How food insecure are residents in Malawi's major cities?

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Abstract

Increasing urbanisation could pose significant food insecurity challenges in Africa, yet little has been researched regarding food insecurity in urban Africa. This study compared the levels and severity of food insecurity in Malawi's four major cities using data from Malawi's fourth Integrated Household Survey (2016/17). Urban food insecurity was found to be relatively low and less severe in Blantyre, Lilongwe, Mzuzu and Zomba compared to published rural statistics. Lilongwe had the highest level of food insecurity. The majority of households experienced seasonal food insecurity four months of the year and spent three-quarters of their budget on food. Poor households with uneducated male heads with a high number of dependents, few income sources were most likely to experience food insecurity. Interventions to improve the availability and accessibility of livelihood options for urban households would improve food security

Keywords: Food security; urbanisation; food consumption; coping strategies; Malawi

1. Introduction

By the turn of the 20th century, only twenty cities globally had populations exceeding a million people (United Nations Human Settlement Programme (UN-Habitat, 2008)). At the beginning of the 21st century, this figure rose to about five hundred (UN-Habitat, 2008), with three-quarters located in developing countries (Cohen, 2004). By 2016, over half of the world's population was living in urban centres (UN-Habitat, 2016). This proportion is likely to rise to 70 percent by 2050 (United Nations Department of Economic and Social Affairs (UN DESA), 2018). Most of this growth is expected to occur in developing countries (UN-Habitat, 2016).

Urbanisation is considered a positive development and a driver for economic growth and development (Overman and Venables, 2005). Nevertheless, rapid urbanisation - which is more prevalent in third-world countries - has the potential to stretch the capacities of cities to absorb and ensure sustainable food security for the ever-growing population.

Rapid urbanisation can negatively affect all the elements of food security, especially considering that most urban dwellers are net food buyers who usually spend a substantial proportion of their disposable income on food (Matuschke, 2009). The 2007/2008 food crisis demonstrated that urban poor were more vulnerable to food price swings than their rural counterparts (Rosset, 2008). As the prices for staples rose sharply from mid-2007 and reached a peak in 2008, the urban poor were the hardest hit, resulting in food-related riots (Cohen and Garret, 2010).

The 1948 Universal Declaration of Human Rights recognises food security as a basic human right (UN. 1948:25). Despite this right being incorporated into regional agreements and national constitutions, and various efforts to address food insecurity being made at the international, continental as well as regional levels, food insecurity remains a significant challenge in developing countries (Aberman *et al*., 2018).

Food security and nutrition are central to many continental and regional agreements, such as the post-2015 Agenda for Sustainable Development, the African Agenda 2063, the Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods and the SADC Food Security and Nutrition Strategy. Despite recent international attention through agreements such as the 2016 United Nations Urban Agenda (NUA) and the 2015 Millan Urban Food Policy Pact, these African agreements and strategies do not pay much

attention to urban food insecurity (International Food Policy Research Institute (IFPRI), 2017).

Most Malawian food security and nutrition policies, strategies and guidelines are silent on urban food security despite an overwhelming focus on food security and nutrition in Malawi by government, civil society organisations and other non-governmental organisations through programmes such as food for work, scaling up nutrition and the farm input subsidy among others, (Riley and Chilanga, 2018). Yet food security for all is recognised as a right in Malawi's 1994 constitution (Government of Malawi (GoM), 1994). The constitution holds the state accountable for ensuring that everyone in Malawi has access to sufficient and nutritious food all year round (GoM, 1994). Malawi's Vision 2020 seeks to ensure the realisation of the right to food for all (GoM, 2000:11)

As a way of ensuring that Malawi achieves food security and improved nutrition for all, several policies and strategies have been developed over the years. Some of the food security and nutrition-related include but are not limited to:

- The 2016 National Agricultural Policy (NAP) which seeks to promote food security through increased production of diversified food crops to foster better nutrition (GoM, 2016).
- The 2017/18-2022/23 National Agricultural Investment Plan (NAIP) which seeks to address challenges facing the agricultural sector in Malawi including low productivity (GoM, 2018 a).
- The (NMNP) seeks to support high impact- nutrition-specific and nutrition-sensitive interventions at a larger scale (GoM, 2018 b).

