compares with the *National Drought Management Authority, Taita-Taveta County Bulletin for July 2016*, which depicts small-scale farming, casual-waged labour, and business/trade as the major occupations in the county (NDMA, 2016:1). The researcher observed that farming has not been a sustainable occupation due to lack of rain and irrigation for watering crops. Despite farming being the lead occupation, farmers could not draw sustainable income from the occupation. Some sought casual jobs to earn income for purchase of their households' food. Subsequent

findings indicate that casual labour was the lead source of income among the females (see sub-section 6.2.1.8).

6.2.1.4 Educational levels of the female household heads

Figure 6.2 shows educational levels of the female household heads:

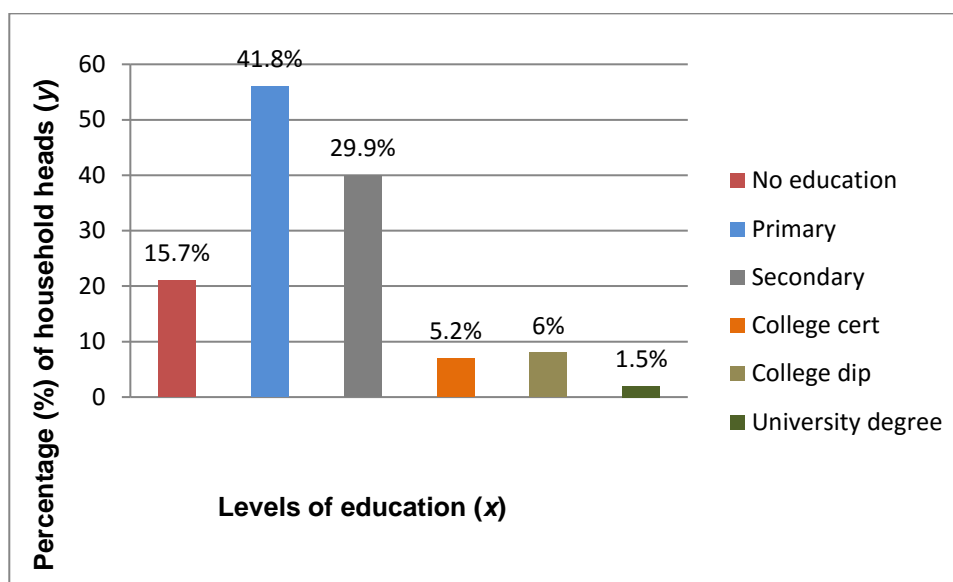


Figure 6.2: Education levels of the female household heads (n=134)

The justification to the inclusion of this variable (level of education) in the biography was because in the researcher's opinion, the more educated a household head is, the better the chances for employment, which would earn income to their households. The household head would ultimately use the income for food purchases. According to Qureshi et al., (2015:396), education is a key factor that influences food security status of households, for it provides greater employment opportunities and increases household income. The researcher is also of the opinion that a well-educated household head is well-versed with nutrition requirements for her household.

Figure 6.2 shows that 41.8% (56) of the respondents of this study had reached primary school and 29.9% (40) secondary education. Only 5.2% (7), 6% (8) and 1.5% (2) held a college certificate, college diploma and university degree respectively. The KDHS (2015:26) also indicates that 31.6% and 48.1% of the female household population in urban and rural Kenya had some primary schooling, 16.6% and 5.9% had completed secondary school and 13.8% and 3% had post-secondary education. The researcher of this study computed the mean of the KDHS (2015:26), and found it to be 39.85%, 11.25% and 8.4% of primary, secondary and post-secondary respectively. The KDHS (2014:26) further indicates that

only 3.8% of female household population had attained post-secondary education in the Coast Region. Both this study and the KDHS results are comparable.

These empirical findings revealed that 15.7% (21) of respondents had no education. The finding is relatively comparable with the KDHS 2014 mean of 14.2% the researcher has computed based on the following report: The KDHS (2015:26) illustrates that 8.9% and 19.5% of female household population in urban and rural areas in Kenya, have not attained any education. However, the finding is divergent with KDHS 2014, which shows a higher percentage in the Coast region - the KDHS (2015:26) shows that 26.5% of the female household population in Coast Region has no education. Owing to the fact that the study area is in the Coast Region of Kenya, this study finding (15.7%) indicates that the Voi Division performs better in literacy levels than the larger Coast Region.

- **Pearson bivariate correlations of education levels of household heads with HDDS, FCS, and CSI**

Moreover, the researcher computed Pearson bivariate correlations between education levels of household heads with HDDS, FCS and CSI as illustrated in table 6.5 below:

Table 6.5: Pearson bivariate correlations of education levels of household heads with HDDS, FCS, and CSI

Education levels	HDDS	FCS	CSI
Pearson correlation	.368**	.442**	-.307**
Significance (2-tailed) (0.000)	.000	.000	.000
N (134)			

** Correlation is significant at the 0.01 level (2-tailed).

The researcher is of the opinion that Pearson’s correlation coefficient can be used in the measurements of both positive and negative associations. The advantage of Pearson’s coefficient correlation is that it is not affected by change in scale or by change in location, therefore is helpful in comparing relationships between two pairs of variables (Kothari & Garg, 2014:139). According to Kothari & Garg (2014:138), when two variables change values in the same direction, they are said to be positively correlated. In this study, a two-tailed Pearson correlation showed a positive relationship ($r=.368$, $p=.000$; $r=.442$, $p=.000$) between the respondents’ level of education and HDDS, FCS respectively. This means, the more educated the household head is, the more HDDS and FCS her household would have. However, the education levels were inversely correlated with the CSI ($r=-.307$, $p=.000$). The researcher of this study has used the term “inversely correlated” to mean “negatively correlated”. When two values change values in the opposite direction, we have negative correlation (Kothari & Garg, 2014:138). This finding therefore supports the

hypothesis that, there is a positive relationship between levels of education and food security (whose proxies are HDDS and FCS in this study) among female-headed households in the Voi Division. This finding corroborates with a finding in Mozambique, which indicated strong negative relationship between lack of education and food security – years of schooling of household head was hypothesised to have a positive effect on food security (Bahta, Wanyoike, Katjiuongua & Marumo, 2017:10).

6.2.1.5 Number of household members

Table 6.6 shows number of household members per household:

Table 6.6: Number of household members per household (n=134)

Number of household members		Frequency (f)	Percent (%)		
	2	37	27.6		
	3	42	31.3		
	4	22	16.4		
	5	18	13.4		
	6	5	3.7		
	7	5	3.7		
	8	2	1.5		
	9	2	1.5		
	10	1	.7		
	Total	134	100.0		
Descriptive statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
No of household members	134	2	10	3.63	1.675

In this study, the range of the number of household members was 2 to 10 with a mean of 3.63 people. The mean size of a Kenyan household is 3.9 people (KDHS, 2015:22). According to Kothari and Garg (2014:194, 196), t-test is a measure of difference of two means. The researcher of this study manually calculated a one-sample t-test to determine if the mean of household members in this study (3.63) was different from the KDHS (2015:22) – mean of 3.9. The results of the calculation showed the same mean, 3.63 with a standard deviation of 1.675. The researcher also calculated the variability of the sample mean by dividing the standard error mean (.145) by the square root of the sample size (134). The resultant measure of the variability of the sample mean was 0.03. This means that both the study's sample mean and the KDHS' means are comparable, or there was not much difference between the two means.

- **Spearman’s rank correlation between number of household members and CSI quartiles**

The researcher is of the opinion that the number of household members correlates negatively with food security, because the more the members, the smaller the ration of food serving. According to Fouché and Bartley (2011:251), correlation is a measure of association.

Table 6.7 shows Spearman’s rank correlation between number of household members and CSI quartiles:

Table 6.7: Spearman’s rank correlation between number of household members and CSI quartiles

		Number of household members	CSI quartiles
Spearman's rho	No of household members	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	134
	CSI quartiles	Correlation Coefficient	.214**
		Sig. (2-tailed)	.004
		N	134
** Correlation is significant at the 0.01 level (2-tailed).			

The researcher is of the opinion that, just like Pearson correlation coefficient, Spearman’s rank correlation is also indicative of both positive and negative associations. According to Kothari and Garg (2014:140), Spearman’s rank correlation is a technique of determining the degree of correlation between two variables (bivariate according to Fouché & Bartley, 2011:266) in case of ordinal data where ranks are given to the different values of the variables; and the main objective of the coefficient is to determine the extent to which the two sets of ranking are similar or dissimilar. To test the null hypothesis, “There is no association between number of household members and food security at a significance level of 0.05”; the researcher computed Spearman’s rank correlation on the number of household members’ relationship with the ranked CSI quartiles (a subjective proxy for food security in this study). The relationship was a positive ($r_s=.214$, $p=.004$). This means that the null hypothesis was rejected and that, the more the household members in a household, the more coping strategies the household employed. This was indicative of increased use of coping strategies with increased food shortage or food insecurity. This finding is consistent with the case of Kisii County in Kenya. The Kisii County residents were found to

resorting to consuming indigenous vegetables (spider plant or *sagaa*, black-night shade or *managu*, pumpkin leaves, cowpea leaves or *egesare* and vine spinach or *nderema*) owing to shortage of ordinary vegetables of the community's preference, such as kales (Abuga, 2018:24). This scenario was linked to the high shortage of the vegetables and the ultimate hiked prices of the vegetables (Abuga, 2018:24).

6.2.1.6 Marital statuses of the female household heads

Figure 6.3 shows the marital statuses of the female household heads:

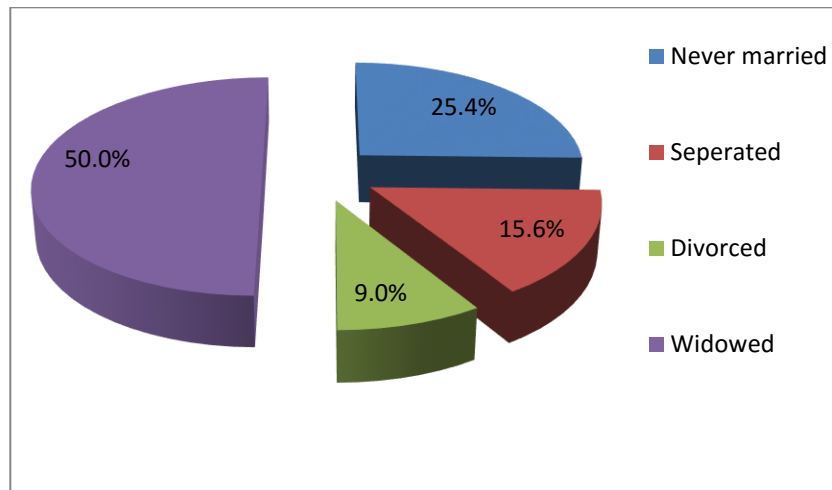


Figure 6.3: Female household heads marital statuses (n=134)

The respondents of this study were all deemed to be *de jure* female household heads. Previously in the definition of key terms in sub-section 1.2.3 of chapter one of this study, “*de jure*” female household head is described as a female who is the legal and customary head of the household. The female household heads include never-married single mothers, widows, separated and divorced women living with dependents. The researcher included “marital status” variable in the biography, so as to investigate what prompted the females to be the household heads. This was for descriptive purposes. Half the respondents, 50% (67) were female household heads as a result of being widowed. This finding is too high and divergent with the KDHS (2015:56) finding that, in Kenya, 3.7% women of reproductive age were widowed in 2014. Despite the fact that the KDHS findings indicate a statistic of a particular category of women (women of reproductive age), which in this study amounted to 64.2%; the researcher infers that the finding of the present study shows a higher percentage than the KDHS, because the former comprised of respondents of both the women of the reproductive age and older women of ages up to 90 years (see the discussion under table 6.1). Moreover, the difference in the findings may be due to the geographical scope of the KDHS’ and this study’s. The former statistic is based on a national wide survey finding and the latter is based at a divisional level. According to the researcher’s opinion, it

is ordinary for the old women to be widowed. Following the ecological system’s perspective, this study considers the marital status “widowed” as an exo-system, since it is a social circumstance which the female does not have an active role in preventing its occurrence. On the other hand, a hard-working widow may mitigate her household from plunging into more poverty and food insecurity by working harder than when her husband was alive.

Figure 6.3 shows that the never-been married, separated and divorced respondents were 25.4% (34), 15.6% (21) and 9% (12) respectively. In Kenya the percentage of women of reproductive age (15-49) never married are 28.9%, separated (5.6%) and divorced (2.1%) (KDHS, 2015:56). The comparable statistics (of the study and the KDHS) are those of “never married” category. The researcher is of the opinion that irrespective of what causes a woman to be the sole household head, their households are generally food-challenged. For example, very low food security was more prevalent than the US national average (5.6%) for households with children headed by a single woman (10.8%) (Coleman-Jensen, Gregory & Singh, 2013:14). The low food security is mostly attributed to high poverty prevalence among single females. This assertion is consistent with Bahta et al. (2017:4), that, households of single women (unmarried with children, divorced and/or widowed) tend to be relatively poorer than male-headed and other households. According to the Bronfenbrenner’s perspective, the fifth level of the ecological system is referred to as chrono-system which includes socio-historical circumstances. In this study, the marital statuses are influenced by socio-historical circumstances, especially of death of a spouse (husband); which according to literature, may influence the FHHs’ food security status differently with male-headed and/or other household categories. The prevalence of food insecurity among the FHHs, calls for more concerted efforts to ensure the achievement of the SDG2 of total eradication of hunger in the world.

6.2.1.7 Sources of livelihood of the female-headed households

Table 6.8 shows sources of livelihood of the FHHs studied:

Table 6.8: Sources of livelihood (n=134)

Source of livelihood	Frequency (f)	Percent (%)
Formal employment	20	14.9
Small-scale business	28	20.9
Small-scale farming	42	31.3
Hawking	6	4.5
Casual labour	33	24.6
Other	5	3.7

Source of livelihood	Frequency (f)	Percent (%)
Total	134	100.0

This study included “source of livelihood” variable to show the households’ dairy economic activity that earns them food. Like “occupation”, small-scale farming took the lead among the responses with 31.3% (42). Owing to personal experience and observation during the empirical study, the researcher deduces that, the proportion of respondents who said small-scale farming was the lead source of livelihood for their households resided in the rural areas of the Voi Division. This view is supported by KNBS (2014:5), that Kenya’s rural economy is mainly smallholder farming, which produces the majority of Kenya’s agricultural output. *National Drought Management Authority - Drought Early Warning Bulletin for July 2016* also shows that in Taita-Taveta County (Voi is a constituent of the county) of Kenya, farming is practised. In the mixed farming: food crops/livestock livelihood zone, most households experienced total food crop failure - those who harvested got far much below normal produce due to failed season (NDMA, 2016:6). The researcher is of the opinion that the majority of the Sub-Saharan Africa population resides in rural areas. This presumption arises from personal experience and from literature. For instance, literature shows although Botswana is thriving well in economy (which would consequently attract urban settlements); most of its population is still residing in rural areas. Over 70% of the country’s population resides in the country’s rural areas, and the majority (70%) relies on traditional/subsistence agriculture for their livelihoods (Bahta et al., 2017:2). It is for this reason that the Comprehensive Africa Agriculture Development Programme (CAADP), aims at increasing food supply and reducing hunger by raising smallholder productivity; as Aw-Dahir (2018:18) asserts.

Casual labour was the second leading in the responses with 24.6% (33). This finding also compares with that of the occupation (casual labour was second with 29.9%). The researcher observed that the casual labour practice was a common in both rural and urban areas of the study area. The third in popularity was small-scale business at 20.9% (28). Employment was only 14.9% (20). The researcher is of the opinion that, if employment among the target population would have been higher than the finding, food security would have been more sustainable, since employment stabilises sources of income and food access. This is because frequent and chronic droughts experienced previously in the study demarcation may have compromised sustainable crop production. Qureshi et al. (2015:396), observe that employment opportunities increase household income. This view is consistent with the results of research by Tibesigwa and Visser (2015:18) which reveals that off-farm household income was one of the main determinants of household food

security in South Africa. On the basis of this study, there is a commonality with all responses of “source of livelihood” and “occupation”. The researcher infers that the “occupation” is the major economic activity of the household head, which directly influences the household livelihood (lifestyle support).

6.2.1.8 Sources of income of the female-headed households

Table 6.9 shows the sources of income of the FHHs studied

Table 6.9: Sources of income (n=134)

Sources of income	Frequency (f)	Percentage (%)
Sale of farm produce	9	6.7
Casual labour	53	39.6
Formal employment	19	14.2
Sale of livestock and their products	1	.7
Pension	3	2.2
Money donations by the GOK/and NGOs	3	2.2
Business	39	29.1
1 & 4	1	.7
Money gifts from relatives	5	3.7
Other	1	.7
Total	134	100.0

Sources of income in this study were indicative of household main sources of cash money. Liquid finances affect food security especially the purchase of food. It was therefore vital to include the variable in the study to “draw a picture” of the FHHs’ capability of food access through purchases. The major source of income for the respondents was casual labour at 39.6% (53). It is followed by business at 29.1% (39). Only 14.4% (19) drew their income from formal employment, while 6.7% (9) got their income from sale of farm produce. This is unlike the “occupation” and “sources of livelihood”, both of which have shown small scale-farming leading in responses. The researcher is of the opinion that casual labour is leading as the major source of income since the smallholder farmer household heads also drew income from the sector, by seeking menial jobs from farms of non-farming sectors. The sale of farm produce contributed negligently as a source of income. The researcher is also of the point of view that farming should highly influence rural income, while casual labour, formal employment and business are presupposed to be major sources of income in urban areas. However, the farming is no longer sustainable in the study demarcation due to prolonged droughts, without or with little irrigation infrastructure. The low performance in “sale of farm produce” may be comparable with Botswana. In Botswana, overall, the

agricultural sector accounts for only 1.9% of the national income compared to industry, and service sectors account for 28.7% and 69.4% respectively (Bahta et al., 2017:1).

Likewise, the casual labour was the most prevalent in both rural and urban areas of the Voi Division because, according to the researcher's opinion, agricultural production is devastated by droughts (for rural households) and the high prevalence of semi-skilled labour expertise which favours low-wages and short-term employment. Lack of formal job opportunities is also a factor influencing the casual labour leading in response rates. This finding of 39.6% (53) of casual labour and 14.2% (19) of formal employment is consistent with *KDHS 2014* that, 61% of females in Kenya are working in any sector for monetary remuneration (KDHS, 2015:49). Income influences wealth. The Gini-coefficient of wealth index in Kenya is 0.18 and 0.19 in urban and rural areas respectively (KDHS, 2015:18). *Economic Research Report Number 173* (September 2014) by the US Department of Agriculture (USDA) corroborates the researcher's opinion. According to its report, food insecurity was strongly associated with income in the US - for example, 42.1% of households with annual incomes below the official poverty line (household income-to-poverty ratio under 1.00) were food insecure, compared with 6.7% of those with incomes above 185% of the poverty line (Coleman-Jensen et al., 2013:12). In the context of the ecological perspective, this section of biographical characteristics of the FHHs, represent various systems in the FHHs' ecology. The micro-system is a FHH within which all members of the FHH interact. The meso-systems are the biographical dynamics surrounding the FHHs which influence the members' interaction with the micro-system and other systems surrounding them. For example, the members' interaction is within the FHH, and can go beyond the household to a second micro-system such as workplace.

This is particularly with regards to an employed female household head, whose interaction is across the household and her workplace. The exo-system is the situations of food security that the FHHs have control over and those others they have no direct control over. For example, the female household head may have control over her own interrelation with her hungry children but on the other hand, not have much control over food access during food insecurity. The macro-system is the Voi Division, represented by the variable "area of residence", and the chrono-system are life dynamics the FHHs have passed through in their lifecourse, including death of a male household head and spouse. The biographical characteristics of the FHHs interact with other variables of the study in meeting the objectives of the study. Subsequently, quantitative findings of the rest of the variables are discussed.

6.2.2 Household dietary diversity score

The first objective of this study was to:

- Determine the status of dietary diversity among female-headed households in Voi Division, Kenya by utilising dietary diversity score as an indicator of food security.

In order to realise this objective, the researcher structured a technical tool, 24-hour recall schedule in the survey questionnaire. The information that captured the objective was contained in section C of the questionnaire. The respondents were required to make entries of food items their household members had consumed in the previous 24 hours into the study, in the schedule. These foods served as proxy indicators of the households' HDDS, which is one of the determinants of household food security. The various food items consumed by the household members were categorised into 12 food groups.

Technically, there are 12 food groups required for analysis of data from the tool (24-hour recall). They are: cereals; roots and tubers; vegetables; fruits; meat and poultry; eggs; fish and seafood; pulses and legumes; milk and dairy products; fat and oil; sugar and honey; and miscellaneous. FANTA (2015:14) asserts that, HDDS is not a nutrition indicator, but a proxy for household socio-economic status, therefore the food groups are not based on nutrition outcomes or guidance.

Table 6.10 shows the 12 food groups and their consumption in the households:

Table 6.10: Twelve food groups and their consumption

Food groups	Cereals (%)	Roots & tubers (%)	Vegetables (%)	Fruits (%)	Meat & poultry (%)	Eggs (%)	Fish & seafood (%)	Pulses & legumes (%)	Milk & dairy products (%)	Fat & Oil (%)	Sugar & honey (%)	Miscellaneous (%)
Consumption	97.8%	25.4%	24.6%	9%	8.2%	2.2%	9%	52.2%	72.4%	91.8%	97.8%	96.3%
Non-consumption	2.2%	74.6%	75.4%	91%	91.8%	97.8%	91%	47.8%	27.6%	8.2%	2.2%	3.7%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Descriptive statistics					
Food groups	N	Minimum	Maximum	Mean	Std. Deviation
	134	3	10	6.37	1.199
	134				

This table illustrates findings that, the first and second most consumed food groups were cereals (97.8%), sugar and honey at 97.8%. The third most consumed food group was miscellaneous (mostly tea leaves) at 96.3%. It was followed by fat and oils at 91.8%. This indicates that consumption of carbohydrate foods was the highest. It is estimated that currently only 30 crops provide over 90% of human food energy needs, and just five of them (rice, wheat, maize, millet and sorghum) provide about 60% of the energy intake of the world's population (FAO, 2010c in FAO, 2013:175). The assertion by FAO is consistent with the findings illustrated on the 24-hour recall table above, which indicates that maize, wheat and rice were the most consumed cereals by the FHHs of the study. This finding corroborates that maize (corn) is a global, regional and Kenya's staple. Olielo (2013:2) supports that maize is a basic staple to the country. He says that ugali (maize flour cooked in water as source of starch) is the main staple food, which his study's finding indicated that it was consumed by 88% of the Kenya's households. The findings of this study also show that, some protein food groups followed carbohydrate foods in the popularity of consumption.

Milk and dairy products food group leads in protein food groups' consumption. Its consumption rate is 72.4%. According to the researcher's experience and observation about this study's population, the main food item for the food group was milk. The researcher hypothesised that, the main reason for the high milk consumption, is because it is a major ingredient of tea for breakfast. The second most consumed protein-source food group is pulses and legumes, which was utilised at a rate of 52.2%. This study's finding on the food group, is comparable with the finding on nutrition education, which aimed at promoting consumption of pulse-based foods among rural women of reproductive age in Sidama Zone in Southern Ethiopia, which indicates almost similar rate of consumption of pulses. For instance, it was found that 58% of women in the Sidama Zone consumed kidney beans (and other pulses) once per day (Yetnayet, Henry, Berhanu, Whiting & Regassa, 2017:12383). However, despite the remarkable consumption rates of the mentioned food groups, other food groups' consumption rates were very low. The researcher is of the opinion that HDDS should be indicative of dietary diversity, therefore a person's dietary diversity is achieved by consuming a variety of food groups for macro and micro-nutrients diversity. This viewpoint follows the WFS description of food security. The chapter 1 of this study illustrates that, the food security encompasses enough or sufficient, safe, nutritious food in everyone's diet. This therefore illustrates the importance of having high consumption rates across most or all food groups.

In this study the following food groups were poorly consumed: meat and poultry (8.2%), fruits (9%), and fish and seafood (9%). The researcher through personal experience deduces that the least consumption of the food groups is due to high retail prices of meat, poultry, fruits and fish commodities. Most households in the study area purchase the food items from the market. This is particularly the meat and poultry which the local community consumes as special delicacies. Additionally, the researcher has heard locals say that the fish available and consumed in the study area is either imported from China, and a little is supplied from local sources in Kenya. Moreover, most fruits sold at Voi Town (the main local market centre) are supplied from outside the study demarcation. The researcher is of the opinion that the food “imports” exacerbate their prices hikes due to elongated market chain. The other reason for the low fruit uptake may have been due to drought being experienced during the time of the study. The consumption of fruits is relatively comparable with the findings of Olielo (2013:2), that fruit products are consumed by only 17 % of people in Kenya. The range of the number of food groups consumed per FHH in this study is 3 to 10, and the mean is 6 (out of the possible 12 food groups).

- **Chi-square test of sources of income and HDDS**

Additionally the researcher computed a Chi-square test on sources of income and HDDS. Table 6.11 shows the findings:

Table 6.11: Chi-square test of sources of income and HDDS

	<i>P</i> value	χ^2
Pearson Chi-Square	.000	.667

The researcher strived to find out the influence of food prices (its proxy is sources of income in this study) on food security by computing Chi-square test. Chi-square can be generalised to test the independence of two attributes of a population and its value symbol is χ^2 (Kothari & Garg, 2014:237). The researcher of this study is of the opinion that “independence” in Kothari and Garg (2014:237) means the lack of association presumed in a null hypothesis. For example in this study, the hypothesis would be, “There is no association between sources of income and HDDS among the FHHs at a significance level of 0.05”. The association of HDDS with sources of income indicated a strong positive association of $\chi^2=.667$ at $p=.000$. This means the number of the HDDS food groups a household consumed were determinable by the household’s sources of income (see table 6.9). Therefore, the more stable sources of income for the households, the more food groups the

household would consume. As illustrated in section 1.4 and chapter 4, the third level ecological environment is the exo-system. Therefore, the HDDS fits in the third level of the ecological environment, because the female household head has either active or indirect role in determining her household's HDDS. For instance, an employed female household head is more capable of purchasing a variety of food than unemployed one. However, both may not control occurrences of natural calamities which may influence low HDDS in their households.

6.2.3 Food consumption score

The second objective of this study was:

- To measure food consumption frequency among female-headed households in Voi Division, Kenya, by utilising food consumption score as an indicator of food security.

Food consumption score is a qualitative measure of food security constructed using data collected at a household level (Bahta et al., 2017:1, 3). The researcher is of the opinion that the qualitative nature of the tool arises from the ideal consumption of food variety for macro and micro-nutrition to the food consumers. FCS is heavily informed by the linkage between dietary diversity and household food access (Jones, Ngure, Peltó & Young, 2013:491). The FCS combines data on dietary diversity and food frequency, using 7-day recall data (Jones et al., 2013:491). The researcher is of the opinion that, FCS is a food security technical tool which records dietary scores in a longer duration than the 24-hour recall tool. In this study, the FCS measurement tool in the section C of the questionnaire, and was intended to measure dietary consumption frequency among the FHHs during the 7 days prior to the study. The researcher included various food items deemed consumed in the study demarcation. The researcher extracted each food item and assigned it into a food group among the recommended 8 food groups (note the difference between the food groups of the HDDS and FCS). Technical bodies of food security, particularly FANTA recommends for the inclusion of 8 food groups in FCS assessments, as illustrated by Vaitla et al. (2015:7). The FCS food groups are: main staples; pulses; vegetables; fruits; meat, fish and eggs; milk and dairy products; sugar and honey; and fat and oils. The FCS analyses are based on 133 questionnaires instead of the 134, because one questionnaire had missing entry of the FCS.

The following sub-sections discuss the analyses of the 8 FCS food groups:

6.2.3.1 Consumption of main staples

Consumption of main staples is represented in table 6.12, as shown:

Table 6.12: Consumption of main staples (n=133, missing=1)

Main staples (weight @ frequency of consumption=2)		Number of female-headed households	
		<i>f</i>	(%)
	Low consumption (≤ 4 times)		1 (0.8%)
	Acceptable consumption (≥ 5 times)		132 (99.2%)
	Total		133 (100%)
Missing	System (1)		

The table above illustrates the consumption of the “main staples” food group. The “main staples” food group comprises of all cereals and tubers. Examples of common cereals are maize, wheat, rice; while tubers may be arrow roots, Irish potatoes, and sweet potatoes. The findings indicate that most of the FHHs (99.2% or 132) had acceptable consumption frequency of 5 and more times in the week. Only one (0.8 %) household had consumed the food group fewer than the recommended frequency of 5 or more times per week. The frequency of food group’s consumption of 5 or more times is usually weighted 10 and is referred to as “acceptable” consumption. The researcher infers that the following characteristics of the food group influenced the highest consumption - it comprises of the Kenya’s as well as the world’s staples: maize, wheat and rice. These food items are the major ingredients of household meals; and myriad snacks and pastry are made from the food items, especially the wheat. This viewpoint is comparable with Olielo (2013:6) that ugali, which is (starch) made from maize flour is the main staple carbohydrate food consumed by 88% of the households at least 4 times in the week in Kenya. In addition, another investigation in Botswana indicates that main staples were consumed by 70-80% of households at an average frequency of 7.8 -9.8 days in a fortnight (Bahta, 2017:6).

6.2.3.2 Consumption of pulses

The other food group of the FCS is “pulses”. Table 6.13 shows the consumption of the pulses:

Table 6.13: Consumption of pulses (n=133, missing=1)

Pulses (weight @ frequency of consumption =3)	Total weight	Number of female-headed households	
		<i>f</i>	(%)
0	0	13	(9.8%)
1	3	23	(17.3%)
2	6	38	(28.6%)
3	9	28	(21.1%)

	4	12	21	(15.8%)
	5	15	10	(7.5%)
	Total		133	(100.0%)
Missing system			1	

Pulses in this section comprises of legumes such as all kinds of beans, peas, and green grams, and nuts including groundnuts. The table above shows that the “pulses” as a food group was not consumed by 13 (9.8%) FHHs in the week prior to the study. The food group’s consumption frequency is as follows: 1 by 23 (17.3%) households, 2 by 38 (28.6%) households, 3 by 28 (21.1%) households, 4 by 21 (15.8%) households, and 5 by 10 (7.5%) households. The total number of households that consumed the “pulses” in the last 7 days prior to the study is 120 (90.2%). Research findings regarding a study in Sidama Zone of Southern Ethiopia indicates that, 58% of women in the zone consumed kidney beans (and also other pulses) once per day and 3-6 times per week (Yetnayet et al., 2017:12383). On the basis of this finding, if the women in the Sidama Zone were able to consume the food group at a frequency of once per day, then in 7 days, they were able to consume it 5 or more times, which is acceptable consumption. On the contrary, the FCS of this study indicates only 10 (7.5%) households were able to consume food items in the group for 5 or more times in the week.

6.2.3.3 Consumption of vegetables

Vegetables are vitamin-source food group in the FCS. Table 6.14 shows the consumption of vegetables:

Table 6.14: Consumption of vegetables (n=133, missing=1)

Vegetables (weight @ frequency of consumption=1)	Number of female-headed households	
	(f)	(%)
0	3	2.3%
1	1	0.8%
2	4	3.0%
3	10	7.5%
4	13	9.8%
5	102	76.7%
Total	133	100.0%
Missing system	1	

The results in this table show that, 3 (2.3%) of the FHHs did not consume vegetables in the previous 7 days preceding the study. Only one (0.8%) household consumed the “vegetables” once, 4 (3%) households consumed it twice. Ten or 7.5%, 13 or 9.8%, and

102 (76.7%) consumed it 3, 4, and 5 or more times respectively. Those who consumed it 5 or more times represent the majority of the FHHs (76.7%), and portray acceptable consumption of the food group. The finding corroborates with those of Olielo (2013:6), that green vegetables were consumed by 92% (majority) of Kenyans as represented by his study on Nairobi City of Kenya. The result is also comparable with that of the Botswana that 78% (also the country's majority) of livestock producers' households had regularly consumed vegetables on average 8.1 days in a fortnight (Bahta et al., 2017:6). Moreover, Kaimuri, Mwaniki & Kombe (2016:164) found a consumption rate of vegetables in Meru County in Kenya, of 46.48%, at consumption frequency of 5-6 times per week; which showed the majority consumption than the rest of consumption frequencies. This consumption frequency (of Meru County) was followed by 29.01% as the second majority of consumption frequency of 3-4 times a week (Kaimuri et al., 2016:164). Looking at the table above, the consumption frequency of 3-4 times was achieved by 17.3% FHHs, which is relatively comparable with the findings of study by Kaimuri, Mwaniki and Kombe. Conversely, the finding is internally inconsistent with the 24-hour recall finding on the same food group. The consumption rate for vegetables during the 24-hour recall is 24.6%. Consumption of vegetables is associated with various benefits.

The section C of the questionnaire of this current study has entries for various vegetable food items as vital sources of vitamins. According to Ekwaru, Ohinmaa, Loehr, Setayeshgar, Thanh and Veugelers (2016:515), there is an economic burden (in terms of costs for treatment and management of chronic diseases) attributable to inadequate consumption of vegetables and fruits in Canada. Additionally, in Australia, the economic burden attributable to low vegetables and fruits consumption was estimated to be \$AU 269 million in 2008, and for the UK the costs for treatment and management of chronic diseases attributable to poor diet to be £4.9 billion in 2006/2007 (Ekwaru et al., 2016:515).

6.2.3.4 Consumption of fruits

Similar with the vegetables, fruits too are equally important sources of vitamins for household members. Table 6.15 shows the consumption of fruits

Table 6.15: Consumption of fruits

Fruits (weight @ frequency of consumption=1)	Number of female-headed households	
	(f)	(%)
0	38	28.6
1	13	9.8
2	23	17.3

Fruits (weight @ frequency of consumption=1)		Number of female-headed households	
		(f)	(%)
	3	20	15.0
	4	11	8.3
	5	28	21.1
	Total	133	100.0
Missing system		1	

The table above illustrates consumption of “fruits” food group. Thirty eight or 28.6% of the FHHs had not consumed any fruit in the 7 days prior to the study. The number of FHHs that had consumed fruits once, twice, thrice, four times, and five or more times were 12 (9.8%), 23 (17.3%), 20 (15%), 11 (8.3%), and 28 (21.1%) respectively. The study by Olielo (2013:7) indicates that fruits were consumed at a rate of 26% in Kenya. Moreover, a nutritional assessment in Meru County in Kenya, among women of reproductive age indicated the consumption of fruits as 31.55%, 3 to 4 times per week; and 31.27% 5-6 times per week (Kaimuri et al., 2016:164). The findings on the Meru County and the current findings portray relatively comparable consumption patterns that, in this study 31 or 23.3% of the FHHs had consumed it 3-4 times; and 28 or 21.1%, had eaten the food group 5 or more times per week. Other research findings by Agaba, Ghosh and Griffiths (2017:12843) in Uganda, show that fruit and vegetable food groups consumption (of non-vitamin A) was low in both districts of Lira (29%) and Kisoro (44%), reported as having consumed at least fruit or vegetable in diets. The finding of this study is also incongruent with the 24-hour recall, which indicates 9% of the food group consumption.

6.2.3.5 Consumption of meat, fish and eggs

Another food group in the FCS is “meat, fish and eggs”. Table 6.16 shows consumption of the “meat, fish and eggs” food group:

Table 6.16: Consumption of meat, fish and eggs (n=133, missing=1)

Meat, fish & eggs (weight @ frequency of consumption=4)			Number of female-headed households	
			f	%
Consumption frequency	Weighted frequency			
0	0		43	32.3
1	4		23	17.3
2	8		17	12.8
3	12		19	14.3
4	16		11	8.3

	5	20	20	15.0
	Total		133	100.0
Missing system			1	

In this study, a substantial number of the female-headed households 43 (32.3%), had not consumed meat, fish and eggs in the 7 days prior to the study, 23 (17.3%) had consumed the food group once (weighted 4), 12.8% twice (weighted 8), 14.3% had consumed it 3 times (weighted 12), 11 (8.3%) four times (weighted 16), and 20 (15%) consumed it 5 and more times (weighted 20). The researcher attributes the consumption of the food group with, besides employment, “casual labour” livelihood, which may have provided some income to the household heads for purchasing meat, fish and eggs. This view is corroborated in FAO (2009a in FAO, 2013:5) that, urbanisation and rising incomes in developing countries are driving increases in the consumption of animal products. The food group is dietary beneficial in providing proteins to its consumers.

Agaba et al. (2017:12843), say that, meat, poultry and fish make up the main source of animal protein in most Ugandan meals. The food group is weighted 4, because of its dietary significance. Olielo (2013:6) is also of the opinion that meat is a main protein source and was eaten by 46% of the sampled households (in Nairobi City) at least 4 times in seven days. This is a double statistic compared with finding of this study (31 or 23.3%) of similar category. Additionally, Bahta et al. (2017:7), assert that fish is leading source of animal proteins in Botswana (it accounted for 79% of the surveyed households). This finding is comparable with the current study, because the latter has consumption rate of 67.7% or 90 female-headed households out of the 133 (at least once per week). Another comparable finding with this study is by Nguka, Shitote, Wakhungu and China (2017:11662) which reveal that, 50% fish farmers (in Western Kenya) had fish in their diet once in a week. However, daily consumption of the food group in this study (15% or 20 FHHs) is not consistent with the Nguka et al. (2017:11662), of 37% of fish daily consumption. In this study, the consumption of 5 or more times of the food group is considered acceptable, thus is regarded as daily consumption. In Uganda, consumption of eggs was very low with only 1% in Kisoro District and 4% in Lira District consuming eggs (Agaba et al., 2017:12843). This finding is implicitly inconsistent with this study’s finding of the 67.7% consumption rate of at least once in a week.

6.2.3.6 Consumption of milk and dairy products

The third protein-source food group of FCS is “milk and dairy products”. Table 6.17 shows the consumption of milk and dairy products:

Table 6.17: Consumption of milk and dairy products (n=133, missing=1)

Milk & dairy products (weight @ frequency of consumption=4)			Number of female-headed households	
Frequency	Weighted frequency		<i>f</i>	%
0	0		15	11.3%
1	4		4	3.0%
2	8		9	6.8%
3	12		15	11.3%
4	16		12	9.0%
5	20		78	58.6%
Total			133	100.0%
Missing System			1	

The findings reveal that, a number of households (15 or 11.2%) not having consumed any milk or dairy product in the 7 days. Four (3%) had consumed the food group only once (weighted 4), 9 (6.8%) had consumed it twice (weighted 8), 15 (11.3%) thrice (weighted 12), 12 (9%) four times (weighted 16), and 78 (58.6%) households had it 5 and more times (weighted 20). Similar with the researcher's opinion about the food group in the one-day recall, milk is a daily food because of its importance at breakfast in tea. The HDDS table showed a consumption rate of 72.4% in the previous 24 hours (see table 6.10), while in the FCS, its consumption rate is 88.7% at least once in the previous 7 days. On the other hand, the researcher is further of the opinion that, the lack of 100% consumption rate of the in the both HDDS and FCS cases may have been due to depletion of pasture, since the study was done during dry droughty season. The *Taita-Taveta County Monthly Bulletin for July 2016*, indicated that food stocks depletion at household level was expected in one month time (from the July); and more importantly, livestock products would dwindle due to scarcity of pasture and browse (NDMA, 2016:11).

6.2.3.7 Consumption of sugar and honey

Besides milk, food group, "sugar and honey" is also a major ingredient in tea including among the FHHs. Table 6.18 shows the consumption of the "sugar and honey" food group:

Table 6.18: Consumption of sugar and honey (n=133, missing=1)

Sugar & honey (weight @ consumption frequency=0.5)		Weighted consumption frequency	Number of female-headed households <i>f</i>	
			<i>f</i>	%
2		1.0	1	0.8%
3		1.5	3	2.3%
4		2.0	4	3.0%

Sugar & honey (weight @ consumption frequency=0.5)		Weighted consumption frequency	Number of female-headed households	
			f	%
	5	2.5	125	94.0%
	Total		133	100.0%
Missing system			1	

From researcher's knowledge and experience with the local community in the Voi Division, the food group, particularly sugar food item, is mostly used in the morning and 10 O'clock snack in tea or tea supplement as a major ingredient. On the other hand, honey is hardly common in their consumption schedules. A reason for the low consumption of honey could be, the food item is too expensive for for daily usage. However, if consumed, it may be on bread to add taste. This makes sugar a priority food item in the food group. Looking at the other tables illustrating the FCS, the table on "sugar and/or honey" is the only lacking "zero" and "once" consumption frequency. The consumption frequencies of the food group are as follows: only one (0.8%) household had a consumption frequency of "twice". The other frequencies are thrice, 4 times and 5 times by 2.3% (3), 3% (4) and 94% (125) FHHs respectively. This finding shows that, all the FHHs had consumed the food group at least once and 94% (125) FHHs utilised it for 5 or more instances in the week. As mentioned earlier, consumption of 5 or more times implies acceptable FCS. The researcher is of the opinion that the reason for sugar and honey food group's consumption leading in the FCS, is because its usage surpasses that of milk. Sugar is used as ingredient in both milk and black tea (*chai rangi*). The finding is highly comparable with the HDDS "milk and dairy products" consumption rate of 97.8%. Both the HDDS and FCS findings compare with the findings of the study of Olielo (2013:7) which indicates that, there was 90% sugar consumption in the Nairobi study area. Olielo (2013:7) further says, "Another study in 5 districts in Kenya showed 80.5% sugar consumption".

6.2.3.8 Consumption of fats and oils

The final food group in the FCS is "fat and oils". Table 6.19 shows consumption of the "fats and oils" food group:

Table 6.19: Consumption of fat and oils (n=133, missing=1)

Fat & oils (weight @ consumption frequency=0.5)	Weighted Frequency	Number of female-headed households	
		f	%
0	0	4	3.0
1	0.5	1	0.8
2	1.0	1	0.8

Fat & oils (weight @ consumption frequency=0.5)	Weighted Frequency	Number of female-headed households	
		<i>f</i>	%
3	1.5	4	3.0
4	2.0	2	1.5
5	2.5	121	91.0
Total		133	100.0
Missing system		1	

According to the researcher, fat and oil are used to fry food in order add taste. The findings on the consumption of fats and/or oils, show that 4 (3%) of the FHHs had not consumed it in the 7 days prior to this study. The FHHs that had consumed the food group once, twice, thrice, 4 times, and 5 and more times were; 1 (0.8%), 1 (0.8%), 4 (3%), 2 (1.5%) and 121 (91%) respectively. Likewise the “sugar and honey”, “fat and oils” food group was highly consumed by the FHHs. It is the second “acceptable” consumed food group (91%) from the sugar and honey (94%). This finding is consistent with (Olielo, 2013:3) assertion that, as a country prospers, its diet becomes more varied, and may include higher consumption of ... fats and oils to increase energy levels of diets. However remarkable the FCS of both sugar and fat/oils in this study is, the researcher is of the opinion that sugar and honey, fat and oils food groups have been on “a blame-table” for causing myriad of poor health conditions. For example, too much consumption of sugar is associated with diabetes mellitus, while too much consumption of fats and oils is correlated with coronary heart disease, hypertension and stroke. This viewpoint is corroborated in Nettleton, Brouwer, Geleijnse and Hornstra (2017:29) that, higher saturated fatty acid intake might increase coronary heart disease. Moreover, the researcher observes that, these two food groups are the least technically weighted. She is therefore of the opinion that the low weights are associated with low dietary importance of the food groups.

