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# CHAPTER 1

## BACKGROUND TO THE INVESTIGATION



## CHAPTER 1 BACKGROUND TO THE INVESTIGATION

### 1.1 THE EFFECTS OF CHRONIC MALNUTRITION IN COMMUNITIES

The concept of a balanced diet is based on the consumption of a variety of nourishing foods in proportion to essential nutrients and kilojoules to support body growth and function. Malnutrition is a state of disease which results when either deficiencies or excesses lead to imbalances of nutrients and energy that are available for use in the body. Under nutrition and over nutrition are manifestations of malnutrition because both result in an imbalance of nutrients and energy (1).

There seems to be a widespread occurrence of chronic malnutrition in developing countries such as South Africa (2,3). The younger children (under the age of five years) in any community are the worst victims of protein-energy malnutrition (PEM), because of their vulnerability by being in the growth phase (4, 3).

The research of Steyn et al (5) clearly shows that the problem found in black preschool children is one of chronic malnutrition, caused by a diet low in kilojoules over a long period of time (2). Many interrelated factors contribute to this state, including the health status, socioeconomic and education levels, housing status of a population, and political climate (see Chapter 3) (1). The main causes appear to be the food shortage and imbalances in the diets of these children (3). Secondary malnutrition results from inadequate absorption, impaired utilization of nutrients or from increased metabolic demands or losses and may thus reflect other underlying disorders (6). No age group is totally free of PEM, but the older the person, the less frequently this disease occurs and the less critical the manifestations thereof (4). The quality and quantity of food consumed by any group of people are indicative of that group's welfare (3).

According to Steyn et al (7) it is clear that the patterns of infant feeding (or childhood feeding practices) affect the nutritional status, health and growth of children. Research on infant feeding (2, 7, 8) indicates that nutrition problems occur when breastfeeding declines with the onset of weaning, or when breastfeeding is totally stopped, or if the mother returns to the workplace, or if the weaning period lasts too long and the child's main nutrient intake consists of an inadequate volume of breast milk without adequate weaning (solid) foods (8, 9). Poor weaning practices can lead to stunted growth, delayed motor and mental development, immune incompetence, frequent attacks of diarrhoeal disease, PEM, micronutrient deficiencies, and lastly but most importantly, interfering with the realization of full human potential (6, 10, 11).

### 1.2 SUBSTANTIATION OF THE RESEARCH

Knowledge of and insight in the health and/or malnutrition situation of the baby and/or child in a specific community is essential before any problems can be addressed (7). As there were no research results on the health / malnutrition situation available on the Moretele district in the Hammanskraal community, it was

decided that baseline data should be gathered in order to describe this community. This data could serve as a basis for any recommendations and practical solutions to improve and / or sustain the current situation, as well as for the planning of nutritional intervention programmes (2, 5, 7).

When planning a research project in order to gather baseline data, it would be sensible to first gather information about the nutritional status and nutritional practices of the child, because the intervention to stop stunting of growth should take place at this level. Secondly, information should be gathered about the nutritional knowledge and the attitudes of the mother/caregiver of the child on food and nutrition, because this could be used to explain the food intake of the children (2, 7).

According to Steyn et al (7) there is very little data available on the dietary practices of young black children in the rural areas in South Africa. Research that has been done was on breast feeding or on breast feeding and infant feeding (children aged three to five years old). There is a paucity in the literature regarding data on breast feeding and weaning practices, as well as the eating habits of the child shortly after weaning (children between the ages of six to 36 months) (7). This period is probably the most critical in the physical development of any individual, since nutritional practices in this early stage of life have a great influence on especially brain development and subsequent intellectual performance at school (7). These side-effects clearly have great implications for the future manpower pool and socio-economical developments in developing countries such as South Africa (3).

The problems associated with chronic malnutrition and the wider social implications thereof are thus clear. The young growing child is more susceptible to the nutritional defects that accompanies malnutrition. National food supplementation programmes located within a broader primary health care approach, and the improvement of nutritional practices, could therefore be of more value to this group of children than the older child or adult. Firstly, because of the direct and more immediate effects of the growth and development of the child as such, and secondly because of the indirect and more long term beneficial effects on the future adult population (2, 3).

### 1.3 INVESTIGATION

The research had been requested by a private company in order to obtain baseline data on communities and their nutritional practices in areas where there is no such information available. The Moretele District in the Hammanskraal area north of Pretoria is the non-urban community that was identified for the investigation. Children between the ages of naught to 36 months were targeted. The mothers / caregivers of these children were included in the research group to obtain data regarding the nutritional status of the children, as well as on the feeding practices of the mothers / caregivers regarding the studied children.

The research question put forward was: What are the nutritional status and feeding practices of children aged naught to three years in two clinics in the Moretele district in the Hammanskraal area? To answer this question in a meaningful and scientific justifiable way, baseline data were gathered from the target group in order to make recommendations regarding the factors that affect the nutritional status and feeding practices of the children negatively.

The study is presented in three parts :

## **PART 1 : LITERATURE REVIEW**

The literature review will be presented in two chapters.

Chapter 2 deals with chronic under nutrition in deprived communities in developing countries. In Chapter 3 all the factors that influence the nutritional status of young children are discussed.

## **PART 2 : EMPIRICAL INVESTIGATION**

The empirical investigation is discussed in three chapters.

In Chapter 4 the research aim, objectives, and design are discussed. In Chapter 5 the quantitative research strategy is discussed and in Chapter 6 the qualitative research strategy is discussed.

## **PART 3 : RESULTS AND RECOMMENDATIONS**

In this part the research results, the discussion thereof and the recommendations are presented. Three chapters deal with the results. The results obtained from quantitative research methods are discussed in Chapter 7. The results obtained from qualitative research methods are discussed in Chapters 8 and 9. The executive summary and recommendations for this research study are presented in Chapter 10.

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# **PART 1**

## **LITERATURE REVIEW**

# **CHAPTER 2**

## **CHRONIC UNDER NUTRITION AND THE YOUNG IN DEPRIVED COMMUNITIES IN DEVELOPING COUNTRIES**

# PART 1 LITERATURE REVIEW

## CHAPTER 2 CHRONIC UNDER NUTRITION AND THE YOUNG IN DEPRIVED COMMUNITIES IN DEVELOPING COUNTRIES

*"Children are our most precious asset, and their well-being reflects the future of the nation. Children differ from adults in two important respects: they are growing and developing, and they are dependent on others for sustenance and protection. In order to grow, develop and thrive, children require adequate nutrition, protection from the environment, essential health care and an emotionally nurturing family setting. Deficiencies in one or more of these components are why millions of children around the world still die unnecessarily every year, and why untold millions fail to reach their genetically endowed potential" (6).*

### 2.1 INTRODUCTION

Health problems, especially that of chronic under nutrition, has been causing concern worldwide (1, 2, 3, 6, 12). In any given population there have always been subgroups (vulnerable groups)(see Table 1), who are considered at high risk for a range of health and nutrition problems. New subgroups are emerging constantly due to the evolvement of new / current problems in an environment. Possible reasons are:

- ☛ they are consuming an inadequate diet because they are poor or lack consistent access to the food supply,
- ☛ they are unable to eat because of a handicapping condition,
- ☛ infants, young children, the elderly, and the mentally retarded are dependent on others for food,
- ☛ they are unable to meet their needs for increased nutrients and energy to support pregnancy, lactation, growth and development, and other physical conditions (1).

TABLE 1 : GROUPS WITH SPECIAL NEEDS (1)

VULNERABLE GROUPS	EMERGING GROUPS
Pregnant and lactating women	Poor (low socioeconomic status)
Infants	Hungry
Young children (toddlers)	Homeless
Older persons	AIDS / HIV positive
Chronically ill or handicapping condition	Lead poisoning
Migrants	Tuberculosis (new drug resistant strain)
Minorities	

Any group could be vulnerable for one or more reasons (1). If global efforts to reduce chronic under nutrition and mortality rates are to succeed, the focus should be directed to infants and toddlers (12). Infants and toddlers are considered the worst victims of chronic under nutrition because of their vulnerability (1, 2, 3, 12, 13). Kibel and Wagstaff (1995:3)(6) summarize children's wellbeing as containing four

elements (see Table 2).

TABLE 2 : ESSENCE OF THE WELLBEING OF CHILDREN

1. ADEQUATE NUTRITION	2. PROTECTION FROM THE ENVIRONMENT
3. ESSENTIAL HEALTH CARE	4. EMOTIONALLY NURTURING FAMILY

(Adapted from Kibel & Wagstaff, 1995:3 (6))

The first and most important element is adequate nutrition (3, 12). A nutritionally adequate diet in any part of the world should contain ample quantities of all the essential nutrients and energy by means of eating a variety of nourishing foods in order to comply to all the functions of nutrition in the human body. These include in the first place the provision of energy, secondly the maintenance of body tissue and the promotion of growth, and thirdly the regulation of body processes to protect the body against disease (1, 3, 14). Growing children require an additional amount of certain essential nutrients, including protein, energy, calcium, iron, zinc, vitamin A and vitamin D to meet the needs of the growth spurts in these years (3, 4, 10). If the child receives poor nourishment, it will not meet his needs and consequently will make him more prone to becoming malnourished (11).

PEM is no longer regarded as a disease caused by low intakes of protein and energy only. It is now known that PEM is a manifestation of deficiency of many nutrients (13). According to Walker (1990) (13) there is a relationship between reduced antioxidant nutrient status and the development of kwashiorkor. The focus is particularly on  $\beta$ -carotene, vitamins C, E, and also on dietary selenium, manganese, copper and zinc. These nutrients are all essential components of key enzymes involved in antioxidant pathways responsible for reducing free-radical attack. In the development of kwashiorkor, free radicals are formed as part of the body's immune response to infection (13, 15). They are superoxides that can also damage body tissues (especially the kidneys), causing oedema, fatty enlargement of the liver, pale skin and hair, and possibly diarrhoea (15). Children with low antioxidant status are more prone to infection and consequently the production of large numbers of free radicals (6, 13, 15).

### 2.1.1 MALNUTRITION DEFINED

PEM encompasses a range of clinical disorders, including the underweight child, the stunted child, the syndromes of kwashiorkor, marasmic kwashiorkor and marasmus (13, 16). PEM may be hidden or very obvious, and additional stresses such as infections (measles) and diarrhoea may lead to a rapid transformation from a mild to a serious case of malnutrition (6). On the one end of the range marasmus occurs. This is caused by a lack of protein, energy and other nutrients such as vitamins A, C, thiamin, riboflavin, niacin and minerals such as iron and zinc, i.e. when the total food intake is low. On the opposite end kwashiorkor occurs, which is caused by a lack of protein quality and quantity in the diet (4, 14, 16, 17). The name "Kwashiorkor" was given by Cicely Williams in 1933 when she described "a disease the deposed

baby gets when the next one is born", and it is also the local name in the Gold Coast for a nutritional disease of children, associated with a maize (corn) diet. (13, 16, 17). Marasmus typically occurs in the child under the age of one year, while kwashiorkor more typically occurs in the child between the ages of one and two years(4, 14, 16, 17).

### 2.1.2 NATURE OF THE PROBLEM: THE VICIOUS CIRCLE OF MALNUTRITION

Malnutrition quite often starts in utero. After birth it may be precipitated by inadequate amounts of breast milk from malnourished mothers or thirdly, because of inappropriate weaning practices. Whatever the cause might be, the result would probably be stunting in the later years of childhood (2, 7, 13). According to Steyn et al (7) it is clear that the patterns of infant feeding (or childhood feeding practices) affect the nutritional status, health and growth of children.

To understand the vicious circle of chronic malnutrition, it is essential to understand the way in which malnutrition would probably develop in an individual, from conception onwards, in a poor underdeveloped community (also see Chapter 3). Ocloo (1993:11-12)(3) explains the different phases clearly. Women are responsible for bearing children, rearing children, working in the home as well as working outside the home to earn a living. All these pressures lead to a decreased work capacity in the mother, resulting in a low income with inadequate food consumption. The mother is often already malnourished with the onset of pregnancy, resulting in premature births, babies with low birth weight, birth defects and infant deaths. These babies are often too weak to fight against poor living conditions and may therefore die sooner than expected. Unfortunately this could then lead to an early return to pregnancy and another birth of a weak child (1, 3, 6).

When such a weak child is born, he continues to be malnourished for several reasons. His undernourished mother produces inadequate amounts of breast milk to meet his nutritional needs. Weaning / complementary foods are of low quality and consumed infrequently, and the diet of the weaned child is totally inadequate. This then leads to the stunting of growth and eventually to the development of PEM, which in turn may increase the risk for acute and chronic infections. These children do not always survive, and if they do, they continue to be malnourished because of the low income of which approximately three-quarters is spent on food (1, 3, 6). Families often cannot afford adequate amounts of food to feed everyone. High quality foods such as animal proteins are rarely purchased because they are so expensive. The foods usually purchased are those that provide bulk - to fill the tummies - but are often not of high quality; the net effect is a nutritionally inadequate diet (3). Therefore any fall in income due to crop failures, unemployment and so forth, will enhance the risk of malnutrition. The result often is irregular and inadequate food intake which means less than the required amount of energy intakes for the children in these communities. Additionally the poor living conditions, poor personal hygiene, poor food preparation practices and poor storage of food contribute to the development of infectious diseases in this vulnerable group, giving rise to the vicious circle of malnutrition (3)(Figure 1).

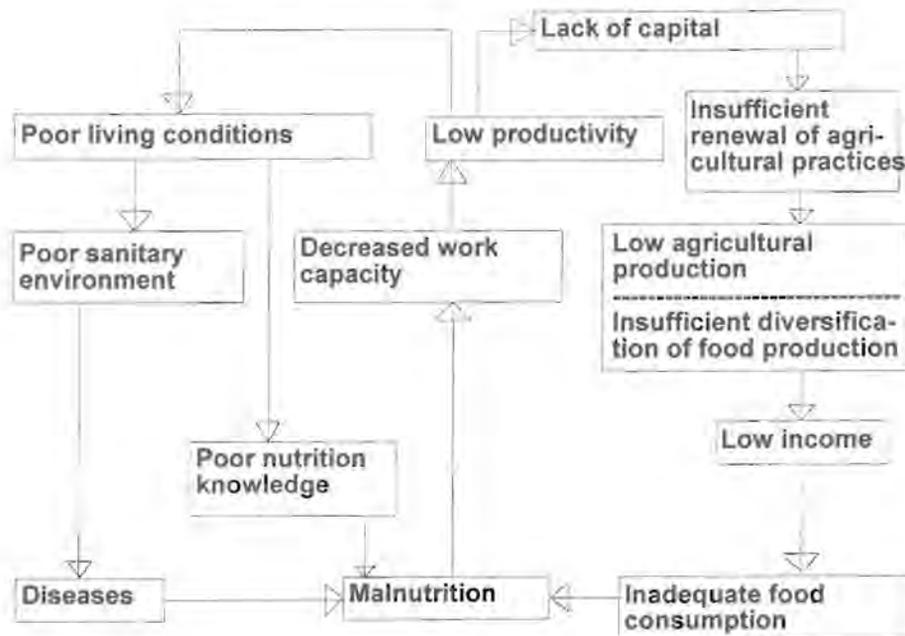


FIGURE 1 : VICIOUS CIRCLE OF MALNUTRITION (3)

Furthermore, the mothers are so exhausted by work or frequent childbearing, that they cannot provide a nurturing, stimulating environment for their children. These children sometimes also lack parental attention because they are often left in the care of other children, caregivers or the elderly (also see Chapter 3). The cycle of malnutrition thus continues up to school age where it continues in the same fashion as described previously. The older children usually have to help with activities involved in the upkeep of the family, leaving them little time for rest and recreation. Their food intake does not relate to their energy expenditure. Since much less energy is consumed than is required, malnutrition results (2, 3, 4, 6, 10, 14, 18). Physical weakness, reduced resistance to infections, stunting of growth, lack of stamina for continuous activities, lack of initiative, general sluggishness and an increased susceptibility to diseases which make them perform poorly at school, complete the final picture in these children(3)

The child in a low socioeconomic community thus grows up with the same problems that his parents have to cope with in order to survive. The survivors now become poor achievers and consequently they remain impoverished. In this way the vicious circle of malnutrition maintains itself (3, 6, 14).