- The 2018-2030 National Resilience Strategy (NRS) envisions a country "where people are resilient to economic and environmental shocks that affect their lives and livelihoods." (GoM, 2018 c)

2. Justification for studying food security in the urban context

Some scholars have highlighted the importance of placing food security on the urban agenda (Crush and Riley, 2017; Battersby et al., 2017). Due to the fast-paced urban lifestyle, many urban consumers rely on already prepared foods with high energy density but with potentially low micronutrients (Food and Agriculture Organisation (FAO) *et al*., 2019). Furthermore, access to urban foods depends mainly on cash exchange, with a few exceptions where some urban households engage in a little backyard farming for household consumption, which is not the case in informal settlements (Battersby, 2016). Most urban poor households neither have large food stores, nor do they have access to areas for their own production due to overcrowding (Battersby et al., 2017). In addition, poor urban dwellers are particularly vulnerable to price changes due to limited cash and cash reserves (Aberman *et al*., 2018).

Most studies in sub-Saharan Africa suggest an increase in food insecurity in most urban centres (Frayne and Crush, 2018; Legwegoh and Riley, 2018; Battersby, 2016). Many of the existing food security studies in Malawi are drawn from rural areas (Makombe *et al*., 2010; Aberman *et al*., 2018). Despite increasing evidence of food insecurity in Africa, there are no reliable studies on the urban food security situation in the four major urban centres of Malawi. Yet, food insecurity continues to affect the urban areas as much as it affects the rural areas.

Only three available studies report findings for urban food security in Malawi (Mvula and Chiweza, 2013; Chilanga and Riley, 2017; Riley and Chilanga, 2018). None

determined how severe food insecurity was or identified the most vulnerable groups. This study set out to compare levels and severity of food insecurity across Malawi's major cities of Blantyre, Lilongwe, Mzuzu and Zomba.

3. Research methodology

This study compared the levels and severity of food insecurity in Malawi's four major cities of Blantyre, Lilongwe, Mzuzu and Zomba (Figure 1). Blantyre is the commercial and industrial capital of Malawi located in the southern region. Lilongwe is the capital of Malawi located in the plains of the central region. Zomba and Mzuzu are the secondary cities of Malawi situated in the northern and southern regions respectively.

Table 1 provides a socio-demographic comparison of the four study areas. Lilongwe is the largest urban centre in terms of both area and population (National Statistics Office (NSO), 2018). One in seventeen Malawians lives in Lilongwe (NSO, 2018). Blantyre is the second-largest city, followed by Mzuzu and Zomba (NSO, 2018). However, the population density is higher in Blantyre than in other cities (NSO, 2018). The annual population growth rates of Lilongwe and Mzuzu are similar (NSO, 2018). Manda (2013) projected that Mzuzu and Lilongwe will continue to experience more rapid urbanisation over the 20 to 50 years, more so than Blantyre and Mzuzu.

Lilongwe has the highest proportion of people living in informal or unplanned areas (75 percent) followed by Blantyre, Zomba and Mzuzu (NSO, 2018). These informal settlements are usually characterised by poorly constructed infrastructure and limited urban basic services such as quality houses and improved water and sanitation facilities (GoM, 2018 d). Only one in five people in Zomba have access to piped water (Manda, 2013).

Over half of the labour force in Blantyre work in formal employment, making it the primary livelihood source (NSO, 2015). On the contrary, a majority of the labour force (70 percent) in Lilongwe relies on the informal sector (NSO, 2015). Chilanga and Riley. (2017) found that about 40 percent of people working in the informal sector in Lilongwe engage in micro and small and medium enterprises (MSMEs). According to the United Nations Settlement Programme (UN-Habitat (2013)), a substantial proportion of the population (70 percent) depend on the timber industry as a source of livelihood in Mzuzu.

Table 1: Socio-demographic characteristics of the study areas

Characteristics	Districts				
	Blantyre	Lilongwe	Mzuzu	Zomba	Data source
Area (km^2)	240	403	146	42	NSO (2018)
Population	800,264	989,318	221,272	138,013	NSO (2018)
Population growth rate (%)	3.6	4.0	4.0	3.4	NSO (2018)
Proportion of males (%)	50.8	51	50	52	NSO (2018)
Population density (persons per Km^2)	3334.433	2454.883	1515.562	3286.024	NSO (2018)
Proportion of population in informal settlement	70	75	60	66	UN-Habitat (2013)

4. Data sources and sampling

The study used secondary data from the National Statistical Office of Malawi's fourth Integrated Household Surveys (IHS4) of 2016/17. Integrated Household Surveys (IHS) are conducted every five years, collecting nationally representative data to assist the Malawian government in monitoring various aspects of the welfare of the population (NSO, 2017). The IHS data assist in monitoring the progress of achieving the Sustainable Development Goals (SDGs) and targets set out in the Malawi Growth and Development Strategy (MGDS). The surveys are implemented with the help of the

World Bank as part of the Living Standards Measurement Surveys (LSMS) (NSO, 2017).