From the FCS findings, the researcher concludes that the consumption of some food groups is relatively acceptable, and the consumption of others is conversely low. The mixed findings is indicative that, the SDG2 of eradicating hunger and food insecurity in their entirety has not been achieved among the FHHS, particularly through 100% acceptable FCS. According to the theoretical framework of this study, each ecological sub-system contributes to proper functioning of the whole system. Likewise, acceptable consumption of most or all food groups is vital among the FHHs to meet their dietary needs and food preferences, as stipulated by the WFS. Just like the HDDS, the FCS fits as a third level of ecological environment, the exo-system because the female household head has either

active or indirect role in determining her household's FCS. The subsequent section contains discussion regarding how the third objective of this study was met.

6.2.4 Overall status of food security among the female-headed households

Objective three of this study was:

- To determine the overall status of food security among female-headed households in Voi Division, Kenya.

In order to arrive at this objective, the researcher has triangulated both the HDDS and FCS. Additionally, descriptive data on MAFP and CSI are also added to describe and explain in more detail how the FHHs food provisioning was like and how they coped with food shortages, respectively. The advantage of using these multiple tools (mixed methods) was to reap from the benefits of validity and reliability of the data obtained from different perspectives. These benefits have been discussed in detail in the chapter 5 of this study. For example, Creswell (2014:219), and Yeasmin and Rahman (2012:156) assert that triangulating different sources of data reap from the benefit of increased validity and reliability of results. In order to arrive at the overall food security status, the researcher analysed the levels of food security according to the HDDS, FCS and CSI in disaggregated form; then thereafter aggregated the objective measures (HDDS and FCS) to arrive at the overall status. She also conducted inferential tests on them and the CSI as well to ascertain their relationships.

6.2.4.1 Levels of food security according to household dietary diversity score

Figure 6.4 illustrates levels of food security according to HDDS.

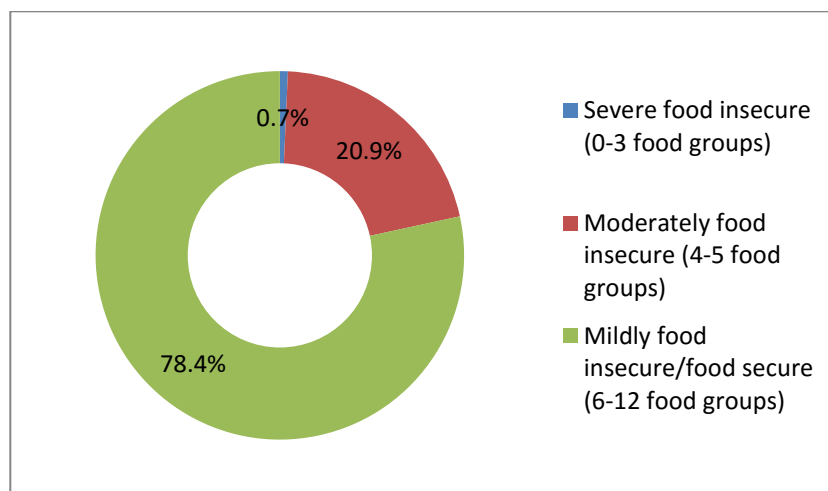


Figure 6.4: Levels of food security using HDDS (n=134)

As mentioned earlier, HDDS is an indicator of dietary diversity of a household and reflects its socio-economic status. FAO (2011:23) stipulates that the HDDS is meant to provide an indication of household economic access to food (see chapters 2 and 3). In this chapter, just like literature and the rest parts of the study illustrate, the measure of the HDDS is based on 12 food groups. According to Vaitla et al. (2015:17), HDDS in itself is an objective measure and is indicative of food security status. Section 2.3.7 of the chapter 2 of this study illustrates in detail, classification of HDDS food groups into different categories of food security levels, particularly as recommended by FANTA. The figure above shows that, 1 (0.7%) FHHs had consumed 0-3 food groups in the 24 hours prior to the study. The consumption of the 0-3 food groups is categorised as “severe food insecurity” level. The researcher is of the opinion that, the FHH may have been influenced into the status by extreme poverty. The chapter 3 of this study highlights female poverty as one of the factors that influence food insecurity particularly among FHHs. The FHHs that had consumed 4-5 food groups are classified as “moderate food insecure” and were 28 (20.9%). Moreover, majority of the FHHs (105 or 78%) had consumed 6 to 12 food groups, which was classified as “mild food insecurity/or food security” level.

6.2.4.2 Levels of food security according to food consumption score

The FCS levels of food security are represented in the figure below:

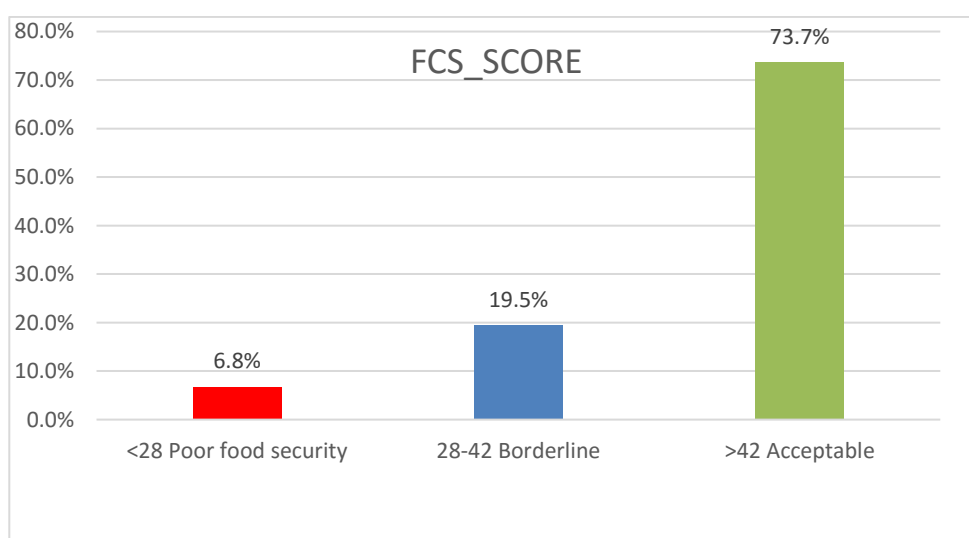


Figure 6.5: Levels of food security according to FCS (n=133)

The researcher sought also to classify the FHHs according to their respective food security levels by undertaking the following steps: weighting the frequencies of consumption of each food group by assigning them respective weights (see tables 6.7 to 6.14). She thereafter summed each of the food groups' weights, by adding the weights together to get the final total weights of the 8 food groups per FHHs. Finally, she classified the FHHs according to

the number of the total weights. This follows literature guidelines, particularly by FANTA (2015) in Vaitla et al. (2015:7-8).

The FCS is a composite score based on the number of food groups, out of 8 possible food groups, that any household member has consumed over the previous 7 days; multiplied by the number of days that the food group was consumed; weighted by the nutritional importance of the food group; for a total possible score ranging from 0 to 112.

The following is the guideline for the classification of food security statuses according to FCS as discussed in the chapter 5 of this study:

The standard FCS-based food consumption cut-offs and categories are: <21 = “poor,” 21–35 = “borderline,” and >35 = “acceptable”; and in areas where oil and sugar are regularly consumed, the thresholds are adjusted as follows: <28 = “poor,” 28-42 = “borderline,” and >42 = “acceptable”; and † 42 to 112 is for populations consuming oil and sugar daily, ‡ 13 to 41.5 is for populations consuming oil and sugar daily (Vaitla et al., 2015:viii).

The researcher of this study prioritised the latter classification because, the FHHs had shown daily consumption of “sugar and honey” (94%) and “fats and oils” (91%) food groups (see tables 6.13 and 6.14). From the figure above, the weight of less than 28 depicted “poor food security” level, and 9 (6.8%) FHHs were classified in the category. Secondly the weighted category of 28-42 is “borderline food security” level, which had 26 or 19.5% of the FHHs falling within the classification. Lastly, majority of the FHHs (98 or 73.7%) were classified within the “acceptable food security” level, whose weight goes beyond 42 up to the possible maximum of the 112 weight. This finding compares with the KDHS (2014:19) that, 2%, 10% and 89% of households in Kenya have poor, borderline and acceptable FCS respectively.

6.2.4.3 Pearson correlation coefficient of the HDDS and FCS food security levels

The researcher further computed a Pearson correlation coefficient to test the relationship between the HDDS and FCS food security levels at a significance level of 0.05. Table 6.20 shows Pearson correlation of the HDDs and FCS:

Table 6.20: Pearson correlation of HDDS and FCS (HDDS n=134, FCS =133)

		HDDS	FCS
HDDS	Pearson Correlation	1	.515**
	Sig. (2-tailed)		.000
	N	134	133
FCS	Pearson Correlation	.515**	1
	Sig. (2-tailed)	.000	
	N	133	133

	HDDS	FCS
** Correlation is significant at the 0.01 level (2-tailed).		

The researcher sought to test the null hypothesis, “There is no significant relationship between the HDDS and the FCS food security statuses at a significance level of 0.05”. As discussed previously, bivariate analysis means analysis of two variables, and correlation measures association of the variables. The results of the correlation revealed a significant strong positive relationship between the two variables ($r=.515$, $p=.000$). This interpreted that, an increase in HDDS corresponds with an increase in the FCS. The researcher arrives at this interpretation since the resultant p value is less than the set significance level (0.05). Kothari and Garg (2014:182) say that, a significance level is the maximum value of probability of rejecting a null hypothesis. Furthermore, the descriptive statistics on the HDDS and the FCS show corresponding increase in the variables.

The chapter 5 of this study justifies that, the use of objective indicators of food security is the best for the following reason: objective indicators are often preferred because of fears of increased bias with subjective measures, because, respondents who are asked subjective questions or analysts who use subjective responses may attempt to “game the system” if there are resources at stake (Vaitla, Coates & Maxwell, 2015:49). In the effort to reap from the benefit of the objectivity, the researcher included the tools, the HDDS and FCS as the main determinants of the food security among the FHHs.

6.2.4.4 Cross-tabulation of the HDDS and FCS food security levels

Besides computing the Pearson correlation coefficient, the researcher also aggregated the food security levels of the tools (HDDS and FCS) in a cross-tabulation table.

Table 6.21 provides a cross-tabulation of HDDS and FCS food security levels:

Table 6.21: HDDS food security levels * FCS food security levels cross-tabulation

% of Households			Categories of FCS			
			Poor food security = <28	Borderline food insecurity= 28–42	Accept-able food security => 42	Total
Categories of HDDS	Severe food insecurity = ≤3	Frequency Percentage	0 0%	0 0%	1 0.8%	1 0.8%

% of Households		Categories of FCS			
		Poor food security = <28	Borderline food insecurity= 28-42	Acceptable food security => 42	Total
Moderate food insecurity = 4 & 5	Frequency	7	9	12	28
	Percentage	5.3%	6.8%	9%	21.1%
Mild food insecurity/food security = 6-12	Frequency	2	17	85	104
	Percentage	1.5%	12.8%	63.9%	78.2%
Total	Frequency	9	26	98	133
	Percentage	6.8%	19.5%	73.7%	100%
0%=Severe food insecure		12.8%=Moderately food insecure		87.2%=Mildly food insecure/food secure	

The aim of the cross-tabulation of the HDDS and FCS was to get an overall food security status based on the objective measures of food security. The researcher computed a cross-tabulation of the levels of food security according to the HDDS (n=134) and the FCS (n=133) and got the following results.

The cross-tabulation table above illustrates the output, with three food security statuses represented with colour codes assigned to each status: no households belonged in severe food insecurity. The colour code for the severe food insecurity status boxes is red. In the first red box, no household was found to belong to severe HDDS and poor FCS. Moreover, there were no households in severe HDDS and were in combination with borderline FCS in the second red box. These two boxes represent the overall “severe food insecurity” status. Therefore, no household fell in the category. The statistic to represent this finding therefore is “no (0%) FHHs was in the overall severe food insecurity status”. Secondly, in order to determine the second overall status of food security, “moderate food insecurity”, the researcher used colour code blue into boxes that were relevant for the query. Only one (0.8%) FHH was in severe HDDS and also in acceptable FCS; 7 (5.3%) FHHs belonged to moderate HDDS and poor FCS; and 9 (6.8%) FHHs were in the moderate HDDS and borderline FCS. These 3 blue boxes account for 17 (12.8%) FHHs which are found to have belonged to the overall “borderline food security” status. Finally, the researcher used green

colour code in the boxes to indicate the third classification of food security status, referred to as mild food insecurity/food security. In the first green box, there are 12 (9%) FHHs in moderate HDDS level and acceptable FCS level; 2 (1.5%) FHHs are in mild food insecurity/food security HDDS level and poor FCS level; 17 (12.8%) FHHs are in mild food insecurity/food security HDDS level and borderline FCS level; and lastly 85 (63.9%) FHHs are in mild food insecurity/food security HDDS level and acceptable FCS level. From these findings, the FHHs are classified into overall food security statuses as follows: severe food insecurity 0 (0%), moderate food insecurity (17 or 12.8%) and mild food insecurity/food security (116 or 87.2%). The researcher previously mentioned that MAFP and CSI are added into the section discussing how the third objective was met, for descriptive purposes.

- **Months of adequate food provisioning**

It was important to include the item MAFP in the questionnaire of this study, so as to indicate seasons of enough and insufficient food provisioning in the FHHs. The recall period for this indicator was previous 3 months from the period of the study.

Table 6.22 gives an indication of the food provisioning in the FHHs studied:

Table 6.22: Enough and insufficient food provisioning (n=134)

	January 2016	February 2016	March 2016	April 2016	May 2016	June 2016	Previous year	None
Enough food (% , f)	0.7%, (1)	0, (0%)	5.2%, (7)	19.4%, (26)	15.7%, (21)	21.6%, (29)	6.6%, (9)	30.6%, (41)
Insufficient food (% , f)	0, (0%)	1.5%, (2)	0.7%, (1)	0.7%, (1)	2.2%, (3)	11.9%, (16)	71.6%, (96)	11.2%, (15)

Question items on MAFP were important for this study to gauge the periods or months the FHHs had enough, and inadequate food around or during the time of the study. The respondents were required to indicate the latest 3 months of enough food provisioning, and latest 3 months of insufficient food provisioning. The responses they provided were diverse - some responses indicated periods or months beyond the immediate 3 months from the period of the study. The FHHs whose responses on enough food provisioning were valid - those that indicated immediate previous 3 months from July (April to June 2016) of the enough food provisioning were 56.7% (76) in total. The reasons for the enough food provisioning in the responses were diverse, including: enough rainfall, presence of money, food donation by the government, fair food prices, and another unspecified reason at 27.6% (37), 29.9% (40), 0.7% (1), 17.2% (23), 24.6% (33) respectively.

On the other hand, respondents who said that their households had not enough food provisioning from April to June 2016 were 14.8% (20) in total. The reasons for insufficient

food in all the responses were erratic rainfall, lack of or less money, erratic rainfall compounded with high prices, high food prices as the most defining factor, and other unspecified reasons at 35.1% (47), 23.1% (31), 6% (8), 22.4% (30), and 13.4% (18) respectively. The researcher is of the opinion that, climate change is the main cause of erratic rainfall. Insufficient rains mean that crop and animal productivity will be lower than expected, which will ultimately hike prices of food items. Agriculture is a key channel through which climate change affects food security (FAO, 2016:8).

Bilinsky and Swindale (2010:1) are of the opinion that as a household manages its resources over the course of a year, the ability to meet its food needs may vary. This is due to any number of factors, such as inadequate crop production by the household due to poor soils or lack of labour, loss or decrease in income sources such as employment, social obligations or natural disaster (Bilinsky & Swindale, 2010:2). FAO (2013:18) illustrates that consequences of droughts to food security is high prices of food. For example, a prospective study in Morocco (World Bank, 2009a in FAO, 2013:6) points to gradually increasing aridity due to reduced rainfall and higher temperatures, with negative effects on agricultural yields, especially from 2030 onwards. Rain-fed crops are expected to be particularly affected (FAO, 2013:6). Extreme weather events reduce ... incomes and thus access to food (FAO, 2016:8). This is particularly in Africa. Most of Africa's poor and hungry populations live in rural areas and depend on agriculture for their daily income and livelihoods (Aw-Dahir, 2018:18). For example, climate change has caused decline in supply of vegetables in Kisii Town in Kenya, over the past five months, making the food prices to shoot up in the region by more than 400% (Abuga, 2018:24). The researcher of this study is of the opinion that, generally, insufficient food provisioning means a household should be experiencing food insecurity. For instance, the study in Botswana indicates that, households that reported they had experienced lack of food during the past 12 months prior to the household survey were significantly more likely to be food insecure ($p=10\%$) (Bahta et al., 2017:7).

This study's finding on insufficient food provisioning is supported by (NDMA, 2016:1) that, in the Taita-Taveta County; April, May and June are characterised by the following activities: planting and weeding in the long rains. However, the county registered an early cessation of long rains, compared to previous seasons and in the month under review (July 2016) no rains were registered in the county, and the lowlands continued to register high temperatures than usual during this time in a normal year (NDMA, 2016:11). This would make prices of foodstuff to remain high (NDMA, 2016:11). The researcher of this study agrees with these indications, since she did not encounter any rainfall during the period of

the empirical study (July to October 2016). The impacts of the drought were more severe in the rural areas that the residents were resorting to religious fasting (though it seemed implicit) as a coping strategy to food shortages. She also observed critical condition of a baby getting fed on Oral Rehydration Solution (ORS) at lunch-hour and no food was given to the under-two year old boy. Looking at the two responses, it is clear that the FHHs with enough food provisioning were more than those with insufficient food provisioning. These findings are comparable to the findings on the levels of food security according to HDDS, and FCS. The three indicators show that majority of FHHs being in good food security or resilient food insecurity status. However, another section of the FHHs were experiencing food insecurity, through insufficient food provisioning. Physical and human ecological factors were blamed for their predicament. Basing the findings on the ecological systems theory, the climate change and food price hikes are perceived as an ecological environments or factors, which affected the FHHs (a micro-system) in an unfavourable way, hence predisposing them into employing coping strategies.

- **Coping strategies index**

In addition to the HDDS, FCS and MAFP, this study included composite coping strategies to further describe food security statuses among the FHHs. Literature shows that, CSI is a subjective tool in measuring food security. In the chapter 5 of this study, CSI is explored as a subjective measure. Subjective measures of food security may include perceptions of severity and worry about food insecurity (Vaitla et al., 2015:17). Additionally in the same chapter 5, Coates et al. (2007:3), say that, CSI are beneficial in gaining a more detailed picture of the experience of food insecurity (access) in any particular context. Moreover, the advantage associated with combining the objective (in this study the HDD, FCS, and MAFP) and subjective food security tools is to reap from the benefit of getting varied perspectives concerning food security. As mentioned earlier, there is increased reliability and validity of data associated with mixing different sources of data. The recall period of the CSI for this study is 30 days or a month. The weights of frequency of occurrence of the CSI have been explored in the chapter 5 of this study.

Table 6.23 shows different coping strategies employed by the FHHs:

Table 6.23: Coping strategies

Reduction of meals per day (n=134)				
Reduction of meals per day (weight=2)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	23	17.2	17.2
1	2	28	20.9	38.1

2	4	52	38.8	76.9
3	6	18	13.4	90.3
4	8	13	9.7	100.0
Total		134	100.0	
Skip meals all day (n=134)				
Skip meals all day (weight=4)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	91	67.9	67.9
1	4	26	19.4	87.3
2	8	16	11.9	99.3
3	12	1	.7	100.0
Total		134	100.0	
Reducing size of meals (n=134)				
Reducing size of meals (weight=1)		Number of FHHs		Cumulative percent
		<i>f</i>	%	
0		39	29.1	29.1
1		12	9.0	38.1
2		54	40.3	78.4
3		23	17.2	95.5
4		6	4.5	100.0
Total		134	100.0	
Restrict adult consumption for children (n=134)				
Restrict adult consumption to allow more for children (weight=2)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	86	64.2	64.2
1	2	12	9.0	73.1
2	4	31	23.1	96.3
3	6	3	2.2	98.5
4	8	2	1.5	100.0
Total		134	100.0	
Workers feed but not non-workers (n=134)				
Feeding workers only (weight=2)		Number FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	109	81.3	81.3
1	2	17	12.7	94.0
2	4	6	4.5	98.5
3	6	2	1.5	100.0
Total		134	100.0	

Consumption of less preferred and/or cheaper foods (n=134)				
Consumption of less preferred and/or cheaper foods (weight=1)		Number of FHHs		Cumulative percent
		<i>f</i>	%	
0		41	30.6	30.6
1		9	6.7	37.3
2		43	32.1	69.4
3		26	19.4	88.8
4		15	11.2	100.0
Total		134	100.0	
Borrow food from relatives/neighbours (n=134)				
Borrow food from relatives/neighbours (weight=2)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	79	59.0	59.0
1	2	15	11.2	70.1
2	4	36	26.9	97.0
3	6	3	2.2	99.3
4	8	1	.7	100.0
Total		134	100.0	
Purchase food on credit (n=134)				
Purchase food on credit (weight=2)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	26	19.4	19.4
1	2	5	3.7	23.1
2	4	80	59.7	82.8
3	6	20	14.9	97.8
4	8	3	2.2	100.0
Total		134	100.0	
Consumption of ordinary wild foods (n=134)				
Consumption of ordinary wild foods (weight=4)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	101	75.4	75.4
1	4	12	9.0	84.3
2	8	20	14.9	99.3
3	12	1	.7	100.0
Total		134	100.0	
Consumption of immature crop (n=134)				

Consumption of immature crop (weight=4)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	101	75.4	75.4
1	4	8	6.0	81.3
2	8	17	12.7	94.0
3	12	7	5.2	99.3
4	16	1	.7	100.0
Total		134	100.0	
Consumption of dead animals				
Consumption of dead animals (weight=4)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	130	97.0	97.0
1	4	3	2.2	99.3
2	8	1	.7	100.0
Total		134	100.0	
Consumption of taboo foods				
Consumption of taboo foods (weight=4)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	131	97.8	97.0
1	4	2	1.5	98.5
2	8	1	.7	99.3
Total		134	100.0	
Figure 34: Consumption of seed stock held for the next season (n=134)				
Consumption of seed stock (weight=3)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	104	77.6	77.6
1	3	3	2.2	79.9
2	6	24	17.9	97.8
3	9	3	2.2	100.0
Total		134	100.0	
Sending household members to eat elsewhere (n=134)				
Sending household members to eat elsewhere (weight=2)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	125	93.3	93.3
1	2	4	3.0	96.3
2	4	5	3.7	100.0
Total		134	100.0	
Withdraw children from school (n=134)				

Withdraw children from school (weight=4)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	129	96.3	96.3
2	8	5	3.7	100.0
Total		134	100.0	
Involvement in begging and/or other degrading jobs (n=134)				
Involvement in begging and/or other degrading jobs (weight=4)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	132	98.5	98.5
1	4	1	.7	99.3
2	8	1	.7	100.0
Total		134	100.0	
Members migrating from household (n=134)				
Members migrating from household (weight=4)		Number of FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	133	99.3	99.3
2	8	1	.7	100.0
Total		134	100.0	
Entire household migrating from the area (n=134)				
Entire household migrating from the area (weight=4)		Number of FHH		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0		134	100.0	100.0
Sale of household assets (n=134)				
Sale of household assets (weight=4)		Number FHHs		Cumulative percent
Raw frequency	Weighted frequency	<i>f</i>	%	
0	0	127	94.8	94.8
1	4	4	3.0	97.8
2	8	3	2.2	100.0
Total		134	100.0	

The CSI in the table above have been weighted accordingly. Leroy et al. (2015:182), say that, a continuous score is calculated by summing the frequency of each coping strategy used is multiplied by its severity weight in order to get the CSI. The higher the score, the more coping reported, and therefore the more food insecure is the household (Leroy et al., 2015:182). In this study, "reduction of meals per day" means that the household head made a prior plan for her household members not to have all meals per day. This action was necessitated by food shortage in her household. The weight to the reduction in the number

of meals per day is 2. Findings on the variable illustrate 23 (17.2%) of the respondents said that their households had never reduced number of meals per day, 28 (20.9%) had hardly (1 or 2 times) done it, 52 (38.8%) sometimes (3-10 times) practiced it, 18 (13.4%) had often (more than 10 times) employed it, and 13 (9.7%) had always (every day) done it. The researcher is of the opinion that the reduction of meals per day, offered households resilience to spread out their food so that they could have something to eat in a longer period. From the findings of both the 24-hour and 7-day recalls, it was evident that the households were skipping meals such as 10 o'clock snack, lunch and 4 o'clock snack. Moreover, the researcher had a personal encounter with a household with a small child but had no lunch. As indicated on the previously sub-section, the child was fed on ORS at lunch-hour (no food was given to him at all). Another situation of the coping strategy by the FHHs was religious fasting, hence no meals were consumed at. From the look on the respondents' faces, the researcher would construe that, the fasting was "hidden" coping strategy.

Skipping meals for an entire day means the FHHs' members were forced by lack of food to stay without food all day. The weight of the variable is 4. Majority of the respondents (91 or 67.9%), reported that their households have never skipped food consumption for an entire day in the previous 30 days, 26 (19.4%) had hardly done it, 16 (11.9%) had sometimes done it, and 1 (0.7%) had often done it. This reveals that food insecurity was not too severe to deny the households a meal in a day. This finding is corroborated by the levels of food security as indicated by the HDDS and FCS, the overall food security statuses, and the findings of the MAFP.

Reduction in size of meals means that all members of the family consumed amount of food lesser than they preferred. The respondents of the study who indicated that their households have never reduced sizes of their meals to cope with food shortfall, were 39 (29.1%), those who had hardly done it were 12 (9%), sometimes (54 or 40.3%), often (23 or 17.2%) and always were 6 (4.5%). This strategy was highly employed by the FHHs and its findings show comparable results with the "reduction of meals per day". The researcher is of the opinion that, both strategies were used to ensure that the FHHs' members had a continued access and utilisation to little food available for them.

Restriction of food consumption of adults to allow more for children is a situation where adults including the household head, consumes less food so that young children may have bigger portions. Majority of the respondents (86 or 64.2%) indicated that their households have never restricted food consumption of adults to allow more for children. However, the rest of the respondents, 12 or 9%, 31 or 23.1%, 3 or 2.2%, and 2 or 1.5% said their

households had “hardly”, “sometimes”, “often”, and “always” employed the coping strategy respectively. This finding is relatively similar with the study carried out by Gichuhi, on coping strategies for food security among women in Kenya. It found that some of the strategies used included adults reducing their meal portions so that their children could eat bigger portions at 10% (Gichuhi, 2014:7).

Feeding working members entails whereby the principal caregiver, serves food to members of her household who are engaged in tasks such as domestic chores and farm-work. This occurs at the expense of those who have not been assigned household duties. Many respondents (109 or 81.3%) indicated that their households have “never” prioritised feeding working members and deny non-working ones as a coping strategy to food inadequacy. However, 17 (12.7%), 6 (4.5%), and 2 (1.5%) FHHs “hardly”, “sometimes” and “often” had done it respectively. During the empirical study, the researcher observed some respondents frowning at the mention of the strategy, which insinuated the practice could be against the community’s norms. Then, the FHHs that had employed the strategy are deemed to experience a lot of food shortages.

Consumption of cheaper and/or less preferred food means that the households consumed foods purchased at cheaply and not very palatable to the FHHs’ members. The findings show that, 41 (30.6%), 9 (6.7%), 43 (32.1%), 26 (19.4%) and 15 (11.2%) FHHs had “never”, “hardly”, “sometimes”, “often” and “always” consumed foods cheaper and of less preference to the members. The researcher is of the opinion that the strategy was widely employed as it cushioned household heads from depleting their incomes on food purchases only. Since the major source of income for the FHHs was casual labour (see table 6.5), the researcher is of opinion that, income from the casual labour did not earn the household heads enough money to afford purchases of more expensive food items, which could have formed a part of the preferred food. The researcher perceives the strategy a “normal” or ordinary mechanism to spread out one’s finances for continued food purchases.

The researcher is of the opinion that, critical food shortage may influence a household head into borrowing food from their friends or relatives. Fairly majority of the respondents (79 or 59%) said that they have “never” borrowed food as a result of its lack in their households. Others 15 (11.2%), 36 (26.9%), 3 (2.2%), and 1 (0.7%) said they “never”, “hardly”, “sometimes”, “often” and “always” had borrowed food from relatives or friends. Just like the strategy of feeding working members at the expense of those not working, reaction of the respondents upon the mention of the current strategy indicated it was “shameful”. Therefore, the households that “always” employed it are deemed to have been in poorer

food situation. The strategy is found to be used in Kenya though. Gichuhi (2014:7) reveals that 10% of Kenyan women borrowed food as a coping strategy.

The other coping strategy explored in this study was “purchase of food on credit”, whereby the household heads are forced by food shortage or lack of money, to obtain food from markets to pay for it at a later date. The researcher is of the opinion that the strategy is common among household heads whose sources of income are not stable. In this study, some respondents (26 or 19.4%) indicated that, they had not purchased food on credit, and many others were found to have employed the strategy, as follows: 5 (3.7%), 80 (59.7%), 20 (14.9%), and 3 (2.2%) as “hardly”, “sometimes”, “often” and, “always” respectively. The researcher inferred from the respondents’ reaction that this practice was ordinary and there was little shame associated with it. This is probably a reason it is found to be widely used than the shameful ones. Gichuhi (2014:7) asserts that 16.6% of women in Kenya indicated that they purchased food on credit as a coping strategy.

In this study, consumption of wild fruits means households resorting to consuming fruits from wild trees as main food owing to lack of other traditional food items to feed the FHHs’ members. Many respondents (101 or 75.4%) said their households have “never” consumed wild foods as a result of food shortage. The researcher of this study, from her experience with the community of the Voi Division, is of the knowledge that the local community consumes wild foods, particularly fruits and vegetables. Fruits such as baobab, tamarind; vegetables such as dandelion are considered normal foods by the community. Unlike many other parts of Kenya, the Voi Community’s attitude towards these foods is positive. Basing on this observation therefore, consumption of wild fruits may have been considered a light coping technique. Additionally, the researcher deduces that owing to this attitude by the community, the respondents whose households may have been consuming the food items might have said they “never” consumed them. Furthermore, the researcher is also of the opinion that, the FHHs in the Urban Voi may not have had chances of obtaining the wild fruits from bushes. Nevertheless, there is no shame associated with consuming some wild fruits as mentioned above. On the other hand, in this study, the FHHs that employed the coping strategy were 12(9%), 20(14.9%), and 1 (0.7%) hardly, sometimes, and often respectively. This finding is consistent with a study on climate change adaptation strategies among rural Maasai pastoralists in Kenya, which found that the pastoralists were using the coping strategy of collecting wild fruits. Harvesting of wild fruit was a practice of the adaptation (Bobadoye, Ogara, Ouma, Onono, 2016:125).

Another coping strategy covered in this study is consumption of dead animals or carcasses. Most respondents (130 or 97%) said that members of their households have never

consumed dead animals as a result of food shortage. Only 3 (2.2%), and 1(0.7%) respondents said their households had “hardly”, and “sometimes done it respectively. Furthermore, from the respondents’ reaction, this was a frowned-upon strategy hence not widely used.

Likewise the consumption of carcasses, consumption of taboo foods in this study, refers to the FHHs having to eat foods that are forbidden by the community in which they are embedded. Majority of the respondents (130 or 97%) indicated that their households have never consumed taboo or forbidden foods. Only 2 or 1.5% had hardly, and one or 0.7% FHH had sometimes employed the strategy. The researcher is of the opinion that the strategy compares with the consumption of dead animals because both are against the community’s norms hence are associated with too much shame.

The other coping strategy is consumption of seed stock held for the next season. When designing the survey questionnaire, the researcher of this study had construed in her mind that, only female household heads involved in crop production would respond to this question. Though not confirmed, this might have been the case. The question elicited the following responses: majority of the respondents (104 or 77.6%) said their households had not consumed seed stock held for the next planting season as a result of food shortage. However, 3 or 2.2%, 24 or 17.9%, and 3 (2.2%) had consumed it “hardly”, “sometimes”, and “often” respectively. As mentioned above, the researcher anticipated non-farming respondents to indicate non-usage of the strategy. This means that those who used it even rarely must have been farmer FHHs.

Next, sending members to eat elsewhere is also a coping strategy employable in food shortages. The food shortage can force a household head to send their household members, especially children, to go to parties and public functions, or neighbours to be served with some free food. Majority of the respondents (125 or 93.3%) said that, their households have “never” sent members to eat elsewhere due to lack of food. The table above illustrates that, the households that had “hardly”, and “sometimes” used the coping strategy were 4 (3%), and 5 (3.7%) respectively. This coping strategy was regarded shameful therefore was not widely used.

Other coping strategies tested in this study were: withdrawing children from school, begging and getting involved in other degrading jobs, household members migrating elsewhere, entire family migrating, and selling of household assets. Only 5 (3.7%) respondents said they had sometimes withdrawn their children from school because of food shortage. The researcher is of the opinion that the strategy was applied in situations of acute food

insecurity. Majority of the respondents (129 or 96.3%) indicated that they have “never” withdrawn their children from school because the children were too hungry to stay in school. The researcher was aware of the existence of school-feeding programme during the time of the study. She is of the opinion that, public schools that were receiving the food assistance provided an alternative food source to FHHs. Although food eaten from elsewhere apart from the FHHs were not considered for this study, the food aid cushioned children from dropping out of school since they could get lunch meal at the schools. This therefore acted as supplementary source of meals for the children. “Household members’ involvement in begging” is considered shameful coping strategy by the study community. In this study, degrading job involves illegal income generating activities like sale of illicit liquor and prostitution. The majority (132 or 98.5%) of the respondents said their households had never begged for food, nor getting involved in other degrading activities like the prostitution or illegal liquor brewing. Few respondents however said they had hardly (1 or 0.7%) and sometimes (1 or 0.7%) used the strategy. Household members’ migrating elsewhere was also included in this study’s CSI. Almost all respondents (133 or 99.3%) said their household members never migrated from the household as a result of food shortage or lack of it. Only one household (0.7%) indicated the use of the coping strategy. Besides, no respondent said their entire family had migrated from a location they lived in because of lack of food. The researcher is of the opinion that, this is because the form of livelihood in the study area is sedentary hence did not encourage migration. This finding is unlike the pastoral areas in the country, which are found to use this strategy. For example, a study on Kajiado County, found that migration in search of pasture was a common (79%) adaptation practice in the area (Bobadoye et al., 2016:125). The researcher also included “sale of household assets” in the CSI structure of this study. The majority of the respondents (127 or 94.8%) indicated that they have never sold household items due to food shortage. The FHHs that were deemed having sold household assets to purchase food were 4 (3%), and 3 (2.2%) - “hardly”, and “sometimes” respectively. No respondent reported disintegration of household bond or abandonment of children or elderly because of food shortage. Only one (0.7%) respondent said their household had sometimes done another unspecified coping strategy apart from the mentioned.

- **The mean and standard deviation of the CSI**

Table 6.24 illustrates the mean and standard deviation of the CSI:

Table 6.24: The mean and standard deviation of the CSI

Mean score	Standard deviation
22.22	17.654

The table above illustrates the mean of the CSI as 22.22 and a standard deviation as 17.654. This mean score is comparable with the KDHS' CSI mean of 18.9%. In this study, CSI are the conscious manipulation of food situations by the household heads so as to continue surviving in food shortage. They are the exo-systems in the larger ecology of the human survival. That is the behaviours the FHHs get engaged in when faced with food shortage, a salient indicator of household food insecurity.

- **Levels of food insecurity according to the CSI**

It has been mentioned in the chapter 5 that, coping strategies are the coping behaviours that household members rely on when they do not have adequate food to consume (Vaitla et al., 2015:8). Being indicators of food access, CSI can be used to establish levels of household food insecurity (referred to as statuses of food security in this study). Using the CSI, the statuses of food security among the FHHs in the Voi Division are established by dividing the weighted CSI into four sections (quartiles).

*Please note that the CSI has not been used to compute the overall food security status among the FHHS. The CSI quartiles served as proxy for the levels of food insecurity which are: least severe, moderate, severe and very severe. The researcher is of the opinion that the levels show levels of food insecurity (not security) due to the nature of CSI. That is, coping strategies can only be employed where there is food shortage. "Coping strategies refer to the responses that people make when facing hardships such as household food insecurity and the measures they take to attenuate or mitigate their consequences." (Leroy et al., 2015:182).

Figure 6.6 illustrate the levels in quartiles, as shown:

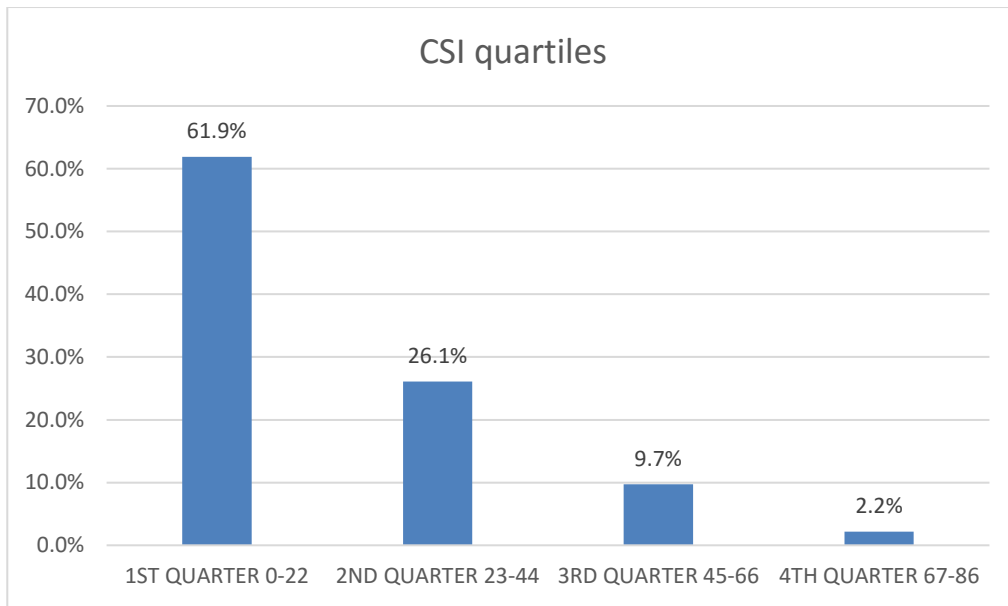


Figure 6.6: Levels of food insecurity according to CSI (n=134)

The researcher divided the scores into quartiles of their severity and classified them into food insecurity levels: least severe, moderate, severe, and very severe. The following scores represent the percentages of households that fell under each category respectively: 83 (61.9%), 35 (26.1%), 13 (9.7%), and 3 (2.2%) whose quartile-ranges were 0-22, 23-44, and 45-66 respectively. All the FHHs in this study fell in a quartile ranging between 0 to 66 CSI. Therefore, the FHHs that were at the quartile with highest count are deemed to have been the most food insecurity. This observation is in line with Leroy et al. (2015:182) that, the higher the score, the more coping reported, and therefore the more food insecure is the household.

In order to explain in more details the situation of food security among the FHHs, the researcher further computed partial correlation and multiple regression tests to establish the HDDS, FCS and CSI associations.

Table 6.25 illustrates correlations between HDDS, FCS and CSI:

Table 6.25: Correlations between HDDS, FCS, and CSI food security levels

Control Variables		HDDS categories	FCS categories	CSI quartiles	
-none ^a	HDDS categories	Correlation	1.000	.378	-.322
		Significance (2-tailed)	.	.000	.000
		Df	0	131	131
	FCS categories	Correlation	.378	1.000	-.460
		Significance (2-tailed)	.000	.	.000

Control Variables		HDDS categories	FCS categories	CSI quartiles
CSI quartiles	Df	131	0	131
	Correlation	-.322	-.460	1.000
	Significance (2-tailed)	.000	.000	.
	Df	131	131	0
HDDS categories	Correlation	1.000	.273	
	Significance (2-tailed)	.	.002	
	Df	0	130	
	Correlation	.273	1.000	
FCS categories	Significance (2-tailed)	.002	.	
	Df	130	0	

a. Cells contain zero-order (Pearson) correlations

The researcher sought to find out the relationships that exist between the HDDS, FCS and CSI food security or insecurity levels at 0.05 significance level. This was done by computing partial correlations on the 3 variables. The resultant correlations were as follows: HDDS and FCS levels ($r=.378$, $p=.000$); HDDS and CSI levels ($r=-.322$, $p=.000$); FCS and CSI levels ($r=-.460$, $p=.000$). These correlations were acquired in the situation where the effects of the CSI quartiles on the other variables (HDDS and FCS levels) were not controlled for. When the researcher controlled the effects of the CSI quartiles on the HDDS and FCS levels, the resultant correlation weakened to $r=.273$, $p=.002$. Looking at the first correlation between the HDDS and FCS, the correlation was positive, which means the HDDS and FCS increased or decreased in the same direction. The second correlation (HDDS and CSI) is negative, therefore the variables moved in the opposite directions – where the HDDS increased, the CSI decreased. Thirdly, the correlation of the FCS and CSI is negative and stronger than that of the HDDS and CSI. This means that an increase in the FCS caused a bigger decrease in the CSI, than it would have been with the HDDS. The researcher is of the opinion that, the effect of the CSI is bigger on the FCS than on the HDDS owing to the recall periods. The HDDS is based on one-day recall, while the FCS is based on 7-day recall. The latter can be more reliably predictive of the CSI which was based on a longer time of 30 days. From these findings, the researcher can confidently say that high levels of CSI were associated with poor food security status among the FHHs in the Voi Division. Furthermore, coping strategies means ways of trying to survive in an already difficult situation of household food shortages or food insecurity. Additionally, the researcher sought to test the hypothesis using multiple regression.