## 2.2 PREVALENCE

Under nutrition continues to cause enormous worldwide human suffering. As indicated previously, young children are at much greater risk of dying from hunger than adults and smaller children (3, 12, 13). More than one-fourth of all deaths occur among young children (under five years of age) in developing countries - most of which is three years and younger (12). According to Dennill et al (19) the World Health

Organisation(WHO) estimates that more than 25% of these deaths result from malnutrition. In developing countries about 184 million children are defined as having malnutrition with weight-for-age less than -2SD. of the reference. This represents one third of the under-five child population (12). Africa's children account for only 10% of the world's children, but one third of the 40 000 children who die every day worldwide are African (19). This accentuates the fact that the problem in Africa is much more extensive than that in other developing countries. In Figure 2 the under-five mortality rate (U5MR) of Africa is compared with that of other developing countries.

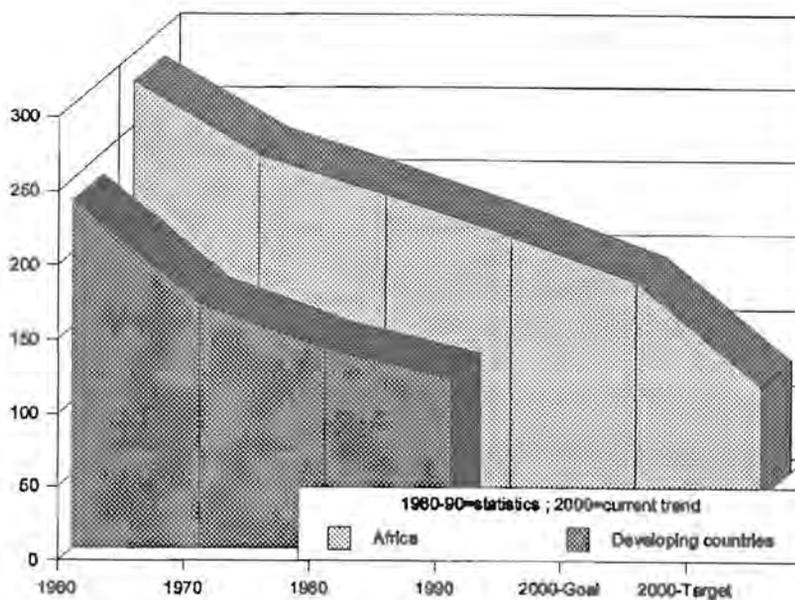


FIGURE 2 : AFRICA'S CHILDREN: UNDER-FIVE MORTALITY DECLINES (19)

For the whole of Africa, the U5MR has up till the mid-1990's been halved since that of 1960 (285%). But an increased acceleration is needed if the year 2000 goal of 75% is to be achieved. The current 2000 trend for Africa is 145% (19). According to the United Nations Children's Fund (UNICEF)(1998)(20), South Africa is ranked 69th (of 191 countries) with 66% on the list of countries ranked in descending order of their estimated 1996 U5MR. In 1960 South Africa's UMP was 126%. Currently 62 countries are still above the 75% goal.

The United Nations (1987) published the *First Report on the World Nutrition Situation*, which states that in most parts of the world nutrition has improved over the last 25 years, as the infant and child mortality rates reflect (13). Malnutrition is indicated by low birth weights, children underweight for age and by infant and child mortality. These indicators have shown that malnutrition remained stable in South America, decreased in Asia and Central America, but it is still rising in Sub-Saharan Africa (13, 21). The data on the percentage of infants with low birth weights, as presented in Table 3, verify this trend.

TABLE 3: PROPORTION OF INFANTS WITH LOW BIRTH WEIGHTS (BELOW 2.5kg)  
 (Adapted from 21)

REGIONAL SUMMARIES	1980	1990
Sub-Saharan Africa	16	17
South Asia	35	33
Middle America	15	13
South America	12	12
United States	-	15(blacks) 7(whites)

Maternal health and nutrition are clearly very important if the low birth weight problem is recognised. It affects some 20 million newborn babies annually, mainly in developing countries, but not excluding industrialised countries (21, 22). The data in Table 3 on the proportion of infants with low birth weights clearly show that this is still a huge public health problem.

Food deprivation may either lead to low weight-for-height (wasting), an indicator for acute or short term malnutrition; or to low height-for-age (stunting), an indicator for chronic malnutrition (21). Table 4 presents data on food deprivation in children world wide.

TABLE 4 : PROPORTION OF CHILDREN WASTED AND STUNTED, 1980-1990 (21)

COUNTRIES / REGIONS	WASTING (12 - 23 MONTHS)	STUNTING (24 - 59 MONTHS)
Sub-Saharan Africa	10	39
Asia (without India and China)	11	53
India	27	65
China	8	41
Latin America	5	26
North Africa	2.5	25
Overall figure of countries mentioned	13	46

According to UNICEF (1998) (20) the percentage under-fives (1990-1997) suffering from stunting is 42% for Sub-Saharan Africa and 23% for South Africa. For wasting it is 8% for Sub-Saharan Africa and 3% for South Africa and for moderate and severe underweight 30% and 9% respectively (Refer to Table 5 for the South African values). Wasted children could catch up growth, provided they receive sufficient nutrients, but stunting is largely irreparable and these children never regain their full height or cognitive potential. Therefore the figure indicating that 46% (Table 4) of the world's children are "too short" due to malnutrition is worrisome (21).

Health and related socio-economic indicators put Africa among the least developed regions of the world (19). Examples of these according to UNICEF(1998) (20) include:

- ☞ Infant mortality rate: 105 per thousand in Sub-Saharan Africa compared to 6 per thousand in industrialised countries.
- ☞ Life expectancy at birth: 51 years in Sub-Saharan Africa compared to 77 years in industrialised countries.
- ☞ Safe water supply: 49% in Sub-Saharan Africa compared to nearly 100% in industrialised countries.

The infant mortality rate (IMR) is defined by Kibel & Wagstaff (1995)(6) as an index that reflects not only the health status of children under one year of age, but also reflects the overall environmental and health service inputs in a community. It is a key indicator for comparing the health status of countries or regions. Dennill et al (19) compare the IMR's of several countries world wide as published by the Department of Health and Population Development in 1992 (Figure 3).

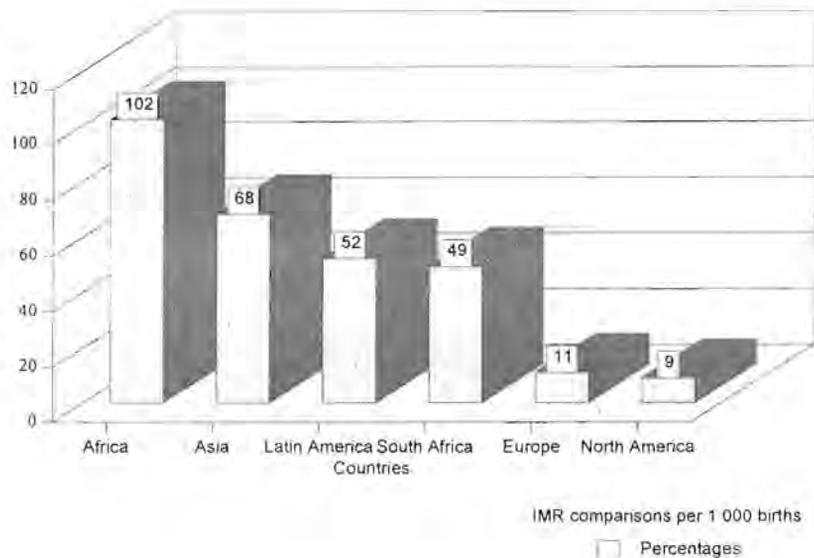


FIGURE 3 : INFANT MORTALITY RATES (15)

According to UNICEF (1998) (20) the percentage IMR's (1996) is 105% for Sub-Saharan Africa, 50% for South Africa and 60% for the World.

The first step in addressing the problem of chronic under nutrition would be to accurately assess the type, severity, prevalence and distribution of the disease in vulnerable groups (23, 24). In South Africa the crudest idea of the trends in the prevalence of chronic under nutrition is perceived as there are no regular, accurate and satisfactory nutritional data available (23, 25). Walker (1995)(17) states that chronic under nutrition has affected 30-50 million children under five years in Africa. In 1989 1200 African children died in South Africa as a result of nutrition-related diseases. The report of the Committee for the development of a Food and Nutrition Strategy for Southern Africa estimated in 1990 that 2,3 million people in South Africa and the TBVC countries previously needed nutritional assistance (23).

Regardless of the sparse data, several researchers agree that chronic under nutrition is a major health problem in South Africa amongst black, coloured and Indian pre-school children (23, 25). The trends in prevalence suggest the following :

- ☞ Stunting occurs frequently among rural black pre-school children with a prevalence of between 25 and 41% in contrast with 12% in urban blacks, 20% in coloured and 6% in Indian children (25).
- ☞ Approximately 31% of rural black pre-school children are underweight, while the figure for peri-urban blacks varies between 10-15%, for coloureds 48% and for Indian children 35% (25).

The research of Steyn et al (5) shows that a fairly large percentage of Pedi preschool children in two rural communities in Lebowa were stunted (36% of boys and 22% of girls) and only a small percentage wasted (5% of boys and 2% of girls), which indicates that these children experienced malnutrition from a very early age. Steyn et al (5) also state that the most recent studies of black preschool children in South Africa (in among other, the Umtata district, Transkei, Khayelitsha and in Lebowa) have two findings in common. Firstly, that the percentage prevalence of stunting in children is greater than the percentage underweight in children and secondly, that most studies show less than three percent wasting in these age groups. The percentage stunting in general is greater than 30% and the percentage underweight less than 15% in these groups. These findings suggest that the problem that is found in black preschool children be one of chronic malnutrition. The cause is a diet low in kilojoules over an extended period (1, 4). The following basic indicators for demographics and nutrition in South Africa emphasise the problems as stated previously (see Table 5). The overall stunting rate is 13% for the total South African population, with the wasting rate low at 2.6%, and the underweight rate higher again at 9.0% (17,26,27,28).

TABLE 5 : CHILDREN IN SOUTH AFRICA : BASIC INDICATORS FOR DEMOGRAPHICS AND NUTRITION

BASIC INDICATORS		STATISTICS		
		(Specified by year)		
		1995	1996	
DEMOGRAPHICS	Crude birth rate: → South Africa average	23.4	21.3	
	→ White	13.7	12.2	
	→ Coloured	21.7	21.2	
	→ Indian	18.1	16.1	
	→ African	25.3	22.4	
		Low birth weight prevalence	16%	
		1990	1994	1991-1996
	IMR: → South Africa average	40.2	48.9	56.1
	→ White	7.4	7.3	19.3
	→ Coloured	28.6	36.0	60.5
	→ Indian	15.9	9.9	34.1
	→ African	48.3	54.0	59.0
		1960	1990	1997
	Under-5 mortality rate: → South Africa average	126%	73%	65%
	→ White		12	
	→ Coloured		19	
	→ Indian		13	
	→ African		20	
		1995		
NUTRITION (nutrients)	Children - marginal vitamin A status	30.0%		
	Children - iron deficient	10.0%		
	Children - visible goitre	1.0%		
		Wasting %	Underweight%	Stunting%
NUTRITION (anthropometry)	Population groups: → South Africa average (1994*)	2.6*	9.0*	13.2*
	(1990-97◇)	3.0◇	9.0◇	23.0◇
	→ White	0.9*	1.1*	1.8*
	→ Coloured	4.1*	16.9*	18.2*
	→ Indian	5.2*	6.2*	4.1*
	→ African	2.4*	8.7*	14.6*

Crude birth rate: annual number of births per 1000 population expressed per 1000 live births

IMR: probability of dying between birth and exactly 1 year of age expressed per 1000 live births

Low birth weight: less than 2500g

Wasting: below minus two standard deviations from median weight for height of reference population

Stunting rate: below minus two standard deviations from median height for age of reference population

Underweight: below minus two standard deviations from median weight for age of reference population

\*SA Health Review - 1994 (26)

◇UNICEF statistics - 1990-97(28) (SAVACG - 1994(111) values are similar)

(Compiled from 17, 26, 27 and 28)

## 2.3 GROWTH AS AN INDICATOR OF CHILDREN'S HEALTH

### 2.3.1 GENERAL IMPACT OF GROWTH ON CHILDREN'S HEALTH STATUS

Physical growth is a characteristic that is unique to childhood. Thus normal growth patterns and factors influencing them are quite important to be able to assess child health. A normal rate and pattern of growth are indicators of child wellbeing and nutritional status (6). Frankle & Owen (1993)(1) define "the nutritional status of an individual as the condition of his or her health as influenced by the intake and utilization of nutrients". Nutritional status cannot be measured directly by any single measurement or test. Assessment of nutritional status is therefore dependent on the interpretation of relevant food and nutrient intake data, as well as evaluation of nutrition-related health indicators (1, 29). The U.S. Department of Health and Human Services defines nutritional assessment as "the measurement of indicators of dietary status and nutrition-related health status to identify the possible occurrence, nature, and extent of impaired nutritional status", which can range from deficiency to toxicity (29).

An overall linear relationship exists between nutritional status and mortality, indicating a gradual increase in mortality as nutritional status decreases (2, 3). According to Taylor (1988)(30) the faltering of growth in children seems to be the best single general indicator of incipient problems in child health and development. The monitoring of child growth can therefore be used to identify children with early problems in order to apply corrective measures in time (6, 17, 30, 31). Abnormal size and growth are commonly associated with malnutrition or disease (1). The vicious circle of malnutrition is best broken at an early stage by identifying children as they start the insidious, silent downward progression towards ill health. Children who are not growing are probably sick children ! (1, 30).

Physical growth and development in children can be divided into various stages, which each has typical characteristics relating to child growth and development. Infancy is the period where the greatest growth spurt occurs. Thereafter growth is slow but steady while coordination and intellectual skills are developed (6). The effect of nutrition on human growth and development is therefore clear and the measurement of physical growth parameters or anthropometry, as well as dietary analysis forms the basis for preventive health care programmes worldwide (6, 29).