The four major urban centres include Blantyre, Lilongwe, Mzuzu and Zomba. A total sample of the urban stratum in the IHS 4 data was 1728 households. Of this sample, Lilongwe had the highest proportion (33.4 percent), Blantyre, Mzuzu and Zomba had 22 percent apiece.

4.1.Data treatment and analysis

Data were cleaned and checked for inconsistencies before analysis. Descriptive statistics analyses including means, frequencies, cross-tabulations, standard deviations were used to describe various aspects of sampled households including Demographic characteristics; sources of income; livelihood sources and food insecurity coping strategies. The Microsoft Excel 2016 and Stata 15 statistical software were used in the analysis to construct various food security indicators.

There is consensus among researchers that measuring food insecurity is complex and that to date, no single agreed measure of food insecurity exists (Hendriks, 2013; Headey and Ecker, 2013). As a result, there is always a trade-off in the choice of food insecurity metrics to be used as there is no measure that captures all the four dimensions of food security, food availability, food accessibility, food utilisation and stability (Maxwell *et al.,* 2014). The study used the following internationally recognised food security indicators: The Household Dietary Diversity (HDDS), the Food Consumption Score (FCS), the reduced Coping Strategies Index (rCSI), the Months of Adequate Household Food Provisioning (MAHFP), the share of expenditure on food and an asset indicator (Table 2).

Table 2: Food security indicators

Indicator	Recall period	Description
Household Dietary Diversity Score (HDDS)	7-days	HDDS captures various food groups consumed by the household within a designated period, usually 24 hours (FANTA, 2006).
Food Consumption Score (FCS)	7-days	A composite score that measures dietary diversity, food frequency and relative nutrition importance of various food groups (WFP, 2015).
Months of Adequate Food Provisioning (MAHFP)	12-months	MAHFP is an indicator for both availability and access dimensions of food security at the household level measured by number of months in a year that the households reported having enough food (Bilinsky and Swindale, 2010; FANTA, 2003).
reduced Coping Strategies Index (rCSI)	7-days	rCSI measures the frequency and severity of food consumption behaviours used by households when faced with food shortages (WFP, 2015).
Share of food expenditure in total household expenditure	30-days	The indicator measures household economic vulnerability i.e. how important food is within a household budget relative to non-food items or services, the more economically vulnerable the household is (Maxwell, 2014; WFP, 2015).
Asset	Current	Measured by the total number of assets owned by households, the indicator reflects the household's ability to cope and withstand food shortages (Hjelm *et al.*, 2016)

To identify groups of most vulnerable people to food insecurity, the study used Spearman's rank-order correlation, a non-parametric test that captures strength and direction of association between variables (usually ordinal or continuous) (Hauke and

Kossowski, 2011). Spearman's correlation is applied where the assumption of normality is violated and a non-linear relationship between the two variables exists (Hauke and Kossowski, 2011). In this study, the variables of interest (food security indicators and socio-economic characteristics) were either ordinal or continuous in nature, thereby satisfying the first assumption. Scatter plots revealed monotonic relationships between the variables, meaning that either the variables increased in value together or as one variable increases in value, the other one decreased in value. The mathematical representation of Spearman's correlation was as follows:

$$rR = 1 - \frac{6\sum_{i=1}^{n} d_i^2}{(n^3-1)} \quad (1)$$

Where n is the number of data points of the two variables and d_i is the difference in the ranks of the ith element of each random variable considered. The Spearman correlation coefficient, ρ, can take values from +1 to -1.

- A ρ of +1 indicates a perfect association of ranks
- A ρ of zero indicates no association between ranks and ρ of -1 indicates a perfect negative association of ranks.

The closer ρ is to zero, the weaker the association between the ranks

5. Results

Male-headed households constituted the largest proportion of as compared to female-headed households (78.2 percent). This was observed in all the study areas. Lilongwe had the highest proportion of male-headed households with 83.5 percent (Table 3). Blantyre had the lowest proportion of male-headed households (74.5 percent).