Table 6.26 shows multiple linear regression of the HDDS, FCS and CSI food security levels:

Table 6.26: Multiple linear regression of HDDS, FCS and CSI food security levels

Model	R	R Square	Adjusted R Square	P value	Std. Error of the Estimate
1	.487 ^a	.237	.226	.000	.673

a. Predictors: (Constant), FCS levels, HDDS levels

The null hypothesis was, “There is no significant association between HDDS and FCS food security levels to predict CSI food security levels at a significance level of 0.05”. Kothari and Garg (2014:328-329) observe that, multiple linear regression is applicable in situations where the response of a variable may depend on more than one explanatory variables. In this study, the independent explanatory variables are the HDDS and FCS (predictors) food security levels and the dependent variable is CSI quartiles or levels (predict). The researcher computed multiple linea regression on the HDDS and FCS food security levels to predict the CSI quartiles/food insecurity levels, as shown in Table 6.26. The regression results were as follows: $R=.487$, $R^2=.237$ and adjusted $R^2=.226$ at a $p=.000$. The standard error of estimate was .673. Basing on this finding, the researcher can confidently say that, there is significant relationship between the predictor variables, HDDS and FCS food security levels and the predicted CSI food insecurity levels. The rejection of the null hypothesis is based on the findings that, the actual regression value (R) is 0.487, while the expected value (R^2) is 0.237 at $p=0.000$, and under a standard error of 0.673. The p value of the regression is less than the established significance level of 0.05.

Generally, the HDDS and FCS are the two major objective indicators of food security that, the researcher mainly used to achieve the first 3 objectives of the study. For descriptive purposes, another objective measure, the MAFP was included. Additionally, in order to reveal how the FHHs coped with food shortages, the subjective measure the CSI has also played a pivotal role in the description and explanation of the food security. The use of the multiple indicators illustrates the importance of the mixed methods design of this study. Basing on the ecological systems perspective, these indicators are the exo-systems, whichby the FHHs as micro-systems, have either direct control over or other times do not have direct control over. The female household heads can control food utilisation in their household for instance through food purchases, but may not control the same through rainfall, due to ecological factors beyond their control – especially the climate change. Some sections of the FHHs showing being in a state of food insecurity calls for concerted efforts for hunger and food insecurity eradication. In the context of the ecological systems perspective, the mixed findings on the statuses of food security are the exo-systems which

affected the FHHs micro-systems positively or negatively depending on human and physical ecological environments.

6.3 Summary

In this chapter the following quantitative findings were discussed: the biographic profile of the FHHs, which include: area of residence of the FHHs, the age of the female household heads, occupation of the female household heads, education levels of the female household heads, the number of FHHs' members, marital status statuses of the female household heads, sources of livelihood for the FHHs, and sources of income for the FHHs. Following the 3 objectives of this study, other quantitative findings are presented in the following order: household dietary diversity among the FHHs while utilising the HDDS, food consumption frequency while using the FCS, and the establishment of the overall food security statuses among the FHHs. The presentation and discussion of the third objective was done by categorising levels of food security according to the HDDS and FCS and later amalgamating the two indicators to arrive at the overall statuses of food security among the FHHs. In order to further describe and explain the overall food security statuses, the study also included MAFP and CSI. Generally, the food security status among the FHHs was resilient, but not completely eradicated.

The next chapter presents the qualitative findings.

CHAPTER 7

QUALITATIVE FINDINGS

7.1 Introduction

This chapter presents qualitative findings with regards to the first 3 objectives of the study. The objectives were to:

- Determine the status of dietary diversity among female-headed households in Voi Division, Kenya by utilizing dietary diversity score as an indicator of food security.
- Measure food consumption frequency among female-headed households in Voi Division, Kenya by utilizing food consumption score as an indicator of food security.
- Determine the overall status of food security among female-headed households in Voi Division, Kenya.

The chapter presents the qualitative findings and discussion of how the objectives were met. Qualitative research is concerned with qualitative phenomena, relating to or involving quality or kind (Kothari & Garg, 2014:3). The qualitative phase of this study was informed by case study design. According to Creswell (2007:73 in Fouchè & Shurink, 2011:321), a case study involves an exploration of a bounded system, or a single or multiple case, over a period of time through detailed, in-depth data collection involving multiple sources of information. In this study, collective case study was employed in the qualitative phase, and it involved different methods of research which were used in the investigation to provide food security qualitative data. Among the methods used were key informants' interview, which was conducted on 15 key informants. Key informants interviews were done among the 15 sampled participants. However, one participant's data was discarded, leaving 14 for qualitative analysis. The researcher discarded data from the key informant for the latter had asked the researcher to supply her with the interview schedule prior to the actual empirical study. The participant's responses elicited a lot of subjectivity since she was trying to follow the script as she had an earlier encounter with it. This scenario compares with Greeff (2011:360) assertion that, a weakness with interview, is because the participant is likely to provide the researcher with the "official account", which is not really valid. As previously indicated in the chapter 5, a case study design strives to describe, analyse and interpret a particular phenomenon (Yin, 2003 in Fouchè & Shurink, 2011:321). Fouchè and Shurink (2011:321) assert that, the exploration and description of the case takes place through a detailed, in-depth data collection methods, involving multiple sources of information that are rich in context. In this phase, one of the methods of the in-debth investigation was one-to-

one key informant interviews, while utilising an interview schedule and an audio recorder as data collection instruments.

Another method was observations, which were done parallel with the survey during the quantitative phase, with a fraction of the 134 FHHs. The research instrument for the observations was observation checklist. Moreover, photograph-taking was the third data collection method, also done together with the observations, and among some of the 134 FHHs, using a digital camera and as the research instruments. These methods are consistent with the ones proposed by Fouchè and Shurink (2011:321): “Interviews and observations are some of the data collection methods of the case study design”. The purpose of applying many data collection methods in this study was to reap from reliability and validity of the data associated with mixed methods designs (in this study, convergent parallel mixed methods).

The purpose of convergent parallel mixed methods design for both the quantitative and qualitative phases is discussed in detail in the chapter 5. Creswell (2014:219) states that the use of the mixed methods adds the benefit of increased validity and reliability of results. Additionally, Yeasmin and Rahman (2012:156) assert that “by triangulating, different sources of data and viewpoints (in integration) bring about the validity and reliability.” In order to meet the 3 objectives highlighted above, the researcher uses emerging themes from the qualitative data obtained in this phase.

Similarly with the quantitative phase, the qualitative phase was also informed by the Bronfenbrenner’s ecological systems perspective. As indicated in chapter 1, the perspective (theory) structures human ecology into 5 sections, namely micro, meso, macro, exo and chrono systems (Friedman & Allen, 2011:9). The perspective is also discussed in more details in chapter 4. As per this theoretical construction, this study demarcation (Voi Division) is regarded as the macro-system, which is a “geographically bounded” system of the case study. Once again, as mentioned in the chapters 1 and 4, the micro-system is the FHH. This is because the FHH is the immediate environment in which all its members reside and directly interact in. The second level, the meso-system are the interactions between the factors that affect food security among the FHHs. This is so, because these factors determine the food welfare of the household members. The third level, the exo-system is the food security statuses among the FHHs. The FHHs are directly affected by the food security status, which they may affect them directly or indirectly. Moreover, the food security statuses may be influenced by factors the FHHs have control over (for example, will to prepare or cook food), while other times by external factors which are beyond their control (including effects of climate change). The macro-system is the Voi Division, because the

FHHs are bounded in the study demarcation physically and socio-culturally. The chronosystems are the life transitions experienced by the female household head and her dependents, for example loss of male household head leading to widowhood marital status. The current chapter presents the qualitative findings according to dominant themes, sub-themes and categories.

The qualitative findings are in the following order:

- Qualitative findings of key informants' interviews.
- Observational analysis of FHHs.
- Visual analysis of photographs of FHHs.

7.2 Qualitative findings of key informants' interviews

This section discusses qualitative findings emanating from the one-to-one interviews conducted with the key informants. The presentation in the section is done in the following sequence: biographical information of key informants and basic characteristics of the female-headed households, and then thematic analyses.

7.2.1 Biographical information of key informants and basic characteristics of female-headed households

As indicated at the introduction section of this chapter, the analysis of the key informant interview responses was based on 14 participants out of the sampled 15 informants. The researcher discarded one participant's input, for the latter had asked the researcher to provide her with the interview schedule prior to the actual day of the interview. The researcher observed a lot of subjectivity in her responses since she was trying to follow the interview schedule she had earlier seen and read. This scenario, as indicated at the introduction of this chapter, compares with Greeff (2011:360) assertion that, a weakness with interview, is because the participant is likely to provide the researcher with the "official account", which is not really valid. On the other hand, (Greeff, 2011:360) also observes that interviews are very advantageous in obtaining large amounts of data in a short time, and are the effective way of obtaining data in depth. The researcher therefore used the responses from the 14 participants, which she deemed as sufficient in-depth data for the analysis.

The researcher analysed the data both manually and using computer's Ms Excel for Windows 2010. She began the analysis by sorting the raw data by scanning through questions to make sense of them and the responses. Secondly, she listened to the voice recordings of the interviews in the audio-recorder, and transcribed each of them verbatim.

Then she scrutinised each question and the various responses it elicited among the recordings, while at the same time adding the memos or doing comparison with the field notes. Although, the researcher strived to deduce meanings of the responses according to the meanings brought out by the key informants (emic interpretation). This is consistent with (Greeff, 2011:341) that, all interviews are interactional events, and interviews are deeply and unavoidably implicated in creating meanings that ostensibly reside within participants. However at times, the researcher employed etic interpretation (researcher's own reconstruction of the responses) where inevitable. By employing qualitative analysis, an attempt is made to capture the richness of themes emerging from the participant's talk (Greeff, 2011:360). In accordance with this recommendation, the researcher was keen in detecting emerging themes and sub-themes from the verbatim responses. In this section, qualitative findings from the key informant interviews are presented in forms of themes, sub-themes (and categories where necessary). All the sub-themes (and/or categories) are supported by verbatim quotes, demonstrating the richness of the data. Thereafter, the researcher presents a discussion on the themes.

7.2.1.1 Background and nature of key informants' work

The participants of this study were key informants purposively selected from different organisations (see sub-section 5.5.4 on qualitative sampling). The advantage of selecting key informants from diverse sectors was to enable the researcher to get a variety of perspectives concerning food security, which is a key idea in collective case studies. Interviewing key informants from a wide range of sectors allows you to look at varying perspectives and underlying issues or problems (UCLA Centre for Health Policy Research, Sa:3). Moreover, this method of sampling enhances objectivity and the ultimate credibility of the data. According to UCLA Centre for Health Policy Research (Sa:3), if you only interview people of a particular background or sector, you may end up with results that are one-sided or biased.

The table 7.1 below illustrates background and nature of key informant participant's work:

Table 7.1 Background and nature of key informants' work (n=14)

Participant code	Age	Gender	Highest level of education	Work experience	Nature of work
1	43	Male	Degree	11	Field monitor/office
2	30	Female	Diploma	5	Field monitor/officer
3	44	Male	Master's degree	16	Director NDMA

Participant code	Age	Gender	Highest level of education	Work experience	Nature of work
4	36	Male	Degree	6	Coordinator Asset Creation Project
5	48	Male	Diploma	16	Chief executive officer
6	34	Female	Diploma	10	Disaster response officer
7	26	Male	Diploma	5	Volunteer
8	49	Male	Degree	10	District Officer (administrative)
9	42	Male	Advanced certificate	5	Clerical officer
10	50	Male	Certificate	30	Agricultural extension officer
11	33	Male	Degree	8	Sub-county agri-business development officer
12	38	Male	Degree	15	Agricultural production officer
13	44	Male	Degree	19	Business Administration & Managing director of Water Company
14	Skipped	Female	Degree	8	Crop development officer

Subsequently the table will be discussed according to each column.

- **Age**

The age group of the participants (key informants) ranged from 26 to 50 years. A vast majority of them (13) were aged 30 to 50 years. Only one participant was 26 year old. The age range was consistent with the inclusion criteria of the key informants; since they were supposed to be over 18 years old (see the inclusion criteria in the sub-section 5.5.4). The inclusion criteria is also consistent with human resource production age in Kenya, whose legal working age is 18 years and above until they reach the retirement age of 60 years. According to Kenya *Human Resource Policies and Procedures Manual for the Public Service* (Republic of Kenya, 2016:64), all officers shall retire from the public service on attaining the mandatory retirement age of 60 years, 65 years for persons with disabilities and/or as may be prescribed by the government from time to time.

- **Gender**

Both genders were represented among the key informant participants. Eleven out of the 14 participants were males and only 3 were females. One of the females was working as a field monitor. The second female was working as a disaster response officer, while the last female participant was working as a crop development officer in the Ministry of Agriculture. From this finding, it is salient that the proportion of male to female workers was very low (11:3) compared with the 1/3 Gender Rule of Kenya. The constitution of Kenya stipulates that, in every sector of human resource production, there should be at least a 1/3 representation of each gender. This is consistent with the stipulation in Republic of Kenya (2016:32) that, the Government of Kenya will endeavour to have a gender balanced civil service by ensuring that not more than 2/3 of positions in its establishment are filled by either gender. The reader should however note that this finding may not conclusively represent the actual situation in the entire Voi Division, since the sampling of the key informants was non-probability purposive. In the chapter 3 of this study, a concern of, “general lack of employment, is seen to play a crucial role in maintaining or exacerbating female poverty. Therefore, the researcher is of the opinion that the low representation of female gender in the job sector may be indicative of rampant female poverty and the ultimate food insecurity among the FHHs.

- **Highest level of education**

Half of the participants (7) had attained a degree as their highest level of education. Four participants had attained a diploma, one a master’s degree, another, an advanced certificate and one had a certificate. The researcher is of the opinion that the levels of education were associated with information absorption and levels of expertise among the key informants. Following this view, the key informants were well educated and deemed to provide credible information on food security. This opinion is shared by McKenna and Main (2013:4) that, key informants are unquestionably important in community-based research, providing information about the community and helping the researcher make additional contacts.

7.2.1.2 Areas in which the key informants worked and years of working experience

The “areas of work” in this sub-section refers to the sector in which the key informants worked. The sectors represent the key informants’ areas of career specialisation. Table 7.2 shows the participants’ career specialisation in food security, and the number of years worked.

Table 7.2: Area of food security work, and years of working experience

Participant codes	Key phrases	Themes	Sub-themes	Years of work experience in similar or same job
1	"with vulnerable communities"	Community development work	General community development work, including food security programmes	11
2	"with the community – targeted vulnerable communities"	Community development work	General community development work, including food security programmes	2
3	"I am a data analyst, ... with something called early warning system"	Food security	Early warning systems	9
4	"With vulnerable who are food insecure"	Food security	Asset creation programme	6
5	"I represent farming sector in County Budget and Economic Forum. It is a decision-making body in the devolved units in the counties".	Food security	Farming sector	7
6	"Food issues in terms of floods when they have affected them"	Food security	Disaster response	10
7	"Give relief food to the affected during disasters"	Food security	Disaster response	5
8	"I chair the steering group meetings. That's the committee"	Administrative	Emergency food insecurity response	5
9	"We do distribution with vulnerable persons"	Clerical	Emergency food insecurity response (food distribution)	9
10	"Production, delivering of extension messages"	Agriculture	Agricultural extension services, production	29
11	"Extension service provider, ... to the farmers and specifically in the area of agribusiness"	Agriculture	Extension services, agribusiness	8
12	"Agriculture production: fruits, vegetables and cereal production"	Agriculture	Water services, food production	6

Participant codes	Key phrases	Themes	Sub-themes	Years of work experience in similar or same job
13	"Water provision"	Water provision	Managerial	1
14	"Crop production"	Agriculture	Extension services, crop production	8

- **Area of work**

The key informants provided the following data (based on emerging themes) with regard to their area of work: general community development work, which entailed working in food security programmes with vulnerable communities. The second emerging theme was food security which was the dominant theme in all responses. The participants who alluded "food security" said they worked in various food security programmes such as early warning systems, asset creation programme, farming, and disaster response units. Most of them worked with NGOs, government parastatal (NDMA) and community-based organisation. Two participants worked as government administrators as District Officer I (DO I) and a clerical officer in the same department of National Government Administration. In addition to their routine duties, they said they were involved in food security distribution activities with vulnerable communities. The theme of agriculture was represented by 4 participants. Out of the 4, three were officers in the Department of Agriculture and one worked in the Department of Water Services. Their proportion of male to female gender was 3:1. Two males worked as agricultural extension officers in production and agribusiness and one in the water department promoting crop production. The female worked as an extension officer in crop production. These findings are consistent with McKenna and Main (2013:5) that, key informants in community-engaged research often work for activist, professional, government, or non-profit organisations in the community. The diversity of their specialisation is advantageous to this study because, as UCLA Centre for Health Policy Research (Sa:3) rightly puts, "interviewing key informants from a wide range of sectors allows you to look at varying perspectives and underlying issues or problems". As mentioned previously, the different viewpoints adds to credibility of the data.

The findings are moreover significant for this study for they represent different sectors that influence food security in the Voi Division. This is more particularly of agricultural production. As a profession, agriculture is found to contribute to economic growth. For instance, the growth in Kenya's Gross Domestic Product (GDP) in 2015 was mainly attributed to agriculture at 22% from 14.7% in 2014 (KNBS, 2016:24). This growth was mainly attributed to bumper harvests due to abundant rainfall in 2015, including maize production, which increased from 39 million bags in 2014 to 42.5 million bags in the 2015

(KNBS, 2016:144). Since the majority of the professions were found to be directly involved in food security, the research reaped from the benefit of obtaining valid feedback from the participants. These community experts (key informants), with their particular knowledge and understanding, can provide insight on the nature of problems and give recommendations for solutions (UCLA Centre for Health Policy Research, Sa:1). In this study, the data collected from the key informants enriched the findings on the food security immensely, and provides practice guidelines and recommendations (in chapters 8 and 9 respectively) on intervention strategies for addressing the issue.

- **Work experience**

A slightly more than half of the participants (8) had 10 and above years of work experience. The longest serving informant had 29 year experience in food security work, followed by one informant with 11 years, and another with 10. The rest 9 key informants had work experience ranging from 5 to 9 years. Only two key informants had two and one-year experience in food security sector. The minimum and maximum work experience was 5 and 30 years respectively. The researcher believes that, similarly with the level of education, the participants' work experience was a significant aspect of getting trustworthy data, since their experience was based on food security issues in the study area, which increases the credibility of the information they offered. This view is corroborated by UCLA Centre for Health Policy Research (Sa:1) which indicates that, key informant interviews are qualitative in-depth interviews with people who know what is going on in the community.

Most key informants (11) held long term career jobs in food security. However, in the local administration sector, the District Officer (DO) and clerical officer were interviewed because they were involved in food security activities, such as chairing food security steering committee and overseeing food distribution among vulnerable populations. Additionally, the managing director of the local water management authority (TAVEVO) had indirect role in food security through coordination of water supply in the whole of the Taita-Taveta County. The researcher however had only seen domestic water supply (no irrigation) in the study area.

All the key informants indicated that they dealt with females in the line of their work. They gave the following reasons: "Most food security projects target women", "women are the most vulnerable adults", and "women attend public meetings in bigger numbers than men". These responses allude that, females in the Voi Division are more responsible on matters concerning household welfare than their male counterparts. The other reason is that the females were more vulnerable to food insecurity than males, hence were targeted for food security intervention programmes. This alludes to poverty among the females. Tibesigwa

and Visser (2015:2) emphasise the FAO's idea that, in all developing regions, female-headed rural households are among the poorest of the poor.

Coates, Swindale and Bilinsky (2007:7) indicate that, key informants are the persons familiar with conditions and experiences of household insecurity in the areas where surveys are conducted; who could be among others, private voluntary organisation staff members, government officials, academics, prominent community members, or other knowledgeable individuals. Moreover, as indicated previously in the study, Greeff (2011:351, 360) says that, an advantage of using the semi-structured interview is that the researcher obtains in-depth data from experts, while gaining a detailed picture of the topic. In this chapter, the biographical characteristics represent the ecosystems the key informants interacted in their line of duty. That means, the age, gender, highest level of education, area of work and work experience are the chrono-systems they exhibit for the appropriateness of their work. The areas they worked in were the micro-systems or their immediate environment they interacted with in food security issues. The interlinkages between the key informants' area of work and the FHHs form the meso-systems of both the key informants and the FHHs.

7.2.2 Thematic analyses

Subsequently themes and sub-themes generated from the interviews are discussed in table 7.3:

Table 7.3: Themes and sub-themes of thematic analyses

Theme	Sub-themes
1. Experiences at workplace	<ul style="list-style-type: none"> • Challenging • Tranquillity • Both challenging and tranquillity
2. Knowledge about previous research on food security	<ul style="list-style-type: none"> • Lack of awareness • Presence of awareness • Knowledge of some kind of research on another topic
3. Needs and challenges of female-headed households	<ul style="list-style-type: none"> • Needs of female-headed households in Voi Division • Challenges of female-headed households in Voi Division
4. Food consumption patterns	<ul style="list-style-type: none"> • Dietary diversity • Food consumption score • Food groups

Theme	Sub-themes
5. Sources of food	<ul style="list-style-type: none"> • Own production • Market • Food aid • Comfort with food accessibility • Differences in food sources between male-headed and female-headed household
6. Coping strategies	<ul style="list-style-type: none"> • Skipping meals • Reducing portion size of meals • Purchasing food on credit • Reduce portions for adults to allow more to children • Parents sending children to eat elsewhere
7. Status of food security	<ul style="list-style-type: none"> • Moderate food insecurity, and • Poor food security statuses
8. Interventions for food security in Voi Division	<ul style="list-style-type: none"> • Support from external change agents • Participatory community engagement
9. Interventions for food security among the female-headed households in the Voi Division	<ul style="list-style-type: none"> • No special treatment of the FHHs • Formation of self-help initiatives by the FHHs • The interventions should be specially designed for FHHs

7.2.2.1 Theme 1: Experiences at workplace

The participants' experiences or encounters at work are illustrated by the figure 7.1 below:

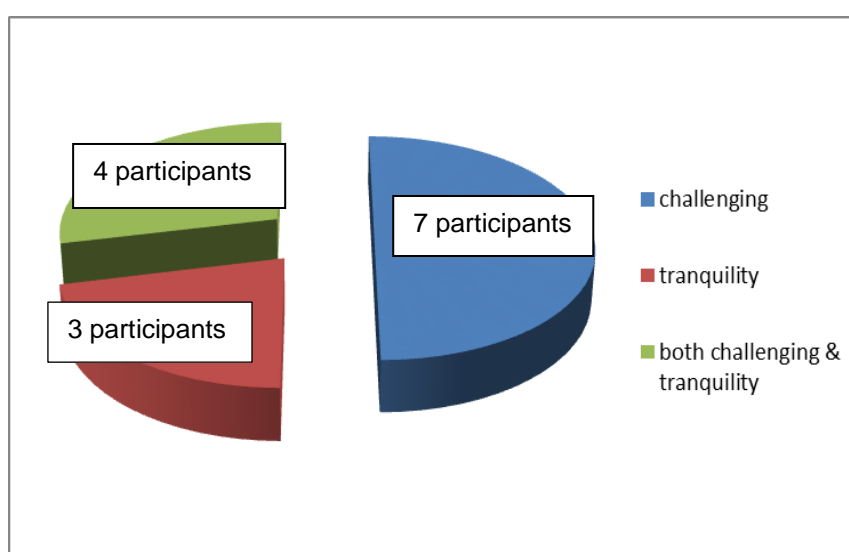


Figure 7.1: Description of experiences at workplace (n=14)

Most participants described their work experience working in the Voi Division as challenging. Generally, the responses provided by the key informants elicited 3 sub-themes:

- Challenging.
- Tranquillity.
- Both challenging and tranquillity.

The verbatim quotes below illustrate each of the sub-themes:

- **Sub-theme 1.1: Challenging**

Half proportion of the participants indicated that they experienced challenges in line of their duty. Their utterances are represented by the following verbatim quotes:

“Working with communities is generally very challenging, because of the vast kind of challenges you find from the communities. A lot of *njaa nyingi* - a lot of hunger. And basically the support you take to the communities is never enough.”

“During disasters, it becomes difficult in that case when you may find somebody who was affected by disaster last time, then the same-same disaster affects him again. Maybe what you gave him or her, they sell.”

“It’s quite challenging because when it comes to food distribution, there is no single time people will say it’s enough!”

“Very challenging because what we get sometimes is not enough for every person. And you know the masses are many - many are the people who are the vulnerable.”

“It has been challenging ... to meet to various issues that affect the people we serve like farmers and specifically women. Like access to factors of production like capital, access to markets ... to me, in terms of ... coz I am supposed to provide extension services to them, so I need resources like facilitation with fuel, I need a mode of transport to reach them. So in the part of the government, that’s a challenge to me; but to them now the challenge comes in way of accessing the market.”

“Very challenging - because of ah... you know Taita-Taveta is endowed with water resource, but water is the most scarce commodity. Water again remains at where it is and it is not distributed where it is needed. And a good example is Njoro, so much water, but not distributed.”

“Long-challenging: facilitation to go field work, it is not happening. Their (*community*) attendance is not at par. You can schedule a meeting and people have other engagements.”

- **Sub-theme 1.2: Tranquillity**

On the other hand, some key informants were experiencing cordial work conditions with the community in the Voi Division. They said the following:

“The community I am working with, they are good people, they cooperate and they do their work according to our instructions.”

“Maybe, it will be ... Voi, generally what I can say about Voi ... it is good working in Voi.”

“Project itself I think is good because we deal with the community, we interact with them, we get their views and basically in project identification, we engage them.”

- **Sub-theme 1.3: Both challenging and tranquillity**

There are those participants who observed that their work was with both challenges and good moments. The verbatim quotes below illustrate their opinions:

“My work experience has been challenging and exciting. Challenging because we need to train people on how new adaptation measures... on how to grow crops the right way They don't easily. For example, when you want to plant half acre you can give him/her 7 bags of maize ..., but they don't stick to the one acre (probably the participant meant half acre) whereby he does not plant according to instructions. It is exciting that you are interacting with highly knowledgeable people; but unfortunately, when it comes to implementation, very few seem to take. So, it is exciting how come people are not taking up!?”

“They cooperate yes, but challenges are normal!”

“It is demanding and it has gained me popularity because of the efficiency and positive results.”

“Has been interesting because I have been dealing with different caliber - different categories of women in relation to their level of income; and it's a bit interesting because there are those who depend on support from relief food, and there are those who are really working across their capacities to make sure they put food on the table; so it has been interesting! Men, there is a big challenge, because most of the men are waiting for their women to work in order for them to feed their family. So, it has been quite a challenge to women.”

- **Discussion of theme 1**

Theme 1 illustrates the general experiences in the course of the key informants' jobs. From the responses, challenges emerged as the most prominent sub-theme. For instance, it was challenging to meet food demand of everyone in the Voi Division. This may have been attributed to universality of the food assistance, with no definite criteria of inclusion to the assistance. It is not easy for food assistance organisations to establish the socio-economic criteria of vulnerability selection (Lambie-Mumford & Downer, 2014:1421). In this study, the key informants indicated that, some members of the community (in the Voi Division) are over-dependent on external food assistance and were selling the food they receive. The prevalence of food aid and the over-dependence in the Voi Division is consistent with Lambie-Mumford and Dowler (2014:1418) finding that, there is a rise in food aid provision and uptake in the UK, which is an emerging problem in the country. Additionally, the key informants of this study, particularly with the Ministry of Agriculture, experienced logistic difficulties in line of their duties as agricultural extension workers. The institution they

worked with did not provide enough logistical facilitation to promote the extension services with the community of the Voi Division.

Among the extension personnel was a female officer. Tiwari (2018:69) observes that, in order to be effective, efficient and sustainable, development goals require that extension services recruit and train women professionals, specifically target women to provide access to extension services, establish linkages with rural women's groups, and encourage women farmers to participate in extension programme activities. The researcher is of the opinion that the meso-systems, which are the links between the extension officers and the authorities in the Ministry of Agriculture, and the Voi agricultural community was constrained. Other problems or challenges were linked to the community failing to adapt to innovations especially seed planting instructions. There is importance of understanding natural and man-made processes in terms of the interactions between the ecological and social systems (Berkes, Colding & Folke, 2003 in Kaiser, 2011:64), especially applicable to food systems, which are tied directly to the natural environment (Kaiser, 2011:63-64).

Converse with challenges, the key informants expressed that, sometimes they had good work experiences because the community members were co-operative and that, as much as there were those members of the community who were over-dependent on external food assistance, there were those who worked hard to fend for their families, especially amongst females. This is supported by (Ibnouf, 2009:150), that women are more likely than men to use available resources and skills to further improve the welfare of their family.

Basing this thematic finding on the ecological systems perspective, the researcher is of the opinion that, while the co-operation between the community and the key informants created or maintained human-ecological homeostasis for sustainable food security development; the findings on challenges illustrate a need to rectify the hindrances persistent in food sectoral governance and the community.

7.2.2.2 Theme 2: Knowledge about previous research on food security

The key informants had to indicate in question 5 of the interview schedule whether they were aware of any previous research on food security in the Voi Division. This question was posed to the key informants to assess their general awareness of the research topic and to gauge the likelihood of a similar research to this study having been conducted. The findings are hereby presented thematically according to the following sub-themes:

- Lack of awareness;
- Presence of awareness; and

- Knowledge of some kind of research on another topic.
- **Sub-theme 2.1: Lack of awareness**

Lack of awareness of a previous research on food security emerged more prominently than the other sub-themes. The following verbatim quotes support this sub-theme:

“No. Just reports for our project You see the GOK (*meaning the Government of Kenya*), that is the reason why am not calling it a full research: the GOK, us and other partners like the National Drought Management Authority ... we normally conduct food security assessment after every season. So those are the reports I am talking about”.

“No.”

“Not really!”

“In Taita not.”

“Basically not”

“I am not.”

“Am not.”

- **Sub-theme 2.2: Presence of awareness**

This sub-theme emerged as the second in prominence, and is supported by the following verbatim quotes:

“Yes we have many researches that have been done ... others by non-state actors (international bodies) like World Food Programme, World Vision, Plan International, any other bodies”

“Yes, there are several; but they were being handled by the National Drought (*National Drought Management Authority-NDMA*).”

“We have done many, but we have not gotten any feedback from where”

“There have been people who have come from different organisations to do some research but I cannot... because they dealt with different officers, I cannot pinpoint exactly, but there have been. Like previously there are some people who had come to do some research on baobab fruit as a source of food to the people?”

“Yeah, when we were conducting our WASH (*Water, Sanitation & Hygiene Project*), the project which we have: water sanitation and hygiene, we were doing some research which had to do with food security - how can somebody access his daily bread and which means is it in terms of: maybe he is employed, maybe he is a farmer ... in terms of occupation.”

- **Sub-theme 2.3: Knowledge of some kind of research on another topic**

The key informants displayed some awareness about some kind of research, but based on another topic:

“There is another consultant alikuja kufanya mambo ya climate change (translation: there is a consultant who came to do research on issues on climate change).”

“Am not so sure ... I don't believe in heresies, but I understand the people from the World Vision Kenya have been conducting some research and some (other) people who are very much concerned with that - of which for us to get the number of persons that are vulnerable within our sub-county, many are the times we have to rely on such departments or such people in getting the actual information on the ground.”

- **Discussion of theme 2**

The findings on theme 2 are significant to the study, for they confirmed its relevance in the time. The findings indicate previous food assessments for policy and programme planning and/or intervention. There were other unspecified research, but none seemed to be of the same topic with the current study. To further ascertain the timeliness and relevance of her study, the researcher likewise conducted an online check, but only found government and NGO reports on food security regarding Taita-Taveta County. Furthermore, during this study's design phase, the researcher had done an extensive literature search and did not find a precise food security research done in Voi Division, including among FHHs. As indicated in section 1.5 of the chapter 1, the researcher searched on the databases such as SciDev.Net's Sub-Saharan Africa desk, SABINET, Pathways to African Feminism and Development, Journal of African Women's Studies Centre, Global Journal of Agricultural Research, Journal of Food Composition and Analysis.

However, though no previous research was directly similar with the current one, some participants insinuated that the previous research they had come across related to food security revealed poor food security situation. For example, participant 5 observed, “the recent research was about ... because we are experiencing climate change ... so the recent research showed that most of the areas ... those arid land areas would be experiencing acute shortage of food occasioned by long drought and lack of accessible water for irrigation”. The vast majority of the key informants linked the food insecurity with droughts in the various responses during the interview. The finding corroborates the section 1.3 of chapter 1 that, much of Eastern Africa has been affected by unfavourable climatic and drought conditions (FAO, 2015:1). Furthermore, Republic of Kenya (2011:5) shows that, food insecurity in Kenya is mainly caused by recurrent droughts among other factors.

According to Bronfenbrenner's perspective with regard to ecological systems, land and climate factors are the micro and macro-systems respectively. Farmers directly cultivate land for food production but harvest poorly, due to wider ecological systems of the climate change. According to Wittman, Chappell, Abson, Kerr, Blesh, Hanspach Perfecto and Fischer (2016:1292), a focus on the impacts of agricultural production on biodiversity is

important to ensure that long-term food availability is more ecologically sustainable. Moreover, research in this context, whether previous or the current, serve as meso-system in linking change agents and local communities to food security knowledge in food security development. Through knowledge interaction between the change agents and the communities, particularly the FHHs, partnerships are established to ensure sustainable food security as stipulated by the SDG2.

7.2.2.3 Theme 3: Needs and challenges of female-headed households

Literature shows that, food insecurity particularly among FHHs is influenced by myriad of factors, including poverty and social reproduction (see section 3.4.1 of chapter 3). The purpose of the questions on the needs and challenges faced by FHHs, was to explore common and underlying factors which may have led them into food insecurity. The findings are presented thematically under the following sub-themes:

- Needs of female-headed households in Voi Division.
- Challenges faced by female-headed households in Voi Division.
- **Sub-theme 3.1: Needs of female-headed households in Voi Division**

This sub-theme elicited the following categories:

- Male household headship.
- Finances.
- Security.
- Proper healthcare.
- Food.
- **Male household headship**

Some key informants indicated that the females needed a man as the head of the family:

“You know when a man is not in the family it means the family misses a head of a family”

“... They don’t depend on their husbands or males”

“They have to do the part of the father and also the part of the mother”

- **Finances**

A vast majority of the participants indicated that the FHHs require money to meet their household needs. The following verbatim quotes support this sub-theme:

“... the source of income”

“It’s hard for them to get casual labour.”

“... economic activities where they can get money.”

“... ya pili ni fee ya watoto wao (...*second is school fee for their children*).”

“... access to financial services”

“You may wish you had enough money to help her.”

“We need empowerment to purchase more”

- **Security**

Physical and emotional security also emerged among the responses, as supported by the following quotes:

“... security is an issue”

“... peace and security.”

“I think single lady most of the time security is an issue”

- **Proper healthcare**

Few participants highlighted proper healthcare as a need to the FHHs. They said the following:

“... good health”

“... medical health care”

- **Food**

The verbatim quotes below illustrate food need among the FHHs:

“Ya kwanza ni food ... (firstly, is food ...).”

“So you normally make sure they have their basics ... like ... food”

“Just normal basic needs – food”

“Basic needs like food”

- **Sub-theme 3.2: Challenges of FHHs in Voi Division**

The question on the challenges encountered by FHHs was a paraphrase of the previous question on the needs of the FHHs. The researcher asked the latter to enrich on the credibility of the responses of the former. As previously indicated in the chapter 5, trustworthiness of qualitative data is established when findings as closely as possible reflect the meanings as described by the participants (Lietz & Zayas, 2010:191). The sub-theme elicited the following categories:

- Lack of male household headship;
- Lack of financial empowerment;
- Emotional insecurity;
- Landlessness; and
- Gender inequality.
- **Lack of male household headship**

The challenge of lack of a male household head was highlighted once more. Once again, the view is in support of the popular belief that the ideal head of a household is a man. For example, Braunstein (2015:16) asserts that, men contribute to financing of households and women contribute in domestic social reproduction. The participants too were of similar opinion, and they said:

“You know when a man is not in the family it means the family misses a head of a family, so leadership is one of the needs, people would say ‘I wish I had a man or a husband who would have supported me in this or another.’”

“They lack dependency (*the researcher infers this to mean they lack support*) because they don’t depend on their husbands or males (*looks uncertain*).”

“The bigger challenge she is playing both roles of the father and mother.”

“Single mothers have got very big challenges in trying to come up with feeding the family, protecting it, there are so many temptations, if the family is not catered for: the children may start stealing, the mother herself start prostitution – all those vices!”

“Basically is on the issues of supporting the family, because if you are the head of the family you have to make everything move smoothly.”

- **Lack of financial empowerment**

Likewise in the sub-theme of the FHHs needs, financial capability emerged as a major challenge facing the FHHs. The participants who perceived it as a challenge had the following opinions:

“... and the other one is the source of income”

“It is hard for them to get that casual labour.”

“Because of the lack of income, it becomes difficult for them, in fact in Voi Sub-county, they are forced to engage in prostitution.... so those are the challenges!”

“Lack of appropriate finance to finance their businesses.”

“Some are forced to use crooked ways of earning a living like involving themselves in vices like prostitution.”

“There are issues of resources and if you are not earning anything, and you are the head of a family; it becomes a problem. So resources are really key in managing a family.”

- **Emotional insecurity**

A few participants were of the opinion that the female household heads feel emotionally insecure because they do not have a male partner. They said the following:

“Security is an issue, there is desire at least they would have some cover of a man.”

“Emotional challenges because again, our society is a bit conservative. And for those who particularly who are single by either early pregnancies, the society tends to look at you in not-so-good eye. It is a conservative society!”

- **Landlessness**

Once again, few key informants were of the opinion that, the FHHs are cumbered with the burden of lack of land of their own, that they would have cultivated on. The following verbatim quotes illustrate the landlessness challenge:

“Most of them live in rental houses. So they have got land problem issues”

“When it comes to family land ownership, the law does not recognise them to inherit. They stay there under the mercy of brothers or parents. But when one of her godfather dies, the one who used to protect her; you can find her and her children being required to move elsewhere in order to build their houses.”

- **Gender inequality**

Some key informants highlighted gender inequality in resource and opportunity acquisition as a problem of the FHHs. The following verbatim represent their opinion:

“So they (*females*) have got land problem issues, climate change itself is a challenge, lack of appropriate finance to finance their businesses, lack of exposure also - to venture and do businesses, because we (*the researcher infers this to have been referring to females*) need money to go to Arusha, Moshi, Mombasa, Nairobi.”

“Access to opportunities: the way the men and the female... the access to opportunity is eihm ... the balance is ... there is no equality or equity. And then like in agriculture also access to market ... because most of marketing activities are done by men like middlemen, brokers who engage in those activities, females are disadvantaged.”

- **Food insecurity**

One participant mentioned food insecurity as a challenge facing FHHs. The opinion is shown by the following quote:

“Single mothers have got very big challenges in trying to come up with feeding the family.”

- **Discussion of theme 3**

Most of the needs and challenges illustrated through the verbatim quotes with regards to the emergent sub-themes demonstrate the requirements for meeting food security among the FHHs. The researcher is of the opinion that the need for male household head is a conservative ideal about the man's social status as "the breadwinner", while the role of the adult female (wife) is to provide support to the household through domestic chores. As illustrated above, this popular belief is consistent with Braunsteins' (2015:16) assertion that, men contribute to financing of households while the role of women is domestic social reproduction. This is more so, especially in the Sub-Saharan Africa. For example, small-scale studies conducted in Malawi found that, women did the vast majority of household tasks such as cooking, water collection and childcare (Kerr, 2005 in Patel, Kerr, Shumba & Dakishoni, 2015:33). In this study, the participants' views on the needs of FHHs, was associating the male household headship with availability of economical (finances), psycho-social (security, healthcare), and physical (food) provisions. In the context of the ecological framework, economic, psycho-social, and physical needs interrelate to the food security among the FHHs. Their interrelatedness therefore is the meso-system. Additionally, the participants associated females' lack of access to information with general illiteracy levels among women. Smith et al. (2003), in Malapit and Quisumbing, (2015:54) found that, women with higher status relative to men, have greater control over household resources, fewer time constraints, better access to information and health services, and better mental health, self-confidence, and higher self-esteem. Women with greater status have better nutritional status, are better cared for themselves, and provide higher quality care to their children (Malapit & Quisumbing, 2015:54).

Basing these findings with the ecological systems perspective, gender roles determine food security through its linkage with socio-economic (such employment opportunities) and socio-ecological endowments (including agricultural land). These two resources serve as the macro-systems. This observation correlates with Berkes et al. (2003), who emphasised the linkages between natural and social systems, depicting an "artificial and arbitrary" division between the two (Kaiser, 2011:66). Moreover, *Gender and Agriculture*, a sourcebook produced by the World Bank and collaborating partners (2009), warns that the "failure to recognise the roles, differences and inequalities between men and women poses a serious threat to the effectiveness of the agricultural development agenda" (Peterman, Behrman & Quisumbing, 2010:1). The researcher is of the opinion that the gender roles interact to affect the exo-system of the food security. The ecological perspective emphasises on the need for functional symbiosis among all the sub-systems for the larger system (in this case, the FHHs in Voi Division) to operate effectively.

7.2.2.4 Theme 4: Food consumption patterns

In this study, food consumption patterns is central theme since it is influenced by technical indicators of food security, the dietary diversity and food consumption score. Besides the quantitative findings regarding the indicators, this chapter gave them precedent for they illustrate proxies for food security among the FHHs. Because of the qualitative nature of the interviews, not all emerging sub-themes were technically delineated at the design phase of the interview schedule. However, the researcher employed the combination of both emic approach (first order interpretation) and etic approach (second order interpretation) to outline the findings regarding the sub-theme indicators in this analysis. Schurink, Fouché and De Vos (2011:417) interpret the approaches thus: a first-order classification is based on the categories of meaning of the people being studied (the participants in the current study were the key informants), and the latter typology is connected to the researcher's own discovery and reconstruction of the first-order interpretation (or those used by other researchers and/or found in the relevant literature), because the researcher comes in from the outside to interpret the data. Moreover, Räsänen (2015:28:33) explains that, emic and etic concepts in her study involved key informants' and the researcher's concepts respectively. In this chapter, although the sub-themes act as subjective proxies for food consumption patterns, the qualitative data analysis is consistent with the objective and technical analysis on the indicators, during the quantitative phase. In mixed methods, qualitative and quantitative data are aligned based on objectives of study. This view is by De Clark et al. (2011:12), that, semi-structured interviews combine the flexibility of the unstructured and open-ended interview with the directionality and agenda of the survey instrument. In this study, the emerging sub-themes under food consumption patterns include:

- Dietary diversity.
- Food consumption score.
- Food groups.
- **Sub-theme 4.1: Dietary diversity**

This sub-theme emerged from the responses provided by the key informants regarding their observations with regards to the dietary diversity of households in Voi Division. The interview question was guided by the research question:

- **What is the status of dietary diversity among female-headed households in Voi Division?**

The responses provided by the key informants elicited the following categories:

- Poor dietary diversity.
- Acceptable dietary diversity.
- Rural-urban nexus and/or economic capacity.
- Coping strategies.
- **Poor dietary diversity**

A vast majority of the key informants indicated that, people in the Voi Division were experiencing poor dietary diversity, as follows:

“Diet is compromised completely. Because a time like this, you know people take what they find on the table. They don’t have that liberty to choose. So diet is an issue. For example if maize is the only food available, you won’t hear somebody talking about fruit and every other thing. They just eat what is there!”

