*THE UNIVERSITY OF THE WESTERN CAPE*
*PUBLIC HEALTH PROGRAMME*

TITLE:
# Factors Associated With Nutritional Status of Children Aged Six to Fifty-nine months in Livingstone, Zambia.

*A mini thesis submitted in partial fulfillment of the requirements for the degree of Masters in Public Health in the Department of Public Health, University of the Western Cape, Bellville.*

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## ABSTRACT

**KEY WORDS:** Malnutrition . Children .Underweight .Normal weight . Demographic factors .Feeding practices .Health knowledge . Socio-economic factors

A matched case-control study was carried out to identify the factors associated with the nutritional status of children in Livingstone district, Zambia. A trained field researcher collected data on demographic, feeding practices and socio-economic factors in matched groups of underweight children and normal weight children from the mothers/caregivers of the children. Interviews, using a structured pre-tested questionnaire, were used to obtain the data. All children aged from six to fifty-nine months admitted at Livingstone General Hospital during the months of October to December, 2003 with a weight for age below –2SD from the median of the reference population formed the underweight children (cases). The total was 47 children. The cases were then matched according to sex and age to 47 normal weight children attending the under five clinic at Livingstone General Hospital during the same months, with a weight for age above –2SD from the median of the reference population (controls). The final sample was 94 children. Weights were recorded using the same scale in the outpatient's department prior to admission and during the under five clinic session. Interviews then took place in a separate room after the clinic nurse had attended them. A separate visit was then made to the homes of the children on a different day. Odds ratios and 95% confidence intervals were used to measure strengths of associations. Results revealed that the basic causes of underweight were the poor economic state of the country, unfavorable policies and insufficient government support in the areas of health, education, agriculture, housing and employment. Underlying causes were inadequate access to food, inadequate care of children, poor access to health services and unhealthy living environments, while immediate causes were poor food intake and disease. Low educational and literacy levels of the mothers/caregivers, unemployment and lack of sufficient finances to access basic necessities such as food, housing and health contributed to underweight.

## DECLARATION

I declare that Factors Associated with Nutritional Status of Children Aged Six to Fifty-Nine Months in Livingstone, Zambia is my own work, that it has not been submitted before for any degree or examination in any university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Lillian Malambo Chigali May, 2005

Signed:_____

## ABBREVIATIONS

1. AIDS – Acquired Immune Deficiency Syndrome
2. HIV – Human Immune Virus
3. kcal – kilocalories
4. kj – kilojoules
5. ORS – Oral Rehydration Solution
6. PEM – Protein Energy Malnutrition
7. UN – United Nations
8. UNICEF – United Nations Children Fund
9. WHO – World Health Organization
10. SD – Standard Deviations
11. Kg - Kilograms

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## TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF GRAPHS

# INTRODUCTION

This study seeks to investigate the factors associated with the nutritional status of children below the age of five in Livingstone, Zambia. Chapter one of this study deals with a general introduction on malnutrition and a background of the study. The causes of child mortality in developing countries and the efforts made by the Zambian government to improve the nutritional status of its people are also presented. Lastly, a definition of terms and a summary are provided. Chapter two reviews studies that were done on malnutrition highlighting definition and causes of malnutrition, predisposing factors, and the impact of malnutrition. A review of past studies and a summary of this research are provided. Chapter three deals with the methodology used, chapter four presents the results obtained, chapter five presents a discussion of my study and chapter six the recommendations that I make.

# CHAPTER ONE

## 1.0 INTRODUCTION

Malnutrition is the cause of high morbidity and mortality amongst children below the age of five in Zambia (The National Programme of Action for Children in Zambia, 1994). Almost half of the Zambian children (47%) are stunted, 5% are wasted, while more than one quarter is believed to be underweight (Zambia Demographic and Health Survey, 2003). Factors contributing to the poor nutritional status of many children in Zambia include inadequate food security, illiteracy, poverty, frequent infections and illness, as well as time pressures placed on female caregivers.

In recent years, Zambia has been facing serious food insecurity and, as a result, it has been difficult for the country to feed itself, resulting in a high prevalence of malnutrition in the country. Food insecurity, occurring mainly as a result of low levels of food production and consumption, has severely affected the nutritional status of the children in the country.

This situation is worsened by the frequent droughts experienced in the country, which further lower national food production. Poverty has further contributed to food insecurity in urban areas. Low incomes and inadequate purchasing power of the national currency for food acquisition manifest this. This situation is further worsened by the country's economic reforms and structural adjustment programmes which removed food subsidies and caused an unexpected fall in the income for many rural households, therefore increasing the levels of poverty in the country. Due to this, stunting has affected 45-47% of the rural children and wasting has affected 6% of all rural households (Zambia Demographic and Health Survey, 1996).

Illiteracy, unemployment and rapid population growth that surpass the growth of the national economy have contributed to high levels of poverty in the country. Poverty is also a contributing factor of under nutrition in children. Twenty-seven percent of the country's population is illiterate (29% of the total female population and 24% of the total male population) and high illiteracy levels have been linked to high levels of poverty. In 1991-1997 the population growth rate of 3.1% surpassed the Gross National Product (GDP) growth of 2.73%. There has further been a decline in formal sector employment, and a decline in employment in the mining and manufacturing sectors, which have also contributed to high levels of poverty in the country (Zambia Demographic and Health Survey, 1996). This poverty is more pronounced in rural and peri-urban areas, affecting more of the informal sector and is more pronounced in women of low or no education.