A majority of the household heads were married (72.6 percent). Lilongwe had the highest proportion of married household heads (77.1 percent), while Blantyre had

the least proportion (66.9). Mzuzu had a higher proportion of households headed by single persons (9.4 percent) followed by Zomba, Blantyre and Lilongwe. Blantyre had a higher proportion of widow-headed households. A higher proportion of households headed by either divorced or separated individuals were from Blantyre.

The overall mean age of the household heads was 41 years, ranging from 17 to 91 years. The average household head age for male heads was 42 years, while for female heads was 40 years. Blantyre had the highest average age of the household head (41.17 years). Most household heads were between 35 and 40 years (41.5 percent). The results of a t-test revealed a significant difference between the mean ages of male-headed households and female-headed households ($p < 0.01$).

Table 3: Demographic and socio-economic characteristics of the sampled population

Measurements			District			
Variable	**Category**	**Overall Count (%) (n= 1728)**	**Blantyre (n=384)**	**Lilongwe (n =576)**	**Mzuzu (n=384)**	**Zomba (N=384)**
			%	**%**	**%**	**%**
Sex	Male	1351 (78.2)	74.5	83.5	75.8	76.3
	Female	377 (21.8)	25.5	16.5	24.2	23.7
Age	<20	4 (0.2)	0.8	0.2		
	20 – 34	642 (37.2)	35.4	37.5	37.0	38.5
	35 – 49	719 (41.6)	38.8	44.3	41.9	40.1
	50 – 65	273(15.8)	19.0	13.9	18.0	13.3
	>65	90 (5.2)	6.0	4.2	3.1	8.1
Marital status	Single	137(7.9)	8.9	5.6	9.4	9.1
	Married	1254(72.6)	66.9	77.1	72.9	71.1
	Widowed	172(10.0)	14.3	7.3	9.4	10.2
	Divorced/separated	165(9.5)	9.9	10.1	8.4	9.6
Household size	Small (1-4)	999(57.8)	64.1	54.0	57.6	57.6
	Medium (5-8)	683(39.7)	34.4	43.1	39.1	40.6
	Large (>8)	43(2.5)	1.6	3.0	3.4	1.8
Education level of household Head	None	535(31.0)	26.8	36.3	25.0	33.1
	Primary	199(11.5)	11.7	11.3	13.5	9.6
	Secondary	698(40.4)	44.4	38.9	47.5	33.6
	Tertiary	296(17.1)	19.0	13.6	14.1	23.7

The mean household size of the surveyed population was three individuals; this is slightly lower than the national average household size of four individuals (NSO, 2017). The mean adult equivalent was 3.6 individuals. Lilongwe had the highest average household size (4.5 persons); this is slightly higher than the urban average household size reported by NSO (2016). Blantyre had the lowest mean household size of four Individuals. On average, male-headed households had relatively larger household sizes (4.4 persons).

Education plays an important role in household food security in such a way that educated household heads have the potential to access better economic opportunities (Mensah et al., 2013). A significant proportion of household heads in all the districts had completed secondary school (40.4 percent). Almost one-third of the household heads did not have a formal education. A higher proportion of male heads completed secondary (42.8 percent) and tertiary (18 percent) education levels than female heads, meaning that male heads were generally more educated. These differences were all significant at one percent level.

Formal employment was the most prevalent income source, with over half of the households depending on this source. This finding supports that of Crush and Frayne. (2016) who found that half of the urban population in southern Africa rely on formal employment as their main source of income. Non-agricultural businesses were the main income source among households in the Lilongwe sample. This was likely as Lilongwe is the business hub and capital city of Malawi (GoM, 2016). Male-headed households relied more on formal employment as their main income source while females (53.3 percent) households relied more on non-agricultural business than their main income source. The primary income source between male and female-headed households was not statistically significantly different between sexes.

5.1.Food security outcomes

Different food security indicators tend to measure different dimensions of food security including, availability, accessibility, utilisation and stability. The results of six food security indicators used in this study are discussed in the subsections below.

5.1.1. *Household Dietary Diversity Score*

About two-thirds of the households had adequate dietary diversity, i.e. they consumed

food from more than six food groups the week before the survey. The proportion of households with low dietary diversity (those consuming three food groups or less) was higher for Zomba (2 percent) (Table 5). Mzuzu had the highest proportion of households with adequate dietary diversity followed by Lilongwe, Zomba and Blantyre. The F test showed that there were statistically significant differences in the average values of the HDDS across the four cities at 5 % level of significance (p-value = 0.015).