### 2.3.2 FACTORS THAT INFLUENCE GROWTH

Growth is influenced by many factors of which the negatively influencing ones are mentioned mostly (see the vicious circle of malnutrition as discussed in 2.1.2.). Zeitlin (1991)(32) looks at it from another viewpoint. He uses the term "positive deviance" to describe the children who grow and develop normally in low-income families where most children normally suffer from nutritional growth retardation and poor health. Another term used for this occurrence is nutritional resilience or invulnerability to the classic high risk situation. This is in other words a form of adaption to nutritional stress — positive adjustment to a limited food supply. It is in contrast to the more common phenomenon of negative adaption, where stunting of growth in early malnutrition benefits group survival at the expense of the individual by producing people with reduced food requirements and less nutrient deficiency symptoms (32).

According to Zeitlin (1991)(32) "positive deviance research highlights the fact that the best growing children do not necessarily mirror the clinically malnourished, and that the diet quality in addition to energy consumed and frequent feedings distinguish good from poor growers". Zeitlin (1991)(32) concludes that a positive environment (see Chapter 3) that predicts a good nutritional outcome, also predicts good cognitive development, health, and long-term development of the individual into a stable, productive member of society. More than only the nutritional factors concerning families and communities should be considered when evaluating child growth, namely the psychological and social health factors (32) (see Chapter 3).

### 2.3.3 GROWTH MONITORING

Growth faltering in a child is the best single general indicator of problems in child health and development (30). An extensive method of breaking the vicious circle of malnutrition is to identify children at the earliest possible time when they enter this process, and to make their parents aware of the fact that a child who is not growing, does have a problem (30, 31). Growth monitoring is what the first letter of the acronym, GOBI, which was devised by UNICEF to describe the means for effecting the "child survival revolution", stands for (6, 17, 31). Taylor (1988)(30) defines growth monitoring as being the regular assessment of growth and development in individual children in order to apply appropriate interventions. In the broader sense growth surveillance has to do with assessment of groups of children in various populations in order to determine causes for nutritional problems affecting nutritional status and to serve as a guideline to policy makers. Both these approaches are concerned with growth and development of children between the ages of birth to three years (31).

## 2.4 CLASSIFICATION OF MALNUTRITION

To distinguish between the various syndromes as mentioned in 2.1.1, research has shown that many biochemical indices may aid in the diagnosis between these syndromes, but few have proved of practical value. Therefore, to distinguish between the syndromes of PEM, anthropometric measures are compared with international reference standards. Those generally applied are that of the National Centre for Health Statistics, U.S. (NCHS). Tables indicating various cut-off points are available. Most commonly used cut-off points are -2 and -1 standard deviations below the median — roughly equivalent to the 3rd and 15th centiles (6). Three classifications are used most commonly. Firstly the two-way Wellcome classification of PEM (Wellcome Trust Working Party, 1970), where weight for age and oedema are the main criteria, can be used for international comparisons (6, 16, 33, 34). The Wellcome Classification is shown in Table 6.

TABLE 6: WELLCOME CLASSIFICATION OF INFANTILE NUTRITION (33)

	60-80% of standard* weight	Less than 60% of standard* weight
No oedema	Underweight: - nutritional dwarfing - growth retardation	Marasmus
Oedema	Kwashiorkor	Marasmic kwashiorkor

\* Standard refers to the 50th centile and the term is used in preference to 'expected' weight (children should be 'expected' to have a range of normal weights for age, and only those with height-for-age on the 50th centile are expected to be on the 50th weight-for-age centile). 80% of standard approximates the 3rd weight-for-age centile.

Secondly, the Waterlow Classification defines stunting as being less than 90% height-for-age, and wasting as being less than 80% weight-for-height (Table 7)(6). Waterlow also distinguishes between marasmus and kwashiorkor with regard to the degree of fatty liver, oedema, wasting and serum albumin concentration (16, 34).

TABLE 7: WATERLOW CLASSIFICATION OF MALNUTRITION (6)

	NORMAL	MILD	MODERATE	SEVERE
wt-for-ht(%)	90-120	80-90	70-90	<70
Z-score (wasting)	+2Z to -1Z	-1Z to -2Z	-2Z to -3Z	>-3Z
ht-for-age (%)	95-11	90-94	85-89	<85
Z-score (stunting)	+2Z to -1Z	-Z to -2Z	-2Z to -3Z	>-3Z

wt-for-ht : Weight-for-height

ht-for-age : Height-for-age

Z-score : For weight for age and weight for height one Z-score unit is approximately equal to 10% of the median except in children less than 6 months. For height for age, one Z-score unit is equivalent to 5% of the median.

Thirdly, the Gomez classification takes weight and age into consideration. The child's percentage of standard weight-for-age forms the basis for the Gomez classification (35) (Table 8).

TABLE 8: GOMEZ CLASSIFICATION OF MALNUTRITION BASED ON WEIGHT-FOR-AGE STANDARDS (35)

Percentage of standard weight -for-age	Classification
>90	Normal
75-89.9	Grade I (mild malnutrition)
60-74.9	Grade II (moderate malnutrition)
<60	Grade III (severe malnutrition)

Scrimshaw (1990:57)(36) indicates that severe PEM has become relatively uncommon globally. In certain situations drought, civil war and other political factors will cause kwashiorkor to recur and whenever early weaning and insufficient knowledge and resources result in insufficient quantities of breast milk, marasmus will recur. Although the severe forms of PEM are gradually disappearing, retarded physical growth and development with mild to moderate PEM continue to affect a majority of young children in developing countries, and should thus be addressed accordingly (36). According to Latham (1997:131)(35) a number

of nutrition workers in the early 1970's suggested that judging malnutrition only on the basis of weight-for-age has many disadvantages. Therefore a method was suggested that distinguishes between the three categories of mild to moderate PEM based on weight and height measurements of children. These are:

- ☐ *wasting*: acute, current, short-duration malnutrition, where weight-for-age and weight-for-height are low, but height-for-age is normal;
- ☐ *stunting*: past chronic malnutrition, where weight-for-age and height-for-age are low, but weight-for-height is normal;
- ☐ *wasting and stunting*: acute and chronic or current long-duration malnutrition, where weight-for-age, height-for-age and weight-for-height are all low (35).

This classification distinguishes between current and past influences on nutritional status. It will also help the examiner to assess the child's history of malnutrition and will aid in the decision to provide supplementary feeding for the improvement of nutritional status. It is also very useful in nutritional surveys and in nutritional surveillance. In general, worldwide stunting is more prevalent than wasting (35).

## 2.5 CLINICAL SIGNS AND SYMPTOMS OF MALNUTRITION

The clinical presentation of PEM depends on the type, severity and duration of dietary deficiencies. The five forms, as mentioned previously, will be described separately, but each forms part of the PEM spectrum (4).

### 2.5.1 MARASMUS AND KWASHIORKOR

Marasmus and kwashiorkor are the major health problems of infants and young children as described previously. Marasmus (see Figure 4) is a chronic condition of semi-starvation, to which the child adjusts to some extent by reduced growth. Significant loss of body weight, skeletal muscle, and subcutaneous fat is apparent. Serum protein concentrations remain relatively intact (29).

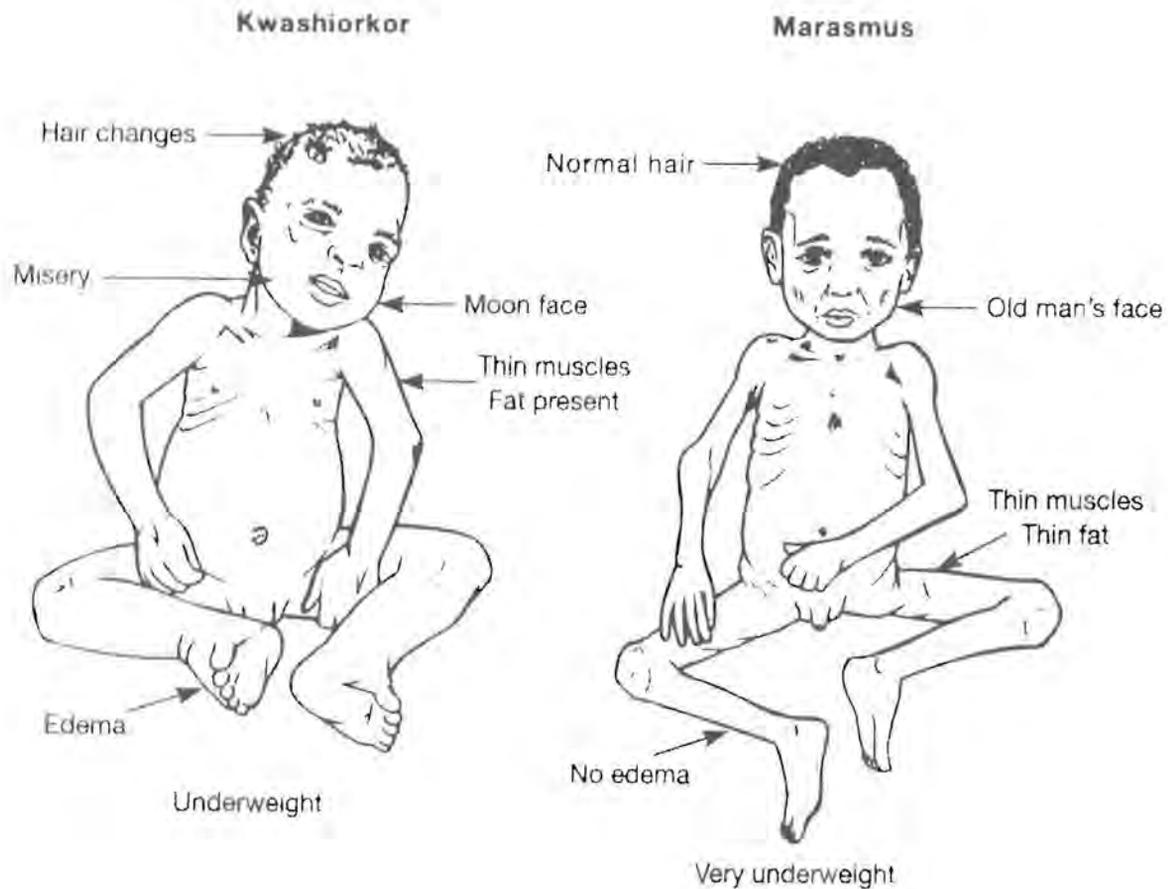


FIGURE 4: DIFFERENCES IN CLINICAL SIGNS BETWEEN KWASHIORKOR AND MARASMUS (29)

Kwashiorkor, in contrast, is associated with extreme protein deficiency, which leads to hypoalbuminaemia, pitting oedema, and enlarged fatty liver. Subcutaneous fat is usually not wasted, but muscle is. The muscle wasting is not clearly visible since it usually is masked by oedema (14, 29). The general characteristics of these two forms of malnutrition are outlined in Table 9.

TABLE 9: CHARACTERISTICS OF KWASHIORKOR AND MARASMUS (29)

VARIABLE	KWASHIORKOR	MARASMUS
Skeletal muscle	No major losses	Significant losses
Serum proteins	Significantly decreased	Relatively normal
Adipose tissue	Preserved	Significant loss
Body weight	Relatively normal	Significant loss
Oedema	Pitting oedema common	Absent
Predisposing factors	Ample energy with little or no protein	Starvation, lack of both protein and total energy

Stimulation and bonding to the mother in the first weeks of life are also critical for normal growth. Maternal deprivation leads to apathetic children with pale skins and cold extremities, and pronounced anorexia: the child rejects food in response to rejection by its mother ("the disease of the displaced child")(34).

#### 2.5.2 MARASMIC KWASHIORKOR

In areas where PEM is endemic, children show a mixture of some of the features of both marasmus and kwashiorkor and they are referred to as having marasmic kwashiorkor or simply, protein-energy malnutrition (4, 15). The child's weight is extremely low and he/she appears thin and wasted. The weight-for-height is also very low. Mild oedema of the legs is typical, sometimes of the arms and face as well. Any other typical symptoms of kwashiorkor / marasmus may be present: thin or moon face; weak hair; skin changes; and misery (15).

#### 2.5.3 NUTRITIONAL DWARFING

Sometimes when children are chronically exposed to insufficient food intake, they adapt by means of reduced / retarded growth. Their weight and height are proportionally reduced in such a way that they appear superficially normal. When weights and heights are compared to standards for normal children, they resemble children of a year or more younger (4).

#### 2.5.4 THE UNDERWEIGHT CHILD

Usually there are more cases of invisible malnutrition than the visible kwashiorkor and marasmus. For each serious case of PEM there are several children with mild to moderate, subclinical PEM. These children suffer from growth retardation which can be detected by their weight-for-age or their weight-for-height that would be significantly below normal. They might also have reduced plasma albumin or other biochemical protein deficiencies. The result of this undetected problem is that these children grow up smaller than their genetic potential and they are usually at greater risk of infections, specifically gastroenteritis or respiratory tract infections, which may then lead to the precipitation of malnutrition (4, 15).

# **CHAPTER 3**

## **FACTORS THAT INFLUENCE THE NUTRITIONAL STATUS OF YOUNG CHILDREN**

## CHAPTER 3 FACTORS THAT INFLUENCE THE NUTRITIONAL STATUS OF YOUNG CHILDREN

*"An understanding of the complex and subtle causes of malnutrition is important to appreciate the scale and depth of the problem, the progress achieved to date and the possibilities for further progress that exist" (20).*

### 3.1 INTRODUCTION

To solve problems, causes must be discovered! Before a community nutrition problem, like chronic malnutrition, can be alleviated or solved, it must be ascertained which factors in the community are causing the nutrition problem (37). According to Naidoo et al (1993)(38) there is an universal awareness that under nutrition is largely the result of poverty, which arises from:

- underemployment and unemployment
- the pressure of a growing population on land which may be maldistributed
- low productivity of agriculture
- uneven distribution of income and consumption
- poor environmental sanitation
- illiteracy
- cultural deprivation (38).

Nutrition problems found among groups are usually determined not by one factor only, but by a variety of interrelated factors that play a role to influence the nutritional status of the individual, or in this case the child, negatively (37, 38, 39, 40). Actual food behaviour is the result of the synergistic relationships among ecological, socio-cultural, economic and political environments. Multiple and interrelated determinants are involved in why malnutrition develops, and a similar series of approaches, multifaceted and multi sectoral, are needed to deal with it (see Figure 5). The model illustrates the important factors that affect the nutritional status of children in a community, ultimately leading to malnutrition, disability and/or death on the negative side, and survival, growth and development on the positive side (20,41).

The model will be discussed with the focus on the child, highlighting the immediate and underlying causes influencing the nutrition of the child, as well as the relevant factors underlying the basic causes. In each instance the global situation will be discussed, followed by the South African scenario in italic print.