“Actually people here don’t eat to get nutritious food but eat to fill their stomach ... because they don’t eat fruits - they eat fruits when they are sick ... even if they have local poultry, they don’t eat eggs, they keep them to sell.”

“In Voi one, is a dry area so *in terms of chakula, kidogo kuna matatizo* (in terms of food there are challenges).”

“Some getting a balanced diet, it is expensive.”

“I tend to think not (*balanced*) because of the level of poverty.”

“Most people are not having a balanced diet. Three meals in a day is not possible for most.”

- **Acceptable dietary diversity**

Only one participant observed that food security among the Voi Community was acceptable:

“The diet is balanced, awareness was created, so everybody knows about nutrition there are no cases of malnutrition.”

- **Rural-urban nexus and/or economic capacity**

Some participants expressed mixed reactions regarding the dietary diversity. They said some of the community members in the Voi Division were having acceptable or poor dietary diversity depending on where they resided and/or their economic capacity. The following quotes illustrate the reactions by the key informants:

“Voi is a town, but in the interior villages ..., especially in Maungu, vulnerability is very high. Because in Maungu, they depend on farming and currently the rain is not reliable. So the food is not there for the children. They are not getting balanced diet.”

“Those who purchase are the people around the town; but the village level, they don’t have that capacity ... the purchasing power.”

“Just on average, you know something to do with food, not all people are able because the number of people who are not employed are so many.”

“Basically in terms of diet, it varies because Voi is very vast. Almost 60% of people in Voi live with one meal.”

- **Coping strategies**

Among the responses concerning diets, one participant highlighted that the community was employing coping strategies. The participant observed:

“... they are trying to survive in one way or the other, using the given the resources that they have.”

- **Sub-theme 4.2: Food consumption frequency**

The research question which guided this sub-theme of food consumption score is:

What is the status of food consumption frequency among female-headed households in Voi Division?

This research question is comparable with objective two of the study, which was: to measure food consumption frequency among female-headed households in Voi Division, Kenya, by utilising food consumption score as an indicator of food security. With regards to the key informant interviews, the researcher asked the participants to mention what they thought about food consumption patterns in the Voi Division. The responses to this question were diverse and yielded the categories illustrated herein:

- Poor food consumption score (FCS).
- Acceptable FCS.
- Rural-Urban nexus and/or economic capability.
- Coping strategies.
- **Poor food consumption score (FCS)**

The participants provided the following responses (the second verbatim was expressed as a response to the question on the dietary diversity). As indicated earlier, there was not much differentiation between the dietary diversity and the FCS. However, the researcher used etic interpretation in classifying them thematically. Poor FCS is illustrated through the verbatim quotes below:

“... nothing like a special breakfast ... the vulnerable - the ones we are working with, areas of Kasigau and some parts of Voi.”

“The food consumption score in Voi according to health and nutrition department, they had gone down at that particular time we were doing assessment; because if you look at what they eat, not the amount but the intake in portions, it was not balanced.”

"I can regard it poor, because generally we need a balanced diet. And for them the source of protein is mainly beans and here we do not grow beans, we rely on the market and the prices are high. So getting proteins is also an issue. But for vitamins and starch, it is plenty ... vegetables but not fruits."

- **Acceptable FCS**

The researcher through etic interpretation construed the verbatim quote expressed below as implicative of acceptable FCS. This is because unlike the other key informants, the participant confirmed recording 3 meal intakes:

"Ugali (maize meal): supper: kiporo (previous night's ugali): morning and taken with tea as breakfast; lunch: ugali, githeri (a mixture of whole maize and pulse), pure/muthokoi (a mixture of pounded maize and pulse)."

- **Rural-urban nexus and/or economic capability**

This category emerged as a result of mixed reactions by some participants that, some community members in Voi Division had good FCS, while others had poor FCS depending on their financial capability and residential area. The verbatim quotes highlight the emergent category:

"That question goes with the dietary. It depends on the means of access."

"We are dealing with different people and different classes at the same time. Some are able and others not able - they are average."

"For those who can afford, the food pattern is a very normal. That is in the morning a cup of tea, bread or something, lunch hour something light meal. Yes, I can say it is a very normal pattern. Rural is a bit challenging I have been to places where people really don't know what is lunch; and in most cases not that they don't want, but because they can't afford. Either because there is no water, either again water forms part of food."

- **Coping strategies**

Some participants revealed that the community of the Voi Division was also employing coping mechanisms in food shortages. The quotes below illustrate the sub-theme:

"... in the morning they take what they had for supper and reserved it a little for the morning."

"They normally reduce the size of the food. Because they want to eat more days, than to eat enough and then miss (food) the following day."

"The community eat in the morning and in the evening."

"We have got a lot of problems because we take only tea. That's all! A single tea! No snacks! Very rare snacks! And at lunch we try to add but in the evening now we eat a lot."

"Most of them just take breakfast and dinner."

“Most people like to eat in the evening and mornings I think, but during the day they can skip. Purchasing power may be lack out”.

- **Sub-theme 4.3: Food groups**

The researcher grouped food groups in the theme of food consumption patterns, because technically, food groups inform both the HDDS and the FCS. This sub-theme was captured by the question relating to the specific foods that are eaten in Voi Division. All participants mentioned maize (in its original form or maize meal) as the main food consumed in the Voi Division. Other main staples were rice, millet, sweet potatoes, Irish potatoes, wheat and green banana. Pulses were: beans, green grams, pigeon peas, cow peas. Vegetables entailed kales, cabbage, indigenous vegetables like dandelion. Fish was mentioned once. The verbatim quotes below illustrate the responses:

“Maize, beans, to some extent they grow a lot of green grams, and pigeon peas and cow peas. Maize takes the lead.”

“Their staple food especially is ugali (maize meal) and rice”

“Ugali and greens, and porridge for the under-fives. Just white flour (maize flour) (*for under-fives*) but a few of them use the one from millet or sorghum.”

“The universal ugali, rice, sweet potatoes, Irish potatoes.”

“Ugali (*translation: they mostly eat maize meal*), then from there ndio wanakula pamoja na beans, green grams.”

“Cabbage, rice and beans, *viazi tamu* (sweet potatoes), *viazi* (Irish potatoes), *greens – hizo dunda* (green vegetables like manage), and *ugali* (maize meal).”

“Maize in ugali, and Sukuma wiki or sometimes the local vegetables.”

“Ugali, rice ... cowpeas, green grams.”

“The staple food of many people is Ugali – in fact maize ... maize is the major, even cassava, sweet potatoes.”

“Maize is the staple food, beans, cowpeas and green grams.”

“Yeah mainly ugali, that’s a staple. Then like of course with vegetables. For *Taitas* (Taita people), there is *mchungu* (dandelion) and other green vegetables, and some local food they call *kimanga* (a mixture of potatoes, green banana and pulses, and possibly a green herb), then they have the rice, the *githeri* (mixture of whole maize, bean or other pulse).”

“Mostly they take staple food: ugali; bananas because we do a lot of banana in Taveta; also rice being an urban area - rice and ugali are the most foods taken by people here.”

“People eat ugali and normal greens: Sukuma wiki, cabbage (*silence*), beans, of course wheat.”

“Yes, rice, ugali - I think ugali is staple, dried fish, and vegetables”.

- **Discussion of theme 4**

The majority of the participants perceived dietary diversity to be compromised in the Voi Division. The reasons for the poor dietary diversity were lack of adequate food stock, eating for satiety in the belly instead of nutritional outcomes, high food prices and poverty. Moreover, the area of residence and economic capacity were also determinants of the dietary diversity. The participants cited droughts among the determinants of the poor dietary diversity. The researcher infers, "... because a time like this ..." in the first quote regarding the poor dietary diversity; insinuated non-rainy season with drought prevalence. This verbatim quote indicates that the droughts influenced the food shortages, which led the community to consume the food available to them, instead of their preferences. Therefore, this should have been a coping strategy. Moreover, the people living in the urban area of the Voi Division were said to be having better dietary diversity compared with those in the far flung rural areas. Drought featured prominently as an influence into poor dietary diversity. The drought prevalence in the study area as the factor of poor dietary diversity corroborates with FAO (2016:51) that, climate change alters rainfall and water availability patterns ... which is crucial in efforts to sustainably improve (food) productivity. In the context of the ecological systems perspective, climate change is a physical ecological environment which links the FHHs micro-system to food security exo-system.

Additionally, the responses on the FCS corroborate with the key informants' observations about dietary diversity, therefore are not very conspicuously different. Since most of the questions in the interview schedule were designed to meet the objectives of the study, the researcher was guided by both participants' opinions (emic interpretation) prominently, and her inferences on the hidden meanings of the responses (etic interpretation) to thematically separate the dietary diversity and food consumption score. From the both sub-themes, dichotomy in social class is seen to influence food affordability. The credibility of such assertion is supported, especially by (KNBS, 2007:48) as indicated previously that, the Coast Region of Kenya has the highest poverty prevalence, such that its rural poverty rate is 73.9%. Taita-Taveta County, in which Voi Division is embedded, has rural poverty rate of 57.2%. Just like the dietary diversity, food consumption score is an exo-system to this study. The poor statuses of the indicators lower food security exo-system.

With regards to the third sub-theme, the food groups, the researcher strived to identify food groups and the staple food from food items highlighted by the participants. As mentioned earlier, food groups are proxies for HDDS and FCS. All participants mentioned maize (mostly *ugali*) as the most common food. Participants used the following words to describe the maize food item, "maize takes the lead", "maize is the staple", "the universal maize",

“they mostly eat maize meal”, “maize is the major”. From the responses, it is clear maize was the commonest food, despite the droughts mentioned by participants and the researcher’s observations of very poor food yields during immediate rain season. Persistent droughts in the country (Kenya) had precipitated the poor maize yields going back even before the 2016. The national maize output in the year of the study (2016) projection indicated below average: “national maize output from the long rains was expected to be 16% below the five year average (KNBS, 2014:8-9)”. This study’s finding is consistent with a study by Ntwenya, Kinabo, Msuya, Mamiro & Majili (2015:9) which found, high factor loading on cereals consumption than other food groups irrespective of seasons - which confirmed observations from other previous studies that have documented shift in the dietary patterns of the dominance of cereal based diets (in all seasons). The finding further corroborates the quantitative findings of this study (see chapter 6), that maize featured prominently in both the HDDS and the FCS, and was the staple food. Other sources-of-carbohydrate foods mentioned were: millet, rice, Irish potato, sweet potato, wheat. Besides the carbohydrate food, the findings indicate protein foods which include: beans, pigeon peas, cow peas, green grams, and dried fish. The major sources of vitamins are: green vegetables and cabbage. No fruits were mentioned.

These food items can be classified according to both the dietary diversity score (DDS) and the FCS: The maize millet, rice and wheat belong to “cereals” food group of DDS and “main staples” food group of FCS. Irish and sweet potatoes are in “roots and tubers” of DDS and “main staples” of FCS. Beans, pigeon peas, cow peas, and green grams belong to “pulses and legumes” according to DDS and “pulses” according to FCS. Dried fish belongs to “fish and seafood” according to DDS and “meat, fish and eggs” according to FCS. An example of a similar study was to assess dietary patterns and household food insecurity in rural populations of Kilosa District, Tanzania, which found food insecurity to be negatively related with all dietary pattern scores (Ntwenya et al., 2015:6).

The findings on the theme of food consumption patterns illustrate the interrelation between the sub-themes – the DDS, FCS and food groups in informing food security. Generally, the indicators of food consumption patterns are the exo-systems that are influenced directly or indirectly by both human and physical ecological systems.

7.2.2.5 Theme 5: Sources of food

The question on sources of food required participants to mention major sources of food for households in the Voi Division. Likewise, in the consumption patterns, the researcher employed both the emic and etic approaches in patterning the responses in this section.

This is because one participant may have given a response with more than one sub-theme. The following are the emergent sub-themes:

- Own production.
- Market.
- Food aid.
- Comfort with food accessibility.
- Differences in food sources between male-headed and female-headed households.
- **Sub-theme 5.1: Own production**

Many participants said the community of the Voi division, particularly those residing in rural areas, acquired food from their own agricultural production. The participants' responses are highlighted by the following verbatim quotes:

"Own production ... If it (rain) has failed, everything goes."

"... from their own farms - the rural areas or those near the rivers."

"... and when there is good harvests from the farms."

"From their own farms."

"... maybe in the rural, you might find some are farmers."

"... they either grow"

"First it is from the farms."

"Form their farms."

"... subsistence farming in a small way"

- **Sub-theme 5.2: Market**

All participants said market was the major source of food for the Voi Community. This is demonstrated by the following verbatim quotes:

"People living in urban areas in Voi get supplies from the people who have *shambas* - they buy."

"They purchase"

"It's market"

"... purchase from the market."

"... people buy from the food imported from Taveta and other upcountry regions
...."

“They buy from market. The food comes from different areas of Taveta, Wundanyi and Nairobi.”

“Market.”

“Shops.”

“... others come from other places like Mwatate, Taveta – we buy from them.”

“From the market- we have retail markets.”

“... from the market”

“They buy”

“... people buy the food – shops stores and market.”

“Buying.”

- **Sub-theme 5.3: Food aid: Free relief food and food for assets**

Few participants observed that, food aid was a source of food to the Voi Community. The participants had the following observations:

“... relief food, food for work - food for assets.”

“... relief food.”

- **Sub-theme 5.4: Comfort with food accessibility**

A vast majority of the key informants said that, the community of the Voi Division was not comfortable with the sources of food. However, many more participants indicated that the community was comfortable especially with regards to geographical proximity to the markets.

- **Not comfortable**

For the participants who said that the community was not comfortable with the sources or accessibility had the following opinions:

“Of late we have reduced kind of rainfall. That has been a very great challenge, communities have a lot of input in terms of time, seed and every other thing, and finally the rains will not be able to support the crop.”

“Not really because some food is coming from Taveta, and there those days they are not able to get from the local people so they are forced to get it may be from Taveta and come and sell it to people in Voi”

“They are not comfortable because of the minimal economic activities in the county; because in the Voi Sub-county, they rely on what we call casual labour, either from the currently SGR (*Standard-Gauge-Railway*), from the Voi Town, and from the sisal, and the issue of income The small markets in the Voi Sub-county that is in areas of Kasigau, Marunguo and Ngolia. They get their foodstuff from Voi Town.”

“It is a desperate situation madam! We have to take anything! So it is convenience!”

“... the time they don't have the time to come to the market; so they depend on the foods they will get from their farms. That means if the rains are not enough, they will get less food. They are not comfortable.”

“No.”

“No they are not comfortable ... because the state-owned NCPB (National Cereals and Produce Board) is supposed to sell them the subsidised food prices but have left the farmer to the mercy of merchants.”

“... the purchasing power of the people ... it is low”

“Basically no, because of the high prices of the commodities.”

“I am sure they are not.”

“Purchasing power is low.”

- **Comfortable**

Some many more participants said the Voi Community was comfortable with the food accessibility, as shown by the following verbatim quotes:

“The shops are accessible.”

“The market for the food is accessible to the people.”

“Market is accessible.”

“... of the supply I can say yes, because Voi is somehow centrally placed”

“... yes, because we have different outlets within Voi - are really accessible.”

“... yes, super-accessible.”

- **Sub-theme 5.5: Differences in food sources between male-headed and female-headed households**

Some of the participants described the sources of food as divergent according to gender. They had the following observations:

Female-headed would go to their *shambas* and dig, unless maybe somebody has some business to support herself buy some food. Men would basically engage in casual labour if the farms cannot support them. Sometimes you would hear a person... which is now bad to mention, beginning to engage in vices.

“Mostly women are the ones who are engaged in economic activities, men basically go to drink when they get small money. Yes (*women do a lot of food purchases*).”

“Sometimes households headed by women seem to be more secure. Because women are more hard working.”

“In fact the families headed by women feed better than those headed by the men, in Voi. Most men are drunkards, so the allocation of budget to food is little compared to what is allocated to alcohol!”

“Women are strict, so they provide in a more adequate way. Whereas the male-headed household is normally not well supplied with food. Because the man has several temptations, because... before he brings something to the table. *Atapitia kwa mama pima* (he will pass by a woman brewer's den), *apitie* (pass by) maybe to a woman friend who will also demand something (*both laughs*). So, that reduces the amount of food that will be delivered, because food is counted in terms of money.”

“Female-headed households are more organised; because women have their own way of setting up a family.”

- **Discussion of theme 5**

The findings on this theme reveal that, market as the main source of food for households in the Voi Division. This finding is consistent with Mjonono, Ngidi and Hendriks (2009:5) observation that, purchases are a major source of food for households. The findings are moreover consistent with Republic of Kenya (2011:11) as indicated in the literature review chapter 1 that, most Kenyans rely on markets for most or all of their food needs. The second main source of food is own production, particularly among the rural inhabitants of the division. According to Chagomoka et al. (2016:2), rural household food availability is achieved mostly through own food production. Food aid was not very popularly highlighted as a major source of the food. However, literature shows wide application of food aid as an intervention programme for household food insecurity. For example, in the UK, “food aid” is increasingly being used by policy-makers and NGOs (Cooper et al., 2014 in Lambie-Mumford & Dowler, 2014:1419) to encompass a range of different types of short-term assistance with food, beyond the provision of food parcels, to include onsite and home-based meal provision (Lambie-Mumford & Dowler, 2014:1419). These findings are consistent with the findings in the literature review, that some of the sources of household food are purchasing from markets; own food production ... and food as payments (Mjonono et al., 2009:5), and food aid (Wahlberg, 2014:3). These findings can be viewed from the “lenses” of the ecological framework that, the interactions of the market, own production and food aid link the community, including the FHHs to food security, as long as the sources are stable. According to Kaiser (2011:66) while quoting Campbell, Reece, Taylor and Simon (2006), ecological–social systems are made of nested ecosystems comprised of abiotic and biotic factors that are self-regulating. The researcher tested the stability concept by asking the participants whether the community of the division felt comfortable in food access.

With regards to the sub-theme 5.4, the informants indicated that, households in the Voi Division were mostly not comfortable with the sources of food. The reasons for the discomfort were: droughts, food import from far flung areas, lack of employment for income

generation, lack of food subsidies by the government, general low purchasing power and high food prices. All these reasons amount to poor food access because of the high food prices which influenced low purchasing power. This finding is consistent with Cooper, Purcell and Jackson (2014:10) finding that, high food prices affect food acquisition. This observation is still emphasised in the chapter one that, in Kenya, high poverty levels affect access to food, since most Kenyans rely on markets for most or all of their food needs (Republic of Kenya, 2011:11). Conversely, some key informants indicated comfort with the food sources especially because of the proximity to the markets. The researcher is however of the opinion that physical proximity does not always translate into actual food acquisition. Generally, the findings indicate that physical access to food was fairly good but the economic access was constrained. Therefore, the finding was in partial fulfilment of the WFS stipulation of what constitutes food security. At the introduction of the chapter 1 of this study, Aiga and Dhur (2006:36); Du Toit, et al. (2011:2), indicate, food security is said to exist when all people, at all times, have physical and economic access to sufficient, safe, nutritious food to meet their dietary needs and food preferences for an active life. Therefore the fair physical access by the Voi Community was fulfilling the part of the “physical access” but not the part of the “economic access”.

From the verbatim quotes on sub-theme 5.5, among the differences that existed between the male and female-headed households, the key informants’ praised females for being hard-working, not involved in vices such as alcoholism (hence females provided food for their households better than males). This finding corroborates Patel et al. (2015:33), that, the Ekwedeni Region of Northern Malawi is characterised by high levels of gender inequality within food insecure families, and excessive alcoholism among husbands. These inequalities predisposed FHHs to seek casual labour from well-to-do households (Patel et al., 2015:33). Similarly, in this study, the FHHs were found to engage in casual labour (see chapter 6). Furthermore, according to some of the verbatim quotes, the females of Voi Division utilised their income responsibly, especially in food purchases. On the other hand, the finding contradicts Cooper et al. (2014:8), that, food poverty affects women more than men, because many women can go hungry in order to feed their children; and single parents, the majority being women, are twice as likely to live in poverty than complete families. In summary, the verbatim quotes on the sub-theme elicited the following varied opinions:

- Female-headed households farm more than male-headed;
- Males do more casual labour than females;
- Females do most economic activities in comparison with males;

- Males engage in vices (such as alcoholism) more than females;
- Females engage in more casual labour than males;
- Men are more involved in farm production than females; and
- No difference between female and male-headed households.

Generally, in the context of the theoretical framework of this study, the sources of food as the exo-systems of ecology were influenced directly or indirectly by both human and physical ecological inputs.

7.2.2.6 Theme 6: Coping strategies

Coping strategies are coping behaviors that household members rely on when they do not have adequate food to consume (Chagomoka, 2016:2; Vaitla et al., 2015:8). The researcher of this study explored from the key informants whether the households in the Voi Division were relying on the behaviours. Since they indicate coping with food shortages, coping strategies serve as proxy for food insecurity. The theme elicited the following sub-themes:

- Skipping meals;
- Reducing portion size of meals;
- Purchasing food on credit;
- Reduce portions for adults to allow more to children; and
- Parents sending children to eat elsewhere.

• Sub-theme 6.1: Skipping of meals

Several participants indicated skipping of meals as a form of coping with food shortages among households in the Voi Division. This is illustrated by the verbatim quotes below:

“... or sometimes people take only supper - meal-skipping”

“... skip meals – can do one or two meals in a day- breakfast and supper.”

“One, skipping of meals”

“... skipping meals: some have two meals per day”

“... skipping”

“... skipping a meal a day”

• Sub-theme 6.2: Reducing portion size of meals

Few participants observed that reduction of portion size of meals was used as a coping strategy. They said:

“They reduce the sizes of meals, reduce the portions of meals per day e.g. if they used to eat two KGs now they use two”

“If you buy like two kgs unga (flour), and you make sure at least I eat today, tomorrow; rather than having porridge in the morning”

- **Sub-theme 6.3: Purchasing food on credit**

Only one participant indicated that the households were purchasing food on credit to cope with food shortages. To affirm this, the participant used the following statement:

“Some access food in terms of credit.”

- **Sub-theme 6.4: Reduce portions for adults to allow more to children**

A participant observed the following concerning the sub-theme:

“... they could reduce size of portions for the elders and give much to the children.”

- **Sub-theme 6.5: Parents send children to eat elsewhere**

Only one participant indicated that parents were sending their children to eat elsewhere, particularly at school. From the response however, the researcher is of the opinion that there may not be a clear delineation of the usual universal children’s enrolment in schools and the coincidence of prevalence of school feeding programme by the GOK, or the parents were merely sending the children to school for the sake of eating at the schools. Nonetheless, the participant had the following observation:

“... those parents, they send their kids to schools. Most of schools unapata the school feeding programmes na watakuwa relieved nyumbani (*translation: there is school feeding programme in most schools and the children who attend such schools are relieved of hunger*).”

- **Discussion of theme 6**

The major coping strategy employed by the households is skipping meals. On this note, the researcher, while conducting the survey, noticed that the most skipped meal was lunch. Moreover, ten o’clock and 4 o’clock snacks were non-existent particularly among the rural community. Other coping strategies found among the Voi Community were reducing portion size of meals, purchasing food on credit, reducing food portions for adults to allow more to children, and parents sending children to eat elsewhere. Generally, the coping strategies used in the Voi Division are found elsewhere. The study by Tefera and Tefera (2014:98) found the following coping strategies as used in Mareko District of Ethiopia: reducing the number of meals, reducing size of meals, borrowing grain and cash, receiving food aid and others among both food secure and food insecure households. Most literature, including CARE/WFP (2003:2) and Vaitla et al. (2015:8), as discussed previously in the literature review show coping strategies as food access indicator. In relation to the ecological systems

framework, coping strategies indicate unstable exo-systems of food shortages or food insecurity.

7.2.2.7 Theme 7: Status of food security

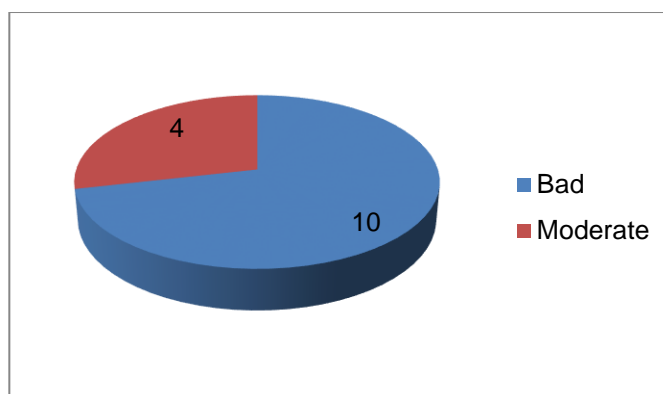


Figure 7.2: Status of food security

The researcher required from the key informants, information regarding food security status in the study demarcation. The discourse between the researcher and the participants elicited the following sub-themes:

- Moderate food insecurity, and
- Poor food security statuses.
- **Sub-theme 7.1: Moderate food insecurity status**

The moderate food insecurity status emerged as a result of the following verbatim:

“Well, fair - fair in the sense that many people have been enlightened”

“I can say 50:50; because there are areas they don't get food so they depend on relief food so I can't say I can say 50:50 ... but eh sometimes with the situation we are right now, sometimes droughts - lack of rains sometimes; it goes to 60 to 65. So far the World Food Programme (WFP) and the World Vision have reduced the tendency of giving the community food - that means the situation is not that bad.”

“Moderate because of those in towns and severe for those living in the rural.”

“50 percent is insecure.”

- **Sub-theme 7.2: Poor food security statuses**

A vast majority of the participants indicated that the food security status in the Voi Area was generally poor. The following verbatim quotes illustrate the sub-theme:

“Severe.”

“Not very good.”

“Voi Sub-county is food insecure.”

“... for now food security is poor and this is because of drought.”

“Bad!”

“Currently there is a problem; currently it is dry *kabisa* (completely)! There is nothing particularly in Voi there is nowhere people will get food apart from buying.”

“Generally it is not so much good because of the sources of getting it. Most of the people in Voi are not employed.”

“It is bad! *Reason* - The drought and human wildlife conflict .

“Voi is not food secure from the farms”

“Currently as we speak the community is food insecure because as I said before the production was not very good. They didn’t harvest enough for them and in order to sell; and then coupled with that, the issue of wildlife conflict - the elephants which destroy the crops, so low purchasing power means they cannot access the food in the markets.”

- **Discussion of theme 7**

A fair number of the participants observed that the status of food security in Voi Division was moderate food insecurity. They insinuated that the reasons for the moderate food insecurity status were because the community was enlightened on matters concerning food security, and better socio-economic status of township community inhabitants. On the hand, the salient finding was the prevalence of poor food security status among the Voi Community. The poor status was associated with droughts particularly among the rural area dwellers. Secondly, the existence of food assistance is indicative of vulnerability to food insecurity among the community members. This is consistent with, “an agricultural season had an influence on food availability, access, utilisation and stability in the supply of the foods” (Ntwenya, Kinabo, Msuya, Mamiro & Majili, 2015:9). Other factors that influenced the poor food security were unemployment and human-wildlife conflicts. According to Kaiser (2011:63), the ecological–social perspective provides a useful framework for analysing food security because of its emphasis on reciprocal interactions between people and their environments. Therefore, in this study the interactions between the ecological factors (such as droughts) and the community “bounded” in the Voi Division, including the FHHs influence the food security exo-system.

Moreover, the findings regarding prevalence of food insecurity in the Voi Division allude to credibility of the recent report that, the world’s hunger rates are taking negative turn from the trend of the continued improvement up to the MDGs final year, 2015. UN (2018:10) reports that, the world hunger is rising again now, following a prolonged period of decline, as more people suffer food insecurity, especially in the Sub-Saharan Africa. The researcher

is of the opinion that the Sub-Saharan Africa food insecurity is getting into a downward trend owing to ecological factors, the droughts, which dwindle crop yields, as rightfully highlighted by the participants. This means that the call for eradication of hunger and food insecurity still persists.

North American organisations representing a wide variety of interconnected interests focusing on social, environmental, and economic justice define food security at the community level, “community food security is a condition in which all community residents obtain safe, culturally appropriate, nutritionally sound diet through an economically and environmentally sustainable food system that promotes community self-reliance and social justice” (Hamm & Bellows, 2003:37 in Kaiser, 2011:63).

7.2.2.8 Theme 8: Interventions for food security in Voi Division

In this theme, the data provided by key informants with regards to interventions for food security in the general community of the Voi Division, is thematically presented:

- **Sub-theme 8.1: Support from external change agents**

The key informants were of the view of the community is getting assisted by external agencies as reflected in the following verbatim quotes:

“So we need to do water trucking, surveillance in diseases, both of human and even for livestock. And also to curb human wildlife conflict, KWS to enhance surveillance into these area. Also the Agriculture Department should introduce drought-tolerant crops”

“... there were foods which were being donated to the people who were not well off. We call it relief food; but nowadays, the relief food goes to those people who maybe they are not in the well good position, the disabilities, and also the old.”

“This time round we have county governments in place; and because most services have been devolved to the counties; I think it is upon the county government to have analysed, and have the data about such a person within sub-counties and come up with ways of trying to help them. For example the professionals in the sector of agriculture should tell the people ‘go back to farming!’ - Modern ways of farming. Let the county government pump good money to such organisations and all that so that the people on the ground are able to benefit and even produce more food”

“First deal with the issue of human-wildlife conflict - to erect maybe an electric fence to prevent the animals from coming to this place; then promote water harvesting because this is an arid area, so the rains that we have ... if the government can put more measures to harvest that water can help to produce food; then enhance access to capital especially for the female-headed households, reduce the conditions for them to access that capital; and enhance marketing.”

“The county government; but I think the national government has a role to play too. Because you realise to build enough water for irrigation, we require a billion of shillings. Like now we are talking about the Murang’a Tunnel. Currently, we

have been working with some consultant to see whether we can actually remove water from Njoro and do irrigation in Mwatate. It is something that I have been concerned and I went to South Africa the other day to try to source people to fund us - our project and some of these projects can be very costly; particularly where water cannot flow via gravity, has to be pumped so much electricity needed."

"We can bring input and market: like farmers be supported from input level to market level; and priority should be given to female-headed households - seeds, fertiliser, and irrigation kits."

- **Sub-theme 8.2: Participatory community engagement**

Many key informants were of the opinion that, besides the external change agencies input, the community should be pro-active in changing their food security statuses. The following quotes illustrate their views:

"Protracted Relief Recovery Operation (PRRO): It is a step taken from just giving food relief - doing something else that would bring a lasting solution to food security I feel if the government would have taken their other part in the helping the whole community to do terraces, the technology of zai pits so that it becomes a kind a law, rule or policy, like what chiefs used to do, they kind of forced somebody to plant this kind of ... it must happen, whether you like it or not, it is what we used to call Chiefs' Act."

"Maybe, at least the community should use the little amount of rainfall by building those structures to avoid using more area of farming; examples like green houses, zai-pits, so that when rains come they can store more water for their crops, and so that crops can be watered and can grow into maturity; also terraces."

"Maybe improve the farming technology that they are doing, that's key. In fact that is what we are doing, with this project the asset creation, because the area is very rare to rainfall. And we introduce those technologies *kama hizo* (like those) zai-pits and terraces, for soil and water conservation. So that the little rain they receive can be tapped and used for crop production."

"... We are intending ... because in the part of the value chain, people can keep poultry, and when the chicken are ready, they need to be slaughtered and to go the market"

"In future to having irrigation to the people who have lands to do irrigation for agriculture, and even empower the community on issues of entrepreneurship regarding agriculture: these issues of having *kukus* (chickens), *mboga* (vegetables) to the people who have lands, *lakini sasa* (but now) it's dry they don't a source of water. So even in the future, water will be a problem in Voi!"

"First of all, they should plant drought resistant crops, sink dams and water pans, then fencing off the park - the KWS (*Kenya Wildlife Services*) -that is to avoid human wildlife conflict."

"There is need to change the current farming system to climate-smart. Because there is a lot of effect due to climate change: by growing drought-tolerant crops, improving on soil and water conservation especially water harvesting: we should get at least several water pans so that people can harvest water and use it for irrigation, to grow high value crops which can generate income fast like vegetables and the likes."

“One, we have to have a better adaptive way of dealing with issues of food security. One, we have to work out the issues of climate change adaptation by making sure we protect and conserve the environment. And is by protecting and conserving the environment, that means the issues of droughts, floods, disasters will be overcome by protection and conservation of the environment: one, we have to manage the forest cover, conserve the water sources and conserving water sources, we also need to maximize on water harvesting strategies in order to boost food security because if you have water, you can also produce food.”

- **Discussion of theme 8**

The theme “interventions for food security in Voi Division” emerged from emic and etic interpretation of the findings as elicited by the key informants’ verbatim. The interventions mentioned by the participants were either on implementation phases or were proposals. The sub-theme of “support from external change agents” means that community development in the Voi Division are brought about by development agencies, with little or no local community participation. A fair number of participants indicated that the interventions on food security in the Voi Division were or should be through food promotion services such as: provision of mobile water services to community members living in remote areas of the division; human-wildlife conflict resolution between residents of the division and the wild animals from Tsavo East National Park; direct food assistance to vulnerable communities living in the division based on research evidence; financial resource assistance to the communities for modern farming, including irrigable crop production; and promotion of sustainable food markets. The majority of the participants who mentioned the intervention strategies insinuated mostly, the Taita-Taveta County Government and the Kenya National Government (and its agencies) as the implementing bodies of the services. This finding is consistent with food security promotion services by the City Council of Darebin City in Australia. One of the best practice and guiding principles of 2016 to 2020 Action Plan by the City Council is to: “Promote environmental sustainability through localised food production, sustainable food choices and food waste” (Community Wellbeing, Sa:11). This action plan shows the pro-activity by the council as food security development implementing agency among the vulnerable groups in the Darebin City.

With regards to participatory community engagement, majority of the key informants indicated that climate change was the major hindrance to food security, hence suggested the following multi-sectoral climate-smart practices as the possible interventions of ensuring food security in the Voi Division: with the support of the government, the local community should practice climate-smart innovations such as cultivating crops in green houses, digging zai-pits (holes for collecting rain water while ensuring the crops in the hole benefit from the water), digging terraces for collecting rain water in and conserve soil, cultivating drought resistant crops. Other suggestions were: adding value to food to catch better

market prices, practice irrigation in food production, the government (through Kenya Wildlife Services) to install (electric) fence to avert human-wildlife conflict - wildlife from the Tsavo East National Park invade farmlands adjacent to the park, destroy crops and kill livestock. A similar situation to the sub-theme can be corroborated by an illustration about the City Council of Darebin City and the proposed city communities' participation in food security promotion. The city has the following action plan of ensuring vulnerable community's food security: "supporting and advocating for increased community gardens in neighbourhoods where there is significant social and economic disadvantage both for local fresh food production and to integrate intergenerational opportunities and involvement" (Community Wellbeing, Sa:10).

According to the ecological systems perspective, all levels of human ecology work for the benefit of each other, hence the relationship is the meso-system, and should form cordial symbiotic relationships for proper functioning of the entire macro-system. For instance, according to FAO (2013c:16), it is not only a single technique or practice (on food security) that has to be considered but the system as a whole, at the farm and household level and beyond the farm gate (in this case, external change agencies). It is also important to form multi-sectoral partnerships in solving food insecurity among the community as evidenced by the City Council of Darebin City action plan:

Develop partnerships at all levels to recognise the broad inter-sectoral context for food insecurity prevention and management - all levels of government must work with various sectors to influence the social, economic and environmental factors that determine food insecurity; work from an evidence-based approach to ensure program planning and evaluation is informed by research and local information; research, monitoring, evaluation are essential components that will underpin food insecurity and nutrition initiatives (Community Wellbeing, Sa:11).

Therefore, multi-agency collaboration, including with the local community will have more positive impacts on ensuring total food security among the communities living in the Voi Division, including the FHHs. Furthermore, one view of the ecological systems theory indicates that the "network" of relations between the five ecological levels determine its continuous existence.

7.2.2.9 Theme 9: Interventions for food security among female-headed households in Voi Division

Regarding interventions for food security among the FHHs, the key informants suggested several strategies that elicited 3 sub-themes, as follows:

- No special treatment (equal treatment with men).
- Formation of self-help initiatives.

- Interventions for food security among FHHs should be specially designed.

The sub-themes are visually presented in the figure 7.3.

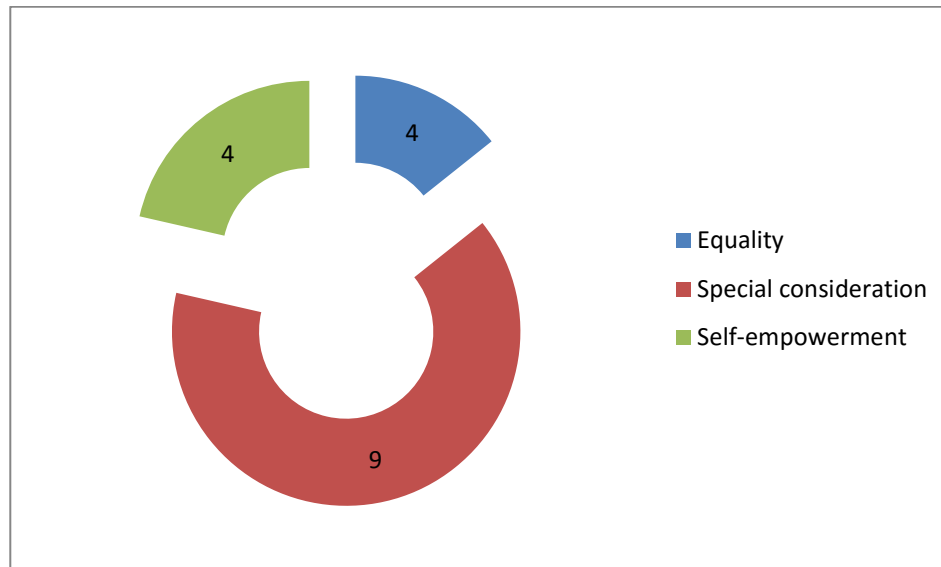


Figure 7.3: Interventions for food security among female-headed households (n=14)

- **Sub-theme 9.1: No special treatment (equal treatment with men)**

Few participants were of the opinion that no special treatment should be accorded to FHHs.

The following verbatim quotes show this observation:

“I don’t want to separate the male and female as per se ... like the Ministry of Agriculture in Kenya and the government - if it is dealing with farmers.”

“No! The issue of specialty no! Once we start putting specialty on female-headed households or males-headed households, we will also put a gap!”

- **Sub-theme 9.2: Formation of self-help initiatives**

A few more key informants suggested for self-help efforts among the FHHs. They said:

“At least they form some groups whereby they can be contributing a small amount (of money) or those kitties ... such they can form groups ... they can make table-banking whereby when you are hit by a need, it is easier to access the money rather than keeping it in banks, then they can buy food. Because *kama huna chakula* (if you do not have food), you can go and borrow small “loan.”

“Maybe formation of groups, and then they get involved in small businesses, table banking. You know when they are in groups, *wanaweza ku-access loans* (they can access loans).”

“Most of the time we have to work so that you can sustain your life and move smoothly.”

- **Sub-theme 9.3: Interventions for food security among FHHs should be specially designed**

A vast majority of the key informants suggested for both the external change agencies and local community either alone or in partnership, in interventions for food security. The verbatim quotes below illustrate what they said:

“A lot of sensitisation is important both for psychological and economic encouragement, because this is somehow very hard for ladies, when it comes to issues of food security, school fees and so many other chores to be undertaken. Then out of that, they need also to be trained on how they can get their own incomes. Even if it is a small business or entrepreneurship, that could assist. And also they can be engaged in politics to be leaders so that they can be empowered and also get a source of income.”

“We need to identify them as a unique entity in the community and vulnerable people, so that we come up with a special package which can be a financial package, technological package.”

“... they should be empowered to get those sources *kama ni pesa* (such as finances), *maji* (water), business, *mambo na* (something to do with) income”

“They need more support ... from well-wishers ... NGOs”

“... If the county government should mobilise these women and come up together in a forum –for the women to air their views and the challenges that they have. Out of those forums, they can come up with tangible and all the needed mitigations. If it is now the government has given some money, we are going to construct shelters or if there is a certain *mrandi* (project) that we have to put.”

“Me, what I can say is that they seek more share on land ownership, and the law should be reviewed to considered female children and be allowed to inherit family land.”

“Encourage to form groups and participate in activities that are not capital intensive like value addition activities”

“I would actually recommend the government that such families be given special consideration Things like having these families helped pay school fees - some subsidies so that they are able to afford the education.”

“Basically they should be given priority when an intervention is being made: start by knowing first of the level of education of the woman, then they be registered first instead of calling farmers in general.”

- **Discussion of theme 9**

The theme on interventions for food security among FHHs elicited 3 sub-themes. The first sub-theme emerged from few participants indicating that, no special interventions are needed for FHHs. The second sub-theme emerged by a few participants indicating that female household heads should form self-help initiatives such as forming groups for saving and loaning money, and small business enterprising. Thirdly, majority of the participants indicated that interventions for food security among the FHHs should be specially designed

to fit their needs. The participants indicated that, it is important to sensitise the FHHs on food security; and build capacity among the FHHs, especially through training the household heads on strategies for entrepreneurship, political involvement, and food value addition. Other interventions are direct assistance from well-wishers, non-governmental organisations, and government(s) through assisting the FHHs in paying and subsidising school fees for their children. Moreover, the participants indicated that the female household heads should be actively involved in decision making with regards to their households' food security interventions. Lastly but not least, the females should be allowed to own assets, including land.

The first sub-theme regards FHHs as equal with male-headed households. The second sub-theme illustrates the need for self-development among the FHHs. Self-help initiatives can increase resource ownership among the FHHs. Ownership of assets is important for poverty reduction, and women's control of assets is associated with positive development outcomes at the household and individual levels (Johnson, Kovarik, Meinzen-Dick, Njuki & Quisumbing, 2016:295). The findings of the research by Johnson et al. (2016:303), on ownership of assets based on gender reveals that, the number, share, and/or value of male-owned assets is higher than that of female-owned assets for all assets and all projects; and rarely does the number or value of women's assets reach half of that of men's. The findings also suggest that greater recognition of the importance of assets, and attention to issues of gender and asset ownership in project design and implementation as well as evaluation, could improve the ability of projects to benefit women (Johnson et al., 2016:308).

The findings with regards to the interventions specially designed to fit the needs of the FHHs indicate the significance of alleviating the vulnerability to food insecurity among the FHHs. This observation is comparable to FHHs elsewhere, including in the City of Darebin. Population and Consultation Data suggest that, low income households including sole person, sole parent (of which 82.4% are women) are particularly vulnerable to food insecurity in the City of Darebin (Community Wellbeing, Sa:7). With regards to the sub-theme of designing special interventions for food security among FHHs, the City of Darebin illustrates that, it is important to formulate an action plan which must be equity-focused and recognise the social gradient of food insecurity; and also by giving a focus on inequalities and those who are most vulnerable should be maintained to ensure that equity of access to safe, nutritious and culturally appropriate food is achieved (Community Wellbeing, Sa:11).