All households consumed cereals, especially the grains. Over 90 percent of the sampled households consumed cereals every day. This may be explained by the fact that maize is an important staple for Malawi contributing more than two-thirds of typical household diets (IFPRI, 2019). Other frequently consumed food groups were vegetables, fats and oils, sugars and condiments. On average, more than four out of five households in Mzuzu consumed vegetables daily, followed by Blantyre (77 percent), Lilongwe (76 percent) and Zomba (73 percent). About four in five households in Blantyre consumed sugar every day.

The least frequently consumed food groups were fruits (79 percent), milk and other dairy products (61 percent) and pulses (76 percent). On average, these foods were consumed about twice a week. The low consumption of pulses can partly be explained by an increase in prices between 2016 and 2018 (averaging 47 percent per annum) (GoM, 2018 d). Despite milk and other daily products being the least consumed food group, sixty-nine percent of households in Mzuzu consumed milk at least once a week. Forty-four percent of households in Blantyre did not consume milk at all a week prior to the survey. The lower milk consumption can be explained by the fact that dairy products are relatively expensive and that most poor households consider these foods as a luxury.

5.1.2. Food Consumption Score

Food group	Coefficient of variation	Blantyre n=384			Lilongwe n=586			Mzuzu n=384			Zomba n=384		
		Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Main staples	0.13	6.89± 0.62	1	7	6.84± 0.75	1	7	6.53± 1.24	1	7	6.77± 0.87	1	7
Pulses	0.73	2.11± 1.73	0	7	2.40± 1.69	0	7	2.39± 1.55	0	7	2.64± 1.69	0	7
Vegetables	0.21	6.27± 1.42	2	7	6.35± 1.36	0	7	6.47± 1.29	0	7	6.27± 1.42	1	7
Fruits	0.83	2.30± 2.25	0	7	2.71± 2.18	0	7	2.89± 2.38	0	7	3.34± 2.40	0	7
Meat and fish	0.50	3.88± 1.94	0	7	3.86± 1.88	0	7	4.31± 2.11	0	7	4.21± 2.16	0	7
Milk and other dairy products	1.00	2.93± 2.98	0	7	2.92± 2.94	0	7	3.16± 2.83	0	7	2.93± 3.03	0	7
Fats and oils	0.26	6.50± 1.40	0	7	6.25± 1.75	0	7	6.51± 1.34	0	7	5.97± 1.87	0	7
Sugar	0.29	6.42± 1.67	0	7	6.32± 1.79	0	7	6.21± 1.89	0	7	6.02± 1.96	0	7
Condiments	0.12	6.89± 0.58	2	7	6.79± 0.94	0	7	6.89± 0.66	0	7	6.81± 0.87	1	7

The results of the Food Consumption Score revealed that main staples (including cereals, roots and tubers), vegetables and sugar were the most frequently consumed foods. On average, pulses (such as legumes) were consumed for two days making the least consumed food group of the eight groups considered in the FCS (Table 4). The coefficient of variation (CV) for milk and other daily product was the highest among all the food groups (100%) while the CV for staples was the lowest (12%). The results of the CV suggest that there was more variability in the consumption of milk than in the consumption of staples (Maxwell *et al*., 2014).

Table 4: Summary findings of food groups consumed in the study areas

Overall, a third of households (30 percent) had inadequate food consumption. They consumed limited and insufficient nutritious food. Of those households with inadequate consumption, 3.2 percent consumed a poor diet and 26.8 percent consumed a

borderline diet. The proportion of households with acceptable food consumption was higher in Mzuzu (73 percent) followed by Zomba, Lilongwe and Blantyre. Lilongwe had a higher proportion of households with inadequate food consumption (34 percent). The results of one-way analysis of variance showed that there were statistically significant differences between the average values of the FCS among the four study areas at 5% level of significance (Table 5)

Table 5: One-way ANOVA on food consumption score

Food Consumption Score					
	Sum of Squares	df	Mean Square	F	Sig
Between Groups	1402.697	3	467.565755	2.68	0.0457
Within Groups	301073.219	1724	174.636438		
Total	302475.916	1727			

The results of the Food Consumption Score were consistent with those of the Household Dietary Diversity score in a way that both suggest Mzuzu had a higher proportion of households with adequate dietary diversity and acceptable food consumption. Again, both indicators point out that Blantyre was the worst in terms of dietary quality, with higher proportions of households with inadequate dietary diversity and food consumption.