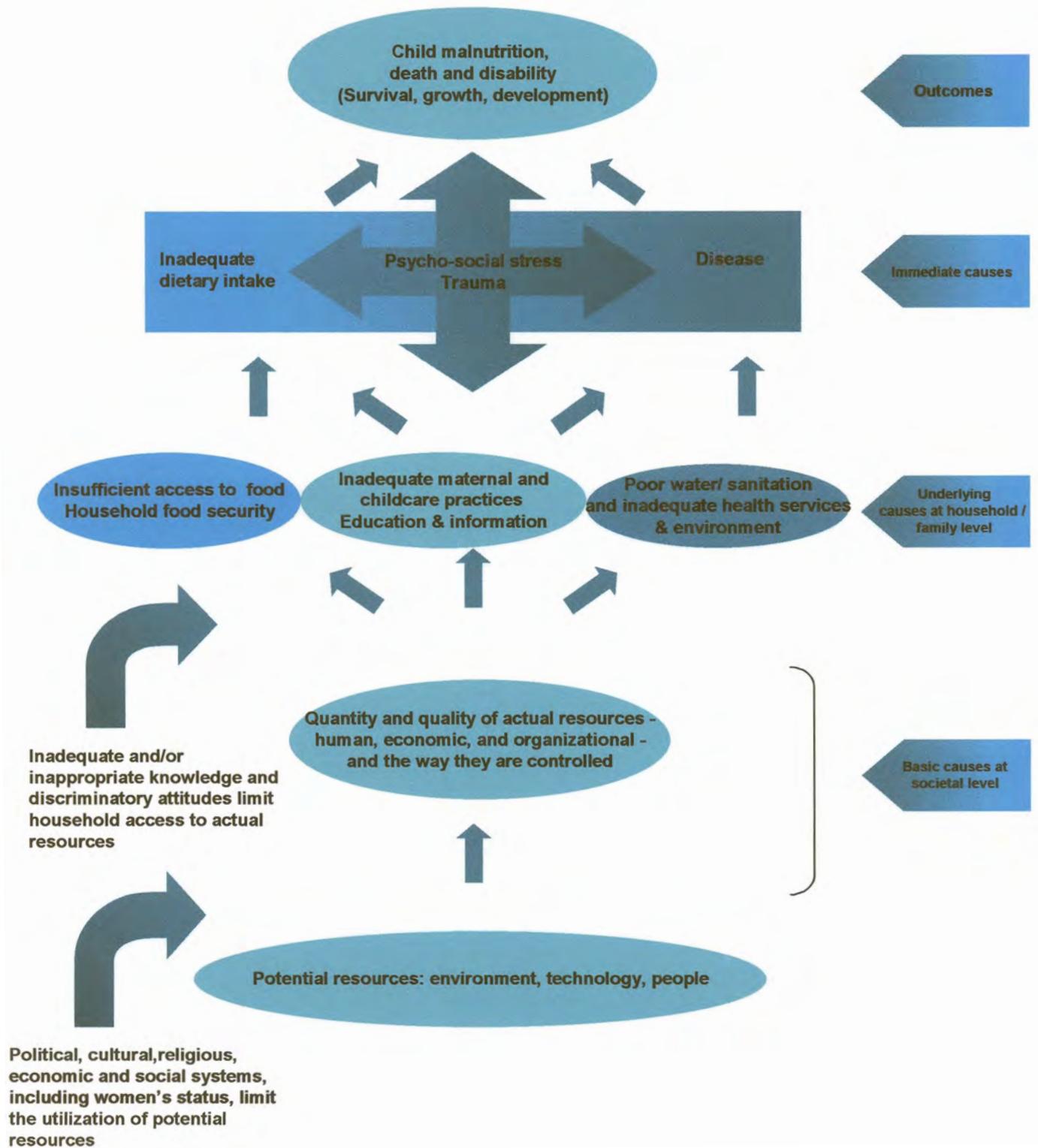


FIGURE 5 : CAUSES OF CHILD MALNUTRITION / SURVIVAL AND DEVELOPMENT (Adapted from 20 and 36)

## 3.2 IMMEDIATE CAUSES

The model clearly reiterates the creation of the vicious circle of malnutrition as explained in Chapter 2. The two most significant causes of malnutrition are **inadequate dietary intake** and the **incidence and prevalence of specific diseases**, and they are known to be interactive (20, 41). Children who enter this malnutrition-infection cycle can quickly fall into the downwards and fatal spiral since one condition feeds off the previous one (see Figure 6).

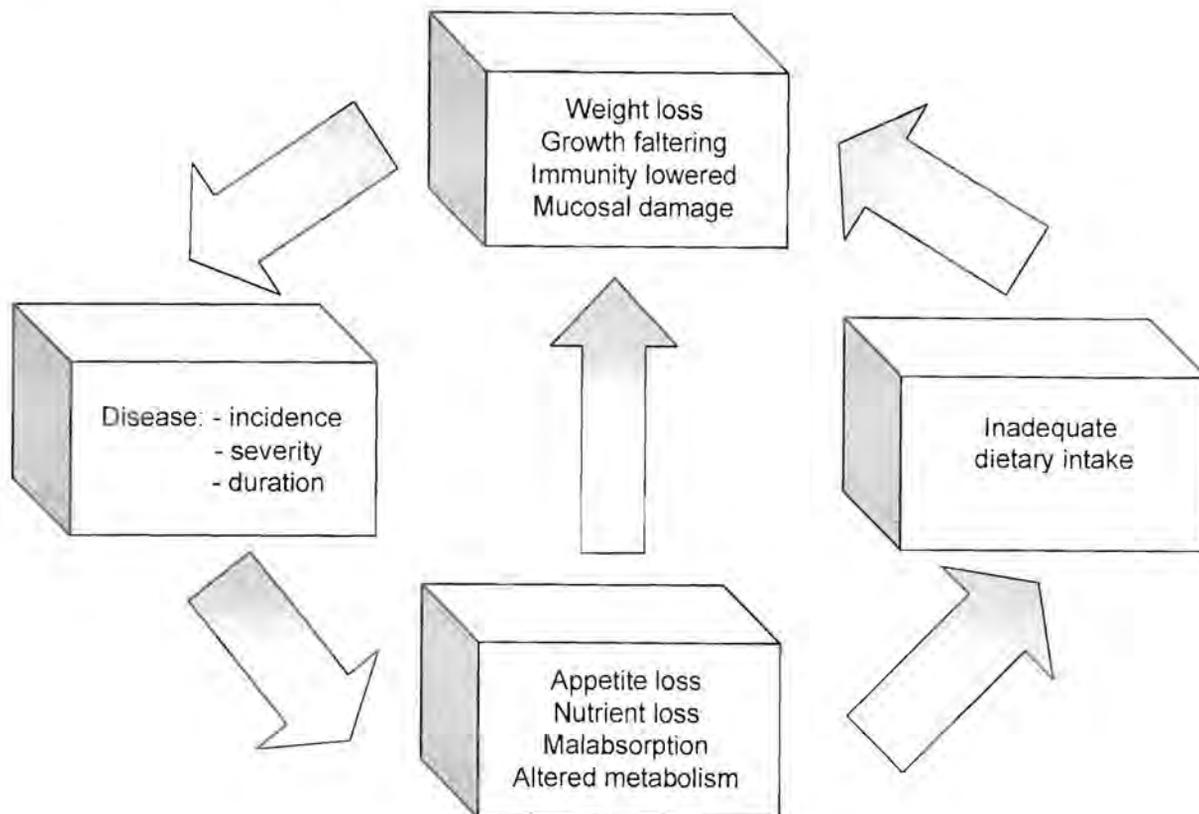


FIGURE 6: INADEQUATE DIETARY INTAKE / DISEASE CYCLE (20)

### 3.2.1 INADEQUATE DIETARY INTAKE

The nutrient intake per se of the individual will determine his nutritional status (3, 14, 18, 21,37). PEM results as a visible sign / disease of poor nutritional status or under nutrition, but less visible deficiencies of micronutrients also occur frequently. Micronutrient deficiencies such as that of vitamin A, iron and iodine, put a burden on children. It can have lasting effects including eye damage, anaemia, impaired growth and brain development, learning deficits, and decreasing long-term learning and work capacities (21). Research has shown that stunting in children may also be the result of micronutrient deficiencies, particularly that of vitamin A and iron. Retardation in psychosocial, motor, and cognitive development is also the result of micronutrient deficiencies (21).

*Walker (1995)(17) describes the then current South Africa situation regarding dietary intake as follows: the diet in rural areas varies, but the traditional diet with a few local modifications, is usually still followed. The*

*staple food is still very refined maize, which is supplemented partly with "Kaffir corn" (Sorghum vulgare) and wheat products like brown bread (17, 38). Other foods consumed mostly, included dried peas, beans, ground nuts, pumpkin, tomatoes, melons, onions, wild greens and other available fruits and vegetables. Meat is consumed irregularly, once or twice a week and milk only in small quantities. Varying amounts of sugar, tea, coffee, soft drinks, condensed milk, margarine and tinned fish are bought (17). This type of diet is probably adequate in energy and gross protein — one would not go hungry, but the animal protein and fats are low and the carbohydrate is high, fibre is moderately high, calcium and iron are low and most other vitamins, especially vitamin A is borderline low (17). Carbohydrate contributes approximately 65-80%, protein 10-14% and fat 10-25% of the energy content of this type of diet. When nutrient intakes were accessed against the Recommended Dietary Allowances (RDA)(1989), about half of rural children fell below 75% RDA and 38-62% fell under the 5th centile of NCHS Reference Standards — indicating nutritional problems which implicate nutritional status (17).*

### 3.2.1.1 Food Behaviour

The food behaviour of the individuals in a community will directly influence first the nutrient intake and consequently the nutritional status of community members (17, 37, 39, 40). Terry (1993)(37) states that food behaviour in a group refers to patterns of food selection, procurement, distribution, manipulation, consumption, storage, and disposal.

**Food selection** is defined by Terry (1993)(37) as those items chosen as food by a group. What is important in this instance is not only which foods are most commonly selected but also who makes these food selection decisions; usually the adult female, although this is changing in many communities (37). Food preference refers to the like or dislike for a food, and will obviously play an important role in the selection of foods for consumption (39). Peers and adults can exert a powerful influence on the development of food preferences in children. Children's preferences will shift to emulate the food choices of peers. Very young children, under two years of age, clearly prefer foods that they know and therefore choosing foods for them should be done with great care (40). According to research, the statement "I don't like it; I've never tried it," may be a truism about children's food preferences because repeated exposure to unfamiliar foods is likely to result in acceptance of that food (40).

**Food procurement** refers to how food is obtained (37). There are basically four ways of obtaining food: firstly by purchasing food, secondly through producing your own meat, vegetables, fruit, milk or fat, thirdly through preserving food by means of canning, freezing, drying, or other techniques, and fourthly depending on the situation, through generosity or refuge of others (37).

**Food distribution** refers to the way in which food is divided between community members. For individuals or families the amount of food available is determined by income or participation in food programmes. The access to, the amount and type of food received, and the priority for what is available in each household will also influence the nutritional status of family members (37).

Food preparation techniques are indicated by **food manipulation**. Direct control over food manipulation implies self preparation from raw ingredients at home, while indirect control implies purchasing of food in restaurants, ready-to-eat foods or food items requiring minimal preparation. In each instance the food preparation equipment and skills are also important because in some households the equipment is not functioning or unavailable, while others do not have the skills or knowledge required (37).

Terry (1993)(37) defines **food consumption** as the foods eaten, how much, when, with whom, and where. Knowledge of the context in which eating occurs, is necessary before realistic suggestions can be made about dietary change. Foods that a group eats most often are called core foods. They are eaten daily or at least every other day and thus have the greatest nutritional impact on the group, and should thus receive the most attention in assessment and intervention. Secondary foods are those that complement the core foods and are usually eaten at least weekly. Since they are also a consistent source of nutrients, they are also important to the nutritional wellbeing of the group. Foods used least, are often the peripheral foods and consist of those used on special occasions and ceremonies. They have the least nutritional impact but usually have intense emotional and symbolic meaning (37).

**Food storage** refers to the way in which food is put away for future use and therefore has implications for food safety. This concerns storage temperatures, storage periods, hygiene and sanitation practised, storage equipment used and storage space available (37). **Food disposal** refers to which food is disposed of, how, and why. Health hazards should be looked into, especially spoilage of food (37).

It can be concluded that food behaviour as such plays a very important role in the development of malnutrition in infants and small children. The selection of a feeding practice by the mother / caregiver will clearly have an influence on the outcome of the different nutritional phases that a child goes through in the early years of life, until such time as eating a full family diet. Food selection for the infant via the mother / caregiver is therefore an important factor to consider.

### 3.2.2 DISEASE

When a child does not eat enough or well enough, his immune system defences are lowered, resulting in greater prevalence, severity and duration of disease. Infections cause loss of appetite, malabsorption and metabolic and behavioural changes. These in turn increase the nutrient requirements of the body. Disease also accelerates nutrient loss. Sick children also do not eat as they should due to appetite loss, again compromising their immune systems (6, 12, 20, 41).

*The four most likely infections causing PEM in South Africa, according to Coovadia (1993)(25), are diarrhoeal diseases, respiratory infections, tuberculosis and measles.*

An additional cause of poor physical and mental health in children relates to their poor psychosocial development. *The RDP-report (1996:42)(41) states that: "in South Africa, as in other countries which have experienced sustained periods of social disorder, many children have been severely traumatised through exposure to violence and brutality, as witnesses and as victims. Under such circumstances, their normal*

*development as human beings is encumbered by post-traumatic stress and other forms of emotional and psychological scarring. Such trauma has a direct impact on young children's health, feeding and appetite and consequently increases their vulnerability to malnutrition and illness."*

### 3.3 THE UNDERLYING CAUSES

Having identified the immediate causes of malnutrition and death, the focus shifts to the multidimensional underlying causes of malnutrition. These causes relate to a failure to meet the basic needs of children and women (41). Three primary clusters of underlying causes may individually or collectively contribute to inadequate dietary intake, infectious disease or poor psychosocial development: inadequate access to food in a household (household food security); insufficient health services and an unhealthful environment; and inadequate care for women and children (20, 41). In general the prevalence of any one of these clusters is likely to contribute to malnutrition or death (41).

#### 3.3.1 HOUSEHOLD FOOD SECURITY

**Food security** for households and individuals has long been a concern in the international nutrition community (42). Food security was defined in 1989 by an American Institute for Nutrition (AIN) Expert Panel as "access by all people at all times to enough food for an active, healthy life and includes at a minimum:

- the ready availability of nutritionally adequate and safe foods, and
- the assured ability to acquire personally acceptable foods in socially acceptable ways (1, 43, 42, 44).

**Food availability** implies the types of nutritious food available from the direct environment to the specific community, as well as the amount of food and money available (37, 45). Household characteristics such as income, type and size influence the kind and quantity of food used. When families have a low income, they immediately decrease their consumption of fresh vegetables, as these are expensive items to use. Larger households also tend to supply less food per person than do smaller households, except for those foods prevalent in children's diets such as fresh milk, flour, cereals, and sugars (40).

**Food acceptability** according to Terry (1993)(37) refers to those items recognised as food and under what conditions. Lots of food items are available from the environment, but groups differ according to which ones are acceptable for human consumption, for example animal blood, seaweed, yeast paste, raw fish are both acceptable and unacceptable to different groups (37, 45). Other foods are associated with specific sex and age groups, for example large portions of red meat are associated with masculinity, and cottage cheese with femininity (37); fathers and older sons having the first right to protein-rich food; no eggs eaten by some unmarried women (38) or by children (46); women and girls receiving less food than men and boys (3, 43); food is primarily prepared for the father / male, women and children eating what is left over (47); children compete with their elders for food and must mostly be satisfied with the leftovers of the staple food and almost never get meat, fruit or other side dishes to eat (46)(also see 3.4.2.2.5 and Table 17).