In the context of the ecological systems perspective, the theme of interventions for food security among the FHHs is explainable by FAO (2013c:16) that, most of the changes in

resource use of one factor of production impact on the use of other factors. So, dynamics in FHHs (including gendered resource base) impact other ecological systems of their food security. As seen in the example of Urea Deep Placement programme findings in Bangladesh, changes towards more resource efficiency, even through the introduction of a single new technique, can have major economic and social impacts which, in turn have impacts on food security, especially in terms of access to food. Just as indicated about the theme 8, multi-sectoral partnerships which include the local community participation (FHHs in this case), are imperative for promoting food security among the FHHs in the Voi Division, if the SDG2 of total food security among everyone everywhere should be achieved.

7.2.2.10 Summary of thematic analysis

The thematic analysis of the key-informant interviews yielded several findings. The background and nature of the key informants' work revealed that, the age group of the participants (key informants) ranged from 26 to 50 years, and the vast majority was aged 30 to 50 years, and most were males. Most of the participants had attained a degree as their highest level of education, had 10 or more years of work experience, and their nature of work was food security-related. The longest serving officer in the area of food security had 29 years of work experience, while the shortest serving had one year work in food security sector. All the key informants indicated that they dealt with women in the line of their work.

Moreover, the thematic analysis of the key informant's discourse yielded the following themes: experiences at work place, knowledge about previous research on food security, needs and challenges of FHHs, food consumption patterns, sources of food, coping strategies, and status of food security. These themes elicited several sub-themes. The key informants' experiences at work place reveal the following sub-themes: challenges, tranquility and mixed experiences of both challenges and tranquillity. The emerging sub-themes concerning the participants' knowledge about a previous research were: lack of awareness, presence of awareness and knowledge of some kind of research on another topic. The sub-themes on the needs and challenges of FHHs include: male household headship, finances, security, proper healthcare, food as the needs; and lack of male household headship, lack of financial empowerment, emotional insecurity, landlessness, and gender inequality. The food consumption patterns as a theme was illustrated by dietary diversity, food consumption score and food groups as sub-themes. Food sources as a theme yielded own production, market and food aid, comfort with food accessibility, and differences in food sources between male-headed and female-headed households; while coping strategies elicited skipping meals, reducing portion size of meals, purchasing food

on credit, reduce portions for adults to allow more to children and parents sending children to eat elsewhere. The theme on the status of food elicited moderate and poor food security statuses as its sub-themes. An additional theme was interventions for food security in the Voi Division which elicited the sub-themes of the community in the Voi Division getting support from external change agents, and participatory community engagement in food security interventions. The last but not the least theme was “interventions for food security among the FHHs in the Voi Division”. Its sub-themes are: no special treatment of FHHs, formation of self-help initiatives by the FHHs, and interventions should be specially designed for addressing the food needs of the FHHs. In context of the ecological systems theory, background characteristics of the participants are the chrono-systems (since they are life events) that shaped their occupation in food security; while interactions between various background characteristics are the meso-systems that shape their professions’ relevance to this study. The emerging themes and sub-themes (for example dietary diversity and food consumption score) are the exo-systems because they are the indicators of food security. The community of the Voi Division (including the FHHs) is at times in control of their outcomes through human ecology (including food security intervention services) and at times may not have much control over them through natural physical ecology especially droughts. The community bounded in the Voi Division (including the FHHs) is the micro-system and the Voi Division is the physical or cultural macro-system.

Subsequently, the next section will focus on the observational analysis made during the quantitative phase of the study including the FHHs.

7.2.3 Observational analysis

This is the second phase of the qualitative analysis. The findings in this section emanate from observations made by the researcher and research assistants which were recorded in the observation checklist as field notes. These notes were analysed and themes generated from them. The themes further yielded sub-themes. In this section the themes and sub-themes are presented in the following logical order: the type of dwelling, food consumption patterns and coping strategies. Table 7.4 below shows the themes and emerging sub-themes from the observations.

Table 7.4: Observation themes

Theme	Sub-themes
1. Type of dwelling	

Theme	Sub-themes
2. Food consumption patterns	<ul style="list-style-type: none"> • Food groups • Food sources • Water supply
3. Coping strategies	<ul style="list-style-type: none"> • Behaviour of household members

7.2.3.1 Theme 1: Type of dwelling

The figure 7.4 below indicates the types of dwelling of the FHHs as observed by the researcher and research assistants.

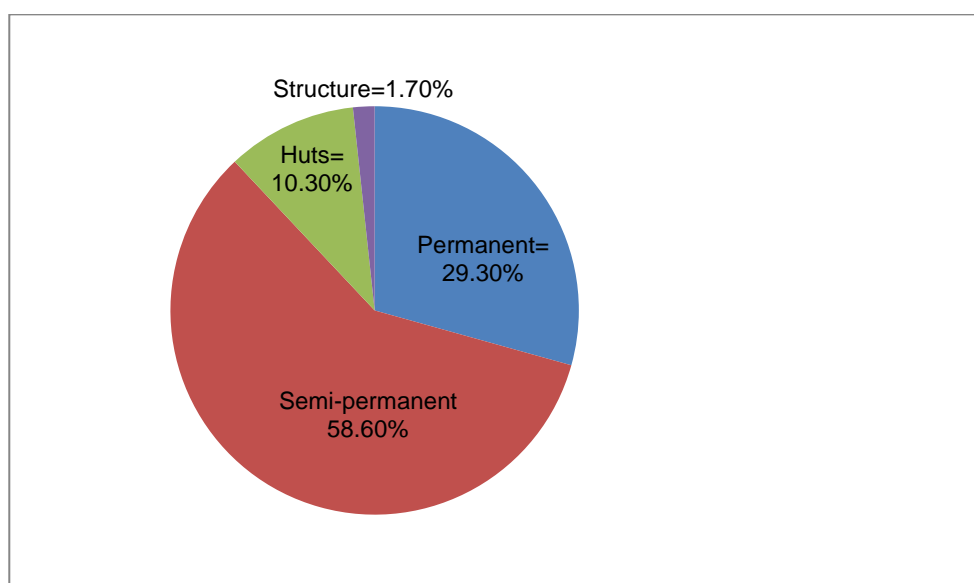


Figure 7.4: Type of dwelling (n=116)

Most of the FHHs' main dwelling consisted of semi-permanent houses (68 or 58.6%), which were strong, weak and precariously almost crumbling. Most of the dwellings' roofs and walls were made of iron sheets and mud/or brick respectively. Permanent dwelling places were 34 or 29.3%. Their roofs were made of iron sheets while the walls were stone, clay blocks or bricks. Some 12 or 10.3% dwellings were huts and 2 (1.7%) were sub-standard structures. The shape of the huts was square and roofs made of old iron sheets or thatched. Generally, the dwellings were either rented or self-owned especially in the urban or rural areas respectively.

The dwellings which were of good standard were the permanent dwellings. The rest of the dwellings were either in good condition or sub-standard and some were almost collapsing.

- **Discussion of theme 1**

With respect to physical housing conditions, an adequate house should provide security, protection from domestic injuries, an acceptable indoor quality, and shelter from extremes of outdoor temperature, dust, insects, rodents, and outside noise (Marí-Dell’Olmo, Novoa, Camprubí, Peralta, Vásquez-Vera, Bosch, Amat, Díaz, Palència, Mehdipanah, Rodríguez-Sanz, Malmusi & Borrell, 2016:209). The researcher is of the opinion that the lack of standard and quality dwellings among the FHHs in the Voi Division was due to poverty, which is a salient element to poor livelihoods in the Sub-Saharan Africa. This finding on poor dwellings is comparable to the adamant poverty levels despite the willingness by the World to eradicate it altogether. The goal is to end poverty everywhere in all its forms by 2030 (UN, 2016:3). As it is discussed in the literature chapters of this report, the Kenya national poverty, rural poverty, and food poverty ratios are 45.9%, 49.1%, and 45.8% respectively (KNBS, 2007:43); whose rural Gini co-efficient of expenditure per adult is 0.380 (KNBS, 2007:83). The North Eastern, the Coast, and the Eastern regions of the country have the highest poverty - their rural poverty rates are 73.9%, 69.7%, and 50.9%, respectively (KNBS, 2007:48). The study demarcation is in the Coast Region therefore, the sub-standard housing can be corroborated with the poverty rates in the area. This situation could expose the members of the FHHs to a myriad of health risks. According to Marí-Dell’Olmo et al. (2016:209), the effects from dampness, moisture and mold on health, can result in allergic and respiratory problems, in addition to mental health problems, as well as general symptoms such as fatigue and headache. Unfavourable dwellings and diseases cause members of households to be in a state of depression because of problems associated with the inadequate dwellings. Feeling unsatisfied with one’s housing can result in psychological distress, which can lead to physical and mental problems (Marí-Dell’Olmo et al., 2016:208). Kaiser (2011:65) says that, the main challenge facing policy makers is to balance social and environmental justice issues in an ecological systemic approach to food security (see Section 1.4). In this case, poverty, including poor housing is a socio-ecological injustice that may lead to food insecurity among the FHHs.

7.2.3.2 Theme 2: Food consumption patterns

The proxies (presented as sub-themes) for food consumption patterns as derived from observations made by the researcher and research assistants, are as follows:

- Food groups.
- Food sources.
- Water supply.

- **Sub-theme 2.1: Food groups**

Sub-theme of food groups emerged from food items observed by the researcher and research assistants, being cooked at the FHHs of the study. The food items formed the following food groups as illustrated in figure 7.5 below:

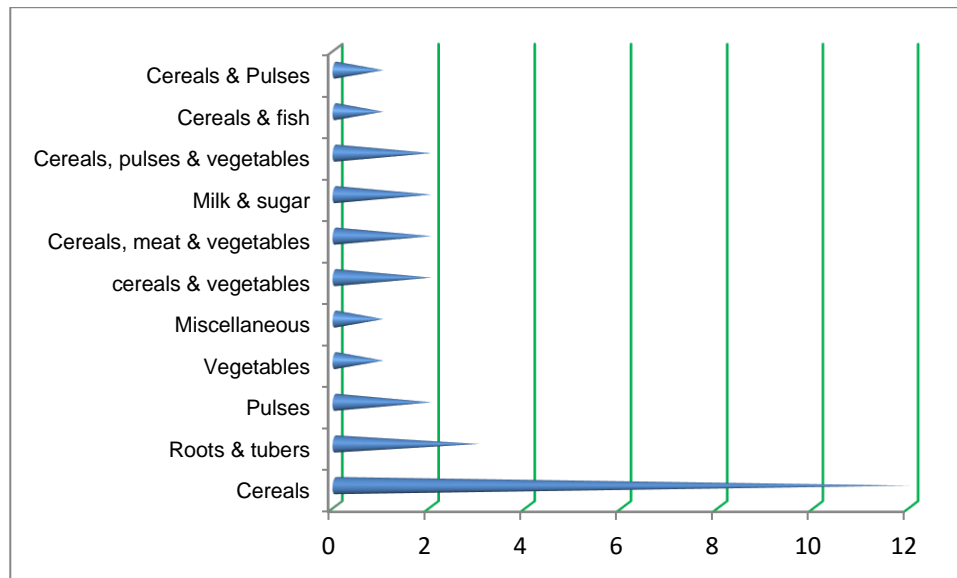


Figure 7.5: Food groups of the food being cooked (n=24)

The researcher and the research assistants observed several food items getting cooked among the FHHs. Out of the food items, the following food groups emerged as being cooked in the households: cereals were cooked in 12 households; cereals and vegetables in 2 households; cereals, meat and vegetables in 2 households; cereals, pulses and vegetables in 2 households; cereal and fish in 1 household; cereals and pulses in 1 more household; vegetables in 1 household; pulses in 2 households; and cereal and pulses in 1 household. In general, these food groups comprised of cereals, pulses and legumes, vegetables, meat and poultry, fish and seafood according to HDDS; and main staples, pulses, vegetables, and “meat, fish and eggs” FCS food groups respectively. The researcher is of the opinion that, the “HDDS cereals” or “FCS main staples” food group featured prominently since it is the staple food group. This is particularly, the maize and its products. This is consistent with FAO (2000), which rate maize as the main staple food for Kenya (KNBS, 2014:7). Furthermore, both the quantitative and the key informant’s finding indicated the same results concerning the cereals or main staples.

- **Sub-theme 2.2: Food sources**

Second sub-theme, food sources elicited the following categories:

- Presence of vegetable garden and crops.
- Presence of nearby markets.
- **Presence of vegetable garden and crops**

The researcher conceived that vegetable gardens were a proxy for own food production, therefore was categorised as a source of household food. Vegetable gardens were observed by the researcher and research assistants among 34 households. The field note analysis revealed that, out of the 34 households, 5 households had gardens with dry premature crops, mostly cowpeas and green grams; 4 had green vegetables mostly kales; 2 maize and vegetables, and 1 had maize only. The gardens with dry premature crops were found in the lowlands of the Voi rural areas, while the green crops were observed among households that resided on Sagala Hill (the hill is high on attitude).

- **Presence of nearby food markets**

Food markets in this section refer to any premise observed selling foodstuff or products at the proximity of FHHs. The researcher and the research assistants made a total of 48 observations. Out of the total number, 47 markets were functional. Forty two displayed variety of food on sale.

- **Sub-theme 2.3: Water supply**

Water is a basic need and an economic, social, financial and environmental resource (Räsänen, 2015:17). Similarly, the SDG6 highlights water as a basic resource. Water related ecosystems and the environment have always provided natural sited settlements and civilisations, bringing benefits including irrigations (UN, 2018:2). The researcher conceived water as an important resource in food consumption since it is used in food handling, cooking and utilisation. From the observational data, some sources of the water were communal and may have been used by more than one FHH. For example, community water points were common in the rural areas, and some urban area households in rental apartments shared an outdoor tap.

Table 7.5 shows different sources of water among the FHHs.

Table 7.5: Sources of water

Sources of water (n=107)		Frequency (f)	Percent (%)
	Well	1	.9
	Tap	89	83.2
	Stream/river	4	3.7
	No water points	8	7.5

Sources of water (n=107)		Frequency (f)	Percent (%)
	Borehole	4	3.7
	Tap & wells	1	.9
	Total	107	100.0
Accessibility of water point (n=105)		Frequency	Percent
	Yes	85	81
	No	20	19
	Total	105	100

From the observations, a tap was the leading source of water and was used by 89 or 83.2% households. There were no water points suspected to be available for 8 or 7.5% FHHs. The researcher and the research assistants could establish the accessibility of the water sources among 105 FHHs. Fair water accessibility was found among 85 or 81% of the FHHs. As stated in the chapter two of this report, the Article 43(b) (d) of the Kenya Constitution 2010 entitles everyone to access to reasonable standards of sanitation and clean safe water in adequate quantities (WSP, 2015:5).

- **Discussion of theme 2**

With regards to the sub-theme of food groups, literature as discussed in the previous chapters and sections indicate that, in food utilisation, food items and groups inform dietary diversity and food consumption score. For instance Aiga and Dhur (2006:37) observe that, the dietary diversity is determined by calculating the number of different food groups, rather than calculating different individual foods consumed. The food groups are derived from food items, which offer diversity of micro and macronutrients. Aiga and Dhur (2006:37) further say that, dietary diversity is the number of individual foods or food groups consumed over a fixed period of time which is reflective of adequate nutrient intake and also encompasses nutrient adequacy.

Concerning the second sub-theme of food sources, presence of vegetable garden and crops was the first indicator of the food sources. The dry crops in the gardens indicate loss of crops to droughts in 2016, which corroborates the findings in other areas of Kenya. In areas around Lake Victoria, parts of Western and Central regions, significantly below normal rainfall affected crop performance, resulting in decline in yields; that maize yields dropped by 50%, beans 40-50%, and sorghum by 30% compared to 2015 (Wanzala, 2017:10). The researcher of this study is of the opinion that droughts are the major cause of food insecurity in Kenya, and more so in the Voi Division, as she had been observing several drought recurrences. This is consistent with Republic of Kenya (2011:5) indication

that, one of the causes of food insecurity in Kenya is recurrent droughts. The researcher is of the opinion that the drought may have influenced poor dietary patterns during the time of the study than during the rainy seasons. Improved dietary patterns were found to be related with harvest season in Kilosa District, Tanzania (Ntwenya et al., 2015:5).

The second category of food sources is presence of nearby markets. Markets were also sources of food to the FHHs, especially in urban areas of the Voi Division. The researcher is of similar opinion with FAO (2006:1) that, having enough food in the market does not (always) guarantee food security, and the food availability in the markets must be accessible to communities through affordability. Cooper et al. (2014:10), indicate that, high food prices cause food insecurity. However, the researcher is of the opinion that, since most of the markets in this study were seen to be functional, FHHs obtained food from these markets. The reader should note that the study was limited to the observations on the markets but did not investigate food affordability in the markets.

With regards to the sub-theme 3, water supply, adequate water is essential for both farming and food preparation. When family farms especially in ASALs are put under irrigation, crops would grow into maturity without having to wither beforehand (WSP, 2015:5). From the observations done for this study, it was clear that water was not adequately available in the rural areas; which is consistent with Räsänen (2015:i) observation which found water reforms in the Taita-Taveta County, did not enable the redistribution of the resource to most marginalised areas, including the study demarcation. In this study, no irrigation water infrastructure was seen and many water points were communal. UN (2018:10) indicates that, the Sub-Saharan Africa's 30% of its population are in food insecurity, mainly attributable to water scarcity in agricultural production. Additionally, droughts made some water sources (including springs in Sagala Hill) to dry up. This observation is consistent with WSP (2015:5) that, due to climate change, water sources are drying up. Water supply is affected by climate change and may cause diseases due to poor hygiene.

Because higher temperatures favour the development of pathogens, and water scarcity affects water quality and hygiene habits, climate impacts could increase the burden of diarrhoea by up to 10 percent by 2030 in some regions (FAO, 2016:8). Owing to this observation, the researcher is of the opinion that water supply in households is essential for both cooking and food handling. The contrary may cause poor nutrition status among household members, especially if they had contracted illnesses owing to water scarcity. The most severely affected would be the poor and especially poor children (WHO, 2003 in FAO, 2016:8). Generally, the finding alludes to the importance water plays as an ecological

element in food provision and utilisation. In such context, water is an exo-system, just like other indicators of food security.

7.2.3.3 Theme 3: Coping strategies

Besides being indicators of food access and instability (see the discussion at the sub-section 7.2.3), coping strategies are indicative of food availability. They are the strategies that food insecure households use to cope with food shortages during shortfall of food access and availability (Tefera & Tefera, 2014:98). In this section, behaviours reflected by the FHHs were recorded:

- **Sub-theme 3.1: Behaviour of household members**

Figure 7.6 presents the behaviours portrayed by the FHHs members:

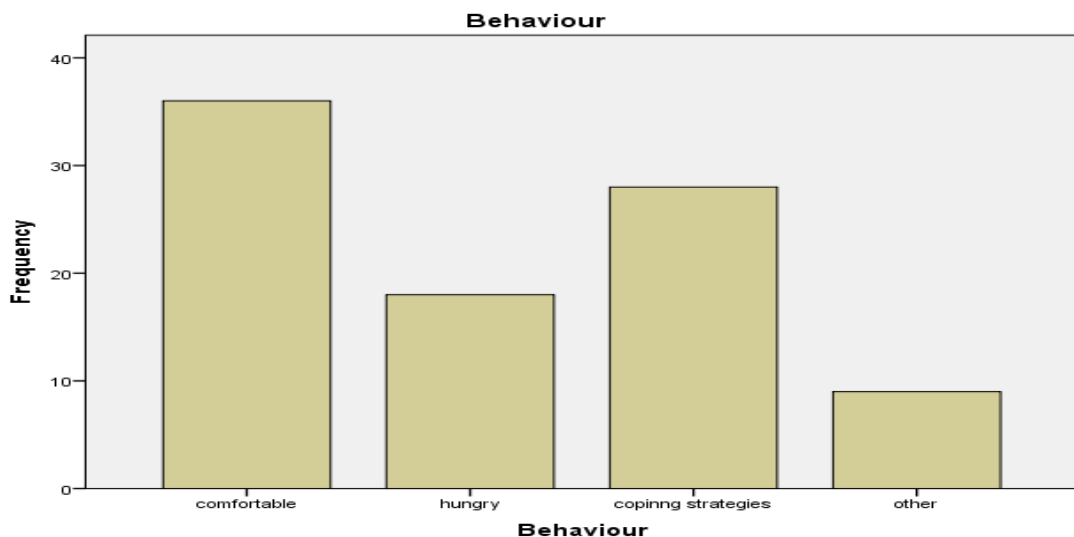


Figure 7.6: Behaviour of household members (n=91)

The researcher and research assistants made observations in 91 FHHs. The household members reflected being comfortable with their circumstances and looked comfortable in 36 (39.6%) households, coping strategies were observed in 28 (30.8%) FHHs, members looked hungry in 18 (19.8%) FHHs, and 9 (9.9%) FHH's members portrayed other behaviour, which was not related to food security. This finding is comparable with the findings of the quantitative phase that, some FHHs were using coping strategies while others were not. In this study, the most observed coping strategy was skipping of meals. The general hungry look in households also went hand-in-hand with helplessness. The finding is also comparable with Chagomoka et al. (2016:2), that, in Nairobi in Kenya slum dwellers were reported to use frequent strategies related to reduction in food consumed (69%) and credit (52%).

- **Discussion of theme 3**

Coping strategies refer to active responding to food shortages at household levels (Chagomoka et al., 2016:2). Following this knowledge, the FHHs employing the coping strategies portrayed gaps in food security – the gap is food shortage. Vaitla et al. (2015:17), additionally assert that, CSI is a good indicator of stability. Therefore stability in food access, availability and utilisation among the FHHs was not good. In the context of the ecological systems perspective, the presence of the coping strategies portrays prevalence of food shortages, which is a shortfall towards the full realisation of the SDG2 of total hunger and food insecurity eradication. The coping strategies and the food insecurity (shortages) are the exo-systems. Their interactive nature is the meso-system.

7.2.3.4 Summary of observational analysis

The observational findings reveal the following themes (type of dwelling, food consumption patterns and coping strategies) and their sub-themes. The type of dwellings was a major theme (no sub-themes), while the food consumption patterns theme elicited the following sub-themes: food groups, food sources, and water supply. With regards to food groups, cereals or main staples according to HDDS and FCS respectively was the most cooked. Food sources elicited own production through dry gardens found in the lowlands of the rural areas, while gardens with green crops (especially vegetables) were observed among FHHs particularly residing in Sagala Hill. Markets as source of food were observed and were functional. Concerning the water supply as a sub-theme, the main source of water was “the tap” for domestic use (no irrigation water), and the domestic water accessibility was fair. Finally, the last theme is the coping strategies, with the major coping strategy being skipping meals among the FHHs in the Voi Division. Similarly with thematic analysis, themes and sub-themes in the observational analysis are the exo-systems because they inform food security.

7.2.4 Visual analysis: Photographs

Qualitative data analysis is, first and foremost, a process of inductive reasoning, thinking, and theorizing, which is far removed from structured, mechanical and technical procedures to make inferences from empirical data of social life (Schurink, Fouchè & De Vos, 2011:399). In the visual analysis, photographs were taken by researcher and research assistants of the dwellings and food items. These photographs were analysed and themes generated from them. Owing to the non-mechanical or non-technical nature of the qualitative analysis, the researcher grouped themes, sub-themes and categories according to their prominence. Many photographs resorted under more than one theme, therefore

sub-themes and categories overlapped. This was because it was not quite possible to place each photo in an exclusive theme. This section discusses the themes from the visual analysis of the photographs in the following order:

- Housing; and
- Food consumption patterns.

7.2.4.1 Theme 1: Housing

The first emerging theme in the visual analysis is housing. The researcher and research assistants took photographs of the dwellings and specifically those with unique features from the rest.

As mentioned in the methodology section of this study that (Gilgun, 2005; Merriam 2008 in Theron et al., 2010:88) state that in qualitative analysis, it is important to be vigilant for contents which are inconsistent with emerging general categories. The researcher was keen to note photographs that were inconsistent with ordinary categories, particularly the first photograph shown below of a dilapidated house.

Figure 7.7 below shows photographs of a dilapidated house and an ordinary house:



Figure 7.7: Photographs of a dilapidated house and an ordinary house

The first dwelling place in the figure above belonged to an elderly widow, while the second one depicts ordinary dwelling of the FHHs. The researcher took a photo of the first house because of its condition of being at the verge of collapsing. The researcher is of the opinion that, the female household head was too elderly and poor to facilitate construction of another house. FAO notes that, in all developing regions, female-headed rural households are among the poorest of the poor (Tibesigwa & Visser, 2015:2). This situation is implicated in the Economic Commission for Africa (2015:6-7) that, in Africa, 48% of its population live in extreme poverty.

- **Discussion of theme 1**

From the literature and personal observations, the researcher is of the opinion that, poverty is intertwined with hunger and/or food insecurity, and housing insecurity. Housing insecurity comprises both housing affordability as well as housing-related legal problems (Marí-Dell’Olmo et al., 2016:208-209). The UN (2015a:6) indicates that, globally the number of people living in extreme poverty was 836 million in 2015. This is a big number, which needs concerted efforts in total eradication in order to achieve the SDG1 of poverty eradication. There is a need for government, non-governmental and community organisations to implement special plans for senior citizens, in making the achievement of the SDG1 targets a reality. The Kenya National Food Nutrition Security Policy goal of achieving food security recommends the following objectives: increase the quantity and quality of food available, accessible and affordable to all Kenyans at all times; and to protect vulnerable populations using innovative and cost-effective safety nets linked to long-term development (Republic of Kenya, 2011:9). The researcher is of the opinion that such plans should be put on action. According to Wittman et al. (2016:1292), lack of food production is not the main reason why people are food insecure; barriers to access and distribution - including poverty - often matter more. In the context of the ecological perspective poverty is a human ecological factor posing danger into the lives of the vulnerable already cumbered by the burden of food insecurity; therefore the entire ecology should be in a networked interaction to counter its effects. The next theme, food consumption patterns, was the more prominent theme of this section.

7.2.4.2 Theme 2: Food consumption patterns

In this section, the emerging sub-themes (as reflected in the photographs) under food consumption patterns are as shown subsequently.

Table 7.6 shows the theme and sub-themes of food consumption patterns:

Table 7.6: Food consumption patterns

Theme	Sub-themes
Food consumption patterns	Food groups
	Sources of food
	Cooking arrangements
	Water supply

❖ Sub-theme 2.1: Food groups

Food items are indicators of food groups, while food groups are proxies for the HDDS and FCS which inform food security objectively. In this sub-theme of food groups, a photograph of dandelion package was taken. The dandelion food item belongs to vegetable food group and its photograph is illustrated in figure 7.8:



Figure 7.8: Photograph of Mchungu (dandelion)

The researcher observed that dandelion was the most available vegetable in the lowland rural area of the Voi Division and thus took this photo. This is because the vegetable thrives in ASALs and during drought seasons, unlike most vegetables cultivated in gardens. Another advantage to the availability of the dandelion is that, it mainly grows as a wild plant hence does not require to be weeded for so that it can thrive well.

- **Sub-theme 2.2: Sources of food**

The sources of food are illustrated by the following sub-themes:

- Own food production; and
- Markets.

- **Own food production**

Under own food production, are two emergent categories, which are:

- Crop farming.
- Livestock keeping.

Figure 7.9 shows a garden and goat shed:



Figure 7.9: Photographs of a shamba (garden) and a goat shed

Two categories emerged under the sub-theme of own food production - crop farming and livestock keeping. The first photo in figure 7.9 is of a garden whose crops had dried prematurely. The photograph of the garden shows total maize failure, dry green gram plants and alive leafless cassava plants. At the foreground of the garden are heaps of pieces of firewood, which indicate some cooking had been going on in the household. However, no cooking activity was seen at the time of the study. The garden belonged to a mother-in-law and daughter-in-law who were both widowed. The latter looked very anorexic and sickly. The mother-in-law commented this about her widowed daughter-in-law, “She usually does not eat”. Probably the daughter-in law was too aggrieved by the loss of her husband. As mentioned earlier severally (for example in the biographic, “marital status” in the quantitative phase), the loss of a male household head, particularly a husband is a chronosystem which influences poor food security among the FHHs.

The second emergent category of the own food production sub-theme is livestock production. Livestock keeping was seen as a source of livelihood probably to supplement crop farming in the harsh weather conditions. The second photo in figure 7.9 above is of goat shed; depicting livestock production which is a common practice in ASALs.

- **Food markets**

Food markets provide avenues of food accessibility among non-farming populations. However, food affordability informs how much can be purchased and the ultimate utilisation of the food among households. According to FAO (2006:1), food availability in the markets must be accessible to communities through affordability.

The photograph in figure 7.10 below is of a small food market in a rural area in the Voi Division:



Figure 7.10: Photograph of a small indoor food market in a rural area of the Voi Division

This photo illustrates a grocery food market that belonged to a FHH respondent of the study. There are various food items in this photo, and they include: Irish potatoes, cabbage, tomato, sugarcane, garlic, orange, among others. From the location where the photograph was taken, it was a long distance from the nearest wholesale market of the food items (Voi Town). Small-scale retailers purchase the grocery from the far flung Voi Town and then sell it to the local residents, including the FHHs. The researcher however, did not observe anyone buying the food items. This may have been due the time at which the researcher was at the scene of the photograph (before lunch hour), or due to high prices associated with the long market chain of having to buy the food from the far away Voi Town and selling it at high prices causing the demand for the items to decline.

- **Sub-theme 2.3: Cooking arrangements**

There are 3 categories that emerged from the “cooking arrangements” and were as follows:

- Sources of fuel.
- Kitchen places.
- Fuel conservation methods.
- **Sources of fuel**

Figure 7.11 shows the sources of fuel used:



Figure 7.11: Photographs of fuel sources: Pieces of firewood

The above photographs depict sources of fuel, namely firewood, particularly used in the rural areas of the study demarcation. Although there may have been other sources of fuel among the FHHs in the Voi Division, firewood, as biofuel was the most observed source of fuel and it was mostly seen among the rural FHHs.

- **Kitchen places**

The photographs in figure 7.12 illustrate kitchen places of the FHHs:



Figure 7.12: Photographs of kitchen places

Figure 7.12 shows kitchen places for food preparation and cooking among the FHHs and females' self-help group, more particularly in rural areas of the Voi Division. The first photograph in the above figure depicts poor hygienic conditions in the kitchen, since dirty utensils can be seen spread on the dirt/mud floor. The dirty utensils could attract pathogens, while the dirty earth floor may have been harbouring parasites, which could predispose household members to infections. To the right of the photo are pieces of firewood, which acted as sources of fuel. The second photo is also of an enclosed kitchen, with potatoes cooking on the fire from a traditional three-stone "stove". The combustion fuel used was firewood. The third photograph is an open-place kitchen. This kitchen was prepared by a female self-help group for cooking tea for the group. Firewood was the source of fuel.

- **Fuel conservation methods**



Figure 7.13: Photographs of heat-conserving stoves

Figure 7.13 above shows photographs of how the FHHs of the study were conserving fuel, while conducting their daily cooking activities. The first photograph in the figure shows earth-mounded stove for fuel (firewood) conservation. The earth mound helped preserve heat and prevent ultimate firewood wastage through the wood getting blown and swayed by winds. The second and the third photos are of “economy” charcoal stoves. The stoves are constructed from metal outer-layer and the inside is smeared with clay soil. Such stoves conserve charcoal fuel more efficiently than entirely-metal made stoves.

- **Sub-theme 2.4: Water supply**

Water resources are embedded in all forms of development, including health promotion, poverty reduction and food security (UN, 2018:2). Figure 7.14 shows water sources among the study population.



Figure 7.14: Photographs of water sources

The figure above shows sources of water for residents of the Voi Division, particularly rural residents, including the FHHs. The first and second photographs show the community’s communal water supply points. However, the third photo was taken of a private-owned water point at a homestead, from which the community members were buying water. Under the sub-theme “water supply” two emergent categories emerged: community water sources and private-owned water sources.

The first and second photographs show the community’s communal water supply points. In the first photograph several features can be seen. From the left are “queue markers”. The researcher observed that the community members booked space of fetching water by putting their personal objects, such as old thermos flasks and small plastic jerry-cans. These items helped the community members to mark their position in the queue. The housing structure in the photo was a kiosk used in securing the tap with a lock. The tap was locked from the inside of the structure. To the right of the photo are containers for fetching in the water. Two of them are suspended upon each other to reach the water tap more

effectively. The second photo was taken of community tap lying in the open. Similarly, with the first photo, there are also objects for booking fetching space.

The third photograph is of a private water point (located inside a homestead) where the community bought water. The researcher observed relative affluence in the homestead, hence deduced the household head must be among the wealthiest in the area. The researcher found that the rural community was struggling to access the water. On the contrary to the limited water supply in the rural areas of the study area, the urban area's water supply was fairly good, since the local water supply organisation was in place and provided tapped water. This was so particularly in Voi Town.

- **Discussion of theme 2**

With regards to the food groups as the first sub-theme, dandelion was the proxy for vegetable food group. Generally, there was poor presence of many other vegetables in the droughty farming areas of the study demarcation. Although the researcher's opinion corroborates Republic of Kenya (2011:11) indication that, food availability refers to the physical existence of food and should encompass availability of adequate quantities of a diversity of food commodities (including vegetables), the availability of a variety of food groups among the farming FHHs of the Voi Division was compromised, mostly due to droughts. On the other hand, the finding is consistent with Republic of Kenya (2011:11) that, per capita food availability in Kenya has declined by more than 10% over the last three decades. The researcher construes that the decline is mostly associated with frequent droughts in the country. Ntwenya et al. (2015:6), found that food insecurity, to be negatively related with all dietary pattern scores. There was also high consumption of vegetables during rainy season, which emphasises the need to take advantage of seasonality difference in food availability to maximise food intake (Nthwenya et al., 2015:10). This study was conducted during post-rainy season, which was preceded by erratic rains and the subsequent drought.

With respect to sources of food, own food production is the first category. Own food production is depicted by garden and goat shed photographs. As mentioned earlier, the garden illustrated on the figure 6.9 above belonged to two widowed women. The aspect of being widowed is consistent with (Apind, Lagat, Bett & Kurui, 2015:156) that, female as household head (in Ahero, Kenya), is majorly attributed to being widowed hence inherit land. In tandem with these authors' assertion, the above photo of the dry garden is evidence that the females practiced farming on their late husbands' plot. This is consistent with Patel et al. (2015:33), observation that, widowed or divorced women (in Northern Malawi) gain access to farmland through male kin. Furthermore, ESARO (2015:v) stipulate that, women

form a large proportion of the agricultural labour force in Sub-Saharan Africa and thus play a vital role in ensuring family nutrition and food security. For example, a national survey in Malawi found that, women and men performed agricultural labour on 94% and 82% of all plots respectively (Patel, 2015:33). In the current study, there was almost total crop failure in the garden, apart from the cassava which seemed to resist the dry condition. This scenario is divergent with ESARO (2015:v) that, in Eastern and Southern Africa, agriculture continues to be a key engine for local and regional economies, representing a critical source of income and ensures food security and nutrition. On the other hand, the finding is consistent with (FAO, 2016:4) that, climate change poses a major and growing threat to global food security. Additionally, NDMA (2016:1) report that, no rainfall was experienced in the entire County of Taita-Taveta during the month of July of 2016.

The livestock production, as a form of own food production in the Voi Division has been found to be practised against the backdrop of droughts, a major characteristic of ASALs. The ASALs are mainly characterised by droughts as shown by the surrounding of the goat shed, which is dryland. NDMA (2016:1) reports that, high temperatures were received in the lower parts (in this case, Voi Division is low-lying) of the county which is not normal during such a period. This means that, livestock-keeping provided alternative livelihoods for the community. This is because local breeds of livestock can survive relatively well in dry seasons; and seemingly, the farmers would sell or obtain milk. The NDMA (2016:1) further reports that, pasture and browse condition was fair in all zones of the county, with high rate of deterioration being experienced in the lowlands; goats and sheep body condition was good, while cattle's was good to fair, due to increased trekking distances to water sources; and milk production was expected to be on a downward trend. Also NDMA (2016:2) reported:

The vegetation condition index (VCI) matrix shows the county is at a moderate vegetation deficit, which shows vegetation condition has deteriorated compared to the previous month (June). The county recorded an aggregate VCI of 28.41, while Voi Sub County recorded the lowest at 20.87. This could be attributed to poor performance of long rains especially in the county lowlands.

The NDMA classifies VCI: <10= extreme vegetation deficit; 10-19= severe vegetation deficit; 20-35= moderate vegetation deficit; 36-50= normal vegetation greenness; >50= very good condition. With this classification, the VCI in the Voi Division therefore was in moderate VCI, which according to the researcher's opinion would support livestock resilience to the drought. Water is an essential ingredient in agriculture and food production (UN, 2014:10). It is intrinsic to ending hunger, achieving food security, improving nutrition and promoting sustainable agriculture (UN, 2018:10). This is the SDG number 2. Therefore, water shortages and scarcity can seriously affect agriculture and food production,

particularly in vulnerable developing countries (UN, 2018:10). This report by the UN corroborates the study finding, and illustrates the importance of proper functioning ecological systems (irrigation) in the sustainable development of the entire macro-system of the Voi Division. The researcher is of the opinion that drought should be countered in the study demarcation to eradicate effects of food insecurity such as hunger and malnutrition.

With regards to the markets as sources of the food items illustrated in the photograph of the figure 7.10, the researcher deduces that, the groceries were bought from the Voi Town and sold in the rural area of Kajire at high retail prices. Such a situation is explained by Hendricks and Haggard (2015:144) that, the effects of rising food prices are complex and cross-cutting, bringing benefits to some producers and traders while imposing costs on net consumers of food, whether urban or rural. The observer is of the intuition that the prices of the food items on display have been too high for the rural consumers to afford comfortably. Qureshi, et al. (2015:393), assert that functional value chains, equitable market environments, infrastructure and stabilisation policies enable consumers' access to food. Moreover, World Bank (2014a:1) corroborates the existence of high food prices that, international wheat and maize prices soared by 18% and 12% respectively between January and April 2014. Such inflations (especially of staple food) constrain food access especially among the poor. Literature also reveals similar outcomes for Kenya. In Kenya, high poverty levels have affected access to food, since most Kenyans rely on markets for most or all of their food needs (Republic of Kenya, 2011:11). From this study's finding, it is salient that factors conducive for food access were not in place. Furthermore, the terrain of earth road from Voi Town to Kajire Area was bad. The researcher also experienced difficulties in travelling due to the poor road system. Poor rural consumers may be more vulnerable than urban dwellers, who typically have higher incomes and greater access to markets (Hendricks & Haggard, 2015:144). According to the theoretical framework of the study, high food prices in this situation were the exo-system which by the FHHs sometimes could afford and other times could not. The interaction that exists between the exo-systems of the food prices and food security are controlled by meso-system of the food affordability.

The third sub-theme of the food consumption patterns, is cooking arrangements. Firewood was the commonest source of fuel especially among the rural folks. As mentioned previously, the Voi Division is ASAL therefore, there was plenty of dry wood that provided convenient sources of fuel for cooking. This finding corroborates Tefera, Asfaw, Gilliland, Worku, Wondimagegn, Kumie, Samet and Berhane (2016:9) that, according to the 2011 Welfare Monitoring Survey, biomass fuel is used by 95% of Ethiopian households. The great majority (85%) of these homes uses firewood for cooking; and a wide variation was

observed between rural (90%) and urban (54%) areas in using firewood as the primary source of energy (Tefera et al., 2016:9). In corroboration with Tefera et al. (2016:9), the researcher of this study is of the opinion that, although the FHHs in the Voi Division may have been using other sources of fuel, as depicted in figure 7.13 (photographs 2 and 3); firewood was the leading among the FHHs residing in the rural areas. This opinion is added value by the cooking energy of firewood in the figure 6.12 regarding kitchen places. As indicated earlier, the etic interpretation by the researcher placed the figures 7.12 and 7.13 in different categories due to priority of the findings.

Regarding the kitchen places, the photos (in figure 7.12) depict scenarios which corroborate the following findings: Nearly half of the world's population relies on solid fuels for household heating and cooking (Bonjour et al., 2013 in Yip, Christensen, Sircar, Naeher, Bruce, Pennise, Lazier, Pilishvili, Loo Farrar, Stanistreet, Nyagol, Muoki, De Beer, Sage & Kapil, 2017:185). These solid fuels are typically burned in inefficient and poorly vented devices, such as open fires or traditional stoves (Yip et al., 2017:185). Similarly, the photographs of the current study also depict three-stone traditional stoves in poorly ventilated enclosures, and an open fire by the self-help group composed of females.

The finding is also consistent with Tefera et al. (2016:9) that:

In poorly ventilated kitchens that use biomass fuels and unimproved stoves in Ethiopia, women are heavily exposed to smoke for prolonged periods of time (often 1-3 hours). About 91% of women are estimated to be involved in cooking in the rural areas in Ethiopia In rural areas in particular, unavailability of ventilation, overcrowding and family members' sharing of spaces in the houses with domestic animals raise the peoples' exposure to diseases.

The researcher agrees that, the limited ventilation of the kitchen enclosures among the FHHs of the current study could expose their household members, especially the principal caregiver to pulmonary diseases. On the other hand, the researcher is of the opinion that the indoor kitchen provided convenience for fuel (firewood) conservation. Owing to the fact that outdoor fires are likely to be swayed by wind - hence more pieces of firewood are likely to be used, than in the enclosed kitchen. Moreover, in rainy seasons, the enclosures cushioned the caregiver from extreme wet weather and cold. The researcher is also aware that, a number of rural households including, FHHs make broods for chickens and allow the chickens to lay eggs and hatch chicks in kitchens or cooking structures. Just as Tefera et al. (2016:9), assert, the chickens may inhabit parasites such as chicken mites and fleas hence raising the households' members exposure to diseases. Additionally, more dangerously, the hatched chicks attract dangerous snakes at nights which might bite humans during the night-time rescues. The researcher opines that FHHs are more likely

than male-headed households to allow chickens in kitchens, since the former are more likely to lack an adult male who can construct a brood for the chickens. Furthermore, the previous findings regarding the key informants said that some of the FHHs' needs and challenges are "male headship and emotional and physical security".