5.1.3. Months of Adequate Household Food Provisioning

Lilongwe had a relatively higher proportion of households (45 percent) that were more food insecure followed by Mzuzu, Zomba and Blantyre (Table 6). Mzuzu had a higher proportion of the least food insecure households. Three in five households had enough food for at least ten months a year preceding the survey. The average number of months

of adequate household food provisioning varied from 7.53 (for Lilongwe) to 9.63 (for Blantyre).

Table 6: Summary of food security outcomes for Malawi, 2017

Indicators	Category number	Category description	Range	Blantyre (n=384)	Lilongwe (n=586)	Mzuzu (n=384)	Zomba (n=384)
Household Dietary Diversity Score (HDDS)	1	Inadequate dietary diversity	≤3	0	0.4	0.5	2.1
	2	Moderate dietary diversity	4-5	43.8	36.3	32.3	37.7
	3	Adequate dietary diversity	>6	56.3	63.4	67.5	60.2
Food Consumption Score (FCS)	1	Poor	0-28	3.2	3.9	1.3	4.5
	2	Borderline	28.5-42	29.4	30.5	25	27.6
	3	Acceptable	>42	67.4	65.6	73.7	67.9
Food expenditure share	1	Very high	≥75%	11	13	7	9
	2	High	65%-75%	39	28	46	38
	3	Medium	50%-65%	26	29	19	26
	4	Low	<50%	24	21	29	28
Months of Adequate Household Food Provisioning (MAHFP)	1	Most food insecure	3-6	24	44.6	37.5	31.8
	2	Moderately food insecure	6-10	3.3	2.4	2.6	9.6
	3	Least food insecure	≥10	72.7	53	59.9	58.6
reduced Coping Strategies Index (rCSI)	1	Severely food insecure	>18	9.1	10.5	10.7	22.1
	2	Moderately food insecure	9-18	12.8	13.7	16.9	18
	3	Mildly food insecure	4-8	10.6	16.2	14.8	15.9
	4	Food secure	0-3	67.5	59.6	57.6	44
Asset Index	1	Least resilient	3-6	42.9	51.4	40.6	42.2
	2	Moderately resilient	6-10	33.9	25	33.6	22.4
	3	Most resilient	≥10	23.2	23.6	25.8	35.4

Three-quarters of households that did not have enough food all year round reported December, January and February as the most difficult months to access food. These findings suggest that food access was a more seasonal problem, with the months with more hunger coinciding with the agricultural lean season when food prices are also higher. Consequently, seven in ten households reported price fluctuations within the year and lack of cash as the main reasons for difficulties in accessing enough food.

5.1.4. Food expenditure as a share in total household expenditure

Forty-two percent of households in Lilongwe allocated at least 65 percent of their budget to food, which was relatively higher compared to Blantyre (38 percent), Zomba (35 percent) and Mzuzu (26 percent). On average, households in Blantyre spent relatively more on food followed by Lilongwe, Zomba and Mzuzu (Table 6). As indicated earlier, average incomes in Blantyre are reportedly higher than in the other cities.

One in ten households allocated more than 75 percent of their budget to food. The majority of households with food expenditures exceeding 75 percent of their income were also classified as the poorest. This is in line with the finding that poor households tend to have higher food expenditures (WFP, 2014). Upon closer inspection of the food commodities that households bought, it was observed that about 40 percent of the food budget was spent on cereals. This finding concurs with those of the FCS and the HDDS which showed that cereals were the most consumed food commodity across the four case studies.

5.1.5. Asset ownership

Household asset ownership is a proxy indicator for resilience, meaning that the more assets a household has, the higher its ability to bounce back quickly from shocks (Browne *et al*., 2014). Zomba was found to be more food secure based on asset ownership, with slightly over a third of the households owning at least ten categories of assets. The proportion of the least food insecure households was higher in Lilongwe, with over half of the households owning five or fewer assets out of the ten classes of assets (Table 6).

Two in five households owned fewer than five assets. The most commonly owned assets were beds (79 percent), irons (52 percent) and chairs (50 percent). On average, households owned seven out of the 28 possible asset classes. The results of the coefficient of variation showed more variability in asset ownership classes among households in Lilongwe (78 percent) followed by Zomba (73 percent), Blantyre (66 percent) and Mzuzu (62 percent).