According to Crockett (1995)(40) experts in food safety rank foodborne disease as the greatest health risk from the food supply. This includes short-term **food safety** (food-borne illnesses), and long-term food safety (contributions to cancer, hypertension or coronary heart disease)(37). Most of the short-term risks can be controlled by proper food handling techniques (food storage and food preparation) by the person who prepares the food (40). Children are more susceptible to contaminants and pathogens in foods resulting mostly in gastroenteritis and PEM as the commonest reason for very young African children being admitted to rural hospitals. Special attention should therefore be given to the handling of their particular foods (17, 40).

According to Terry (1993)(37) the **nutritive quality** of food implies the nutrients generally provided by the total diet of the group. To make realistic suggestions for the improvement of the nutritional status via changed food intake, the nutrient contribution of individual foods / items consumed should also be known.

To summarize, Cohen (1990:24)(45) defines food security as all people obtaining a culturally acceptable, nutritionally adequate diet, through non-emergency (or conventional) food sources at all times. Abundant food may be available, though it may not be affordable to poor families (12, 20, 45). In different areas there may also be a prerequisite for household food security; in rural areas access to land and/or agricultural resources for food production; in urban areas a range of foods available at attainable prices (20). In infants and young children their biological absorptive capacity (which is influenced by disease), the quality of food (its nutrient density, palatability, etc.) and the frequency of access (feeding patterns) is also crucial to their nutritional health (41).

The potential consequences of food insecurity include hunger, malnutrition, and negative effects on health and quality of life, achieved either directly or indirectly by the lack of adequate food (1, 44). The AIN defines hunger as: "a recurrent, involuntary lack of access to food which may produce malnutrition over time" (45). Hunger is also defined as a condition in which people lack the basic food intake to provide them with the energy and nutrients for fully productive, active lives (43), and therefore hunger may also be defined as a lack of "food security" (1). Food insecurity is a process with a general sequence as the problem worsens (44). Household food insecurity (food anxiety) is experienced first, followed by adult (women's) hunger where the quality and quantity of food eaten by adults are decreased (in favour of children), and lastly, child hunger, which is characterized by decreased quantities of food eaten. Child hunger is the last and most fundamentally, severe stage, representing the most problems with household food insecurity (40, 44, 48). Childhood hunger can have a permanent, negative impact on the health, growth, vitality, cognitive development and learning ability of the young child. Therefore hunger eradication is in the world community's interest (40, 43).

### 3.3.2 HEALTH SERVICES, SAFE WATER AND SANITATION

The number and availability of health-care services in a community determine the maintenance of an individual's health and nutritional status (37). Access to curative and preventive health services (clinics, hospitals and primary health care services) that are affordable and of good quality (human and physical resources) is an essential element of good health; especially for children (20, 43). Without these services

they have a high risk for contracting the most preventable diseases. If the parents have limited access to information, it directly influences the wellbeing of the children, for example lifesaving oral rehydration therapy (ORT) or knowledge on standards of hygiene (41).

*In South Africa there exists a substantial inequality regarding this aspect, which can be substantiated by means of black-white and urban-rural divisions by comparing health-care expenditure, the distribution of nurses and doctors, and the availability of hospital beds and access to clinics (38).*

As for environmental health, unclean water and the absence of latrines and refuse pits usually make a population prone to infectious diseases (3, 20, 41). Most infectious diseases are water borne. Weaning foods and formula feeds are easily contaminated with unclean water, especially with faecal pathogens, which are responsible for many diseases and deaths among children. Unhygienic food handling, and unhygienic conditions in and around homes (littered with human and animal wastes among others) add to the risk of spreading infectious diseases. Intestinal parasites infect children easily under these conditions, aggravating poor growth and malnutrition (20, 41). Inadequate access to water also affects the productive capacity of poor households, resulting in deaths of livestock, failure of crops, and spending considerable time and energy in fetching and carrying supplies for the household. Poor housing conditions in informal settlements also affect children negatively (41).

*Clean drinking water supplies are still not widely available throughout the rural areas in South Africa. The family water supply is mostly untreated and has to be transported for long distances to the family home - a considerable expenditure of time and energy, with effects on the mother's nutritional status and consequently the baby's as well. Sewage disposal is nonexistent and therefore pollution of natural water supplies occurs readily. The result is continuous episodes of water-borne and food-borne infections (cholera, typhoid, dysentery and intestinal parasites) leading to diarrhoea and death in infancy. Improving water quality and increasing its accessibility and quantity may prevent these hazardous effects (6). Corrugated shacks predominate in most urban settlements. These are too hot in summer, too cold in winter, poorly ventilated and mostly damp inside, leading to respiratory problems in children. This situation is usually aggravated by overcrowding (41).*

### 3.3.3 CARING PRACTICES

It is well established that malnutrition may still occur in a situation where adequate food is available in a safe and healthful environment with adequate access to health services. Adequate care for the children is thus the key element in the prevention of malnutrition (20, 41). Care for children is manifested in the ways a child is fed, nurtured, taught and guided. Nutritionally it entails all the measures and behaviours that translate available food and health resources into good child growth and development. UNICEF (1998:28)(20) states that "exclusive breast feeding for about six months, and then continued breast feeding with the addition of safe, high-quality complementary foods into the second year of life, provides the best nourishment and protects children from infection." Only feeding practices (as part of care) will be discussed

### 3.3.3.1 Breast feeding

Breast feeding is confirmed to be the primary means of nourishing an infant and of preventing infant morbidity and mortality in developing countries. Breast milk is also confirmed to have universal superiority above any other milk for infants → *BREAST IS BEST!* (6, 8, 9, 13, 22, 49, 50). Currently, recommendations for infant feeding include periods of 3-4 months (6, 9, 13, 50, 51), 3-5 months (52) and six months (49) of exclusive breast feeding. Prentice (1991:78)(9) indicates a world wide variation in breast feeding patterns (Table 10).

TABLE 10 : WORLD WIDE VARIATIONS IN BREAST FEEDING PATTERNS (9)

TYPE OF SOCIETY	% BREAST FED	DURATION OF BREAST FEEDING	GROUP WITH HIGHEST INCIDENCE	REASONS FOR PRACTICES
Industrialised countries	Small percentage	A few weeks only	Highly educated mothers, upper socio-economic groups	1. Aware of potential benefits 2. Desire for a "natural" way of life
Traditional societies	Universal breast feeding in early infancy - formula use is rare	Continued into 2nd and 3rd years of life	Poor mothers, living in rural areas in the developing world	1. Breast milk is a valuable economic resource. Only discarded for another pregnancy
Other urban communities of the developing world	Intermediate percentage	Intermediate duration. Consumption of formula alone/combined with breast milk	Educated, middle and high class mothers	1. Move away from traditional practices 2. Desire for a "modern" lifestyle 3. Pressures on the mother to return to work

There seems to be a declining prevalence in breast feeding in industrialised countries, as well as in urban areas of the developing world (Table 10) (22, 52). Different researchers determined that breast feeding is supplemented from early on (even in the first month) with milk and/or water, fruit juice, tea, gruels, cereals, fruits, vegetables (12, 13, 51, 53, 62, 63). This problem is also increasing, being especially associated with over-rapid, unprepared urban migration (22). *A South African study showed that the proportion of infants being breast fed ranged from 73% to 94% for mean periods of 9-16 months, while rural black children had the most consistent breast feeding habits (53).*

The choice for breast feeding an infant is usually made because of its benefits, while the choice to discontinue breast feeding or to start bottle feeding is often due to the disadvantages of breast feeding, breast feeding problems or personal reasons rather than the positive aspects of bottle feeding (54) (see Table 11).

TABLE 11: BREAST FEEDING: BENEFITS, DISADVANTAGES AND REASONS FOR NOT BREAST FEEDING

<b>BENEFITS</b>	
1.	Ideal nutritional composition
2.	High bioavailability and high nutritional quality of breast milk constituents: vitamins, whey protein, fatty acids, cholesterol, iron
3.	Lower mineral and electrolyte content
4.	Contains digestive enzymes which contribute to the immature or compromised (due to malnutrition) digestive system
5.	Contains antimicrobial factors which reinforce the immature immune system: lysozyme, lactoperoxidases, secretory-IgA, lactoferrin,
6.	Reducing morbidity and mortality from infectious diseases - diarrhoea, xerophthalmia, eye disorders
7.	Improved cognitive development in the pre-term infant
8.	Contains hormones and other factors which have growth modulating properties - epidermal growth factor, prostaglandins, insulin, thyroid hormones
9.	Contraceptive effect via high prolactin levels which suppress ovulation, especially in poorly nourished mothers. Thus it is a determinant of child-spacing
10.	Hygienically safe
11.	Suckling stimulates uterine contractions
12.	Suckling stimulates milk production
13.	Correct temperature
14.	Prevention of allergy/atopy - delaying introduction of foreign proteins
15.	Counteracts constipation
16.	Counteracts obesity
17.	Economical
18.	The demands consequent on lactation tend to mobilize fat stores laid down during pregnancy - improved figure
19.	Convenient for the mother
20.	Breast feeding leads to interaction between the mother and child which is important for emotional development - enhances bonding
21.	Reduced risk of breast and ovarian cancer
22.	Prevents subsequent development of coronary heart disease and hypertension
23.	Breast fed babies tend to be lighter, shorter, with smaller fat-folds than bottle fed babies
<b>DISADVANTAGES</b>	
1.	Large volumes of low energy-dense breast milk leads to appetite suppression - child does not demand enough food to meet his requirements
2.	Drugs taken by the mother may reach her infant through the milk she produces
3.	Breast milk is low in some nutrients - thiamin, iron, vitamin B <sub>12</sub> , D, K
4.	Contains antigens which can sensitize infants
<b>NEGATIVE PERCEPTIONS</b>	
1.	Maternal or infant illness
2.	Impossible to achieve if the mother has to go back to work
3.	Embarrassment for mother
4.	Breast milk can be tainted by emotional states, heavy exercise, exposure to the sun - express and discard
5.	General community opinion

NEGATIVE PERCEPTIONS	
6.	Colostrum should not be given to the baby
7.	Perceived breast milk insufficiency
8.	Fears that breast feeding will permanently alter breast size or shape
9.	The mother prefers not to continue breast feeding too long -low frequency and duration
10.	Next pregnancy
11.	The baby rejects the breast
12.	Nipple / breast problems
13.	Doctor's orders

(Adapted from 1, 6, 8, 9, 22, 49, 50, 52, 54, 55, 56, 57, 58, 59, 60, 61)

### 3.3.3.2 Bottle feeding

Bottle feeding is generally used in situations where the infant cannot be breast fed, for early supplementation of breast feeding or where misconceptions are formed and breast feeding is discontinued (49). Traditionally babies were always given human milk, although the status of the mother influenced the situation: a rich woman could afford to pay a wet nurse to feed her baby. It then became a status symbol not to feed your own baby. This pattern has now been established in developing countries where breast milk substitutes have undermined breast feeding (instead of the wet nurse) (50). Furthermore, urbanization has favoured the nuclear rather than the extended family, resulting in young mothers having limited support and encouragement from their mothers and families. The tradition of breast feeding is therefore disappearing. In urban areas the physical and financial environments are less favourable, pressuring mothers to go back to work. Those who are less well off could now afford the status symbol of not feeding their children themselves (50, 54, 58).

There are a wide variety of breast milk substitutes available to mothers/caregivers, which provide the infant's nutritional requirements if given in recommended strengths and quantities. These products meet the infant's nutritional needs during the first six months of life (1, 6). However, bottle feeding can be hazardous for the child's health if not administered properly (Table 12) (6, 49, 50, 52, 54, 57).

TABLE 12: RISKS OF BOTTLE FEEDING WHICH CAN LEAD TO DISADVANTAGES FOR CHILDREN'S HEALTH

<b>RISKS OF BOTTLE FEEDING</b>	
1.	Formula diluted improperly
2.	Use of contaminated water supplies
3.	Inadequate sterilization techniques
4.	Inadequate or lacking refrigeration
5.	Lack of sanitation
6.	Expense leading to fewer feeds given / improper dilution
7.	Feeds contaminated with different pathogens if kept for later use
8.	Lack of adequate knowledge of the mothers concerning its use
9.	Casual and haphazardous 'topping up' of bottles throughout the day
10.	Obsessive fanaticism whereby the infant is required to take exact and carefully measured feeds at strictly controlled intervals
<b>DISADVANTAGES OF BOTTLE FEEDING TO THE CHILD'S HEALTH</b>	
1.	Decreased intelligence
2.	Poorer cognitive development
3.	Increased weight gain
4.	Increased incidence of atopic diseases and reduced visual acuity due to nutritional/compositional differences
5.	Increased incidence of gastrointestinal illness, otitis media, respiratory and urinary tract infections, diabetes, and necrotizing enterocolitis due to the absence of the immunological components which occur in breast milk
6.	Increased morbidity and mortality
7.	Over dilution → undernutrition and under dilution → hypernatremia or obesity
8.	Oral thrush

(Adapted from 6, 49, 50, 52, 54, 57)

### 3.3.3.3 Complementary feeding

Complementary feeding usually comprises a combination of breast feeding, bottle feeding and solid or semi-solid foods (62). The introduction of complementary foods is a critical stage. Poor practices may lead to PEM, especially in deprived communities (63). If done too early, it may increase the risk of malnutrition and/or illness or illness due to unhygienic food preparation or storage. With introduction too late, breast milk will not meet all the nutritional needs (20, 41). In deprived environments predominant breast feeding protects the infant's health and allows time for the maturation of his own immune system. After the neonatal period the greatest threats to survival and development come during the weaning process (63). Nutrition problems occur when breast feeding declines with the onset of weaning or when breast feeding is totally stopped, or if the mother returns to the workplace or if the weaning period lasts too long and the child's main nutrient intake consists of an inadequate volume of breast milk without adequate weaning (solid) foods (see Figure 7) (8, 9).