With respect to the category of fuel conservation methods, and the first photograph in the figure 6.13, with regards to the earth mound stove, the researcher is of the opinion that the mounds are essential in firewood conservation and are very useful in ASALs, due to the firewood availability. This is also seen in Olang, Esteban and Gasparatos (2017:6) that, more than 60% of households in Kisumu City (of Kenya), used firewood as a main cooking fuel, due to its widespread availability. Despite the benefit of the firewood stove, the widespread use of firewood is associated with poverty. There is pronounced energy poverty in Sub-Saharan Africa than other parts of the planet, as more than two-thirds of its population has no access to modern energy (IEA, 2014 in Olang et al., 2017:1). The researcher is also of the opinion that charcoal was the second most popular source of cooking energy from the firewood. The findings corroborates Olang et al. (2017:6), that charcoal was the second most used cooking fuel in Kisumu. Tefera, et al. (2016:9), discuss similar findings about Ethiopia:

Charcoal is used in urban areas as the second most (18%) common fuel for cooking compared to its negligible use in rural areas (0.2%). The use of cleaner fuel sources such as kerosene, liquefied petroleum gas (LPG) and electricity for cooking is nearly non-existent in rural settings. However, kerosene (5%) and gas/electricity (7.7%) are used in smaller proportions for cooking. Kerosene is used for lighting by a majority (88%) of the households in rural areas while only 64% used it in urban settings (14).

Similarly, the leading and the second leading biofuel in this study was firewood and charcoal respectively. The finding corroborates Tefera et al. (2016:9), that "the existence of cleaner fuel sources ... for cooking are nearly non-existent in rural settings". According to Olang et al. (2017:1), while citing Sovacool et al. (2012), the lack of access to modern energy sources, such as electricity and dependence on traditional fuels such as biomass for cooking and heating, is the main facet of energy poverty in developing countries. The researcher of this study is of the opinion that fuel poverty is an economic ecological exo-system that disrupts fuel access, sustainability and efficiency as a human right; which ultimately causes imbalance in the ecological settings, including among the FHHs.

The sub-theme 2.4 is of water supply. The researcher is of the opinion that, water supply is an essential component of food utilisation in food security. Food utilisation involves appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation, for sufficient energy and nutrient intake (FAO, 2008:1). The uses of water in

a household may involve cleaning and cooking food. Owing to the above presumptions, the researcher took photographs of water supply points among the study population.

Domestic water utilisation is embedded in the target 1 of the SDG6: “to achieve access to safe and affordable drinking water” (UN, 2018:3). As mentioned in chapter 2, food utilisation is done effectively by ensuring food ingested is safe and is sufficient to meet physiological requirements (Qureshi et al., 2015:394). The researcher is also of the opinion that water is essential for ensuring food safety. Water supply is therefore important theme for this study to demonstrate the ability of the study population’s to access water, and how it may influence food utilisation. Most households, including the FHHs in the rural areas could not conveniently access water. Community domestic water supply points were too few. Malapit and Quisumbin (2015:62) findings suggest that, the extent to which diverse diets result in improved nutrition outcomes depends on other underlying household and community-level processes, such as food security, access to health services, water and sanitation, and childcare capacity and feeding practices (UNICEF, 1990; Gillespie, 2013). To boost a country’s food availability, FAO (2012) emphasises the importance of rural infrastructure for agricultural intensification and food supply (Qureshi et al., 2015:397). The researcher and research assistants did not find any irrigation water infrastructure among the FHHs and the general study area.

As mentioned previously in chapter 2 and the preceding sections of this chapter concerning water provision in the Taita-Taveta County, Räsänen (2015:i) says that, water reforms were only partially translated in the Taita Hills, that the reforms contributed to improved access to water by poorer residents in the hill, but it did not enable the redistribution of water to most marginalised areas due to its demand based regulation and inadequate consideration of local politics. Both the Räsänen’s and this study’s findings corroborate each other. Water supply in the marginal rural areas of the Voi Division is poor. Administratively, the Taita Hills are located in Taita-Taveta County, part of the former Coast Province (Räsänen, 2015:37). The county is divided into 4 sub-counties: Taveta, Mwatate, Taita (Wundanyi) and Voi (Räsänen, 2015:37). Both studies have observed the same water management authority, TAVEVO which is also mentioned by Räsänen (2015:28) as source of key informants for her study on dynamics of water policy reform and water justice in Taita Hills. Just like other factors influencing food security among the FHHs, irrigation water serves as an ecological resource or an exo-system that interact with the other factors to influence the food security exo-system. Interdependence among the exo-systems should be cordial. As per the theoretical framework of this study, many exo-systems interact in influencing food security among the FHHs in the study demarcation.

7.2.4.3 Summary of visual analysis: Photographs

Visual analysis of the photographs yielded the following themes and sub-themes: the main themes in this section are housing, and food consumption patterns. The indicators of food consumption patterns as elicited by the photographs taken were: food groups, sources of food, cooking arrangements, and water supply. Chrono-systems of widowhood are factors influencing poverty and hence poor dwelling places among the extremely poor in the Voi Division. Factors influenced by natural physical ecology, especially droughts influence poor food consumption patterns and water supply. Cordial interdependence among the exo-systems would ameliorate the effects of the factors influencing poor food security among the FHHs micro-system for the wellness of the entire Voi Division macro-system.

7.2.5 Triangulation of quantitative and qualitative findings

This study is based on pragmatism. Pragmatism is a research paradigm of mixed methods which involves collecting and analysing both quantitative and qualitative data (Delpont & Fouchè, 2011:434). The study employed convergent parallel mixed methods research design in the quantitative and qualitative phases of the study. The specific designs for the quantitative and qualitative phases were randomised cross-sectional survey design and collective case study respectively. Data from both phases were collected concurrently. The numerical data emanating from the survey were analysed and findings triangulated with the qualitative ones. Using triangulation enables researcher to reap from the benefits of quantitative and qualitative aspects of validity and reliability, which Creswell (2014:219); Yeasmin and Rahman (2012:156) posit are the ultimate results of integrating different techniques, data collection tools and several kinds of participants to ensure variation in sources of information and viewpoints. The quantitative phase yielded numerical data for quantitative analysis and the qualitative one provided descriptive information on characteristics and behaviours related to household food security among the study group. Qualitative research persuades through rich description and allows strategic comparison across cases (Chagomoka, 2016:2-3).

In this study both the quantitative and qualitative data have been presented in chapters 6 and 7. The objectives of this study were achieved by employing both the quantitative and qualitative findings as presented in the chapters.

With regards to the objectives, the convergent parallel mixed methods design worked well, because the data was collected using multiple research instruments. The quantitative survey used a researcher-administered structured questionnaire, while the qualitative phase used an interview schedule (complemented with an audio-recorder), observation

checklist, and a digital camera for key informants' interview, observation, and photograph-taking respectively. Furthermore, all the instruments were applied at the same period of the entire study, hence were convergent applied at one point in time. The data collected for the phases were analysed, and findings merged for comparative interpretation. The triangulated findings guided in formulating practice guidelines for the objective 4, and recommendations of the study.

Through the quantitative phase, the first objective was met by utilising HDDS. The qualitative phase also focused on the dietary diversity as reflected in the interviews with the key informants, observations and photographs. The findings with regards to the objective one are that, with regards to the quantitative findings, the first most consumed food groups were cereals (maize was the major cereal), and sugar and honey respectively.

The qualitative findings revealed compromised dietary diversity. A vast majority of the key informants indicated that there was compromised uptake of meals and poor balancing of diets in the Voi Division. They cited drought as the key factor influencing the poor dietary diversity. Moreover, observation findings indicated that the cereal was the leading food group among the FHHs. The prominence of the two food groups is associated with their ubiquity and affordability – they make myriad of snacks and are also affordable.

With regards to fruit consumption, the quantitative findings showed the “fruits” food group as the least consumed among all food groups, and most key informants did not mention it in diets of the Voi people or said fruits were never consumed. Likewise, the qualitative findings also revealed poor fruit consumption. The researcher is of the opinion that the lack of enough fruits in the FHHs may have predisposed them to a myriad of vitamin-deficiency ailments or conditions.

Following the findings that the cereals, sugar and fats led in the diets of the FHHs, it is an affirmation that carbohydrate or energy-dense foods formed the major proportion in the FHHs' diet. Therefore, both the quantitative qualitative findings indicate similar findings with regards to energy-dense foods and the overall HDDS was good or bad depending on contexts. The poor and the acceptable HDDS were influenced by rural-urban nexus and/or economic capacity of a household, and coping strategies. The statuses of the dietary diversity depended on the rural-urban nexus and financial capability of a household into purchasing food, and those FHHs in food shortages employed coping strategies.

In the quantitative phase, objective two of this study was met by using 7-day food schedule of food consumption frequency. A vast majority of the FHHs had acceptable FCS of main

staples food group. Consumption of fruits showed diverse findings as follows: the FHHs which did not consume fruits group formed the greatest proportion among all consumption frequencies.

With regards to the qualitative findings, main staples were the leading food group, with maize being the main staple food item. Food groups consumed in the Voi Division (including among the FHHs) mostly depended on the rural-urban nexus and economic capability of a household; but mostly were compromised, which led to the community in the division (including FHHs) to employing coping strategies. Similarly with the first objective, energy-dense food were prominently consumed. Main staples had the highest FCS and fruits were poorly consumed.

Objective 3 of the study sought to establish the overall food security status among the FHHs. Quantitatively, in order to arrive at the overall food security status among the FHHs, the researcher used the data emanating from the first two objectives to arrive at the third. The Both HDDS and the FCS were categorised into their respective food security levels. Secondly the HDDS and FCS food security levels were merged through cross-tabulation. The overall food security statuses were then classified accordingly. The triangulation of the data from the two indicators of food security, means that, the mixed methods were valid even internally in one paradigm of the study.

In the qualitative phase, the third objective was arrived at by seeking opinions from the key informants, through observation, and photograph-taking. The findings revealed that, a vast majority of the participants indicated that the food security status in the Voi Division was generally poor, which was mainly attributed to droughts. The rural households demonstrated food poverty, and the researcher observed dryland all over the rural ecosystem, and no or poor consumption of fruits. Therefore qualitatively, the overall status of food security in the Voi Division was mostly compromised, as opposed to the quantitative findings – which showed resilience in food insecurity. The converse findings between the quantitative and qualitative phases with regard to the third objective, reveals a need for future research on the causes of the incongruence. Therefore, the mixed methods of this study was relevant in revealing this converse finding, which would remain undiscovered if a study was not carried out based on the research design. The finding therefore is relevant for informing future actions with regards to food security among the FHHs. The future actions are contained in chapters 8 and 9 as practice guidelines and recommendations respectively.

7.3 Summary

This chapter presented the thematic, observational, and visual analyses. The general themes and sub-themes that emerged in all the analyses are: food consumption patterns, sources of food, and coping strategies. In the thematic analysis of the key informants' interviews, the food consumption patterns as a theme was illustrated by dietary diversity, food consumption score and food groups as its sub-themes. Food sources as a theme yielded own production, market, and food aid, comfort with food accessibility, and differences in food sources between male-headed and female-headed households. Coping strategies as a theme elicited skipping meals, reducing portion size of meals, purchasing food on credit, reduce portions for adults to allow more to children and parents sending children to eat elsewhere.

With regards to the observational findings, food consumption patterns were characterised by the following sub-themes: food groups, sources of food, and water supply. The major food group was cereals according to the HDDS or main staples according to FCS. Sources of food was elicited by own production and markets. The main source of water was the tap. The last theme of the observational analysis was coping strategies as elicited by the behaviour of the household members; and the major coping strategy was skipping meals. Visual analysis of photographs also revealed food consumption patterns through the sub-themes; food groups, sources of food, cooking arrangements, and water supply. The theme on the status of food security (in the Voi Division) emerged from the thematic analysis of the key informants' interviews, which revealed moderate and poor food security statuses.

The last section of this chapter has focused on a discussion of applicability of convergent parallel mixed methods design, and the triangulation of the quantitative and quantitative findings of the study. Generally, the quantitative findings indicate resilience in food insecurity, while the qualitative findings show poor food security status.

The next chapter provides the practice guidelines on food security.

CHAPTER 8

PRACTICE GUIDELINES ON FOOD SECURITY

8.1 Introduction

Applied study seeks to solve practical problems (Cherry, 2014:1); then investigate possible solutions (Roll-Hansen, 2009:5); and uses the data directly for real world application (Hale, 2011:1). Likewise, this study is an applied research because its findings will possibly be used in addressing food security among FHHs. The measurement of food security among the FHHs sought to find real status of the food security, and provide possible solutions through practice guidelines. This chapter is designed to focus on objective 4 of this study:

To describe the statuses of food security among female-headed households in Voi Division, Kenya and provide practice guidelines regarding the food security statuses.

Like the rest of the study, this chapter is embedded in the ecological systems theory. The quantitative findings (Chapter 6) and the qualitative findings (Chapter 7) revealed that several factors affect food security status among the FHHs in the Voi Division in Kenya. Based on the findings, this chapter is designed to describe the statuses of food security and propose guidelines for practice. The guidelines are aligned with the quantitative and qualitative findings with regards to the first 3 objectives of the study. The guidelines are also linked with the ecological systems theory, as mentioned earlier. This chapter will consist of practice guidelines.

8.2 International food security situations

As discussed in section 1.3 of chapter 1, post-2015 agenda of the global Sustainable Development Goals (SDGs) are the current working goals onto which all development programmes are contextualised. This study is embedded on both SDG2 of hunger and food insecurity eradication, and the ecological systems theory. Grace Communications Foundation (2014:2) indicate that, global food insecurity is mainly caused by poverty leading to lack of resources to purchase food, low food production, and substituting commodity crops for food crops. In 1990, almost half of the population (43%) in developing regions lived on less than \$1.25 a day, but this rate dropped to 22% by 2010 (UN, 2014a:9). This means that the MDG1 had been achieved but a significant number of the global population still lingered in the poverty. In chapter 3, the researcher of this study notes that FAO has put concerted efforts in making countries ratify food security as a human right. Moreover, in 2004, a set of voluntary guidelines supporting the progressive realisation of the right to adequate food in the context of national food security were elaborated by an

Intergovernmental Working Group under the auspices of the FAO Council (FAO, 2006:1). Additionally in the chapter 3, the researcher of this study indicated that, through her perusal of literature, she realised that, South Africa's Bill of Rights, enshrined in the chapter two of its constitution, and Kenya's Bill of Rights in the chapter four of its constitution recognise food security as a human right. FAO estimates that the right to food could be judicial in some 54 countries (McClain-Nhlapo, 2004 in FAO, 2006:1).

Also in the chapter 3, Raleigh (2015:188) asserts that, food security is a key development priority for all African states since over 60% of Africans are episodically food insecure and one quarter are chronically food insecure. One major contributing factor to the food insecurity in Africa is rapid urbanisation, with slow or decline in economic growth, as Olielo indicates: "In Africa, urbanisation has occurred in an environment of consistent economic decline" (Olielo, 2013:5). The economic growth in Sub-Saharan Africa slowed from 5.1% GDP growth in 2014 to 3.8% growth in 2015 and more so, there was a slowed growth of 3.4% in 2015 from 5.8% in 2014 in the East Africa Community (EAC); which was mainly associated with political instability in Burundi and uncertainties associated with general elections in Tanzania and Uganda (KNBS, 2016:4). In Africa, inadequate food security has been mostly reported in rural areas, but nevertheless, several studies have revealed food insecurity even in urban areas (Chagomoka, Unger, Drescher, Glaser, Marschner & Schlesinger, 2016:2).

According to the World Bank, the Sub-Saharan Africa has not met the MDG hunger target by 2015 (UN, 2014a:9), and remains with the highest prevalence of undernourishment (FAO, 2013b:10). Overall, the prevalence of hunger in the Sub-Saharan Region declined by 30% between 1990 and 2015; such that Western Africa reduced it by 60% (the proportion declined from 24.2 percent in 1990 to 9.6 percent in 2015), while other sub-regions experienced an increase in the absolute number of undernourished people, by approximately 2% and 20% in Southern and Eastern Africa respectively (FAO, 2015:1). Middle Africa has more than doubled its number of undernourished people over the same period, largely due to civil strife (FAO, 2015:1). The researcher observes that despite the Western Africa having halved its hungry population by 2015, many other parts of the Sub-Saharan Africa are yet to achieve this. These countries therefore need to adopt the SDGs, especially the SDG1 and 2 of total poverty, and food insecurity eradication, respectively. Furthermore, FAO (2015:1) indicates that Middle Africa is off-track while Eastern Africa has made slower progress toward this target. Much of Eastern Africa has also been affected by unfavourable climatic and drought conditions, particularly in the Horn of Africa (FAO,

2015:1). Droughts in Eastern Africa undermine food security, especially among vulnerable populations including FHHs.

Like any other UN member state, Kenya as a country is trying to achieve the SDG2. In Kenya, *the Constitution of Kenya 2010* and *the National Food and Nutritional Security Policy 2011* are the national working legislations on food security. Sub-section 2.3.2 in chapter 2 of this study shows that, the current constitution (*the Kenya Constitution 2010*) illustrates the move by the Government of Kenya towards the achievement of food security on the government through its provision of the right to food (Republic of Kenya, 2010 in KNBS, 2014:4). In 2011, Kenya developed the FNSP with the aim of adding value, building synergies and guiding the implementation of food security programmes. The FNSP is framed in the context of the Kenyan constitution providing for basic human rights, children rights and women's rights including universal right to food (Republic of Kenya, 2011 in KNBS, 2014:4). Out of these moves, the researcher observes the importance of these policy documents including FNSP in addressing national food security. She is however aware of many gaps to implementing such policies by the government of Kenya. Not many of these policy document objectives have been implemented and/or achieved. For instance, despite indication by the *Famine and Early warning Systems 2013*, established under the partnership between the GOK and WFP, on the outlook of food security in Kenya from October 2012 to March 2013, which revealed that the population in need of humanitarian assistance declined from 2.2 million in February 2012 to 2.1 million in September 2012.; there was also a decline in the national food stock. The total maize output (the main staple in Kenya) was likely to be below average. The national maize output from the long rains was expected to be 16% below the five year average (KNBS, 2014:8-9).

It is shown in the chapter 3 that, according to Olielo (2013:3), between February and September 2009, Kenyans who required food assistance numbered 2.6 million (Olielo, 2013:3) out of the 38.6 million of Kenya's population (KNBS, 2012:20). The food insecurity situation continued to persist in the country even in the subsequent years. In 2011 the number of hungry Kenyans was 3.5 million (Olielo, 2013:4). Moreover, the KNBS (2014:8) indicates that Kenya's population who were in need of humanitarian assistance was 2.1 million in September 2012. Despite the prevalence of food insecurity among Kenyans, the researcher of this study recognises the importance of the legislations on food security in the country. For example, the researcher hypothesises that, the implementation of the provisions of the legislations combined with favourable weather in 2015 might have influenced the positive economic development in the country as illustrated by KNBS (2016:3): "The Kenya's GDP is estimated to have expanded by 5.6% in 2015 compared to

a 5.3% growth in 2014". Though not optimum, the slow but positive GDP growth in the country is said to be influenced heavily by improved harvests in 2015. According to USAID (2015:1), the GOK interventions, USAID and other international humanitarian assistance, and near-normal rainfall during the 2015 March-to-May long rains resulted in relatively improved food security. However, the food security in Kenya is not yet optimum because ASALs experience the worst food insecurity in the country, due to droughts as a result of climate change. Voi Division is an ASAL and the researcher deemed it appropriate to investigate its food security, specifically among FHHs. This explains that concerted efforts are needed to counter the effects of the climate change to realise full food security among everyone. The subsequent guidelines offer a way forward but not exhaustive for enhancing food security and accelerate the full eradication of food insecurity in the Voi Division especially among the FHHs.

8.3 Practice guidelines

The guidelines suggested in this chapter emanate from both the quantitative and qualitative findings of the study, particularly on the areas that require future interventions. Like the rest of the objectives of this study, the objective 4 is contextualised on the ecological systems perspective. According to Bronfenbrenner, there exists symbiotic relationship between human ecological systems. This is why the finding on the objectives 1, 2 and 3 are linked together to arrive at the objective 4: To describe the statuses of food security among FHHs in the Voi Division, Kenya and provide practice guidelines regarding the food security statuses.

This section discusses the practice guidelines in the following order: guidelines for programme planning, guidelines for implementation, and guidelines by the key informants.

8.3.1 Guidelines for programme planning

Programme planning for the food security among the FHHs in the Voi Division requires a consideration of myriad of factors, which include rural-urban nexus, male-female nexus, need for institutional mapping for coalition-building in food security development, plan for diversity in food resources for allocations to the households, inculcation of participatory rural appraisals before the planning, and maintaining effective communication among planning partners. With these factors, several intervention strategies are proposed for each item, in order to guide programme planners in their work of planning on food security, especially focusing on the FHHs in the Voi Division, Kenya. Subsequently, guidelines for the planning entail:

8.3.1.1 The food assistance organisations and institutions should plan while considering rural-urban nexus

The quantitative strand of the study assisted the researcher to come up with the guideline, for it revealed that slightly over half of the FHHs were rural area residents. Additionally, there was difference in dietary diversity between urban and the rural residents, with the former indicating higher HDDS. Owing to these observations, the researcher recommends for considerations of rural-urban dynamics in planning for food intervention programmes. The following steps can help in the planning:

- Take count of the FHHs in the urban and rural areas of the Voi Division.
- Conduct situational analysis of road infrastructure in the urban and rural areas. This will help determine the accessibility of the areas.
- Do mapping of functioning food market centres in the urban and rural areas.
- Establish whether there is irrigation infrastructure in the rural areas or some parts of the Division.
- Conduct institutional mapping of food intervention organisations and institutions in the Division. This will help in identifying possible partners in planning and avoid replication of projects.
- Finally, plan for the food assistance interventions according to the needs of the FHHs residing in the urban area and, those in the rural areas of the Voi Division.

8.3.1.2 Programme planning should consider male-female nexus

As indicated in chapter 3, CEDAW requires countries to eliminate discrimination against women in public as well as private spheres, including in the family, and recognises that traditional gender roles and stereotypes must be eliminated in order to end all forms of discrimination against women and girls (Khanna et al., 2016:2). It seeks to achieve 'substantive equality' or 'equality of results', which stresses that there should be equal access, equal opportunities, and equal results for women and girls (Khanna et al., 2016:2), with men and boys. From these assertions, the researcher deduces that, both males and females should experience equity in resource allocations, particularly food resources. Since the male and the females do not have similar needs all the time, the researcher proposes for programme planners to delineate each gender's special needs before making any plans regarding food security interventions. The researcher proposes for FHHs' needs appraisals to establish male versus female needs through the following activities:

- Conducting one-to-one interviews with the FHHs' heads. One-to-one interview will yield candid answers regarding FHHs' needs.

- Conducting focus group discussions with the community. This approach will help the planners establish credible needs of the community according to gender.
- Conducting focus group discussions with the FHHs' heads. Focus groups will gather together the heads for detailed discussions of their needs, reach majority agreement, and prioritise the needs accordingly.
- Analysing the needs.
- Synthesising the data to come up with valid findings on the needs of the FHHs from the community members themselves, and the female-household heads.
- Then plan accordingly.

8.3.1.3 The organisations should also conduct institutional mapping of partners

The researcher is of the opinion that food assistance organisations and institutions may have been replicating services in the study demarcation. This is more so from the qualitative findings through key informant interviews. From the responses by the key informants, the researcher deduces or experienced instances where organisations offered same assistance for example the World Vision and the NDMA had the PRRO project (see chapter 7); which might have been replicated on the same clients. In order to conduct an effective institution mapping, the organisations should seek to know the following:

- What kind of assistance is our organisation or institution offering?
- Which other institution is offering similar services?
- What are the implications of the services?
- How shall we map up the organisations and their services?

In order to answer these questions, the food assisting organisation should partner with the KNBS for data collection on the issues under the questions. That is:

- The GOK, particularly through the KNBS should conduct a county survey to identify all food assisting organisations operating in the study area and establish their areas of linkages.
- The KNBS should analyse the data and provide findings to the organisation that had contracted it.
- The food assisting organisation should work on the findings by seeking partnership with the other organisations, establish areas of linkages and “do-it-alone.”
- Plan according to the findings and decisions on interlinkages and exclusive interventions.

- According to the ecological perspective, meso-systems play a vital role of linking all the micro-systems for proper functioning of the entire system. Therefore, these organisations should further establish cordial partnerships for food security planning. The advantage of forming the partnership is to avoid programme replications (which may create more gaps) in food assistance and to ensure equitable food resources and services allocation.

8.3.1.4 The organisations should also plan for diversity in the food resources for allocations to the households

Both the quantitative and qualitative findings indicated poor fruit utilisation among the FHHs in the Voi Division. According to UN (2016:15) chronic undernutrition puts children at greater risk of dying from common infections, increases the frequency and severity of infections and contributes to delayed recovery; and it is also associated with impaired cognitive ability and reduced school and work performance. To mitigate the detrimental effects of vitamin deficiencies, and add more food groups to the FHHs diets, facilitating and providing services geared towards acceptable dietary diversity will provide the food ecological homeostasis. In order to achieve this, programme planners on food security of the communities (including the FHHs) in the Voi Division should:

- Write plans indicating provisions for fresh fruits and vitamin supplements to the most vulnerable including FHHs' children.
- Plan for capacity building projects on the needs for fruit inclusion in daily dietary intakes of every member of the FHHs.
- Integrate at least 6 food groups in plans for food assistance.
 - Six food groups are the threshold for food secure households, as indicated in chapter 5 that, six to twelve food groups indicate food security.

8.3.1.5 The organisations should inculcate participatory rural appraisals before the planning

The food security organisations should make sure they facilitate for participatory rural appraisals for food security needs of the FHHs by involving members and heads of the FHHs, through the following steps:

- The local community together with the humanitarian organizations should conduct neighborhood social mapping.
 - Social mapping is a methodology of identifying the vulnerable households to food insecurity. This practice will ensure food projects and assistance reach where it is most needed and appropriate.

- Enlist the FHHs as a vulnerable group.
- Let the FHHs participate in identifying their inherent needs to be planned for.
 - The food assisting organisations should give priority to the FHHs in identifying their inherent problems, prioritising the needs, and establish cordial partnership with them in planning for solutions on food insecurity.

8.3.1.6 Maintaining effective communication among planning partners

Effective communication between the government, the voluntary organisations, and the community should be maintained to ensure proper coordination of the planning support systems. Therefore, effective partnerships will also ensure coordination of communication channels, collective decision-making, implementation and sustainability of food interventions among the FHHs. In maintaining effective communication channels, the planners may adopt the following directions of the communication:

- Downward communication: in circumstances where the top managers in one food assisting organisation needs to pass food security information to its subordinates. Such information may entail: implementation of goals, procedures and practices, performance feedback and many more.
- Upward: where the subordinates need to communicate to the seniors. For example, in the instances where the support staff type and submit progress reports and suggestions for improvements to the higher hierarchy in the organisation.
- Horizontal communication: this is whereby the partner organisations need to communicate with each other, especially on planning meetings, inter-organisational problem solving, project(s) co-ordination.
- Diagonal: the communication can move diagonally where partnering organisations need to communicate together and in liaison with the local community.

According to the ecological perspective, the guidelines in planning are geared towards inculcating efficiency in food security intervention programmes with the communities of the Voi Division, particularly the FHHs. This would thereby inculcate the realisation of full food security and stability for accelerated community development in the division.

8.3.2 Guidelines for policy and programme implementation

Food policies are the regulations that guide or govern food interventions towards realising food security, and programme means a set of projects which entails all activities carried out to ensure food security. Guidelines for policy and programme implementation are important for this study. The researcher encountered that, the Kenya FNSP (2011) is very broad in

its strategy as the current working food policy in the country. Therefore, there is need for modification of the policy to inculcate more specificity, addition of more clauses to cater for food security among everyone, and implementation of both the national, institutional and grassroots-based policies which should emanate from well formulated policy guidelines (as revised in the policy). Moreover, the implementation of the policies should be preceded with proper programme planning. The researcher further emphasises on multi-sectoral corroborations in the implementation. According to the ecological systems perspective, a cordial link between the micro-systems (the FHHs and organisations) and the national realms (macro-systems) is supposed to exist in order to achieve sustainable community development, particularly on the food security exo-system. Ultimately, the following approaches to guidelines in policy and programme implementation are proposed: Nutrition and climatic change interventions through water provision, capacity-building for self-reliance, and agricultural extension services.

8.3.2.1 Nutrition and climatic change interventions through water provision

The findings of this study, especially those emanating from the qualitative phase of the study cited drought as the major cause of poor dietary diversity among the Voi populations. Besides the researcher's observations regarding droughts, every key informant mentioned or insinuated that the effects of climate change is the main menace to food security in the Voi Division. The climate change is a natural ecological system jeopardising the food security. A discussion of the SDG6 has been done in the Chapter 3 of this study, "sanitation is addressed by SDG6 which addresses the issues of drinking water, sanitation and hygiene" (UN, 2016:6). The researcher observed very few domestic water points in the rural areas and no irrigation water infrastructure in the study demarcation. There is therefore a need for improved water supplies through the following guidelines:

- **The local water management authority should expand domestic water supply among the rural FHHs**

According to key informants, there is abundance of the water sources in Taita-Taveta County, which would be distributed to the Voi Division, but utilisation of the resource is poor. Although the qualitative findings (observational) found fair domestic water supply, more particularly in the Urban Voi, the resource was not adequately distributed in the rural areas. Therefore, the researcher proposes the following intervention strategies by water management authorities for expanding domestic water supply:

- Constructing more water catchments, besides the existing ones.
- Pipe the water to the areas with the most needs, especially the rural areas.

- Enforce water conservation measures to avoid wastage. For example, using standard materials for water piping and tapping. The researcher has previously observed with concern the widespread use of plastic water pipes protruding above the ground surface in the hot sun. Many of these pipes are broken and make water spillages. She therefore proposes for the use of steel materials in the water infrastructure. The advantages associated with the standard materials are: less water wastage, reduced contamination of the resource and cancer prevention.
 - The TAVEVO Water Management Authority should enforce a rule of ensuring the pipes are laid deeper under the ground surface. The authority should conduct sensitization campaigns regarding this requirement. This is because the researcher has been observing over-the-surface plastic pipes spilling out water on the ground.
 - The water management authority should also change the system layout along sewerage lines to its exclusive system design. Water pipes in Kenya, including in Voi Town are lay out along sewerage trenches which poses risk to public health. The water pipes along the sewerage ways are highly contaminated and can cause diseases to the water consumers.
 - The Taita-Taveta County Government in collaboration with the water service provider(s) should conduct capacity building with the Voi residents on methodologies of rain-water harvesting, constructing rock catchments to complement the tapped water. This should be done through skill training.
 - Additionally, the authorities should subsidize the costs for purchasing the water harvesting materials and equipment. This way, universal hygiene and sanitation in the study area will be enhanced.
- Likewise, irrigation is also vital for own food production and agri-business production. With regards to the irrigation water, the following needs to be implemented:

- **TAVEVO and possible emerging water companies should establish irrigation water infrastructure among farming communities**

Both the quantitative and qualitative findings have a concept of drought as the major factor influencing food insecurity in the Voi Division. As mentioned earlier, all the key informants mentioned droughts as the threat to food security in the Voi Division. During the survey, the researcher observed prematurely dried crops in gardens (see figure 7.9 in chapter 7). For example, in the figure, the surroundings of the garden and goat shed are dry lands. This observation corroborates that, “perturbations in ecosystems have profound impacts on agriculture” (FAO, 2017:5). Therefore there exists a need for irrigation infrastructure among the FHHs to ameliorate food insecurity among them. The researcher therefore suggests the following guidelines:

- **The local water management authority, TAVEVO should implement water supply to all farming areas in the Voi Division**

Irrigation water supply is particularly necessary among the marginalised populations in the rural areas of the Voi Division. Olielo (2013:4) observes that in the situation of the climate change, irrigation for adequate soil moisture is vital for growing crops. Lack of irrigation water in the Voi Division was found to adversely affect food security among the FHHs. The following steps should be taken to rectify the existing lack of irrigation water infrastructure in the Voi Division:

- The GOK and Taita-Taveta County Government should mobilize financial resources to build the irrigation water infrastructure in the whole county, giving first priority to ASALs particularly the Voi Division.
- The local water management authority, TAVEVO should make proposals for more funding from external donors. This would complement the governments' funding and ensure completion of the programme.
- TAVEVO Water Management Authority should expand the irrigation infrastructure from the first-established to the other parts of the county.
- The local politics dynamics should be taken care of to avoid the irrigation programme stalling. This can be done by laying up policies which bar politicians from individualizing programmes.

According to the ecological systems perspective, homeostasis among all levels of the natural ecology is vital for proper functioning of the entire system. This therefore implies that dry lands ecology should be watered for agricultural productivity, so as to be at par with other well-off parts of the Taita-Taveta County. This is because water supply and food security are ecological and physiological resources which are intricately co-joined, as Wittman et al. (2016:1292), rightly puts, "food security and biodiversity conservation are intimately connected, most obviously through agricultural production".

8.3.2.2 Capacity-building for self-reliance

The qualitative findings, particularly the key informants reported facing hardships with the community's willingness to adopt innovations. This implies lack of initiative for self-reliance and development among the community of the Voi Division. The researcher is of the opinion that, the lack of initiative and unwillingness for self-dependence by the community predisposes their households to vicious cycles of intergenerational poverty, including food poverty. International Federation of Red Cross and Red Crescent Societies (Sa:1) indicate that, training and providing resources to vulnerable groups in communities improve their

food security. Therefore the researcher suggests the following guidelines for the community's self-reliance:

- **The GOK and Taita-Taveta County Government in collaboration with food development agencies should conduct capacity-building to empower the community including the FHHs on self-help strategies**

The capacity-building should be conducted through:

- Training the FHHs on the best practices for self-reliance. The researcher is of the positive mind that every community has inherent capabilities for self-development that, if given pre-programme training, they can adopt new innovations accordingly.
- Sensitise the community on the need to work for self-reliance.
- Conduct skills-training including on farming technologies to everyone including the female household heads, by making the community become aware of the new technologies and strategies for sustainable farming. Own food production will alleviate overreliance on external food assistance, which would boost the communities' self-esteem.
- Also conduct capacity-building workshops frequently for sustained knowledge retention. The researcher is of the opinion that people forget so easily and constant reminders are needed.
- In the workshops, remind the community that they possess inherent power of decision-making on priority development areas, including self-help initiatives.
- Train the community on resource management skills including entrepreneurial skills, livestock and crop management.
- **The GOK, the Taita-Taveta County Government and non-governmental agencies should conduct capacity-building with the community on nutrition knowledge as well**

The SDG4 encourages for among other issues, training throughout life (UN, 2016:5, 19); and enhancement of knowledge, skills and values needed to function well and contribute to the society (UN, 2016:5) (see chapter 3). In this current study, the need for training arises from the finding that, the food consumption among the FHHs was based mostly on carbohydrate and fat source foods, and less fruit intakes. These foods are energy dense and pose health risks to consumers. Therefore conducting capacity-building on nutrition will empower the FHHs with positive food consumption behaviours.

The discussion of objective one in chapter 6, indicated that the salient finding from 24-hour recall regarding the HDDS was that the most consumed food groups by the FHHs were

cereals and sugar. Furthermore, the qualitative findings regarding the FCS are reminiscent of need for dietary interventions among the FHHs. Owing to the key informants' observations that the FCS in the Voi Division was generally poor, the empirical observation that the "main staples" took the lead in both the HDDS and/or FCS, and the photo of Irish potatoes cooking as stew to be taken with maize meal (see figure 7.12); it means starchy foods of high energy density was vastly consumed. Furthermore, both the HDDS and FCS revealed high consumption of both sugar and fats/oils. Therefore, cereals or main staples, sugar and fat/oil consumption indicate unhealthy consumption of high-energy loaded foods which is not very healthy for the FHHs. This is an indication of poor balancing of diets and a need for dietary or nutrition interventions, and more so, nutritional education.

Therefore, consumption of high energy density food among FHHs is associated with lack of nutritional knowledge (see section 3.4.1.6 of the chapter 3). Based on the literature and the study findings, the researcher ultimately suggests the following strategies to food development stakeholders for conducting the nutrition education:

- **Conduct malnutrition prevention education**
- Food and nutritional development partners should demystify the concept of malnutrition and its preventative strategies to the Voi Community, especially the female household heads.
 - The findings of this study indicate that the main source of livelihood for the FHHs was small-scale farming. Despite the FHHs being the major food producers, they do not benefit from the food they produce so much. They are ignorant to dietary requirements for their household members, which pose malnutrition vulnerability.

Therefore, the female household heads should be trained on how to recognise various symptoms of malnutrition, especially among their children. This will help in building know-how in them to seek nutritional interventions early enough for the children.

- **Conduct education on balancing diets**

How well households utilise food that is accessible to them will depend on their food nutrition, safety and hygiene knowledge and willingness to ensure a healthy and nutritious diet for all household members (Anderson, 2014 in Qureshi, Dixon & Wood, 2015:396). Conducting education on balancing diets among the FHHs can be done this way:

- The FHHs should be educated on the approaches of ensuring dietary diversity for their household members. With this kind of an intervention, the FHHs will make informed

choices of what food, amount, and kind of food to feed their households in accordance with the WFS declaration of what constitutes food security.

The researcher is of the opinion that, the capacity-building with the community on nutrition knowledge should be done at multi-agency level. Social networks (in context of ecological systems perspective) consist of multilevel networks of individuals, groups, organisations and governments (Robbins, Chatterjee, & Canda, 2006 in Kaiser, 2011:66). Therefore according to the ecological systems perspective, the partnership (as meso system) will contribute to the best outcomes on proper functioning of the community at large as a macro-system, and the FHHs as the micro-system.

8.3.2.3 Agricultural extension services

The study findings especially the qualitative findings (chapter 7), on theme 1, indicated that the key informants were experiencing challenges in line of their duties that, there was poor logistical facilitation by the Ministry of Agriculture to extension service officers. This means that the extension service provision in the Voi Division is not adequately disseminated. The researcher is of the opinion that agricultural extension is a vital intervention strategy, particularly for rural food development, and suggests for the following intervention guidelines:

- **The divisional or sub-county office of the Ministry of Agriculture should conduct extension services focusing on FHHs**

The problem of the lack of logistical facilitation by the government for extension services (agricultural) poses a threat to agricultural capacity among the community in the Voi Division, particularly the FHHs. There should be prior plans on logistics in the extension services. According to Tiwari (2018:71), national policy and strategy must precede organisation and extension services and implementation of programmes in favour of women. Therefore, the researcher recommends the following guidelines for female inclusion and gender equality in agricultural extension, as adopted from Tiwari (2018:72):

- Programme development based on specific situational realities and diagnosed needs of women in agriculture.
- Programmes based on needs assessment data disaggregated by gender.
- Women having access to extension services and being involved in extension programme development and planning, especially woman farmers.
- Evaluation examining extension programme adoption rates, use, and impact relating to women in agriculture.

- Women recruited as professional and paraprofessional staff and field agents for extension services, where appropriate.
- In-service extension training of female staff in management skills and agents in technical and information-transfer skills.
- Extension services forming linkages with rural women's groups for collaborative agricultural development efforts.

The researcher moreover provides the following additional guidelines:

- **The Ministry of Agriculture and other agriculture development agencies should conduct extension education on sustainable agricultural practices**

The researcher is of the opinion that agricultural extension should include need for drought-resistant crop production, especially among the rural households. Thus for sustainable biodiversity protection for food security among the FHHs in the Voi Division, the following measures are critical:

- **Extension education for crop diversification**

Once more, owing to the quantitative research findings that cereals or main staples formed the major diet component among the FHHs, the researcher is of the opinion that extension services should also inculcate knowledge regarding legume, and fruits production and use.

According to the researcher's opinion, the guidelines on agricultural extension service provision will empower the FHHs into adopting and coming up with innovations for mitigating vulnerability to food security, while sustaining the natural ecosystems around them. The community self-accountability will be informed by the empowerment created in them. Overall, according to Friedman and Allen (2011:9), the Bronfenbrenner's perspective stipulates that, every part of the ecosystem is under symbiotic relationship or mutual accommodation. Therefore, interdependence between the multi-sectoral change agents, particularly the Ministry of Agriculture and other agencies, and the local community would boost the FHHs' food security, hence making it possible to attain the SDG2.

8.3.3 Guidelines by key informants

The key informants proposed the following practice guidelines as feasible interventions for food security in the Voi Division, including among the FHHs. This is because they were deemed knowledgeable about the issues of the food security in the study area. The guideline approaches are: formation of self-help groups, capacity-building, FHHs specially designed participatory rural appraisals for needs assessments and decision-making,

subsidising FHHs children's education, formulation of female-friendly policies, and specially designed extension services for females only.

8.3.3.1 Formation of self-help groups

Formation of self-help groups among community members especially the FHHs is vital for their self-dependence. Pandey (2017:32) associates women self-help as a strategy for community empowerment. In order to achieve the women empowerment and self-reliance particularly the FHHs caregivers, the key informants proposed the following guideline strategies:

- **The FHHs should form social groups**

The FHHs should form groups whereby they can be contributing a little money as a self-help kitty, including the government supported table-banking. The table banking entails saving and borrowing small loans. It is appropriate than the regular banking among the poor and the vulnerable to food insecurity. This is because, unlike the commercial bank lending, table-banking does not require any collateral from the debtor. It also provides a convenient platform for requesting loan for capital for small business enterprising.

8.3.3.2 Capacity-building

The key informants also proposed capacity-building interventions for the FHHs' empowerment. The key informants also suggested:

- **Capacity-building for income generation**

Capacity-building for income generation should be geared towards making the female household heads more aware of the prevailing entrepreneurial and market opportunities. The researcher of this study is of the opinion that if properly disseminated, entrepreneurial and market information will encourage farmers (including the female household heads) to participate in starting new businesses and marketing of their farm produce. This is because they will be aware of food dynamics on supply and demand.

- **Capacity-building for technological development**

Technical development in this study means modern equipment as well as innovative strategies in food production. According to Schut, Klerkx, Sartas, Lamers, McCampbell, Ogonna, Kaushik, Atta-Krah, and Leeuwis (2016:544), systems-oriented agricultural innovations, such as participatory research and learning, and processes of technological and non-technological change, are more closely related to agricultural innovation. Building capacity among the female household heads on the need for accepting innovations that have been tested previously, technical innovations, especially on various methods of

agricultural production, will inculcate in them knowledge base about the use of modern technologies for sustainable food security.

8.3.3.3 FHHs specially designed participatory rural appraisals for needs assessments and decision-making

Specially designed rural appraisals with the FHHs imply gender sensitivity in community needs assessments. On the basis of this guideline, the key informants insinuated that, there should be collective and inclusive decision-making on matters dealing with FHHs' food security; hence the females should participate in the decision-making for equity in food security decisions and practices, and their feeling of inclusion. This will inculcate sustainability of food security projects in the division including among the FHHs.