The findings from the asset ownership index, which measures the ability of a household to cope with food security shocks, showed that Lilongwe had a higher proportion of most severely food insecure people. Overall, significant differences were observed in the proportions of least resilient households across the four case studies (at 5 percent level of significance) as determined by the chi-square test.

5.1.6. *The reduced Coping Strategies Index*

Overall, about two in five households were found to be food insecure (including mildly, moderately and severely food insecure categories) (Table 6). Zomba had the highest (rCSI 10.93) and Zomba the lowest average reduced Coping Strategies Index (rCSI 5.31). The one-way analysis of variance results showed that there were statistically significant differences in the means of rCSI across the four areas (at 5% level of significance with an associated p-value of 0.013).

The most commonly adopted coping mechanism was relying on less preferred or cheaper food. Zomba had a higher proportion of food-insecure households (about two-thirds) followed by Mzuzu, Lilongwe and Blantyre (Table 6). Zomba also had the highest proportions of households using each of the five coping strategies (relying on less preferred or cheaper food, borrowing from a friend or relative, reducing the number

of daily meals, limiting meal portion sizes and restricting consumption by adults) (Table 7).

Table 7: Proportion of food coping strategies by district

Food Insecurity coping strategy	N	Blantyre (n=384)	Lilongwe (n=576)	Mzuzu (n=384)	Zomba (n=384)	P-value
		%	%	%	%	
Rely on less preferred food	738	29.7	39.9	48.2	54.4	0.000***
Borrow from a friend or relative	268	14.3	15.3	11.5	21.1	0.023**
Reduce the number of meals eaten in a day	459	18.2	25.0	25.3	38.5	0.000***
Limit portion size of meals	541	23.2	28.5	31.5	43.5	0.000***
Restrict consumption by adults	249	10.4	13.9	11.2	22.4	0.000***

5.1.7. A comparison of outcomes for the indicators

Based on the findings of the HDDS, the FCS and the rCSI, Zomba was classified as the most food-insecure city. Households in Zomba experienced more difficulties in accessing quality diets, which is not surprising considering the city's higher food prices. Consequently, most food-insecure households are forced to apply strategies that help in soothing their food consumption thereby compromising the nutrition status of household members.

The results of the MAHFP, asset ownership and share of food expenditure in total household expenditure, showed Lilongwe as the most food-insecure city. These findings could be explained by the high poverty prevalence in the city. Generally, based on all the six food security indicators used, Lilongwe had the highest proportion of the most severe food-insecure people, making it the most food insecure city. Lilongwe experiences rapid urban population growth, averaging five percent growth annually in the past decade (2008-2018) which is more than the average annual urban population

growths of Blantyre (3 percent), Mzuzu (2.8 percent) and Zomba (2.5 percent) (NSO, 2018). However, the population growth does not commensurate with its ability to properly manage the ever-growing population, pushing more people into poverty.

5.2.Groups most vulnerable to food insecurity

There were negative and significant correlations between household size and MAHFP, asset ownership and HDDS. While a positive and significant correlation was observed between rCSI and household size. These findings mean that the larger the household, the less likely it is to be food secure. Most large households also had a relatively higher number of dependents, implying that fewer workers supported a larger number of people. As a result, such households may have prioritised current consumption at the expense of investing in durable assets thereby exposing themselves to future shocks.

Education of the household head had a positive and significant correlation with FCS, HDDS and ASSET (all significant at 1 percent level of statistical significance). However, negative and significant correlations were observed between the education level of the household head and rCSI, SHARE and MAHFP. These findings imply that households with less-educated heads were more likely to be food insecure. A possible explanation for this finding could be that most uneducated households were not frequently involved in formal employment and very profitable income-generating activities. This is further supported by the fact that education generally increases the likelihood of getting better job opportunities and managing a successful business which in turn allows households to not only accumulate savings but also to have long term investments (Garret and Ruel, 1999).

The socio-economic status (SES) of the household head had positive and significant correlations with HDDS, FCS and asset ownership (all significant at the one

percent level of significance). On the contrary, SES had an expected negative and significant correlation with rCSI, food expenditure share and MAHFP. Poorer households would more likely be food insecure and headed by people with lower education levels, making it harder for them to engage in reliable income-generating activities.