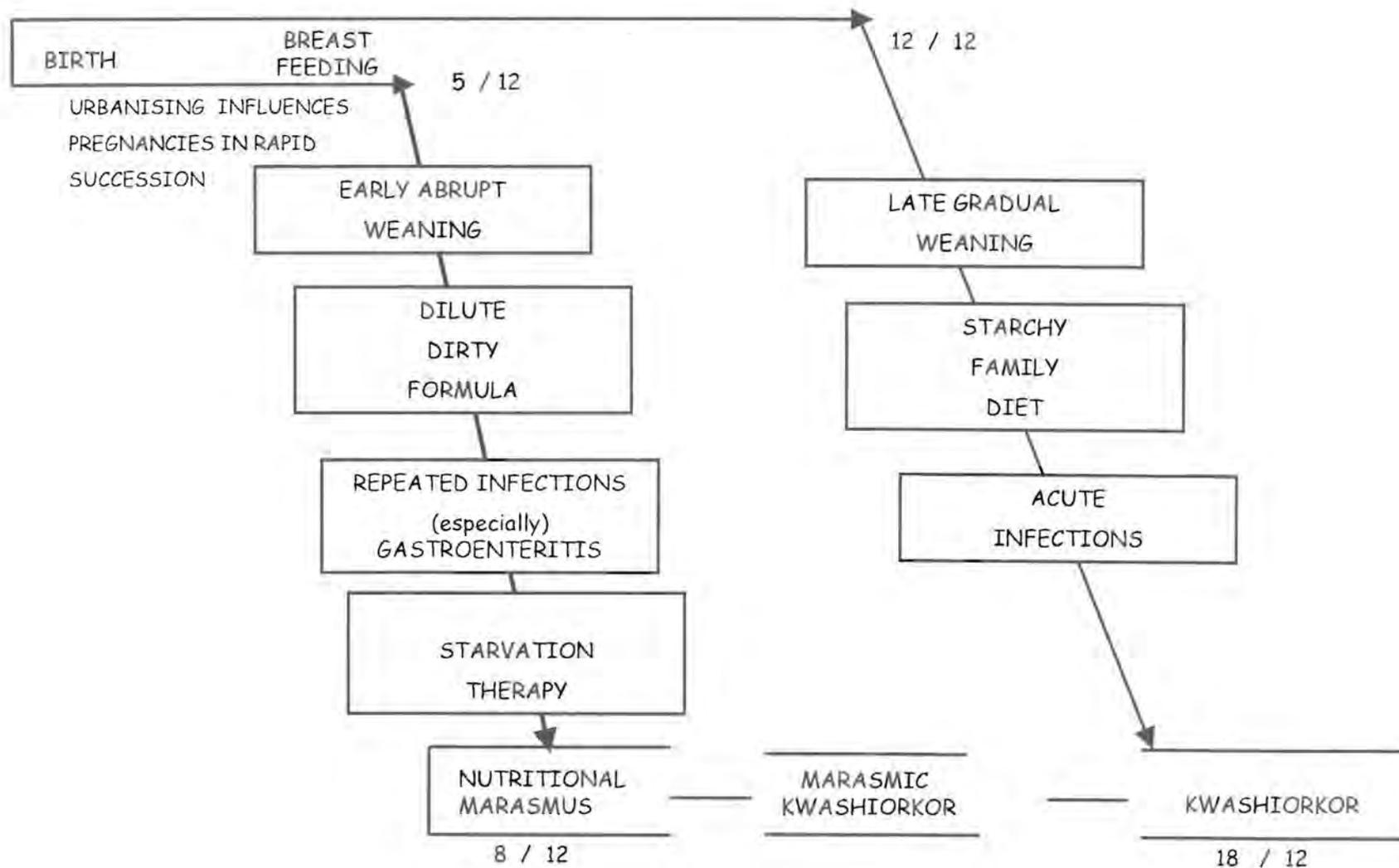


FIGURE 7: PATHS LEADING FROM EARLY WEANING TO NUTRITIONAL MARASMUS AND FROM PROTRACTED BREAST FEEDING TO KWASHIORKOR(4)

**Weaning** The word "wean" is derived from the Anglo-Saxon "*wenian*" meaning "to accustom (as a child) to take food otherwise than by nursing (10). The WHO defines the weaning process as the "progressive transfer of the infant from breast milk as the sole source of nourishment to the usual family diet (12). During this transition period:

- the exposure to environmental pathogens is most intense,
- the likelihood of inadequate nutrient intake most probable,
- the emotional trauma of less intimate maternal-infant contact most stressful (12, 63).

If all of these factors are present, the infant may not be able to adapt physiologically and emotionally, leading to high morbidity and mortality (63).

**The weanling's dilemma** Rowland et al in Walker (1990.31)(13) describe the term "weanling's dilemma" as the difficult choice to be made in the interest of the health of the weanling in the Third World. Human milk does not provide enough energy to meet the requirements of the infant of about 4-6 months of age. Therefore there is risk of malnutrition, unless weaning foods are introduced, but this puts the infant at a high risk of infection, including diarrhoea.

Increased infant morbidity is related to poverty, maternal illiteracy, poor hygiene, contaminated food and poor practices (12, 13, 63). Repeated morbid episodes affect the growth of the child. The child has an increased need for food during such episodes in order to counteract the decreased efficiency in absorption and the increased metabolism related to disease. A sick child unfortunately has no appetite for food, breast milk or solid food alike. With frequent or prolonged episodes no catching-up on food intake is achieved and consequently growth is affected (63). Underweight (low weight-for-age), wasting (low weight-for-height) and stunting (low height-for-age) are most prevalent in this period.

The prevalence of malnutrition, as illustrated in Table 13, shows an increase between the age of six months and two years of age. By two to three years of age the nutritional status usually stabilizes. The percentage of wasting drops off sharply, but children are often unable to compensate for the early poor feeding and continue to be underweight and stunted (8, 12).

TABLE 13: MALNUTRITION PREVALENCE BY SINGLE YEAR OF AGE (12)

Average Prevalence %			
Year of age	Underweight	Stunting	Wasting
0-0.99 years	14.7	18.0	4.8
1-1.99 years	30.4	35.3	9.4
2-2.99 years	26.6	33.5	5.1
3-3.99 years	24.1	34.5	3.4
4-4.99 years	23.2	35.3	3.6
Number of countries	39	39	39

Problems experienced during the weaning process, which may add to the weanling's dilemma, may be broadly categorized as those concerning poor diets and poor feeding practices (12).

**Poor diets** Energy and protein inadequacy and deficiencies of iron, zinc, vitamin D and A are the most common nutrient deficiencies during infancy (10, 12, 64). The vitamin, mineral and trace element requirements throughout the lifespan are shown in Table 14.

TABLE 14: AVERAGE DAILY VITAMIN, MINERAL AND TRACE ELEMENT REQUIREMENTS (ALL AGE GROUPS) (6)

VITAMINS			MINERALS	TRACE ELEMENTS	
Vitamin A	Vitamin C	Vitamin D	Calcium	Iron	Fluoride
300-750 $\mu$ g (1200-1500 IU)	30mg	400IU	500mg	5-10mg	0,25mg

The daily nutrient requirements for protein and energy are reflected in Table 15, illustrating the relatively greater food requirements of the young child and infant.

TABLE 15: PROTEIN AND ENERGY REQUIREMENTS (WHO, 1985)(6)

AGE	ENERGY	PROTEIN
	<b>kJ/kg/day</b>	<b>g/kg/day</b>
0-1 year	418	1,85
1-3 years	418	1,2
4-6 years	365	1,0
7-9 years	326	1,0
Adult man	192	0,6
Adult woman	167	0,5

Too little variety, leading to too few micronutrients, is a common characteristic of weaning diets. Vitamin A, Vitamin C, iodine, iron and zinc deficiencies over an extended period may lead to blindness, stunted growth, mental and physical handicaps, reduced immunity to infections, anaemia, apathy, anorexia, poor absorption, decreased total food intake and death (12, 65, 64). A varied diet and fortified foods (salt with iodine; margarine with vitamin A; cereals with iron and B vitamins, milk with vitamin A and D) may prevent deficiencies. In developing countries weaning diets lack the variety and availability of fortified foods. These children have to rely on breast milk alone for vitamin A, on vegetable sources for low bioavailable iron and on small quantities of animal products for vitamin A and B<sub>12</sub>, iron and zinc (12).

Children in developing countries have low kilojoule (kJ) intakes, due to low energy density of the complementary foods rather than smaller volumes consumed (12, 13, 64). Traditional weaning foods in developing countries are starchy staple porridges. They are diluted with large quantities of water to serve as a weaning porridge with an appropriate consistency. However, the energy and nutrient concentrations



in food.

Secondly, sub-optimal breast feeding practices may contribute to weaning problems. The absence of exclusive breast feeding may affect the infant's health and nutritional status. Delayed introduction of breast feeding may also have negative effects. This practice may be due to hospital policies of separating mothers and infants, or from the cultural belief that colostrum is bad for the baby. The result is a loss of the nutritive and protective benefits of colostrum to the baby (12, 49). A limited period (short duration) breast feeding may lead to a loss of nutrients for the baby which in turn will affect his/her growth and health. (9, 12).

Thirdly, infrequent feedings during the weaning phase may influence the nutritional outcome of the child. In order to meet their energy requirements, infants should have frequent meals because of a small stomach capacity and the low energy-density of weaning foods. In many developing countries traditional weaning foods are neither kilojoule-dense nor given three times per day (12, 13, 66).

Fourthly, inappropriate feeding methods and child care practices may also affect nutritional outcome. More physical interaction, affirmation, verbal stimulation together with high quality foods given will result in a positive outcome. Mothers/caregivers with more self-confidence will practice what they believe is right for the child instead of non-persistence when a child refuses food. The active (separate feeding times, encouragement, praise) rather than passive (child expected to help himself, no new foods) role of the mother/caregiver is therefore very important in successful child feeding practices (10, 12). Guldan et al (1993:174)(66) state that poor child care practices among mothers are more indicative of ignorance than any other reason, including economic hardship. Parents and child caregivers have a crucial role in the emotional, psychological and social development of children. Children need emotional support and cognitive and verbal stimulation for optimal development. Breast feeding is the first means to provide such support and stimulation to the child (20, 41).

#### 3.3.3.4 Essential health care

Another important aspect of caring is ensuring that children receive essential health care at the right time. Early treatment can prevent serious diseases which are far cheaper than therapeutic treatment in a hospital. Children should receive their immunizations according to a specific schedule. Detrimental practices, such as inappropriate feeding methods/practices and unhygienic ways of food handling, as well as poor sanitation may lead to parasite infestation and need to be addressed. Sound health information need to be available to the family and they should be supported to seek appropriate and timely health care for each member of the family. A positive nutritional impact may be achieved by means of timely immunizations, primary health care such as deworming and mineral and vitamin supplementation and health education (12, 20).

#### 3.3.3.5 Education and information

An important cause of poverty, disease and malnutrition that link in closely with maternal and child care, is the lack of education and information. This forms a part of the underlying causes. Limited education greatly reduces life chances, irrespective of gender or culture. But low educational levels among women correlate strongly with the incidence of malnutrition among children. Illiterate women do not have the

means to secure a job or to improve their productive skills and therefore cannot generate resources to improve their family's nutrition. They also have limited knowledge on the nutritional and hygienic needs of a healthy family (41). Poverty rates are usually directly proportional to the years of education attained by the parents. If a household is headed by a female who has not completed high school, the amount of money spent on food per person per month is less than where the female has completed school. The education attained therefore not only affects the income and wage potential of the parents, but also the attention and response given to educational materials and information exchanged in a family (40). According to Naidoo et al (1993)(38) traditional eating patterns / wisdom with food choices become less valid when the rural black cultures come into contact with Western cultures with urbanisation. Their chances of eating incorrectly now become very high especially when coupled with low levels of literacy and a low income.

*In South Africa the 1980 census revealed that 30% of blacks older than 20 had not achieved an educational level as high as standard four and were thus "functionally illiterate". Research in the Cape Peninsula has shown that the level of education clearly influenced the knowledge people had about healthy eating habits (38). In South Africa the total literacy rate (persons older than 15 who can read and write) was 77% for males and 75% for females in 1980 and has improved to 82% for both males and females in 1995 (28).*

To conclude, poverty and social problems including those concerned with nutrition, exist even in families where the average living standard of the community is high. Although a nutritionally adequate diet can be inexpensive, it is necessary to know how to compose it. Poverty is however often combined with a low level of education which always has a concurrent effect (51). Illiteracy additionally influences the level of unemployment negatively; the demand for unskilled labour decreases all the time (38).

### **3.4 BASIC CAUSES**

Although it is true that a lack of resources (poverty) and malnutrition often go hand in hand, the broader explanation lies within a fuller understanding of the different types of resources necessary for good nutrition, and of the factors that affect families' ability to access and control these resources. The three components of nutrition (food, health, care) interact closely in their influence on family life. Efforts to fulfill one component undermine the achievement of another as the same resources are often required for all the components (20).

#### **3.4.1 CONTROL AND MANAGEMENT OF HUMAN, ECONOMIC AND ORGANIZATIONAL RESOURCES**

At the basis of the causal chain are economic and political factors that set the parameters within which a society could develop. The dominant political ideology and economic system, together with the prevailing technical and social conditions of production, influence the way in which natural resources are exploited (41).

The ecological environment, among which natural resources like water, soil fertility and seasonal changes

play a large role in the determination of nutritional status. These factors determine the productive capacity of the society and have an indirect influence on the food availability and food consumption (3, 14, 39, 41). Geography, climate, topography, soil and water are all determinants of the agricultural potential of a certain area and therefore influences the food environment and food behaviour of individuals in that area (6, 39, 41). The way in which these resources are utilised, the technology and skills applied, will influence productive output and the sustainability of the natural resource base (41).

### 3.4.2 POTENTIAL RESOURCES: ENVIRONMENT, TECHNOLOGY, PEOPLE

Prevailing ideologies, which emanate from religion, tradition and culture, serve to legitimise societal practices in both positive and negative ways (41). Through the family the child receives nutrition and protection from the external physical environment, and through the family the wider issues of the community and society will determine the life experiences of the child; culture will mould his/her habits, and the beliefs and values of the community will become part of the child's makeup (6).

#### 3.4.2.1 Physical environment

In some living environments, especially inner city neighbourhoods and rural areas, individuals / children have limited access to food and to both health and nutrition services. The few grocery stores located in these areas stock only selected food items and their food prices are extremely high, which automatically restrict the type and amount of food that can be bought (37, 38, 40, 68). Ever increasing food prices influence especially the low-income consumers in these areas (38). People with a low income spend proportionally more of their income on food. Food expenditure is the most pliable part of the household budget, and meals are easily skipped or stretched when little money is available, thus influencing the food security of the household (40, 68). A lack of storage and cooking facilities will also limit the chances of a family to have a healthy and varied diet (68).

#### 3.4.2.2 Culture

Terry (1993)(37) describes culture as the learned behaviour patterns of a group that may also affect the nutrition problems in the group. Cultural variables like what, where, when and why people eat is linked to the emotional, social, and mythical meanings of food. All aspects of cultural practices (beliefs, customs, techniques and attitudes) interact, therefore a deep and profound knowledge of a culture is needed to understand their practices (69). People demonstrate / communicate deep-rooted sentiments through food, and once a certain food has achieved symbolic status, its nutritional value is lost from mind or becomes secondary (39). Culture is made up from five systems (37).

##### 3.4.2.2.1 *The economic system*

This consists of the production, distribution and consumption of goods and services and it therefore determines the group's access to food and to health and nutrition services (37). As urbanisation follows industrialisation, a move from a food-growing situation to a food-buying situation inevitably

occurs. For the small child this implies in most situations no breast feeding, as the mother often has to work to assist in the support of the family (69). Keane & Willetts (1994)(68) state that when money is tight in a family situation, skipping meals becomes a common coping strategy where the parents would frequently go without food (becoming food insecure) to ensure that their children are fed. Women will more likely than men go without food for the sake of their families.

*In South Africa poverty results due to low wages and a lack of social payments. The migrant labour system furthermore leads to the breakdown of the family unit, resulting in a decrease in subsistence farming with rural people also becoming dependent on bought foods (23, 25, 38).*

#### 3.4.2.2.2 **The political system**

This refers to the way in which a group governs themselves. Decisions of local and state governments in the form of laws and regulations have an influence on the nutritional problems of any community (37).

*Vorster & Labadarios (1993)(23) emphasize the fact that political factors probably played a unique role in the variations of under nutrition among different South Africa population groups by affecting employment, low agricultural productivity, uneven distribution of income, poor sanitation, substandard education, illiteracy, cultural deprivation and socioeconomic inequalities (23, 25).*

#### 3.4.2.2.3 **The social system**

The way people organise themselves into groups and the interactions between these groups encourage certain dietary, health-care and other lifestyle patterns among group members. The social groups and institutions that are important to a community include family, religious and ethnic groups, as well as educational institutions. Their nutritional status is influenced in a formal way by means of education or informally by means of shared food, nutrition knowledge, attitudes and behaviour (37).