8.3.3.4 Subsidising FHHs children's education

The researcher is aware of some subsidies on education by the GOK, through the following programmes:

- The Universal Free Primary Education (FPE) Programme.
- Through a presidential decree, the public secondary education is subsidised for everyone including members of the FHHs.
- Moreover, the plans to subsidise technical education is in progress and expected to kick off in September 2018.
- Another strategy by the government to promote education is through Higher Education Loans Board, popularly known as HELB. Through the HELB, the GOK offers education loan to poor students in tertiary education institutions, including technical institutions and universities. Owing to these observations, the researcher is of the opinion that, deficiency in school progression, including the FHHs' children may be associated with extraneous factors such as early pregnancies and marriages, and drug and substance abuse and/or delinquent tendencies, and ignorance. However, there are special instances where female household heads may not afford to pay their children's school fee balances emanating from the subsidised secondary school and tertiary institution education. For that reason, the government should come in to assist the FHHs financially. Therefore, the researcher agrees with the key informant(s) that, in such special cases, the national and/or county governments should assist the FHHs in clearing the balances. This can be done by establishing a special kitty for the poor and vulnerable groups' education, and if possible, an exclusive kitty for FHHs' children.

8.3.3.5 Formulation of female-friendly policies

The target 2 of eradicating poverty is: create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender-sensitive development strategies, to support accelerated investment in poverty eradication actions. In order to achieve this target, the GOK should:

- Formulate policies that ensure that both males and females have equal access to resources, including food resources and its defining factors.
- Formulate policies seeking to eradicate poverty among females, including food poverty.
- Formulate policies that address gender barriers in education attainment. Girl child education would translate into a literate female who is employable in future. Moreover, the female as a caregiver would possess nutritional education empowerment for her household's food and nutrition security.
- The President of Kenya should declare Nutrition Education a national policy.
- In the establishment of the policy, the GOK should set up a special kitty for the education for FHHs.
- The legislature (the national assembly, senate and county assemblies) should set up by-laws to recall girls and young women who drop out of school due to early pregnancies and marriages; and also formulate anti-discrimination laws to cushion the girls from stigma associated with being a young parent or ex-wife.
- Ensure that the One-third Gender Rule is always observed in every sector of employment. This will give females greater chance of getting hired for better food purchasing power.

The above guidelines are proposed. There is a need for improving dietary practices among FHHs for improved food security and nutrition of their family members. The researcher is of the opinion that, creating nutritional knowledge among the FHHs would be essential for dietary diversity and the ultimate improved food security outcomes among the FHHs. As indicated in chapter 7, the researcher is aware of the One-third Gender Rule as gender policy in Kenya, but the policy is not effectively practiced. If the government makes it mandatory for job sectors to observe the rule, then some equity in the job market would be achieved. Additionally, the ultimate food security among females will be attained at a great extent.

8.3.3.6 Specially designed extension services on females only

According to Tiwari (2018:69), extension is an important vehicle for integrating women into official development efforts throughout the world and empowering them as human beings.

The researcher is of the opinion that, since key informants from the Ministry of Agriculture indicated that the ministry was not sufficiently facilitating them for extension services, it is important that the ministry increases logistical facilitation to its extension service providers, including female officers for better integration with the FHHs in the division, through the following activities:

- Mobilise finances for the extension projects;
- Curb politics and individualising offices;
- Provide a mobile vehicle for easy transport to the fields by the extension workers;
- Provide reading and teaching materials for the extension;
- Motivate the extension officers psychologically – they seemed demotivated to work; and
- Curb corruption altogether.

As discussed previously, this study is an action research and its main goal was to measure and provide possible solutions to the problem of food insecurity that could be prevalent among the FHHs. With regard to this observation, the researcher has proposed the above guidelines in an effort to providing the solutions to the problem of the food insecurity among the FHHs in the study area. This chapter has reaped from the benefit associated with the use of the convergent parallel mixed methods design of triangulating both the quantitative and qualitative findings to arrive at the above guidelines. Just like the researcher's suggestions, the key informants' guidelines are also contextualised on the ecological systems perspective. The ecological systems view states that human development cannot be seen in isolation but must be viewed within the context of the individual's relationship with the environment (Friedman & Allen, 2011:9). Therefore, to ensure sustainable food security among the FHHs in the Voi Division, cordial interaction between the FHHs and other systems is a requisite - partnerships will be required in the actions towards the proposed guidelines.

8.4 Summary

In the context of the ecological systems perspective, the linkage or the meso-system between the indicators of food insecurity and other intervening factors, the exo and chrono-systems were significant in determining the overall food security statuses among the FHHs in the Voi Division in Taita-Taveta County, Kenya. The FHHs are the micro-systems which are embedded within the larger macro-system, the Voi Community. Therefore, the micro, meso, exo, and chrono-systems played a key role in shaping the macro-system's welfare. The overall food security levels according to the quantitative phase indicated resilience in food shortages among the study subjects. However, with a significant proportion of the

households being moderately food insecure, it means concerted efforts are still needed to eradicate hunger and food insecurity completely. The researcher hitherto has proposed the guidelines for practice in interventions of food security, as her part of contribution in the efforts to achieve the SDG2 (total hunger and food insecurity eradication) among the FHHs in the Voi Division, Kenya. Additionally, the proposals by the key informants are of significance in future food security endeavours. Therefore, the key guidelines were on: planning, implementation, and finally the key informants'.

The final chapter – summary, conclusions and recommendations follows.

CHAPTER 9

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

9.1 Introduction

This study was designed to investigate food security among FHHs in Kenya, focusing on Voi Division, Taita-Taveta County. The study report is comprised of the following chapters: chapter 1 is of general introduction, chapter 2 is of literature review on food security in general, chapter 3 is of literature review on food security among female-headed households, chapter 4 is of literature review on ecological systems perspective and food security among female-headed households, chapter 5 discusses the research methodology, chapter 6 presents and discusses quantitative findings, chapter 7 is on qualitative findings, chapter 8 is on practice guidelines, and the current chapter 9 presents summary, conclusions, and recommendations of the study.

9.2 Summary

The summary section in this chapter shows the objectives of the study and how they were met to achieve the goal of the study. Subsequently, the summary with regards to the objectives is illustrated.

9.2.1 Objectives of the study

This section discusses the objectives of this study and how they were met to achieve the goal. The objectives were:

- To determine the status of dietary diversity among female-headed households in Voi Division, Kenya by utilising dietary diversity score as an indicator of food security.
- To measure food consumption frequency among female-headed households in Voi Division, Kenya by utilising food consumption score as an indicator of food security.
- To determine the overall status of food security among female-headed households in Voi Division, Kenya.
- To describe the statuses of food security among female-headed households in Voi Division, Kenya and provide practice guidelines regarding the food security statuses.

9.2.1.1 Objective 1

Objective 1 of this study sought:

To determine the status of dietary diversity among female-headed households in Voi Division, Kenya by utilising dietary diversity score as an indicator of food security.

This objective was firstly met through the literature study, where in chapter one it focused on food security in the world, in Africa and in Kenya, in order to contextualise the topic. Chapter 2 described food security more in-depth, focusing on national food security, household food security, universal pillars of food security, food insecurity, food insecurity versus nutritional insecurity, measuring food security, factors affecting food security, and consequences of food insecurity. Chapter 3 discussed FHHs' food security as a rights-based issue, factors affecting FHHs food security, and consequences of the FHHs food insecurity. The fourth chapter was on literature review to contextualise ecological systems perspective and food security among female-headed households.

This objective was further met in the quantitative phase of the study, where measuring of dietary diversity was done by utilising the 24-hour recall technical tool to obtain data on the HDDS. Its findings have been presented and discussed in chapter 6 of the study (see sub-section 6.4.1).

The qualitative phase also focused on the dietary diversity as reflected in the interviews with the key informants, observations and photographs. Presentation of the findings was done thematically as food consumption patterns (dietary diversity and food groups).

9.2.1.2 Objective 2

The objective was:

To measure food consumption frequency among female-headed households in Voi Division, Kenya by utilising food consumption score as an indicator of food security.

This objective was met through the literature study in Chapter 2 describing national food security, household food security, universal pillars of food security, food insecurity, food insecurity versus nutritional insecurity, measuring food security, factors affecting food security and consequences of food insecurity. Furthermore chapter 3 focused on FHHs, food security as a rights-based issue, factors affecting FHHs food security and consequences of the FHHs food insecurity with this vulnerable group. Moreover, the chapter 4 contextualises food security among the FHHs with the ecological systems perspective.

This objective was also met through the empirical study in the quantitative phase, where food consumption and frequency were measured among the FHHs through the use of 7-day food frequency tool to get data on FCS. The tool elicited findings based on the 8 food groups of the FCS: main staples, pulses; vegetables; fruits; meat, fish and eggs; milk and dairy products; sugar and honey; fats and oils (see section 6.2.3 in the chapter 6). Likewise

the HDDS, the FCS revealed that “main staples” was the most consumed food groups; with “fats and oils”, “sugar and honey” also getting high consumption rates. Fruits were the least consumed food group. The consumption of the energy dense foods among the FHHs requires nutritional education interventions.

This objective was also met through the empirical study in the qualitative phase. For the sake of adding value to the qualitative findings, the researcher strived to create patterns out of key informants interviews, observations and photographs regarding the FCS. It is indicated previously in the chapter 7 that, because of the qualitative nature of the interviews, the dietary diversity and food consumption scores were not technically delineated in the interview schedule, but the researcher employed the combination of both emic and etic approaches to interpret findings regarding the tools during the analysis. Likewise the findings on the objective one, the findings of the objective two was thematically presented as food consumption patterns (FCS and food groups). According to the qualitative findings discussed in the chapter 7 of this study, several FCS food groups emerged from the key informant interviews regarding food consumption scores in the Voi Division, indicated both bad and acceptable situations. The poor and/or acceptable FCS, were associated with rural-urban nexus and socio-economic status of households. Secondly, both the key informants’ interviews and observational results indicated that, “main staples” food group was the most highly consumed among all the 8 food groups. Moreover, the photographs regarding food consumptions are of the dandelion vegetable, and a main staple - Irish potato are also insinuating of the main staples prominence in the FCS. This again, just like the HDDS, showed that energy-dense foods led in the food consumption among the FHHs in the Voi Division. Furthermore, the photographs supported these findings.

Likewise the HDDS, the FCS section is embedded on the ecological systems perspective. The rural-urban nexus and socio-economic status are regarded as the macro-systems. The meso-interaction between them influences the status of the FCS among the FHHs in the Voi Division. In this study the rural-urban nexus and socio-economic status are interactive variables upon the FCS exo-system. The variables are embedded or nested together through their interactive nature upon each other.

9.2.1.3 Objective 3

The objective was:

- To determine the overall status of food security among female-headed households in Voi Division, Kenya.

This objective was firstly met through the literature study, where in chapter one it focused on food security in the world, in Africa and in Kenya, in order to contextualise the topic. Food availability, food access, food utilisation, coping strategies in food shortage, food security and female-headed households were conceptualised. Chapter 2 described food security more in-depth, focusing on national food security, household food security, universal pillars of food security, food insecurity, food insecurity versus nutritional insecurity, measuring food security, factors affecting food security and consequences of food insecurity. Chapter 3 discussed FHHs, food security as a rights-based issue, factors affecting FHHs food security and consequences of the FHHs food insecurity with this vulnerable group. As mentioned previously, the chapter 4 contextualised food security among the FHHs with the ecological systems perspective.

This objective was also met through the empirical quantitative phase, whose findings were arrived at triangulating HDDS and FCS levels of food security on a cross-tabulation table. where the overall food security was found to be fair, because most FHHs were experiencing mild food insecurity or food security. However, a few FHHs were in moderate food insecurity. Moreover, the qualitative phase with the key informants indicated poor food security among the community of the Voi Division, including the FHHs. The existence of the segments of both food secure and food insecure FHHs means that the SDG2 of hunger and food insecurity eradication is not fully achieved among this community; therefore multi-agency interventions are needed to ensure total hunger and food insecurity eradication among the FHHs. The converse findings between the quantitative and qualitative phases indicate the need for future studies to establish validity of food security tools, and establish possible causes of the incongruence, thereby establishing a rapport between them. Furthermore, the future studies should strive to establish which domains of food security created the incongruence in this current study.

The quantitative findings indicated that the HDDS and FCS correlated positively with each other. This means an increase in one of the variable caused a corresponding increase on the other. The researcher is of the opinion that the positive direction of the correlation was influenced by interactive relation between the HDDS and FCS. The HDDS is a single-day recall, and has the ability to inform the outcome of the FCS (a score of 7-day food consumption). Still in the quantitative phase, the researcher further technically categorised these variables into their respective food security statuses (see figure 6.4 in chapter 6). The results on food security status according to HDDS showed that the majority of the FHHs were food secure or in mild food insecurity. A few more were experiencing moderate food insecurity, and only one FHH was totally food insecure. Secondly, the researcher classified

the FHHs into FCS food security categories (see figure 6.5 in the chapter 6). Likewise the levels of food security according to the HDDS, the findings on food security levels according to FCS revealed that, the majority of the households were in acceptable food security status, a few were at borderline, and few others were in poor food security statuses. In order to arrive at the overall food security status, the researcher aggregated the HDDS and FCS food security categories through a cross-tabulation (see table 6.16 in the chapter 6).

The cross-tabulation of the HDDS and FCS revealed the following results regarding the FHHs food security statuses: a vast majority of the FHHs were in food security/mild food insecurity; a few more were in moderate food insecurity; while no FHH was in poor food security status. These results were in contrast with the researcher's hypothesis that many FHHs would have been in a worse food security situation than was found. Similarly with the researcher's opinion, most key informants indicated that, food security status in the study area was poor, but the statuses also depended on the area of residence and/or socio-economic capacity of a household. These contrasting findings between the quantitative and qualitative phases led the researcher to the following rhetoric questions, "Which are the best tools to measure food security among the poor communities? Is it by the use of technical tools or the use of subjective perceptions? If the IPC was used to measure the food security, would it have produced different results?" See section 2.3.7 of the chapter 2 for detailed discussion regarding the IPC. The researcher emphasises the questions because, besides the aforementioned incongruences, both the quantitative and qualitative findings indicated that, the FHHs were employing coping strategies (see table 6.18 in the chapter 6). CSI indicates responding to hardships in already existing food insecurity. This view is consistent with Chagomoka et al. (2016:2), assertion that, coping strategies are active responses to food shortages. Finally, the qualitative findings indicated the natural ecology of droughts as the major cause of disturbance in the food security.

The 3 objectives assisted in meeting the objective 4 as subsequently summarised.

9.2.1.4 Objective 4

The objective was:

- To describe the statuses of food security among female-headed households in Voi Division, Kenya and provide practice guidelines regarding the food security statuses.

This objective was met through the proposed practice guidelines in chapter 8. The guidelines were proposed for the GOK, county governments in Kenya, voluntary organisations, community-based organisations, academic institutions and individuals

(including individuals in FHHs), and other stakeholders to adapt for policy formulation, programme planning and implementation. Generally, the guidelines proposed range from policy, planning, and policy and programme implementation.

This study employed convergent parallel mixed methods design in both the quantitative and qualitative phases, hence all the objectives were met through data from the phases convergent. In context of the ecological systems perspective, the mixing of the findings from the quantitative and qualitative phases implicates the interrelatedness of the phases in production of valid and reliable interpretation of the findings in achieving the objectives.

9.2.2 The goal of the study

The goal of the study was:

- To investigate into and describe food security among female-headed households in Kenya, focusing on Voi Division, Taita-Taveta County.

The goal of this study was met through achieving the above objectives of the study through the mixed methods of quantitative and qualitative research approaches.

9.2.3 Research question and sub-questions

The question which guided this study was:

- What is the status of food security among female-headed households in Voi Division Taita-Taveta County, Kenya?

The sub-questions for the study were:

- What is the status of dietary diversity among female-headed households in Voi Division?
- What is the status of food consumption frequency among female-headed households in Voi Division?

Just like the goal of the study, the main question was answered through the achievement of the four objectives of the study. The sub-questions on the statuses of dietary diversity and food consumption frequency were answered by the first two objectives. The answers to the objectives led to the achievement of the third objective of determining the overall status of food security among the FHHs. Moreover, the description of the food security statuses among the FHHs in the Voi Division assisted in formulating practice guidelines as indicated in the objective four.

9.3 Key findings and conclusions of the study

Key findings and conclusions in this chapter are subsequently presented:

9.3.1 Key findings and conclusions regarding the theoretical framework

This study was contextualised on the ecological systems perspective as theorised by Urie Bronfenbrenner in 1979. The theory consists of scientific study of progressive, mutual accommodation throughout the life cycle between an active, growing human being and the changing properties of the immediate settings in which the developing person live, and are affected by the relations between these settings and the larger contexts in which the settings are embedded. The perspective identifies five environmental systems within which an individual interacts. The 5 systems are: micro-system, meso-system, exo-system, macro-system, and chrono-system. In the context of the perspective, the elements of this study fitted the ecological systems with respect to the 5 ecological settings as follows: the FHHs were the micro-system, interactions between the FHHs and other food security variables were the meso-system, food security statuses among the FHHs were the exo-system, the Voi Division is the macro-system, and life events among the FHHs, such as marital statuses of the female household heads were the chrono-system. Therefore, this study was appropriately contextualised with a relevant theoretical framework as contextualised in chapter 4.

9.3.2 Key findings and conclusions of the quantitative findings

The presentation and discussion of the quantitative findings is done in chapter 6 of this study.

The key findings and conclusions of the quantitative phase are subsequently presented:

9.3.2.1 Biographic profile of the respondents

The key findings and conclusions with regards to biographical profiles of the FHHs are presented subsequently.

- **Key findings and conclusions**

With regards to the biographical profile of the respondents, the key findings were: majority of the FHHs were rural residents; majority of respondents were women of reproductive age; the major occupation of the female household heads was farming, followed by casual labour, then business, and formal employment; the most prominent level of education of the respondents was primary education, secondary education, no education, college certificate, college diploma and university degree in their descending order of frequency-of-

occurrence. The range of the number of FHHs' members was 2 to 10, with a mean of 3.63 people. The findings on marital status revealed that half of the respondents were widowed; and the rest of female household heads were never-been married, separated and divorced. With regards to the FHHs' source of livelihood, small scale farming was the major followed by casual labour, then small scale business, formal employment and hawking. The major source of income for the respondents was casual labour, followed by business, formal employment and sale of farm produce.

In conclusion, the biographical profiles of the FHHs were basic variables influencing food security among them. Therefore rural FHHs were more disadvantaged than urban dwellers, the women of the reproductive age were productive for food security, casual labour assisted unemployed respondents especially the farmers, acquire food for their households, the prominent level of education was only primary level which influenced nutrition-knowledge negatively among the FHHs, the mean number of household members was average and had average influence on food distribution among household members, widowhood was rampant and significantly influenced lone household headship, and finally, small-scale farmers did not harvest much, so they complemented their household food security by doing casual labour. In the context of the ecological systems theory, the biographical dynamics surrounding the FHHs are meso-systems which influence the members' interaction with the micro-system (FHH) and other systems surrounding them.

9.3.2.2 Household dietary diversity

The household dietary diversity was measured through the score, the HDDS and its key findings and conclusions are presented herein.

- **Key findings and conclusions**

The key findings and conclusions based on the HDDS are:

The first most consumed food groups were cereals (maize was the major cereal), and sugar and honey respectively. The prominence of the two food groups is associated with their ubiquity and affordability – they make myriad of snacks and are also are affordable.

The second most consumed food group was miscellaneous (mostly tea leaves), which was weighted 0, therefore it had no significance in the HDDS analysis. Fat and oils were third highly consumed, which indicates that consumption of carbohydrate foods was the highest.

With regards to fruit consumption, the quantitative findings showed the “fruits” food group as the least consumed among all food groups (see section 6.2.2 in chapter 6). The

researcher is of the opinion that the lack of enough fruits in the FHHs may have predisposed them to a myriad of vitamin-deficiency ailments and/or conditions. This is because fruit consumption prevents ailments among consumers.

Following the observation that the cereals, sugar and fats led in the diets of the FHHs, it is an affirmation that carbohydrate or energy-dense foods formed the major proportion in the FHHs' diet. Several factors, some of which are beyond this study, can be attributed to this scenario. For example, cereals make many palatable snacks, hence predisposing poor health upon its consumers. Secondly, cereals are the cheapest among the 3 macronutrients (carbohydrates, proteins and vitamins) hence their affordability may have been good among the FHHs. The quantitative findings indicated high sugar, and fats/oils consumption among the FHHs.

Sugar and fats were also highly consumed because of their similar characteristics with the cereals. The researcher emphasises the health risks associated with overconsumption of these food groups. The section 3.5.1 of the chapter 3 shows that, overfeeding jeopardises public health. The sugar and fat are associated with diabetes and high blood pressure respectively. The researcher is of the opinion that, overfeeding with energy-dense foods is associated with type 1 diabetes. The ultimate question that arose from this finding is therefore, "is the high consumption of the cereals, sugar and fat a sign of food security or insecurity among the FHHs?" In order to establish cereals relationship with the other variables of the study, the researcher compared the HDDS with some selected biographical characteristics (see section 6.2.1 in chapter 6) including the area of residence, age and level of education of the household head.

In an effort to determine how the HDDs compared between urban and rural settings of the study area, the researcher computed t-test on the HDDS averages of the both urban and rural FHHs. The results showed significant difference. On the other hand, correlation results indicated moderate negative correlation between the age of household head and the HDDS. Moreover, there was positive correlation between the level of education of the household head and the HDDS. The interpretation of these quantitative findings is that, there was better dietary diversity among urban FHHs than the rural; older household heads experienced more hardship in food access, availability, utilisation and possibly stability in their households; and that, the higher education level a household head had attained helped in achieving higher HDDS for her household.

Milk and dairy products food group led in protein food groups' consumption. Its high consumption was associated with the fact that milk food item is the main ingredient of tea

for breakfast among the FHHs in the Voi Division. The second most consumed protein-source food group was pulses and legumes.

Generally, meat and poultry, fruits, and fish and seafood food groups were poorly consumed.

In conclusion cereals, sugar and honey, and fats/oils were the most highly consumed food groups, and fruits had one of the least consumption rates in the HDDS among the FHHs. This means the HDDS comprised majorly of energy-dense food groups.

Basing these findings on the ecological systems perspective, the HDDS is the exo-system, which is not adequate because of the overconsumption of the energy-dense food, and poor consumption of other food groups of equal importance, especially fruits. Chrono-system dynamics including advanced age of the household head and death of male household head, had negative influence on the HDDS. Literature confirms rightfully that, household dietary diversity can be achieved through employing many interventions, such as consuming great quantities and variety of vegetables, fruits and animal-sourced food, and nutrition education and behavioural change. For this study, such interventions can be used to achieve optimum HDDS. The HDDS fits in the third level of ecological environment (exo-system), because the female household head has either active or indirect role in determining her household's HDDS.

9.3.2.3 Food consumption frequency

Food consumption frequency among the FHHs was measured through the FCS as guided by the objective two. The key findings and conclusions on the FCS are presented below.

- **Key findings and conclusions**

The following are the key findings and conclusions with regards to the FCS:

- A vast majority of the FHHs had acceptable FCS of main staples food group.
- Majority of the FHHs had consumed pulses at least once in the week, and only a few FHHs had acceptable consumption of the food group.
- A fair majority of the FHHs had acceptable consumption of vegetables. Very few FHHs had not consumed the food group.

Consumption of fruits showed diverse findings: the FHHs that did not consume the food group formed the greatest proportion among all consumption frequencies. On the other hand, among the FHHs that had consumption of the food group in the week, majority of them had acceptable consumption, followed by twice, 3 times, one, then 4 times.

With regards to consumption of meat, fish and eggs; the major proportion of the FHHs had not consumed any food in the group, while the leading frequencies were once, 5 times, 3 times, twice, and 4 times.

With regards to milk and its products, majority of the FHHs had acceptable consumption of the food group. The high consumption was associated with the fact that milk forms part of ingredients of tea for breakfast. However, a few FHHs had no consumption of the food group.

All FHHs had at least two frequencies of consumption of sugar, and a vast majority of them had acceptable consumption of the food group. The majority of the FHHs had acceptable consumption of fats and oils, whereas few had no consumption of the food group.

In conclusion the main staples had the highest FCS and fruits were poorly consumed, which corroborates the HDDS findings that energy-dense foods were highly consumed among the FHHs. Just like the HDDS, the FCS fits as a third level of ecological environment, the exo-system because the female household head has either active or indirect role in determining her household's FCS.

9.3.2.4 Overall status of food security among the female-headed households

The key findings and conclusions with regards to the overall food security among the FHHs are presented here-below.

- **Key findings and conclusions**

The key findings and the conclusions are:

The achievement of the overall status of food security among the FHHs was informed by the objective 3. In order to arrive at the overall food security status among the FHHs, the researcher triangulated both the HDDS and FCS food security levels; which yielded the following key findings:

Food security according to the HDDS revealed that, only one FHH was in severe food insecurity, a few others were in moderate food insecurity, and the majority of the FHHs were in situations of mild food insecurity/food security.

Basing on FCS, few households were in poor food security level, a few others were in borderline, and the majority of the FHHs were in acceptable food security.

The establishment of the overall status of food security among the FHHs was done by cross-tabulating the food security levels according to HDDS and FCS. The overall statuses were that no FHH was in severe food insecurity, a few FHHs were moderately food insecure, while majority were mildly food insecure or food secure. Additionally, a description of MAFP and CSI was provided, which showed that:

Majority of the FHHs experienced adequate food provisioning during 3 months preceding the study. Those FHHs with inadequate food provisioning in the 3 months cited drought as the main cause of the problem. Additionally, the results on CSI showed that majority of the FHHs fell in the first quartile of the CSI, which means they were in a state of food security. However, the other quartiles had significant number of FHHs, which insinuated existence of food shortages. The most common coping strategies used by the FHHs were: reducing number of meals per day, reducing size of meals, consuming less preferred or cheaper foods, and purchasing food on credit. Cumulatively, the findings on the HDDS, FCS, MAFP, and the CSI indicated fair food security; hence the FHHs were hypothesised to have been experiencing resilient food insecurity (in which they survived through employing the coping strategies - an aspect of food insecurity). In the context of the ecological systems perspective, the mixed findings on the statuses of food security are the exo-systems which affected the FHHs micro-systems positively or negatively depending on human and physical ecological environments.

9.3.3 Key findings and conclusions of the qualitative findings

The presentation and discussion of the qualitative findings is done in chapter 7 of this study. Subsequently the key findings and conclusions are presented according to the thematic, observational and photographic analyses:

9.3.3.1 Biographic profile

The key findings and conclusions on the biographical profiles of the key informants are as shown below.

- **Key findings and conclusions**

The key findings with regard to the key informants' biographical profiles were:

The age group of the key informants ranged from 26 to 50 years. A vast majority of them were aged 30 to 50 years. Only one participant was 26 year old. The majority were males. Half of the key informants had attained a degree as their highest level of education. Few others had a diploma, one a master's degree, another, an advanced certificate and one more had a certificate. Most of the key informants worked with NGOs, government

parastatal, and community-based organisation. Few participants worked as government administrators. Their work in the community food security engagements depicted various specialisations, including: general community development work, including food security programmes; early warning systems; asset creation programme; farming sector; disaster response; emergency food insecurity response; agricultural extension services, production; extension services (agribusiness); water services (food production); and water provision (managerial). A slightly more than half of the participants had 10 and above years of work experience. The shortest and longest serving informants had one and 29 years of experience in the food security work, respectively.

In conclusion, the age range of the key informants was congruent with Kenya's human resources recommended age for public workers. Male's outnumbered female workers hence did not reflect equity in gender representation at workforce. Education levels, areas of the key informants work, and their years of work experience were ideal for their knowledge about food security. In the context of the ecological systems perspective, the biographical characteristics represent the ecosystems the key informants interacted in their line of duty. The interlinkages between the key informants' biography with regards to their area of work and the FHHs formed the meso-systems of both the key informants and the FHHs.

9.3.3.2 Key findings and conclusions regarding the thematic analysis

In this sub-section, key findings and conclusions of thematic analysis are presented according to each theme.

- **Theme 1: Experiences at workplace**

Key findings and conclusions with regards to the key informants' work experiences in line of their duties are important in this study. The key findings of this theme are based on the following sub-themes: challenging, tranquillity, and both challenging and tranquillity.

- **Key findings and conclusions**

Challenges emerged as the most prominent experience at workplace by the key informants. For instance, it was challenging to meet food demand of everyone in the Voi Community. This may have been attributed to universality of the food assistance, with no definite criteria of inclusion to the assistance. Besides experiencing the challenges, the key informants indicated that, sometimes they had tranquil work experiences because the community in the Voi Division was co-operative and that, as much as there were those members of the community who were over-dependent on external food assistance, there were those who worked hard to fend for their families, especially amongst females. Generally, the key

informants' work experiences were challenging or cohesive depending on circumstances in which they found themselves.

In conclusion, experiencing the challenges means that demand for food by the community in the Voi Division superseded supply in food assistance by food aid organisations, tranquillity indicates conducive work environment in food security development, and their work experience in line of their duty showed normal and resilient work experiences in food security. In the context of the ecological systems perspective, tranquillity created or maintained human-ecological homeostasis for sustainable food security, while the challenges illustrate a need to rectify hindrances to food security development.

- **Theme 2: Knowledge about previous research on food security**

Presentation of key findings and conclusions regarding this theme are presented according to the following sub-themes: lack of awareness, presence of awareness, and knowledge of some kind of research on another topic.

- **Key findings and conclusions**

Most key informants were not aware of a specific research focusing on food security. Key findings on presence of awareness on previous research on food security indicate that, there had been previous food assessments for policy and programme planning and/or intervention, but none directly corroborated the current one. Thirdly, some more key informants indicated knowledge of some kind of research but on a topic different from food security.

In conclusion, the key informants' lack of awareness of a research focusing on food security means that, current research serves its purpose of filling the gap of the absence of a previous research on the topic, the presence of awareness means that, this study was timely in investigating new gaps on food security, and the knowledge of some kind of research on another topic, insinuates that the study was relevant in the time and served its purpose, just like the preceding two sub-themes. In the context of the ecological perspective, research is the meso-system which links change agents and local communities (including FHHs) to food security knowledge in food security development.

- **Theme 3: Needs and challenges of female-headed households**

Needs and challenges of FHHs were co-related hence their key findings and conclusions also co-associate, and are as shown below.

- **Key findings and conclusions**

The key findings on the needs of the FHHs are as follows: need for male household headship, finances, security, proper healthcare, and food. The participants' views on the needs of FHHs, was associating the male household headship with availability of economical (finances), psycho-social (security, healthcare) and physical (food) provisions. The key findings on the challenges encountered by the FHHs were related to the needs, and were: lack of male household headship; lack of financial empowerment; emotional insecurity; landlessness; and gender inequality. In the context of the ecological systems perspective, gender roles determine food security through its linkage with socio-economic (such employment opportunities) and socio-ecological endowments (including agricultural land).

In conclusion, the needs of the FHHs are indicative of poor food security status among the households. Moreover, just like the needs, the challenges were all related to the FHHs' lack of proper food security. The ecological perspective emphasises on the need for functional symbiosis among all the sub-systems for the larger system (in this case, the FHHs) to operate effectively.

- **Theme 4: Food consumption patterns**

Food consumption patterns as a theme was informed by the following sub-themes: dietary diversity, food consumption score, and food groups.

- **Key findings and conclusions**

The sub-theme on dietary diversity score elicited the following categories:

- Poor dietary diversity.
- Acceptable dietary diversity.
- Rural-urban nexus and/or economic capacity.
- Coping strategies.

A vast majority of the key informants indicated that the community had poor dietary diversity. The rest of the participants indicated acceptable HDDS. The poor and the acceptable HDDS were influenced by rural-urban nexus and/or economic capacity of a household, and coping strategies.

The sub-theme, food consumption score elicited the following thematic categories:

- Poor food consumption score (FCS).

- Acceptable FCS.
- Rural-Urban nexus and/or economic capability.
- Coping strategies.

The following are key findings and conclusions regarding food consumption score:

Similarly with the dietary diversity, FCS showed poor or acceptable results depending on the area of residence (whether rural or urban) and economic capability of a household. Moreover, the Voi Division's households were found to be employing coping strategies to survive through food shortages.

With regards to food groups, cereal or main staples were the leading food group, with maize being the staple cereal food item. Pulses such as beans, and vegetables including kales were also consumed.

Conclusively, the statuses of the dietary diversity depended on the rural-urban nexus and financial capability of a household into purchasing food, and those FHHs in food shortages employed coping strategies. Likewise the dietary diversity, the statuses of the FCS were influenced by rural-urban nexus and economic capability of a household. Food groups consumed in the Voi Division mostly depended on the rural-urban nexus and economic capability of a household; but mostly were compromised, which led to the community in the division (including FHHs) to employing coping strategies. In the context of the ecological systems perspective, the indicators of food consumption patterns are the exo-systems that were influenced directly or indirectly by both human and physical ecological factors.

- **Theme 5: Sources of food**

The following were the emergent sub-themes of sources of food:

- Own production.
- Market.
- Food aid.
- Comfort with food accessibility.
- Differences in food sources between male-headed and female-headed households.

Subsequently, key findings and conclusions are presented.

- **Key findings and conclusions**

Many participants said the community, particularly in the rural areas, acquired food from their own agricultural production. However, the production relied heavily on availability of

rain. Market was the main source of food for households in the Voi Division. This source was mentioned by all participants. Food aid was also found to be a minor source of food for households in the Voi Division, according to the key informants. Generally, there was both discomfort and comfort with food accessibility to the food sources. Key findings with regards to comfort with food accessibility are: A vast majority of the key informants said that, the community of the Voi Division was not comfortable with the sources of food. The reasons for the discomfort were: droughts which hindered food production, food supply “imported” from far flung areas of Kenya, lack of employment for income generation, lack of food subsidies by the GOK, general low purchasing power of people (including FHHs) and high food prices. However, those key informants who indicated comfort with the food sources indicated that, proximity to the food markets made physical accessibility easy. Key findings with regards to differences in food sources between male-headed and FHHs is that, access to food (food acquisition) by females was commendable than that of males. The reasons for the better food access by the females were because the females were deemed to be more hard-working than men and not engaged in vices such as alcoholism. Similarly with the previous theme, the sources of food as the exo-systems of ecology are influenced directly or indirectly by both human and physical ecological inputs.

In conclusion, own production was not the major source of food even among the rural households; market offered the best proxy for sources of food, as there was not enough food from own production, but foodstuff was mainly supplied to markets in the study demarcation from other regions; through food aid, humanitarian organisations and the GOK supplemented other sources of food among the most vulnerable households in the division; physical access to food was fairly good but the economic access was constrained; and FHHs were deemed to have better food acquisition techniques than the male-headed ones.

- **Theme 6: Coping strategies**

Coping strategies as a theme elicited the following sub-themes:

- Skipping meals.
- Reducing portion size of meals.
- Purchasing food on credit.
- Reduce portions for adults to allow more to children.
- Parents sending children to eat elsewhere.

Subsequently, the key findings and conclusions with regards to coping strategies are presented according to the sub-themes.

- **Key findings and conclusions**

The major coping strategy employed by households in the Voi Division was skipping meals, especially the lunch. Moreover, ten o'clock and 4 o'clock snacks were non-existent particularly among the rural households. Few key informants observed that reduction of portion size of meals was used as a coping strategy. Only one participant indicated that the households were purchasing food on credit to cope with food shortages. Likewise, reducing portions of meals for adults to allow more to children was mentioned by one participant. Moreover, one more participant indicated that parents were sending their children to eat elsewhere, particularly at school. However, there may not have been a clear delineation of the usual universal children's enrolment in schools and the coincidence of prevalence of school feeding programme by the GOK, or the parents were merely sending the children to school for the sake of eating at the schools.

In conclusion, the residents of the Voi Division found to be using coping strategies which depicts presence of food insecurity, which ultimately illustrates existence of gaps in fulfilling the SDG2 of ensuring total food security everywhere and among everyone, including the FHHs. In relation to the ecological systems framework, coping strategies indicate unstable exo-systems of food shortages or food insecurity.

- **Theme 7: Status of food security**

The discourse between the researcher and the key informants elicited the following sub-themes with regards to status of food security in the Voi Division:

- Moderate food insecurity, and
- Poor food security statuses.

Key findings and conclusions with regard to status of food security are as presented below.

- **Key findings and conclusions**

Moderate food insecurity was prevalent among households (including FHHs) in the Voi Division. The reasons for the moderate food insecurity status were because the community was enlightened on matters concerning food security, and had fair socio-economic status especially the Voi Town inhabitants, so their food security status was not too severe. A vast majority of the participants indicated that the food security status in the Voi Division was generally poor, which was mainly attributed to droughts.

In conclusion, some households were in good and/or others in bad food security statuses depending on their nutritional knowledge and socio-economic status. Moreover, some

households being in a status of poor food security means that concerted efforts are needed to eradicate food insecurity altogether. Therefore, in relation to the ecological systems perspective, interactions between physical ecological factors (especially droughts) and the human ecological factors influence food security status as the exo-system.

- **Theme 8: Interventions for food security in Voi Division**

The emergent sub-themes for this theme were:

- Support from external change agents, and
- Participatory community engagement in food security.

Key findings and conclusions with regards to this theme are presented herein.

- **Key findings and conclusions**

The sub-theme of “support from external change agents” means that community development in the Voi Division are brought about by development agencies, with little or no local community participation. A fair number of participants indicated that the interventions on food security in the Voi Division were or should be through food promotion services such as: provision of mobile water services to community members living in remote areas of the division; human-wildlife conflict resolution between residents of the division and the wild animals from Tsavo East National Park; direct food assistance to vulnerable communities living in the division based on research evidence; financial resource assistance to the communities for modern farming, including irrigable crop production; and promotion of sustainable food markets.

With regards to participatory community engagement, majority of the key informants indicated that climate change was the major hindrance to food security, hence suggested the following multi-sectoral climate-smart practices as the possible interventions of ensuring food security in the Voi Division: with the support of the government, the local community should practice climate-smart innovations such as cultivating crops in green houses, digging zai-pits (holes for collecting rain water while ensuring the crops in the hole benefit from the water), digging terraces for collecting rain water in and conserve soil, cultivating drought resistant crops. Other suggestions were: adding value to food to fetch better market prices, practice irrigation in food production, the government (through Kenya Wildlife Services) to install (electric) fence to avert human-wildlife conflict - wildlife from the Tsavo East National Park invade farmlands adjacent to the park, destroy crops and kill livestock.

In conclusion, external inputs are vital for sustainable food security in the Voi Division. Partnership of both external agencies and the community are vital in interventions to ensure

food security among the community of the Voi Division (including the FHHs). This is because participatory community involvement and partnership between the development agencies and the local community, engendered with innovations are critical in the interventions on the food security in the Voi Division for sustainable development. Furthermore, one view of the ecological systems theory indicates that the “network” of relations between the five ecological levels determine its continuous existence.

- **Theme 9: Interventions for food security among the female-headed households in the Voi Division**

Regarding interventions for food security among the FHHs, the key informants suggested several strategies that elicited 3 sub-themes, as follows:

- No special treatment (equal treatment with men).
- Formation of self-help initiatives.
- Interventions for food security among FHHs should be specially designed.

Subsequently, key findings and conclusions with regard to interventions for food security among the FHHs in the Voi Division are henceforth presented.

- **Key findings and conclusions**

Key findings with regards to the interventions are, few participants were of the opinion that no special treatment should be accorded to the FHHs. This sub-theme means that, the FHHs should have equal treatment with male-headed households. A few more key informants suggested that female household heads should form self-help groups, for their own development. Majority of participants indicated that the interventions should be specially designed to fit their needs. The participants indicated that, it is important to sensitise the FHHs on food security; and build capacity among the FHHs, especially through training the household heads on strategies for entrepreneurship, political involvement, and food value addition. Other interventions are direct assistance from well-wishers, non-governmental organisations, and government(s) through assisting the FHHs in paying and subsidising school fees for their children. Moreover, the participants indicated that the female household heads should be actively involved in decision making with regards to their households’ food security interventions. Lastly but not least, the females should be allowed to own assets, including land.

In conclusion, “no special treatment should be given to the FHHs” means gender equality should be maintained without regarding certain groups as vulnerable than others; the self-help initiatives would increase resource ownership, including food resources among the

FHHs; and majority of key informants having suggested for food security interventions specially designed to meet food needs of the FHHs, means that FHHs need special attention in food security development. In the context of the ecological systems perspective, there is need to adjust human and physical ecological dynamics in food security affecting the FHHs as the micro-system of this study.

9.3.3.3 Observational analysis

The themes from observational findings were as shown in table 9.1:

Table 9.1: Observation themes

Theme	Sub-theme
1. Type of dwelling	
2. Food consumption patterns	<ul style="list-style-type: none"> • Food groups • Food sources • Water supply
3. Coping strategies	<ul style="list-style-type: none"> • Behaviour of household members

- **Theme 1: Type of dwelling**

The key findings and conclusions regarding the type of dwelling of the FHHs are presented subsequently.

- **Key findings and conclusions**

Most of the FHHs' main dwelling places were semi-permanent houses, and a few were permanent dwelling places, and few others were other dwellings were huts and structures. Permanent households displayed better habitable standards than the rest of the housings. In conclusion, most of the FHHs dwelling places were semi-permanent and provided basic shelter for household members. However, some FHHs had poor dwellings of huts or semi-permanent houses in poor habitable conditions. The existence of the basic shelter and poor dwelling places is indicative that, the main challenge facing policy makers is to balance social and environmental justice issues in an ecological systemic approach to food security. In this case, poverty, including poor housing is a socio-ecological injustice that may lead to food insecurity among the FHHs.

- **Theme 2: Food consumption patterns**

The theme on food consumption patterns was characterised by food groups, food sources, and water supply as its sub-themes.

- **Key findings and conclusions**

With regards to food groups observed, the “HDDS cereals” or “FCS main staples” food group featured prominently, particularly, the maize and its products. Sources of food observed were own food production and markets. The FHHs got water from various sources. Water tap was the most prevalent, and most of the taps were shared among the households. Community water points were common in rural areas, and many urban area households in rental apartments (mostly single rooms) shared an outdoor tap. In conclusion, the main food group was of energy dense foods; regarding the food sources, own food production was not reliable, so most food was purchased from the markets; and water accessibility in the urban Voi was fairly good but poor among the rural FHHs. This therefore alludes that both human (aspects of consuming energy-dense foods) and physical (droughts in food and water accessibility) ecological systems played a key role in determining food consumption patterns of the FHHs.

- **Theme 3: Coping strategies**

There were coping strategies behaviours observed among the FHHs, and key findings and conclusions are presented below.

- **Key findings and conclusions**

With regards to coping strategies, some FHHs were found to be using coping strategies while others were not. For those FHHs using the coping strategies, the mostly used one is skipping of meals. In conclusion, the use of the coping strategies implies presence of food insecurity among the FHHs. Coping strategies as proxies of food insecurity fits as the exo-systems in this study.

9.3.3.4 Visual analysis of photographs

Visual analysis of photographs elicited housing and food consumption patterns as its key themes.

- **Theme 1: Housing**

The theme on housing emerged from photographs of dwellings, specifically those with unique features from the rest. The key findings and conclusions of the theme are presented.