The results in Table 8 further revealed positive and significant correlations between sex of the household head and asset ownership and HDDS. These findings mean that male-headed households were more likely to be food insecure than female-headed households. This finding contradicts those of the World Food Programme (WFP, 2012) who found that female-headed households were more vulnerable. The findings of this study could be explained by the relatively higher education levels among urban female heads, which could improve their prospects of securing better livelihood opportunities. The job opportunities for educated females may have been enhanced women's empowerment campaigns such as the 50-50 initiative being championed by the Malawi Ministry of Gender, Children and Social Welfare in collaboration with the UN Women (GoM, 2018 d).

Table 8: Correlation of socio-economic characteristics and likelihood of being most food insecure

	FCS	MAHFP	SHARE	rCSI	Asset	HDDS
Household size	-0.034	-0.069***	-0.017	0.098***	-0.199***	-0.121***
Education level	0.141***	-0.274***	-0.136***	-0.201***	410***	0.291***
Social Economic Status	-0.178***	-0.319***	-0.102***	-0.293***	-0.409***	0.074***
Sex of head	-0.022	-0.011	0.029	0.061	0.059**	0.323***
Age of the household head	0.063	0.042	-0.031	-0.043	0.247	-0.013
Marital Status	-0.071	0.054	-0.177	-0.093	0.049	-0.151
Livelihood options	0.374**	0.235**	-0.461**	-0.152	0.197**	0.299**
Credit	0.178**	0.260**	-0.051	-0.435**	0.063**	0.063**

** and *** indicate level of statistical significance at 5% and 1% respectively.

Number of livelihood activities per household was positively and significantly correlated with HDDS, ASSET and FCS at 5 percent level of significance. A negative and significant correlation was observed between the number of livelihood activities a household was involved in and rCSI, MAHFP and food expenditure share. The results can be supported by the finding that households with at least two livelihood options had higher per capita incomes. This implied that households with fewer livelihood options were more likely to be food insecure. Livelihood diversification may increase incomes and has a positive influence on food consumption (Ellis, 2005).

Access to credit, which defined in this study as the ability of the household finances either through both formal and non-formal financial institutions, was statistically and significantly correlated with FCS, MAHFP, ASSET, rCSI and HDDS at five percent level of statistical significance. Households without access to credit were more likely to be food insecure. Access to credit can lead to investment in various businesses (Bocher *et al*., 2017). This is further supported by the finding that three-

quarters of households that had access to credit depended on non-agricultural business as their primary income source.

6. Conclusions

While Malawi's urban population continues to grow rapidly in these four cities, food insecurity seems relatively low and less severe compared to reported levels in Malawi's rural areas. Rural to urban migration is considered as one of the strategies for managing food security as urban areas are thought to offer better employment opportunities and social services. However, the conditions in Malawi's cities do not allow most people to thrive, making it harder for them to afford basic necessities such as quality food, water, sanitation and hygiene. Food insecurity was worst in Lilongwe - the fastest growing among the four cities.

Food insecure urban households in Malawi's cities tend to adopt less severe food coping strategies that are less likely to compromise their long-term food consumption. However, the continued use of such strategies could prompt households to adopt even more severe strategies in the event of recurrent food or income shocks such as selling assets, making it even harder for households to bounce back.

Given that the urban food environment in Malawi is largely cash-based and that poor households are particularly vulnerable to income and price shocks, there is a need to promote alternative livelihood development programmes, providing more stable sources of income for households. To ensure that the majority of urban residents have stable incomes, the government needs to intensify skills development programs for the self-employed as well as those seeking or already in wage employment which will improve the quality of labor thereby increasing the probability of securing a decent livelihood.

While addressing the underlying causes of urban food insecurity is important, deliberate efforts that seek to positively impact food insecurity have to be promoted by the national government. These include connecting vulnerable urban households, especially those in informal settlements, to existing social services such as the food and cash for work programmes. As a means of promoting the consumption of nutritious foods, policymakers need to consider incorporating more nutrition-related material in school curricula starting from primary school.

Where possible, urban households could adopt homestead food production, specifically focusing on the nutrient-dense foods such as vegetables, poultry and fish as these could significantly improve their diets. This initiative will assist households in reducing food expenditure, thereby freeing up resources for other equally important aspects to food security such as; sanitation, hygiene and health care.

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Declaration of interest

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Dataset link

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