*In South Africa people are increasingly moving from rural to urban areas in order to find work. This leads to a lack of social support systems for mothers with babies with a subsequent lower quality of care for the baby. A dysfunctional mother-child interaction develops as well as failure to bond properly. This have serious developmental implications for children, affecting language, cognition, social development and adjustment. Undernourished babies therefore have poor recovery and outcome with less opportunity for compensatory experiences (23, 25, 70).*

#### 3.4.2.2.4 **The technological system**

This refers to the application of science to the development of foods, tools and other goods. It can cause rapid changes in food supply, nutrition, health-care and in a group's lifestyle (37). According to Abrahamsson (1977:103)(51) food habits and feeding principles are bound to culture and traditions and therefore learnt from a very early age in developing countries. In industrialised countries, traditions are lacking and therefore have a negative effect on food choice. Food habits

are being based not on experiences, but rather on marketing of new food items. With westernisation this is becoming a more serious problem to consider in rural communities.

*In South Africa this was demonstrated clearly by the irresponsible advertising of inappropriate, expensive foodstuffs like infant formulae feeds during the 1950's. Black consumers buying these items are:*

- *living under poor circumstances with an inadequate supply of clean water for sterile bottle feeding,*
- *illiterate, thus not able to follow written instructions on tins,*
- *poor, thus unable to afford proper dilution of feeds, resulting in under nutrition and gastro-enteritis (38).*

#### 3.4.2.2.5 **The belief system**

This system refers to the beliefs held by a group about their world. Especially important are the nutrition, food and health related beliefs in a community, since they influence nutritional status (38).

**Values** determine what is desirable and undesirable as food and which foods are held in high esteem. Values are not the result of the individuals' own input, but are rather social products imposed on and slowly internalized by the individual. In the African culture for instance, insects are choice foods while they are totally rejected by western cultures. A feeling of security (household food security) is associated with a lack of anxiety over whether food will be forthcoming. Certain foods, like milk, are also associated with a feeling of security (39).

**Beliefs** about food represent an interpretation of the food values and serve as cognitive elements of attitude. Motivations related to health are common, although they are not always practised. Most women believe that breast feeding is best for the baby, but not all practice breast feeding (39). With respect to food habits certain beliefs and taboos restrict the intake of nutritious foods. One example is the belief in some communities that the head of the family, usually the male, should have the best portion of the meal. Children, instead, are often given very small amounts of meat or fish for fear that giving them more will encourage them to steal (3, 38).

*In South Africa there is a widespread belief that blacks only want to eat maize meal as it is part of their culture, and this will not change. Research however indicated that change is taking place - especially over the past 300 years, and that black people have willingly accepted new cultural elements like Coca-Cola and bottle feeding, whereas they actually ate balanced and varied diets before colonisation (38).*

**Customs** are the standards or norms of behaviour that one acquires as a member of a social group. Individuals respond to this by selecting among the available foods those that are acceptable. Food patterns (classification of foods as meals or snacks and suitable foods for each) are passed on through the training of children. Food consumption is therefore a product of a group's food lore and its present environment (39, 51). Customs may prevent families from

adopting balanced and nutritious dietary habits, early introduction and quality of supplementary food for infants, or accepting modern methods of food preparation, processing and preservation (3). *In South Africa food customs often affect women more than men. Certain foodstuffs are tabooed in pregnancy and afterwards for both women and children (38). For example the prohibition of colostrum for the newborn or the restriction of the mother's diet in the puerperium (69).*

**Symbolism** refers to the nonrational expressions that are accepted parts of food and eating. Every food has a particular meaning and these meanings are part of the cultural heritage. This symbolism is often of primary importance and food may be refused because of its unacceptability to the eater. For example meat is masculine (39), or snails and meat are forbidden in certain societies (3).

*Naidoo et al (1993)(38) conclude that the listed food customs and/or cultural taboos (Table 17) have been observed in South Africa and that they may have an effect on nutrition.*

**TABLE 17: FOOD CUSTOMS AND/OR CULTURAL TABOOS IN SOUTH AFRICA THAT MAY HAVE AN EFFECT ON NUTRITION (38)**

<b>FOOD CUSTOMS / CULTURAL TABOOS IN SOUTH AFRICA</b>	
1.	<i>A taboo on the eating of eggs by unmarried black women</i>
2.	<i>A taboo on breast feeding when black mothers are ill or pregnant</i>
3.	<i>Often the child who has just been weaned has to compete for his / her share of food within the family as the father and older sons have the first right to protein-rich food because of their age and status</i>
4.	<i>The custom to throw the colostrum away and to offer sugar water to the newborn infant</i>
5.	<i>A misconception that breast milk is too thin because of its blueish colour</i>
6.	<i>The belief that if an infant is sick or a previous sibling has died the mother's milk is "poisoned"</i>
7.	<i>The belief that a mother's milk will become sour or the baby will not gain weight when she has intercourse with her husband</i>
8.	<i>No eggs, meat and milk in the first 10 days after birth</i>
9.	<i>The abstention by Zulu women from sour milk, fresh milk and meat for a variable period of time after childbirth and menstruation</i>

### 3.4.2.3 Social systems

Biographic and demographic patterns among which age, sex, race, ethnic and religious affiliation, education, employment, income and household composition also influence nutritional status indirectly (37, 40). This type of information describes the individuals belonging to a specific group and is usually an indication of the nutrition problems and practices that are likely to be found in a group (37).

Racial and ethnic differences account for differences in nutrient intake by children. Crockett & Simms (1995)(40) indicate that black children showed the highest nutritional risk since they have lower vitamin A intakes and higher total fat, saturated fat, cholesterol and sodium intakes than children from other racial / ethnic groups studied in America. In South Africa, however, numerous studies have shown that the diets

of black pre-school children were high in carbohydrate-rich foods and low in fats (5, 7).

The biologic environment has to do with aspects of an individual's life that he has no or very little control over, like his nutrient requirements according to his own special needs. Some life cycle stages, for example infants at weaning age, have a higher nutritional risk than others (39). The individual's health status may also pose some risk. For young African children, gastroenteritis with PEM is the most common cause of hospitalisation (17). Food choice is influenced by certain genetic limitations and an individual's taste physiology (17, 39).

Socialization is a learning period influenced by family characteristics as soon as the child begins to consume adult foods from their culture (39, 40). Family characteristics in turn affect the quality and quantity of food available in the home, the way it is prepared and distributed as well as the time spent by the mother feeding her children (39). Children also learn the rules about what to eat and how to eat it, a sense of portion control, table manners, and timing of eating. This social interaction at meal and snack times is essential for teaching the rituals of eating, sharing food, cultural meanings of food and food intake, as well as for transferring family knowledge on their religious and ethnic heritage (40).

Nutrition knowledge is a tool only if individuals are ready to make changes. Food preferences and attitudes seem to be stronger predictors of food consumption than nutrition knowledge (39). Two to five year old children are cognitively ready to learn about nutritious food choices. At this age children are usually eager to learn and participate in food preparation tasks that will aid in the learning about nutrition and in refining the fine motor skills. It is also important to introduce new foods at this time as learning to enjoy a large variety of nutritious foods at this age will help in the formation of a sound foundation for a lifetime of healthy eating (40, 51).

Attitudes about food have to do with feelings and emotion and they are predispositions to beliefs. In many instances attitude is the most important factor in food acceptance (39). Children prefer foods presented to them with a positive attitude and attention from their parents; like when the parents join in the meal, establish a positive and enjoyable eating atmosphere and model positive attitudes and behaviours towards food intake. These children usually have improved dietary quality and would eat health-promoting foods when they are offered (40). Such influences should be demonstrated from a very early age, as children will show persistence in eating behaviours from as early as two years of age (40). Food intake is also guided by the prevailing attitude toward body image and physical appearance — in western cultures model-like thinness is desired while other traditional societies regard robustness as a sign of prosperity (39).

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# **PART 2**

## **EMPIRICAL INVESTIGATION**

# **CHAPTER 4**

## **RESEARCH METHODOLOGY**

## PART 2      EMPIRICAL INVESTIGATION

### CHAPTER 4      RESEARCH METHODOLOGY

*"How can our intellectual life and institutions be arranged so as to expose our beliefs, conjectures, policies, positions, sources of ideas, traditions, and the like — whether or not they are justifiable — to maximum criticism, in order to counteract and eliminate as much intellectual error as possible?" (Bartley in Dane, 1990:3 )(71).*

#### 4.1      RESEARCH PROBLEM

##### 4.1.1      AIM OF RESEARCH

The aim of this research study can be put as an investigation into the breast feeding and weaning practices of mothers/caregivers in the Moretele district / Hammanskraal area, as well as an investigation into the nutritional status and nutritional practices of the children from birth and during and after weaning up to the age of three years (refer to section 4.3.2 for the definition of concepts).

This exploratory investigation can primarily be described as prospective and descriptive in the quantitative and qualitative research domains. Exploratory studies attempt to determine whether or not a phenomenon exists; in this case, malnutrition. Descriptive studies attempt to examine a phenomenon to more fully define it, or differentiate it from others; in this case, feeding practices (71). The results of the investigation could be used to substantiate recommendations aimed at the improvement of the feeding practices and the nutritional status of the children if malnutrition would have been identified.

##### 4.1.2      RESEARCH OBJECTIVES

4.1.2.1 What is the nutrition knowledge regarding infant feeding of the mothers / caregivers of (children 0-36 months old) in the Moretele district ?

4.1.2.2 What are the attitudes towards nutrition of the mothers / caregivers of (children 0-36 months old) in the Moretele district?

4.1.2.3 What is the nutritional status of (children 0-36 months old) in the Moretele district with reference to :

4.1.2.3.1      the weight for height ?

4.1.2.3.2      the weight for age ?

4.1.2.3.3      the height for age ?

4.1.2.4 What are the feeding practices of children (0-36 months old) in the Moretele district ?

4.1.2.4.1      What are the breast feeding practices of mothers in the Moretele district?

4.1.2.4.2      What are the formula feeding practices of mothers / caregivers in the Moretele district ?

- 4.1.2.4.3 What are the weaning practices of mothers / caregivers in the Moretele district ?
- 4.1.2.4.4 How nutritionally adequate is the diet of children (0-36 months old) in the Moretele district?
- 4.1.2.4.5 What are the mothers / caregivers perceptions of hunger and food security with reference to the household, themselves and their children?

The research objective number 4.1.2.3 was addressed within the quantitative research perspective, and numbers 4.1.2.1, 4.1.2.2, 4.1.2.4. were addressed within the qualitative research perspective. (See Chapters 5 and 6 for discussion of the research perspectives.)

## 4.2. RESEARCH PERSPECTIVE

The two most important general classifications of research are those of quantitative and qualitative studies (72). The two types of research differ in various aspects, but are complementary in others (73). One of the biggest differences is the nature of the data itself. For quantitative research observation methods are designed to produce data in the form of numbers, appropriate for statistical (quantitative) analysis. For qualitative research methods are designed to produce data in the form of words, sentences and paragraphs which can not easily be reduced to numbers (74, 73). The second difference lies in the orientation of qualitative research. It makes assumptions about social life, objectives for research, and ways to deal with data that conflict with the quantitative approach. Quantitative standards cannot be used to judge qualitative research. Qualitative reports are rich in description, have colourful detail and unusual characters instead of the formal, neutral tone with statistics found in quantitative reports (73). To explain these methodologies the differences in the key aspects are compared in Table 18.

TABLE 18: DIFFERENCES BETWEEN QUANTITATIVE AND QUALITATIVE RESEARCH (73)

QUANTITATIVE	QUALITATIVE
- Test hypothesis that the researcher begins with	- Capture and discover meaning once the researcher becomes immersed in the data
- Concepts are in the form of distinct variables	- Concepts are in the form of themes, motifs, generalizations, taxonomies
- Measures are systematically created before data collection and are standardized	- Measures are created in an ad hoc manner and are often specific to the individual setting or researcher
- Data are in the form of numbers from precise measurement	- Data are in the form of words from documents, observations, transcripts
- Theory is largely causal and is deductive	- Theory can be causal or non-causal and is often inductive
- Procedures are standard, and replication is assumed	- Research procedures are particular, and replication is very rare
- Analysis proceeds by using statistics, tables, or charts and discussing how what they show relates to hypothesis	- Analysis proceeds by extracting themes or generalizations from evidence and organizing data to present a coherent, consistent picture

Decisions on the type of research domain to use is not always clear-cut. According to Denzin & Lincoln (1994:343)( 75) "a fundamental tenet of the proposed vision of clinical research is that *the question and*

*clinical context are primary; methods must adjust to the clinical setting and the clinical questions".* Researchers should be free to mix and match methods as driven by particular clinically based questions. Terry (1993:17) (37) confirms this view by stating that community assessment requires both quantitative and qualitative information.

Denzin & Lincoln (1994)(75) clarify the choice of method as follows: when research questions are formulated about one's body, life or power, survey methods should be used that start with questions such as "how many", "how much", "how often", or numerically measurable associations among phenomena. Experimental methods should be used with questions such as "if \_, then\_" or "is \_ more effective than \_". Qualitative methods should be used with questions concerning experience, meaning, patterns, relationships and values, since these questions referred to knowledge as story. Denzin & Lincoln (1994:343) (75) further state that "in attempting to evaluate the physical /behavioural, conceptual/historical, social/emotional, and spiritual features relevant to a particular clinical question, multiple paradigms and methods are necessary". According to Neuman (1997:336)(73) the logic of qualitative research does not forbid the use of numbers, statistics, and precise quantitative measurement; such quantitative data can be a source of information, which supplements or complements qualitative data. Sometimes a single method design is appropriate, being either qualitative or quantitative, but some other times a research design requires both qualitative and quantitative approaches. There are at least four different formats in which qualitative and quantitative methods are integrated within a multi method approach (Table 19).

TABLE 19 : DIFFERENT FORMATS OF A MULTI METHOD APPROACH (75)

TYPE	DESCRIPTION	EXAMPLE
Concurrent design	Two independent studies are conducted concurrently on the same study population and the results are then converged	Enhancing clinical trial results with simultaneously conducted interpretive studies to help explain why an intervention does/does not work
Nested design	The two methods are directly integrated into one research study. Quantitative studies incorporating qualitative methods to help identify and operationalize key variables	Simultaneously collecting and analysing data on a concept to measure key independent variables within the context of a prospective epidemiological study design
Sequential design	The results of one study is used to inform another	Using field methods for identifying and describing key variables before developing measurement instruments for hypothesis testing
Combination design	Combining some of the above design options	Using a sequential design of field methods to identify patterns followed by survey techniques to confirm the findings

The type of study population will also determine the appropriate research style within each of the above-mentioned broad research domains.