- **Key findings and conclusions**

The key finding regarding dwelling places of the FHHs depicted both extreme poverty and resilient livelihood. This means that the FHHs especially those belonging to senior citizens live in extreme poverty. In conclusion, the hypothesis regarding this finding is that advanced age is associated with more poverty. In the context of the ecological perspective, poverty is

a human ecological factor posing danger into the lives of the vulnerable already cumbered by the burden of food insecurity; therefore the entire ecology should be in a networked interaction to counter its effects.

- **Theme 2: Food consumption patterns**

An additional theme that emerged from the visual analysis was food consumption patterns. Its sub-themes were: food groups, sources of food, cooking arrangements, and water supply.

Table 9.2 shows the theme and its sub-themes:

Table 9.2: Food consumption patterns and its sub-themes

Theme	Sub-themes
Food consumption patterns	<ul style="list-style-type: none"> • Food groups
	<ul style="list-style-type: none"> • Sources of food
	<ul style="list-style-type: none"> • Cooking arrangements
	<ul style="list-style-type: none"> • Water supply

- **Key findings and conclusions**

The key findings and conclusions with regards to this theme are presented as follows:

With regards to food groups, dandelion vegetable was observed. It was the most available vegetable through own production, especially among the rural FHHs of the Voi Division. Other visual finding were sources of food, and they were own production and markets. The own production was through crop farming and livestock keeping; which were against the backdrop of drought. Besides the urban food market, the Voi Town, the photograph in the visual findings depicts presence of food markets in the rural areas of the Voi Division.

The FHHs had various cooking arrangements, and were patterned as follows: sources of fuel, kitchen places, and fuel conservation methods. Firewood was the major source of fuel in the rural areas because of their natural availability. Kitchen places were both indoors or outdoors. Besides, the FHHs were using heat conserving cooking stoves placed either at the indoors or outdoors. The fuel-conserving cooking stoves utilised either firewood or charcoal. The availability of these bio-fuels was influenced by availability of dry woods.

With regards to water supply, there were two emergent categories: community water sources and private-owned water sources. The community water points were free of charge at the water-fetching time. However, the community paid for fetching water at

private-owned water points. They paid for each 20 litre jerrycan of the water fetched. All the water points were for domestic use.

In conclusion the dandelion (vegetable food group) was the most available food group from own production, but market provided the sources for most of the rest of foods; firewood provided most sources of fuel in the rural FHHs while charcoal was the main source of fuel among urban FHHs; the water supply was for domestic use only, but no irrigation water found. Just like other factors influencing food security among the FHHs, food items and groups, sources of food, fuel and water serve as ecological factors or an exo-systems which interact with many other factors to influence food security exo-system. Therefore, interdependence among the exo-systems should be cordial and networked.

This study was a convergent parallel mixed methods in design. The achievement of its objectives was done through the two phases, quantitative and qualitative paradigms, which were carried out at one point in time. Triangulation and comparison of the findings of the phases helped in reaping from the advantage of validity and credibility of the findings. Moreover, in the context of the ecological systems perspective, the triangulation and comparison of the findings are the interactive links (meso-systems) between all food security systems. Therefore, apart from meeting the four objectives, the mixed methods of this study has guided in coming up with the study's recommendations.

9.4 Recommendations

The rationale for this study was driven by the researcher's recognition that, females are cumbered with the burden of caregiving, poor socio-economic status and social exclusions, thus, their households may experience the most challenges of food security. Therefore the researcher strived to investigate food security among the FHHs; in the hope that the findings from the study will act as source of reference for researchers, policy makers, programme planners and practitioners on food security, particularly among the FHHs, including those in the Voi Division. Therefore, the researcher makes recommendations regarding future research, policy and practice, based on mainly on the practice guidelines proposed in the chapter 8.

9.4.1 Recommendations regarding future research

This study employed both quantitative and qualitative approaches in the food security measurement. The quantitative survey design produced statistics based on technical measurements. According to McKenna and Main (2013:2) positivist paradigms seek absolute truths through the presumed objectivity and expertise of the scholar. Similarly, in

this study the technical quantitative assessment sought to reveal the objective truths about the food security among the FHHs. On the other hand, the qualitative findings were based on subjective assessment. Just as indicated in chapter 4, measuring the experiences of food security is both an objective and a subjective matter in the sense that while portions of the aggregate experience can be directly (objectively) measured, other portions of the experience rely on subjective measures (Vaitla et al., 2015:17). The qualitative phase under the collective case study design yielded findings based on food security perspectives by key informants, researcher's own observations and photographs. Despite the key informant's information that there had been some food security research done previously, none of the studies corresponded directly with this study.

The findings regarding the objectives 1 and 2 showed that, the FHHs were consuming energy-dense foods. On the negative note, fruits were poorly utilised among the FHHs. Moreover, there emanated a contrast between the quantitative and qualitative food security statuses. The quantitative findings indicated fair food security while the qualitative revealed poor food security status. These converse findings led the researcher into the following rhetoric questions, "Which are the best tools to measure food security among the poor communities? Is it by the use of technical tools or the use of subjective perceptions?" Owing to these findings, the researcher is of the opinion that more research is required to investigate the causes of energy-dense food consumption, coupled with poor dietary balancing and low fruit intake. An investigation is also necessary to establish the most valid and reliable tools for measuring food security in order to arrive at a common agreement among all stakeholders, including the FHHs themselves. In order for future studies to yield reliable findings, the future researchers should be diligent to understand specific contexts of the food situations. This is because no matter how communities could be embedded in a similar geographical location, different segments of the communities have different needs, just as the human ecological perspective is divided into segments. Moreover, community participation in the studies will assist in making the research yield reliable findings. The following recommendations are proposed for future research:

- Future researchers should conduct thorough investigation to establish the reasons behind high consumption of the energy-dense foods, poor balanced diets and low fruit consumption among the FHHs in the Voi Division, or elsewhere.
- The researchers should establish the best suitable food security measurement approaches and tools, under what contexts, so as offer clue for the incongruence of the findings of this study (between the use of the technical and subjective tools), and possibly create a rapport between the tools.

- The future researchers should also conduct replicative and/or methodology validation research at the same area but different time of year, to find out whether the findings of the future research will produce similar or divergent findings with the findings of the current study.
- The researchers should prioritise community-based participatory research so as to reveal the hidden aspects of the food security from amongst community members themselves.
- The researchers should conduct comparative studies on male and female-headed households, and rural-urban settings.
- The research should be geared to establish which domain(s) of food insecurity predisposed FHHs in the Voi Division into coping strategies
- The Taita-Taveta University should establish food security research centre.

9.4.2 Recommendations regarding policy

As mentioned earlier the quantitative findings indicated that, the food security among the FHHs was generally acceptable with a few FHHs experiencing moderate food insecurity. These findings are supported by the key informants' opinions regarding the female household heads. They commended females in the study area as being more hard-working than males. Literature shows that, there have been food policies in existence for global, regional, and national spheres. The FAO, WFP, FANTA, CEDAW, UN-Women policies have been discussed in the chapter 3 of this study. FAO (2006:1) indicates that more than 40 countries in the world have adopted food security as human right and have further enshrined it in their constitutions. Kenya as a country is a UN member state, therefore has ratified food security policies in its constitution - the Constitution of Kenya (2010). The right to food is enshrined in the Bill of Rights provided for in the chapter 4 of the constitution (see section 2.3.9.5 of chapter 2):

On economic and social rights, the provisions include: human dignity; equality and freedom from discrimination, for example, women and men have the right to equal treatment, including the right to equal opportunities in political, economic, cultural and social spheres; to be free from hunger, and to have adequate food of acceptable quality, and to clean and safe water in adequate quantities (The Constitution of Kenya, 2010:24, 25, 30).

Lambie-Mumford and Dowler (2014:1421) question what roles and responsibilities reside within the state and charitable organisations in food security as a complex issue. The adoption of human rights approaches may provide the (country) UK with important starting points for understanding these responsibilities; particularly the human right to food (Lambie-Mumford & Dowler, 2014:1422). The researcher is of the opinion that the existence of the policies does not directly translate into food security actions. This is because gaps still exist

in governance and resources, and some of the policy guidelines do not address grassroots problems. For instance, the challenges facing the FHHs in the Voi Division must not always translate to similar circumstances elsewhere in Kenya or another country. The documents of UN Women, including ESARO gear to provide guidelines for addressing women needs in the Eastern and Southern Africa Region. Despite the efforts by ESARO, policies in Kenya do not have special guidelines for FHHs' food security.

With regards to policy, the researcher recognises the importance of global policy ratifications and the essence for world's regions and nations to adopt food security policy recommendations, and make their own in accordance with the ratified ones and the recommendations. Besides formulating national food security policies, countries should decentralise the policies at the grassroots levels through sub-policy formulation. The locally contextualised policies will guide planning and implementation of food security programmes. Basing her opinion on literature and this study's findings, the researcher suggests for modifications of the existing policies in Kenya to make them more relevant at grassroots levels, and the country to formulate new policies specially the ones designed to address FHHs' food security. She recommends the following for the policies:

- Policy stakeholders in Kenya should modify the existing policies to include comprehensive guidelines on how to eradicate food insecurity among FHHs, including those in the study area.
- The policy makers should contextualise the global (especially the SDG2), regional and national food policies into local community contexts. This will make the policies to be of greater utility to the local communities, including the FHHs.
- Policy makers need to formulate special policies on female-headed household food security. This will help address the food insecurity problem as it would be specifically relevant to this segment of the community.
- The national government of Kenya should formulate policy guidelines for establishing many water management authorities in each of its 47 counties, including the Taita-Taveta County. Moreover, the government should modify the existing water policy to make it mandatory for every county to establish many water management authorities. This will boost diversification of the water provision services in the counties, and avoid problems associated with service provision monopoly.

9.4.3 Recommendations for practice

Basing on key findings of this study (emanating from chapters 6 and 7), chapter 8 offers practice guidelines on programmatic planning and policy and programme implementation. To

avoid repeating the practice guidelines as recommendations in this chapter, the researcher has summarised the guidelines into recommendations for practice in the following sub-sections:

9.4.3.1 Recommendations regarding programme planning

Multi-agency partnership will be inevitable for co-ordination in planning of food security programmes, so as to avoid service duplications, and inculcate universality of the food security services. Different segments of a community (including the FHHs in the Voi Division) should have equitable representation in the planning, for inclusion of their special needs.

- The food assistance organisations and institutions should plan while considering rural-urban nexus to establish the dynamics of food security among rural versus urban areas.
- Programmic planning should consider male-female nexus to address specific needs of the households headed by a person of each gender.
- The organisations should also conduct institutional mapping of partners in food security to establish collaborations and avoid service duplication.
- The organisations should also plan for diversity in the food resources for allocations to the community, including the FHHs. Besides provision of main staples, the food assistance items should include fruits and vitamin supplements, among others.
- The organisations should inculcate participatory rural appraisals before the planning, to ensure the local community identifies their inherent problems, prioritises their needs, and get involved in the planning for solutions to the problem of food insecurity.
- The planning partners should establish and/or maintain effective communication channels for effective coordination of planning support systems.

9.4.3.2 Recommendations regarding policy and programme implementation

With regards to policy and programmic implementation, the researcher of this study recommends for own food production by the FHHs as priority number one of ensuring sustainable food security. The self-reliance on food meets the fourth domain of food security, “food stability”. To stabilise food supplies among the FHHs, the researcher has proposed a myriad of intervention strategies as practice guidelines (see chapter 8) through the following 3 major approaches, which include:

- Nutrition and climatic change interventions through water provision.
- Capacity-building for self-reliance.
- Agricultural extension services.

However, in situations when the FHHs experience natural disaster such as droughts, floods, landslides, they should be externally assisted to mitigate their food insecurity.

Generally, the researcher recommends for multi-agency and community collaborations in meeting the food security needs among the FHHs in the Voi Division in Taita-Taveta County, Kenya.

The following recommendations are vital in informing future policy or programmatic implementation:

- Nutrition and climatic change interventions through water provision to eradicate the effects of droughts, through the following intervention strategies:
 - In order to facilitate access to water by the FHHs in the Voi Division, the local water management authority, TAVEVO should expand domestic water supply to rural areas.
 - TAVEVO and future water management authorities should establish irrigation water infrastructure among farming communities, to mitigate effects of droughts.
 - The water management authorities should implement and expand the irrigation water supply to all farming areas in the Voi Division.
- Capacity-building for self-reliance in combating the vicious cycles of intergenerational poverty, can be done through the following interventions:
 - The national and county governments in collaboration with food development agencies should conduct capacity-building to empower the community on self-help strategies.
 - The national and county government(s) and non-governmental agencies should conduct capacity building with the community on nutrition knowledge as well.
- Agricultural extension services
 - The divisional or sub-county office of the Ministry of Agriculture should conduct extension services among the FHHs in order to address their specific needs.
 - The Ministry of Agriculture and other agricultural development agencies should conduct extension education on sustainable agricultural practices including the need to cultivate drought-resistant crops, and crop diversification.

The recommendations for practice suggested in this chapter, as well as the guidelines in chapter 8 and the rest of the recommendations are contextualised on the ecological systems perspective. All the environmental systems are supposed to form linkages in practice so as to achieve the food insecurity eradication among the FHHs in the Voi Division. Food resource is the most basic need of every individual and hence the FHHs (the

micro-system). For the FHHs to survive and thrive, they should work together with the meso, exo, macro, and chrono-systems (see section 1.4 for comprehensive interpretation) especially in the food security situation.

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APPENDICES

11.1 Appendix A: Ethics approval letter



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Research Ethics Committee

27 May 2016

Dear Ms Icheria

Project: An investigation into food security among female-headed households in Kenya: A case of Voi division in Taita-Taveta County
Researcher: BK Icheria
Supervisor: Dr CL Carbonatto
Department: Social Work and Criminology
Reference number: 13356829 (GW20160525HS)

Thank you for the well-written application that was submitted for ethical consideration.

I am pleased to inform you that the above application was **approved** by the **Research Ethics Committee** on 26 May 2016. Data collection may therefore commence.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should the actual research depart significantly from the proposed research, it will be necessary to apply for a new research approval and ethical clearance.

The Committee requests you to convey this approval to the researcher.

We wish you success with the project.

Sincerely

A handwritten signature in black ink, appearing to read 'Maxi Schoeman'.

Prof Maxi Schoeman
Deputy Dean: Postgraduate Studies and Ethics
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail:tracey.andrew@up.ac.za

cc: Dr C Carbonatto (supervisor) Prof A Lombard (HoD)

Research Ethics Committee Members: Prof MME Schoeman (Deputy Dean); Prof KL Harris; Dr L Blokland; Dr R Fassell; Ms KT Govinder; Dr E Johnson; Dr C Panebianco; Dr C Puttergill; Dr D Reyburn; Prof GM Spies; Prof E Tajjard; Ms B Tsebe; Dr E van der Klashorst; Mr V Sithole

11.2 Appendix B: Request letter to perform empirical research



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Humanities
Department of Social Work & Criminology

The Director

Date.....

Ref: Dr Charlene Laurence Carbonatto (DPhil)
 Tel. +27(0)124202410
 E-mail: Charlene.carbonatto@up.ac.za

Dear

REQUEST FOR PERMISSION TO PERFORM EMPIRICAL RESEARCH BY BEATRICE KABUI ICHERIA (13356829)

The above-named student is registered for the following programme at the Department of Social Work, University of Pretoria: **PHD (HUMANITIES GENERAL)**

The student is required to write a **thesis**, resulting from a research project, under my supervision. The research will only proceed once a departmental Research Panel and the Faculty Research Proposal and Ethics Committee has approved the proposal and data collection instrument(s). The following information from the research proposal is shared with you, although a copy of the **research proposal** will be provided to you if needed:

The envisaged **title** of the study is: **An investigation into food security among female-headed households in Kenya**

The **goal** of the study is: to investigate and describe the statuses of food security among female-headed households in Igamba-Ng'ombe Division in Tharaka-Nithi County and Voi Division in Taita-Taveta County, Kenya

The **objective** of the study is: to determine the overall status of food security among female-headed households in Igamba-Ng'ombe and Voi divisions, Kenya.

The **envisaged target group** of the study is: employees (key informants)

The student wishes to do the empirical part of the study through means of: A personal interview according to a semi-structured schedule with employees from your organisation as stipulated above

This request will not result in any demands on you or your staff.

No **costs** will be incurred by this request.

Possible benefits for your organization can be summarised as follows:

- The report will act as a reference for plans, policy, and intervention-making on food security among female-headed households

This student undertakes responsibility to provide you with a copy of the final report.

It would be appreciated if you will seriously consider and **grant permission** to the student to proceed with the project, at your earliest convenient date.

Regards

SUPERVISOR/PROMOTER

Department of Social Work & Criminology University of Pretoria PRETORIA 0002 Republic of South Africa	Tel: Number 00 27 12 420 2325/2030 Fax: Number 00 27 12 420 2093	www.up.ac.za
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11.3 Appendix C: Research Authorisation permit


**NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION**

Telephone: +254-20-2213471,
2241349, 310571, 2219420
Fax: +254-20-318245, 318249
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/16/10047/9304** Date: **26th January, 2016**

Beatrice Kabui Icheria
University of Pretoria
SOUTH AFRICA.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *“Food security among female headed households in Kenya,”* I am pleased to inform you that you have been authorized to undertake research in **Taita Taveta and Tharaka Nithi Counties** for a period ending **22nd January, 2017.**

You are advised to report to **the County Commissioners and the County Directors of Education, Taita Taveta and Tharaka Nithi Counties** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.


**DR. S. K. LANGAT, OGW
FOR: DIRECTOR GENERAL/CEO**


Copy to:

The County Commissioner
Taita Taveta County.

The County Director of Education
Taita Taveta County.

National Commission for Science, Technology and Innovation is ISO 9001: 2008 Certified

11.5 Appendix E: Letter of informed consent for female heads of households

	<p>UNIVERSITEIT VAN PRETORIA UNIVERSITY OF PRETORIA YUNIBESITHI YA PRETORIA</p> <p>Faculty of Humanities Department of Social Work & Criminology</p>
<p>Letter of informed consent – female heads of households</p>	
<p>Research title: An investigation into food security among female-headed households in Voi Division in Taita-Taveta County, Kenya</p> <p>Researcher: Beatrice Kabui Icheria (13356829)</p>	
<p>Introduction</p> <p>My name is Beatrice Kabui Icheria and I am currently conducting a study on the above topic as part of the requirements of a PhD (Humanities General) degree at the University of Pretoria, South Africa.</p>	
<p>Procedure</p> <p>The researcher or a research assistant will visit your household at a time that suits you. A questionnaire will be issued to you to fill in. Completing the questionnaire will take you approximately two hours and the researcher or the research assistant will be present to help with any uncertainties regarding the completion of the questionnaire. Photographs will be taken of food related aspects with your permission, and no persons will be photographed. Before signing this consent form, the researcher or research assistant will give you the opportunity to ask questions or seek more clarification to enable you to make an informed decision. Two copies of the consent form will be signed; one will be kept by you and the other by the researcher or research assistant.</p>	
<p>Purpose of the study</p> <p>Food security is declared a human right, which everyone should have at all times irrespective of their gender or socio-economic status. It is therefore important to find out whether this applies to female-headed households. The goal of this study is to investigate and describe the statuses of food security among female-headed households in Voi Division in Taita-Taveta County, Kenya.</p>	
<p>Confidentiality</p> <p>Confidentiality will be kept at all times and the researcher or research assistant will not use your name, but instead a number will be assigned to you to protect your identity and the data will be stored under this number assigned to you. Only the researcher and supervisor will have access to this data.</p>	
<p>Potential Harm</p>	
<p>Department of Social Work & Criminology University of Pretoria PRETORIA 0002 Republic of South Africa</p>	<p>Tel: Number 00 27 12 420 2325/2030 Fax: Number 00 27 12 420 2093</p> <p style="text-align: right;">www.up.ac.za</p>

No harmful effects are intended on you as a result of this research, thus there should not be a worry of such when answering questions. The researcher or research assistant will do debriefing with you after the survey if needed. In case you are emotionally affected after the interview, the researcher or research assistant will refer you to the officer in charge of counselling at the Department of Gender, Social Welfare and Child Protection in Voi Town for counselling intervention.

Compensation

The researcher will not compensate you for taking part in this study. Participation will be voluntary and at your convenient time.

Participation and withdrawal

Even if you agreed to participate in this study, you have the right to withdraw at any time of the research process without any consequences.

Potential benefits of the research

You will not benefit directly from participating in the study. The researcher hopes that the study will give a better understanding on food security among female-headed households, so as to come up with recommendations for addressing the issue, and help in resolving any challenges experienced by female-headed households in Kenya regarding food security.

Details of the investigator

If you have any questions or concerns about the study feel free to contact:

Name of the Principal researcher: Beatrice Kabui Icheria
Cell phone number: +254720896643
E-mail: beatricekabui@gmail.com

Signature and consent of respondent

Ideclare that I have read and understood the above information. I was given adequate time to consider my participation in the study. I was also given the opportunity to ask questions and all of them were answered to my satisfaction. I am hereby consenting voluntarily to participating in this study.

Signature:..... **Date:**.....

Declaration by the researcher/research assistant

I declare that I explained the above information to the respondent, who was given ample time to ask any questions.

Signature:..... **Date:**.....

Department of Social Work & Criminology Tel: Number 00 27 12 420 2325/2030 www.up.ac.za
University of Pretoria Fax: Number 00 27 12 420 2093
PRETORIA 0002
Republic of South Africa



UNIVERSITEIT VAN PRETORIA
 UNIVERSITY OF PRETORIA
 YUNIBESITHI YA PRETORIA
 Faculty of Humanities
 Department of Social Work & Criminology

Letter of informed consent – key informants

Research title: An investigation into food security among female-headed households in Voi Division in Taita-Taveta County, Kenya

Researcher: Beatrice Kabui Icheria (13356829)

Introduction

My name is Beatrice Kabui Icheria and I am currently conducting a study on the above topic as part of the requirements of a PhD (Humanities General) degree at the University of Pretoria, South Africa.

Procedure

The researcher will arrange and visit you in your offices at a time that suits you. A one-on-one interview will be conducted at the respective office of your work. The interview will take approximately 45 minutes and it will be voice-recorded with your permission. The researcher will read and explain to you the content of the informed consent letter, to ensure that you understand what the research entails and what is expected of you. Before signing this consent form, the researcher will give you the opportunity to ask questions or seek more clarification to enable you to make an informed decision. Two copies of the consent form will be signed; one will be kept by the researcher and the other by you.

Purpose of the study

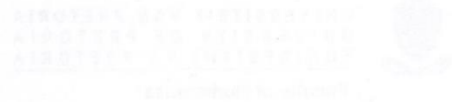
Food security is declared a human right, which everyone should have at all times irrespective of their gender or socio-economic status. It is therefore important to find out whether this applies to female-headed households. The goal of this study is to investigate and describe the statuses of food security among female-headed households in Voi Division, Taita-Taveta County, Kenya.

Confidentiality

Confidentiality will be kept at all times and researcher will not use your name, but instead a number will be assigned to you to protect your identity and the data will be stored under this number assigned to you. Only the researcher and supervisor will have access to this data.

Potential Harm

Department of Social Work & Criminology	Tel: Number	00 27 12 420 2325/2030	www.up.ac.za
University of Pretoria	Fax: Number	00 27 12 420 2093	
PRETORIA 0002			
Republic of South Africa			



No harmful effects are intended on you as a result of this research, thus there should not be a worry of such when answering questions. The researcher will do debriefing with you after the interview. In case you are emotionally affected after the interview, the researcher will refer you to the officer in charge of counselling at the Department of Gender, Social Welfare and Child Protection in Voi Town for counselling intervention.

Compensation

The researcher will not compensate you for taking part in this study. Participation will be voluntary and at your convenient time.

Participation and withdrawal

Even if you agreed to participate in this study, you have the right to withdraw at any time of the research process without any consequences.

Potential benefits of the research

You will not benefit directly from participating in the study. The researcher hopes that the study will give a better understanding on food security among female-headed households, so as to come up with recommendations for addressing the issue, and help in resolving any challenges experienced by female headed populations to food security.

Details of the investigator

If you have any questions or concerns about the study feel free to contact:

Name of the Principal researcher: Beatrice Kabui Icheria
Cell phone number: +254720896643
E-mail: beatricekabui@gmail.com

Signature and consent of participant

I declare that I have read and understood the above information. I was given adequate time to consider my participation in the study. I was also given the opportunity to ask questions and all of them were answered to my satisfaction. I am hereby consenting voluntarily to participating in this study.

Signature:..... **Date:**.....

Declaration by the researcher

I declare that I explained the above information to the participant, who was given ample time to ask any questions.

Signature:..... **Date:**.....

Department of Social Work & Criminology Tel: Number 00 27 12 420 2325/2030 www.up.ac.za
University of Pretoria Fax: Number 00 27 12 420 2093
PRETORIA 0002
Republic of South Africa

11.7 Appendix G: Research assistant non-disclosure agreement



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities

Department of Social Work & Criminology

Research assistant non-disclosure agreement

Research title: An investigation into food security among female-headed households in Voi Division in Taita-Taveta County, Kenya

Researcher: Beatrice Kabui Icheria (13356829)

Introduction

My name is Beatrice Kabui Icheria and I am currently conducting a study on the above topic as part of the requirements of a PhD (Humanities General) degree at the University of Pretoria, South Africa.

Purpose of the study

Food security is declared a human right, which everyone should have at all times irrespective of their gender or socio-economic status. It is therefore important to find out whether this applies to female-headed households. The goal of this study is to investigate and describe the statuses of food security among female-headed households in Voi Division in Taita-Taveta County, Kenya.

Procedure

You have been approached by the researcher and shown an interest to be a research assistant for this study. Your task will entail the following:

1. You will be given a list of selected respondent names and addresses by the researcher
2. You will then have to visit these respondents (female-headed households) at the times arranged by the researcher which suits the respondent
3. After introducing yourself to the respondent, the letter of informed consent will be given to the respondent to read
4. You will be expected to read through this letter with the respondent, in either English or Swahili, whichever is preferred by the respondent
5. You will clarify any contents of the letter as needed, until it is understood by the respondent

6. You will allow an opportunity for the respondent to ask questions, after which you will answer these questions satisfactorily
7. Once the respondent has voluntarily agreed to partake in the study by signing the letter of informed consent, you will also sign and then give that copy to the respondent. A second letter is signed by the respondent and you, which you will keep as a copy
8. You will then proceed to give the respondent the questionnaire and explain how it must be filled in. Completing the questionnaire will take approximately two hours and you will be present to help the respondent with any uncertainties regarding the completion of the questionnaire. In cases where a respondent struggles to complete it or is illiterate, you will ask the respondent the questions and fill it in on behalf of the respondent
9. You are then expected to take photographs of food related aspects with the permission of the respondent after completion of the questionnaire. Under no circumstances may any person be photographed.

Confidentiality and non-disclosure

Confidentiality is essential for any research and you are expected to protect the identity of the respondents involved. The information shared during the survey will be kept confidential by you and not be disclosed to anyone except the researcher. You will be required to assign a number to the respondent, which will be filled in on the questionnaire in order to protect the identity of the respondent. Only you, the researcher and the supervisor will have access to this data.

Signature, confidentiality and non-disclosure agreement of research assistant

I declare that I have read and understood the above agreement. I was given adequate time to consider my participation as a research assistant in this study. I was also given the opportunity to ask questions and they were answered to my satisfaction. I am hereby agreeing voluntarily to be a research assistant in this study, to protect the identity of the respondents I survey and keep all information shared confidential and not to disclose any information shared to anyone else but the researcher.

Signature:..... **Date:**.....

Declaration by the researcher

I declare that I explained the above information to the research assistant, who was given ample time to ask any questions and has agreed to keep all data gathered confidential and not to disclose any information to anyone but me the researcher.

Signature:..... **Date:**.....

11.8 Appendix H: UP Doctoral bursary confirmation



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Department Research and Innovation

2018-01-31

MISS BK ICHERIA
PO BOX 217-60204
MITUNGUU
NAIROBI

Dear Miss Icheria,

RE: UP DOCTORAL RESEARCH SUPPORT BURSARY AND UP POSTGRADUATE DOCTORAL BURSARY CONFIRMATION (u13356829)

Herewith confirmation of the UP Postgraduate Research Support bursary that was approved for the student.

2014: R24 900 & R60 000 (Bursary agreements were received and bursary paid into student account)

2015: R5 000 & R60 000 (Bursary agreements were received and bursary paid into student account)

2016: R5 500 & R75 000 (Bursary agreements were received and bursary paid into student account)

2017: R35 000 (Bursary agreement were received and bursary paid into student account)

2018: No further bursary awards available to the student, however there is a credit on the student account of R110 100 which will be sufficient for the student to register for 2018 and pay her tuition fees.

Should you have any enquiries please feel free to contact Mrs M Schoeman at telephone (012) 420 2135 or e-mail marieka.schoeman@up.ac.za.

Yours sincerely

Mrs M Schoeman
Senior Administrative Officer
UP Postgraduate bursaries

Cc: Dr Charlene L Carbonatto

Room 1-53, Level 1, Graduate Centre
University of Pretoria, Private Bag X20
Hatfield 0028, South Africa
Tel +27 (0)12 420 2135
Email marieka.schoeman@up.ac.za
www.up.ac.za

Departement Navorsing-en Innovasie
Lefapha la Dinyakišišo le Tšwetšopele

11.9 Appendix I: Survey questionnaire

QUESTIONNAIRE
 RESEARCHER: B. ICHERIA
 PhD Humanities (General) – University of Pretoria, South Africa

Dear respondent,
 Please note that the information you provide in this questionnaire will be kept confidential and will only be used for research purposes. Your identity will not be revealed. Kindly complete the questionnaire appropriately.

SECTION A: BIOGRAPHIC DETAILS
INSTRUCTIONS: Please indicate your biographic details in the shaded boxes in the tables below.

1. Please indicate your age in years

For office use

VA1

2. What is your main occupation?

VA2

3. What is your highest level of education?

No education	1
Primary	2
Secondary	3
College certificate	4
College Diploma	5
University Degree	6
Postgraduate	7
Other (specify)	8

VA3

4. How many people live in this household and share meals?

VA4

5. Kindly indicate the number of dependents you have

VA5

6. Please tick with X to indicate the ages of your dependents

Age	How many	Code
0-11 months		1
1-2 years		2
3-4 years		3
5-6 years		4
7-9 years		5
10-12 years		6
13 – 15 years		7
16 -18 years		8
19 and above		9

VA6

7. What is your marital status? Use X to indicate.

Never married	1
Separated	2
Divorced	3
Married – legally	4
Married – traditionally	5
Widowed	6
Other (specify)	7

VA7

8. Please indicate the applicable items regarding your living circumstances by circling

Type of the main house - modern, semi-modern, traditional huts, shanty, (other and specify)	1
Type of house wall - mud, stone, concrete, brick, timber, (other and specify)	2
House roof – grass/palm leave thatch, iron sheets, asbestos, tile, (other and specify)	3
House floor - earth, cement, cow dung and mud, (other and specify)	4
Means of transport - ox/donkey-cart , bicycle, motorcycle, vehicle, walking, public (other and specify)	5
House lighting - light from firewood, kerosene chimney lamp, kerosene tin lamp, solar panel, solar lamp, electricity, (other and specify)	6
Cooking energy - firewood, charcoal, kerosene, cooking gas, electricity, (other and specify)	7
Means of communication – mobile phone, telephone, computer internet, letter, (other and specify)	8
Living area sitting arrangement – sofa, simple couches, chairs, stools, stone/stump, bed (other and specify)	9
Livestock - cows, goats, sheep, poultry, pigs, (other and specify)	10
Source of entertainment – radio, TV, DVD/VCD player, computer, phone, (other and specify)	11
Other items (please list them)	12

VA8		1
VA8		2
VA8		3
VA8		4
VA8		5
VA8		6
VA8		7
VA8		8
VA8		9
VA8		10
VA8		11
VA8		12

9. What is your main source of livelihood? Please indicate with X

Formal employment	1
Small scale business	2
Small scale farming	3
Hawking	4
Livestock keeping	5
Casual labour	6
Other (specify)	7

VA9

10. What is your main source of income?

.....

VA10

SECTION B: FOOD PROVISIONING

INSTRUCTIONS: PLEASE FILL IN YOUR ANSWERS IN SHADED BOXES IN THE TABLES BELOW. Use numbers to indicate months, e.g "1" for January, "8" for August

1. (a) Which are the latest 3 months that your household has had enough food?

--	--	--	--

VB1a

(b) What contributed to the scenario?

.....

VB1b

2. (a) Which are the latest 3 months that your household has not had enough food?

--	--	--	--

VB2a

(b) Why?

.....

VB2a

3. What determines your food acquisition habits?

.....

VB3

SECTION C: FOOD CONSUMPTION

1. **24 HOUR DIETARY RECALL**

INSTRUCTIONS: PLEASE INDICATE IN THE BOX PROVIDED

- i. The gender of the household member; by the use of "F" for female and 'M' for male
- ii. The dish consumed by him/her e.g. githeri
- iii. The ingredients referring to specific food items that the dish was made of e.g., githeri is "maize, beans, potato, onion, cooking fat..."
- iv. The approximated amount of the different ingredient portions served to the member; referred herein as "disaggregated portions" e.g. one cup of porridge, one teaspoonful of sugar...
- v. The researcher will fill in the remaining spaces at her convenient time

A. BREAKFAST

VC1a

Age group	Gender	Dish	Ingredients	Disaggregated portions	Amount in grams	Total amount of calories
6-23 months						1
24-59 months						2
5-14 years						3
15-18 years						4
19-24 years						5
25-49 years						6
50-64 years						7
65 and above years						8

1	
2	
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4	
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7	
8	

B. TEN O'CLOCK SNACK

VC1b

Age group	Gender	Dish	Ingredients	Disaggregated portions	Amount in grams	Total amount of calories
6-23 months						1
24-59 months						2
5-14 years						3
15-18 years						4
19-24 years						5
25-49 years						6
50-64 years						7
65 and above years						8

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VC1 a

C. LUNCH

Age group	Gender	Dish	Ingredients	Disaggregated portions	Amount in grams	Total amount of calories
6-23 months						1
24-59 months						2
5-14 years						3
15-18 years						4
19-24 years						5
25-49 years						6
50-64 years						7
65 and above years						8

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D. FOUR OC'LOCK SNACK

Age group	Gender	Dish	Ingredients	Disaggregated portions	Amount in grams	Total amount of calories
6-23 months						1
24-59 months						2
5-14 years						3
15-18 years						4
19-24 years						5
25-49 years						6
50-64 years						7
65 and above years						8

VC1 b

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VC1c

E. DINNER

Age group	Gender	Dish	Ingredients	Disaggregated portions	Amount in grams	Total amount of calories
6-23 months						1
24-59 months						2
5-14 years						3
15-18 years						4
19-24 years						5
25-49 years						6
50-64 years						7
65 and above years						8

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VC1 d

F. POST-DINNER SNACK

Age group	Gender	Dish	Ingredients	Disaggregated portions	Amount in grams	Total amount of calories
6-23 months						1
24-59 months						2
5-14 years						3
15-18 years						4
19-24 years						5
25-49 years						6
50-64 years						7
65 and above years						8

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G. ANY OTHER MEAL

Age group	Gender	Dish	Ingredients	Disaggregated portions	Amount in grams	Total amount of calories
6-23 months						1
24-59 months						2
5-14 years						3
15-18 years						4
19-24 years						5
25-49 years						6
50-64 years						7
65 and above years						8

VC1 e

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2. SEVEN DAY FOOD FREQUENCY
INSTRUCTIONS: PLEASE INDICATE IN THE TABLE

- i. By the use of **codes (0-5)**, indicate the number of times your household consumed the following food items, during the last 7 days (Frequency of consumption in the week).
- ii. The sources of these food items (please choose from the codes for **"sources of foods"** listed below the table).
- iii. In your own opinion, did your household members consume adequate foods? (put **"1"** to indicate **yes**, or **"2"** to indicate **no**)

No	Food type	Frequency of consumption in the week						Sources of foods	Adequate 1= yes 2=no
		None (0)	Once (1)	Twice (2)	3 times (3)	4 times (4)	5 and more times (5)		
1	Maize								
2	Sorghum								
3	Wheat								
4	Rice								
5	Finger millet								
6	Arrow roots								
7	Irish potato								
8	Cassava								
9	Sweet potato								
10	Honey/sugar								
11	Fats/oils								
12	Other carbohydrate (specify)								
13	Milk								
14	Red meat								
15	Poultry meat								
16	Fish								
17	Eggs								
18	Pulses (beans, pigeon peas, green grams, cow peas)								
19	Nuts								
20	Other proteins (specify)								
21	Kales (sukuma wiki)								
22	Spinach								
23	Cabbage								
24	Cow peas leaves								
25	Traditional herbs (Amaranth/mchicha, bitter herb...)								
26	Carrot								
27	Other vegetables (specify)								
28	Mango								
29	Paw paw								
30	Avocado								
31	Banana								
32	Oranges								
33	Guava								
34	Other fruit (specify)								

Codes for sources of foods: 1=market; 2=own production; 3=gifts from relatives, neighbours and friends; 4=food-for-work; 5=free relief food; 6=money donations to buy food; 7=wild food; 8=other (specify)

VC2

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3. SECTION D: COPING STRATEGIES

INSTRUCTIONS: MARK BY CIRCLING, IF YOUR HOUSEHOLD HAS DONE ANY OF THE FOLLOWING COPING MECHANISMS IN THE LAST 30 DAYS. HOW MANY TIMES HAS IT DONE SO?

Code	Coping Strategy (in the previous 3 months)	Relative Frequency				
		Never	Hardly	Sometimes	Often	Always
1	Reduction in the number of meals per day	0	1	2	3	4
2	Skip food consumption for an entire day	0	1	2	3	4
3	Reduction in size of meals	0	1	2	3	4
4	Restrict consumption of adults to allow more for children	0	1	2	3	4
5	Feed working members at the expense of non-working	0	1	2	3	4
6	Changed consumption to less preferred or cheaper foods	0	1	2	3	4
7	Borrow food from a friend or relative	0	1	2	3	4
8	Purchase food on credit	0	1	2	3	4
9	Consume normal wild food	0	1	2	3	4
10	Consume immature crop	0	1	2	3	4
11	Consume dead animals (cows, goats and others)	0	1	2	3	4
12	Consume taboo foods (acacia pod, bitter fruits)	0	1	2	3	4
13	Food consumption of seed stock	0	1	2	3	4
14	Send household members to eat elsewhere (women groups' tea parties, schools, churches)	0	1	2	3	4
15	Withdraw children from school	0	1	2	3	4
16	Begging or engaging in degrading jobs (liquor brewing, prostitution...)	0	1	2	3	4
17	Member(s) migrating from the household	0	1	2	3	4
18	Entire household migrating from the area	0	1	2	3	4
19	Sale of household assets	0	1	2	3	4
20	Disintegration of household bond and everyone starts their own life	0	1	2	3	4
21	Abandonment of children or elderly	0	1	2	3	4
22	Others (specify)	0	1	2	3	4

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THANK YOU FOR YOUR PARTICIPATION IN THIS STUDY
GOD BLESS

11.10 Appendix J: Interview schedule for key informants

Interview schedule

Research for: PhD Humanities (General)

Principal researcher: Beatrice Kabui Icheria (13356829)

Title: An investigation into food security among female-headed households in Voi Division in Taita-Taveta County, Kenya

Theme 1: Background and nature of work

Age	
Gender	
Qualifications/level of education	
Work experience	
Nature of work	

Theme 2: Food security

1. In which area of food security are you working?
2. For how long have you worked in the area?
3. In your line of work, have you dealt with women in areas concerning food security?
4. How would you describe the work experience?
5. Are you aware of any research on food security in the area?
6. What were their results?

Theme 3: Dietary diversity

7. What would you say about diets in Voi?
8. Do you know of specific foods eaten in Voi area?
9. Is the community known to skip some meals in a day?

Theme 4: Food consumption patterns

10. What can you say about food consumption patterns in the community?
11. Which are the major sources of food for households in Voi area?
12. Are the people comfortable with the source(s) and are these accessible?
13. In what way do you think food sources for female-headed households are different from the male-headed?

Theme 5: Status of food security

14. What can you say about the status of food security in the community?
15. Are you aware of any coping strategies against food insecurity that the community employs when faced with food shortage?
Please explain

Theme 6: Needs and challenges of female-headed households

16. From your work experience, what are the needs of female-headed households in Voi?
17. What are the challenges encountered by female household heads in this area?

Theme 7: Recommendations

18. What would you suggest as feasible interventions for challenges on food security, especially in Voi area?
19. Do you suggest any recommendations for female-headed households as a special entity?

11.11 Appendix K: Observation checklist

Observation checklist

Research for: PhD Humanities (General)

Principal researcher: Beatrice Kabuilcheria (13356829)

Title: An investigation into food security among female-headed households in Kenya

Field researcher should complete this observation checklist for every household they visit but with permission. Observations/behaviors relevant for the study should be noted down in the checklist. Whatever observed outside the checklist should be noted at the back pages of field notes, and before leaving the observation site, the researcher should review what is written down to ensure nothing has been skipped.

Division _____ Sub-location _____ Household Code _____

No	Questions	Option/checklist	Observations/comment/other
1	What are the main types of shelter being used in the site?	<ul style="list-style-type: none"> • Permanent house • Semi-permanent houses • Huts • Tent • Structures 	
2	If there is meal preparation going on, what food items make the ingredients?		
3	What time of the day is the meal?		
4	If at meal time, what is the behavior of the household member?	<ul style="list-style-type: none"> • They look comfortable • They look hungry • They use a coping strategies • Other 	
5	Is there garden(s) for the household?	<ul style="list-style-type: none"> • Yes • No 	
6	What crops are in the garden?		

7	Is there a market at/near the site?	<ul style="list-style-type: none"> • Yes • No 	
8	Is the market functioning/open?	<ul style="list-style-type: none"> • Yes • No 	
9	Is there variety of food items in the market?	<ul style="list-style-type: none"> • Yes • No 	
10	If people can be seen collecting water, where are they getting it from?	<ul style="list-style-type: none"> • Well • Tap • Stream/river • Spring 	
11	Is the water point accessible	<ul style="list-style-type: none"> • Yes • No 	

Please include any other comment here:

11.12 Annexure L: Declaration Technical Editor

EC Nagel
PO Box 900
WINGATEPARK
0153

The Supervisor and Co-supervisor: BK Icheria (13356829)

Department of Social Work and Criminology

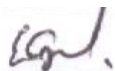
Faculty of Humanities

University of Pretoria

Dear Drs Carbonatto and Bila

This letter is a declaration stating that I, Elize Nagel (ID 5811160004086), has done the technical editing of the thesis of Beatrice Kabui Icheria (13356829) entitled: *An investigation into food security among female-headed households in Kenya: A case of Voi Division in Taita-Taveta county.*

Yours sincerely,



Elize Nagel

(+27) 83 288 2601

elize.nagel@gmail.com