This research study was a cross-cultural study where the research population belonged to a different culture than the researcher, thus certain problems were expected, including:

- illiteracy (in a section) of the target population,
- lack of standardized measuring instruments for a group with this particular cultural background,

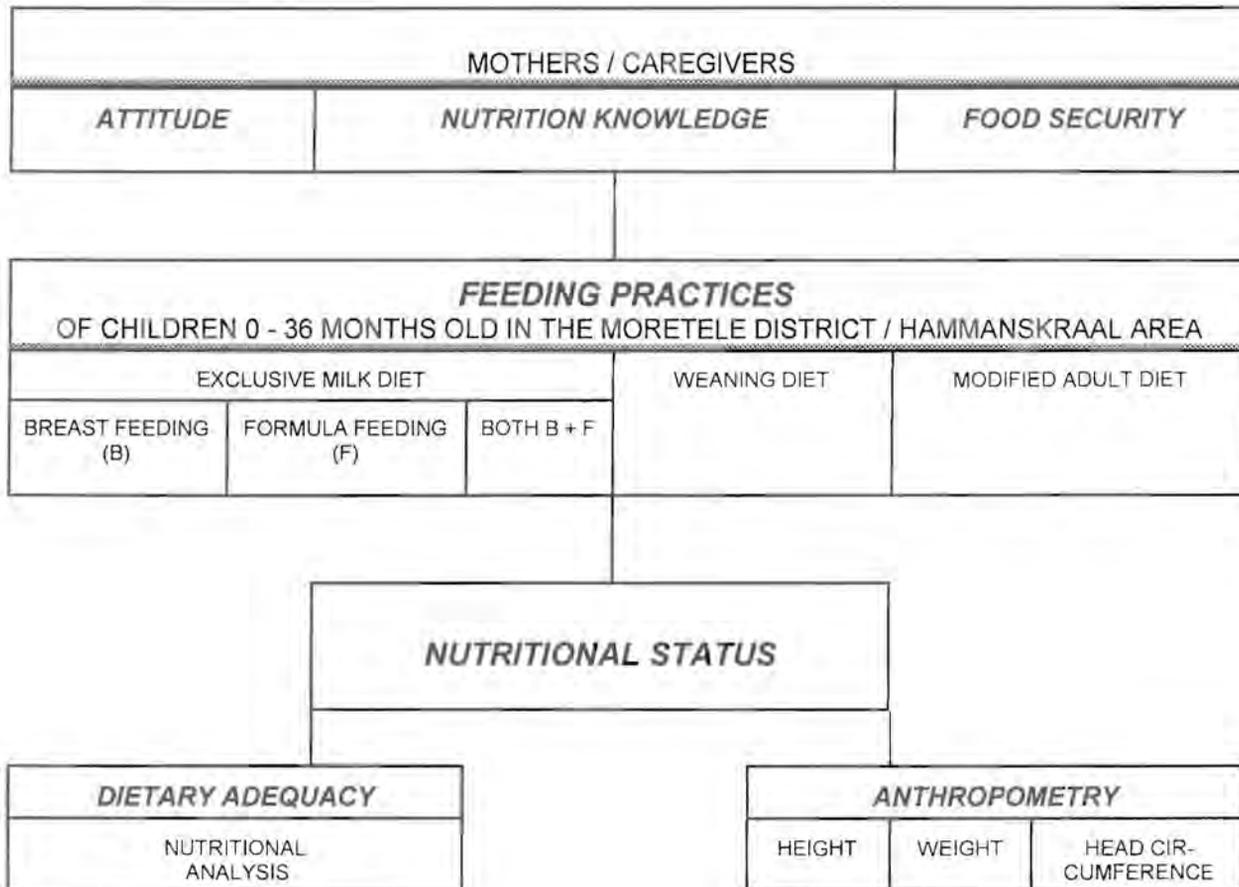
- language problems; the researcher conversing in a second language and the mother/caregivers conversing in a second or third language,
- acceptance of the researcher due to belonging to a different culture and background, therefore influencing honesty and completeness of data gathered (76).

According to Schoeman (1988:2) (77) to identify with the research mothers/caregivers from a different culture is not a prerequisite to obtain scientific knowledge. It is rather the methodology that is important. A research strategy that involves observation or dialogue of some kind, which will reduce the differences between the researcher and the mothers/caregivers is thus recommended. Biesheuvel (1987:24)(78) also favours a multi method strategy for cross-cultural research including methods such as group discussions, interviews with small groups, participant observation, interaction between informants and interviewers and feedback discussions / debriefing.

To achieve the aims of the research as stipulated previously, the combination design (see Table 19) was chosen on the premise of appropriateness. Within this design an exploratory and descriptive survey in both the quantitative and qualitative research domains was implemented. Quantitative or numerical information included data from existing documentation / clinic reports as well as information gathered by means of an empirical survey. However, little information about the physical environment, culture, nutritional practices and food environment of the community would be gathered in this way (see model in Figure 5, Chapter 3). Quantitative or numerical data were therefore complemented with qualitative or descriptive information, gathered by means of techniques such as observation and interviewing (37).

### 4.3 RESEARCH DESIGN

#### 4.3.1 CONCEPTUAL FRAMEWORK



#### 4.3.2 DEFINITION OF CONCEPTS

- ☞ **Attitudes:** an attitude is a relative stable and lasting learned inclination to appear or react to certain persons, objects, institutions or matters in a certain manner (79). In this investigation it implied the attitudes of mothers / caregivers about the different feeding practices or feeding techniques that were being used, or not used, as well as the attitude towards the types of food given.
  
- ☞ **Nutrition knowledge:** this implied the knowledge of the mothers / caregivers about infant feeding (14, 38, 41).
  
- ☞ **Feeding practices:** this included the types of food, amounts and frequency of food-intake and the technique of administering (14, 20, 41) used for:

- exclusive milk diet, which suggests the exclusive intake of milk as the only food source (14)
- breast feeding, which suggests the exclusive intake of breast milk as the only food source (6, 9, 13, 14, 20, 50, 51)
- formula feeding, which suggests the exclusive intake of formula milk as the only food source (1, 6, 14)
- both breast and formula feeding which suggest a combination of breast milk and formula milk as the only food source (14, 53)
- weaning diet, which suggests the intake of a form of solid food in combination with either breast milk or formula milk (12, 14, 52)
- modified adult diet, which suggests that the child would eat a variety of solid foods from all the food groups in the family diet. Milk alone would no longer be the main source of nutrients (12, 14).

**Nutritional status:** a measurement of the extent to which the physiological needs for nutrients of the individual is met. In this investigation only the anthropometric measurements for height, weight and head circumference, as well as dietary intake, were used in order to evaluate the nutritional status of the children (1, 29).

**Dietary adequacy:** the nutrient analysis of the 24h-recall was compared to dietary standards to evaluate the dietary adequacy (29).

**Anthropometry:** the measurement of the physical dimensions and gross composition of the body. Height, weight and head circumference of the children were measured (1, 6, 29).

## 4.4 OPERASIONALIZATION

### 4.4.1 BIOGRAPHIC INFORMATION

A questionnaire (see Addendum A), specifically designed to gather information regarding each child individually, was used. Information regarding demographics, environmental factors and health factors was gathered in this way. This information was used to describe the community in terms of frequency distributions.

#### 4.4.2 ATTITUDES AND NUTRITION KNOWLEDGE

Focus group interviews were used to explore these concepts. A trained interviewer conducted each focus group interview based on a structured, tested, interview schedule. (See Addendum B.) The content of each interview was analysed and interpreted by means of content analysis and presented by means of frequency distributions and ethnography.

#### 4.4.3 FEEDING PRACTICES

Data on breast feeding and / or formula feeding, as well as the weaning practices, were gathered in focus group interviews by means of the mentioned interview schedule. (See Addendum B.) Content analysis was used to analyse the data which were presented by means of frequency distributions and ethnography.

#### 4.4.4 FOOD SECURITY

A hunger scale was implemented to evaluate the perceptions of the mothers / caregivers of household food insecurity. The Hunger scale developed by Radimer (1990)(48) from the Radimer/Cornell Measures of Hunger and Food Insecurity was used. (See Addendum A.) Radimer (48) indicates that there is no scale score equal to hunger. Any consistent score above a "never" response was considered as indicative of hunger. The results were presented by means of frequency distributions.

#### 4.4.5 NUTRITIONAL STATUS

##### 4.4.5.1 Dietary adequacy

Dietary related data were gathered by means of a 24-hour recall method of habitual food intake. (See Addendum A.) The data were evaluated by means of a nutrient analysis computer programme (Foodfinder) (129) based on the South African food tables. The data were compared to the WHO recommendations, as well as the RDA(1989) to evaluate the nutritional adequacy of the individual intake. The results were presented by means of frequency distributions.

##### 4.4.5.2 Anthropometry

The height, weight and head circumference values were classified according to the percentiles of the NCHS, as well as the Reference data for the weight and height of children (WHO)(1, 29, 35).

#### 4.5 MEASURING INSTRUMENTS

Due to the exploratory and descriptive nature of the research design, various measuring instruments were used for the data collection. In the quantitative research strategy individual interviews with structured questionnaires and anthropometry were applied. (See Addendum A.) In the qualitative research strategy

focus group interviews were executed. (See Addendum B.) The selection, development, methodology, reliability and validity of the measuring instruments are discussed in Chapters 5 and 6.

## 4.6 POPULATION AND SAMPLING

The population consisted of mothers / caregivers with children between the ages naught to 36 months old living in the Moretele district / Hammanskraal area situated approximately 90 km from Pretoria (180 km return journey). Two non-urban areas approximately 30 kilometres outside the Hammanskraal-proper town area were identified as suitable for the purpose of this study. These areas were known as Mathibestad and Makapanstad in the Moretele district. The Mathibestad area clinic was approximately 30 kilometres outside the Hammanskraal-proper town area and the Makapanstad area clinic was situated approximately ten kilometres further away (deeper rural).

Convenience sampling was used as sampling technique. The sample was taken from mothers / caregivers and their children that visited the baby / child or immunisation clinic on a Tuesday morning. Six groups of mother/caregivers were included in the sample according to age based on the classification of Hendricks and Badruddin (1992:125) (10). According to this classification there are three overlapping periods in the nutrition of the infant, namely:

- ☐ exclusively breast fed (0-12 months)
- ☐ weaning period (3 and/or 4-24 months)
- ☐ period of modified adult diet (24-36 months).

Six phases where diet changes occur can be identified, namely :

- 0 - 3 months : exclusive breast feeding (0-3 months)
- 3 - 6 months : breast feeding and grains (4-6 months)
- 6 - 9 months : breast feeding, grains, soft fruits and vegetables (7-9 months)
- 9-12 months : breast feeding, grains, soft fruits and vegetables and meat (10-12 months)
- 12-24 months : breast feeding (supplement) and regular solid food (13-24 months)
- 24-36 months : no breast feeding, only solid food (25-36 months) (10).

Mothers / caregivers were allocated to a particular group according to the age of the child. Four focus group interviews (two per clinic) with approximately 6 mothers/caregivers per group were conducted for each age group (i.e. 24 focus groups); resulting in a total sample of 144 children. Due to a number of mothers / caregivers not pitching up for the scheduled focus group interviews, the sample size increased to 174 children and 26 focus groups. A letter of informed consent (in English and Tswana) was signed by each mother / caregiver who agreed to participate. (See Addendum A.)

## 4.7 COLLECTION OF DATA

The protocol was approved by the Ethics and Protocol Committee of the Faculty of Medicine, University of Pretoria (UP).

To overcome the cultural, literacy and language problems, it was decided to make use of two field workers/interviewers of the same ethnic group. One field worker / interviewer was included in the study for each clinic. The field workers were living close to the health clinics involved in the study, and were therefore able to recruit new children on a continual basis for inclusion in the research study (74). An interviewer was exclusively used per clinic, with no contact whatsoever between the interviewers. The techniques for the data collection were taught by the researcher beforehand. The researcher monitored the process on regular intervals (i.e. visiting the clinics alternatively during each research session).

Data collection started in September 1995. This was preceded by a pilot study (see Addendum C) and a training session for the field workers. (See Addenda D and E.) It was decided to start with the individual interviews only, and to leave the focus group interviews until a number of children had been identified. This entailed completion of the biographic questionnaire, doing the anthropometric measurements, and the 24h-recall, as well as completing the hunger scale for each child individually. (See Chapter 5 for the selection and development of measuring instruments.) Each mother/caregiver was booked back for the focus group interview on his / her next scheduled visit to the clinic. The field workers conducted interviews from approximately 08:00 until 12:00 or 13:00 on every Tuesday for the duration of the study.

The focus group interviews were started a few weeks later once enough mothers/caregivers had been recruited and the field workers had been trained. (See Addendum E.) The first focus group took place on 7 November 1995 at Mathibestad. Problems concerning the starting time, arrival of the recruited mothers/caregivers, recruiting new mothers/caregivers to make up the correct group numbers, and difficult environmental circumstances hampered the group sessions. It became clear that to have participatory mothers / caregivers the interviews as well as the focus groups had to take place as early as possible in the morning. The last focus group interview was done on the 26th of March 1996.

All the focus group interviews were preplanned for specific dates (usually the return date specified by the clinic). Mothers / caregivers were asked to come back on that day and time. A food parcel as an incentive was handed out once the individual interview and focus group interview had been completed. If mothers/caregivers did not arrive on the appropriate date or time, substitutes had to be found. Their interviews were done either before the group or just after the group interview. The researcher travelled between clinics to deliver equipment, check on the number of people in the focus groups, to control all the growth chart information of the children and to generally oversee the research process. (See Chapter 6 for the development of the interview guide.)

## 4.8 DATA ANALYSIS

### 4.8.1 QUANTITATIVE RESEARCH DOMAIN

Descriptive statistics were done and the data were presented as frequencies, means, standard deviations and percentages. Results were presented on a comparative basis between the age groups in the two clinics. Inferential statistics (Student's t-test, Chi-square and the Mann-Whitney u-test) were done. (Refer to Chapter 5.)

### 4.8.2 QUALITATIVE RESEARCH DOMAIN

Content analysis and ethnography were used to analyse the qualitative data. Content analysis typically produces numerical descriptions of the data, or rather the systematic coding of data, while ethnography provides descriptive data (80). Content analysis was used for the objective, systematic and quantitative description of the manifest content of the interviews. Tables were used to summarise the basic information that were relevant to the research study (80, 81). Ethnography was used to make the summaries from the group discussions or to give a description of what happened in the focus group discussion, complemented with direct quotations to verify the data (80). Results were presented on a comparative basis between the age groups in the two clinics. (Refer to Chapter 6.)

## 4.9 ASSUMPTIONS

The following assumptions were made regarding the research:

- ☞ the mothers/caregivers gave their full cooperation to complete all the individual questionnaires and measuring instruments honestly,
- ☞ the mothers/caregivers participated openly and honestly in the focus groups,
- ☞ the mothers/caregivers understood what was expected of them concerning each of the measuring instruments,
- ☞ the mothers/caregivers did not in any way try to please the researcher with the answers that they provided,
- ☞ the mother's / caregiver's recall of the baby's/child's food intake was not hampered by memory loss and the recall provided was representative of habitual food intake,
- ☞ the interviewers followed the instructions for the interview process correctly in both the individual and group interviews,
- ☞ the interviewers followed the correct procedures for the anthropometric measuring of the children,
- ☞ the interviewers did not influence the mothers/caregivers in any way,
- ☞ the interpretation by the interviewers of the responses provided by the mothers/caregivers in the focus group interviews was as exact as possible, and they gave a true reflection of the discussion in the transcription.