This study discusses the findings of the research undertaken to assess factors that are associated with the nutritional status of children in the Livingstone district.

### *1.1 BACKGROUND OF THE STUDY*

Hunger and malnutrition remain amongst the most devastating problems facing the world's poor and continue to be the leading problem of most developing countries (WHO, 2003). 20% of the world population is believed to have inadequate food consumption (Martorell, 1992). It has further been estimated that one third of all children below the age of five years in developing countries are stunted (De Onis, Frongillo and Blossner, 2000).

70% of these children are believed to live in South-Central Asia, 26% in Africa and approximately 4% in Latin America (World Health Report, 1998).

WHO further states that 60% of the 10.9million deaths occurring each year among children below the age of five years in developing countries are due to malnutrition (WHO, 2003).

Africa is a continent that is still developing as a result of which many countries are still faced with environmental degradation and poor health structures (World Health Report, 1998). Waste disposal systems are still inadequate with increased risk of water contamination and soil degradation by chemical pollutants.

Some countries in Africa have had a decline in food production and are faced with a risk of chronic famine, thus increasing the risk of malnutrition (World Health Report, 1998; UN Commission on Nutrition, 1999). Rates of stunting, which have been associated with poor development in children have been observed to be rising in some countries in Sub-Saharan Africa and South-Central Asia. Zambia is one of the countries in Sub- Saharan Africa which has not been spared this unfortunate trend. Indeed, Zambia has had an increase in the stunted development of its children since 1980 (De Onis et al, 2000).

Livingstone district, in which this study took place, is situated in the Southern Province of Zambia and has an estimated population of 158 000 people, 50.23% of whom are women (Zambia Reproductive Health News, 1998). Most of these women depend on the incomes of their spouses, although some do supplement this with cross-border trading. Most of the formal workers are government employed and do not get adequate incomes to enable them sustain their lives and those of their families.

In the 1990s because of the poor economic situation of the country a large number of industries closed down. This caused many people to lose employment and accounts for the high levels of unemployment in the district. As a result, most people in the district either depend on informal employment such as street vending or cross -border trading to make ends meet. Due to this, most mothers and caregivers spend long hours away from their families causing a negative impact on the nutritional status of their children.

Causes of undernutrition are complex, ranging from factors such as political instability and slow economic growth to factors related to the inability of populations to meet their basic needs such as access to sustainable food, housing and healthcare (De Onis et al, 2000; UNICEF Conceptual Framework. UNICEF/WHO Joint Committee, 1989). Undernutrition is therefore basically a problem of poverty.

WHO (2003), in fact, documents a relationship between health and income, with the poorest sections of the population stated as being the most vulnerable. Culture in some tribes also plays a role in predisposing people to malnutrition. Where income and material resources are inadequate, women may sacrifice their own nutritional needs and those of their children against those of higher status household members such as in-laws or guests (McGuire J. and Popkin BM., 1989).

Nutrition improvement has been recognized as an important route to better health and enhanced human capital. Any episode of infection that a person is subjected to leads to a declining nutritional status such as growth failure in children and this reduces resistance to disease and further lowers the body's immunity.

As a result this causes an increased risk of mortality and according to Mason (1996), this can only be reversed by better nutrition.

### *1.2 CAUSES OF CHILD MORTALITY IN DEVELOPING COUNTRIES, INCLUDING ZAMBIA*

The major cause of child mortality in developing countries has been attributed to factors such as fertility behaviour, nutritional status, infant feeding, accessibility to health services for mothers and children, environmental health conditions and socio-economic status (Ruststein, 2000). Interventions directed at these factors have been known to have a positive impact in reducing child mortality. According to Ruststein (2000), people whose children suffer from malnutrition cannot be passive recipients of programmes, but need to be actively involved in problem assessment, analysis and action in the fight against malnutrition.

In Zambia the under five mortality increased from 174 per 1000 births in the mid 1980's to 197 per 1000 births in 1994 (The National Programme of Action for Children in Zambia, 1994). The major causes of morbidity and mortality among children aged 0-5 years were identified as malnutrition, diarrhoeal diseases, malaria, and acute respiratory infections. Perinatal transmission of HIV accounts for 75% of all pediatric HIV/AIDS cases. In 1994, the prevalence of HIV in malnourished children was estimated to be 22% (The National Programme of Action for Children in Zambia, 1994).

In 1991 the government of the republic of Zambia reaffirmed its commitment to Primary Health Care. Primary Health Care aims to achieve better health status for its citizens by adopting a holistic approach to healthcare management of the patient.

Following systemic collection and standardization of data on the nutritional status of children under five years in 1997, WHO confirmed that child malnutrition is a major public health problem in developing countries, where one third of all children under the age of five are stunted. Zambia, in particular, was reported to have had an increase in the prevalence of malnutrition since 1980 (De Onis et al, 2000). The World Bank Poverty Assessment further reported that two thirds of Zambia's population live below the poverty line. Half of all children aged between one to four years are believed to be stunted due to malnutrition, and 69% of them are believed to live in households in which their basic needs are not met (Central Board of Health, 1997). Although these young children, who form the focus of this study are raised in similar geographical areas and cultural conditions, some become malnourished while others maintain normal nutritional status. It is therefore important to determine what factors explain the difference in this nutritional status.

### *1.3 EFFORTS MADE BY THE ZAMBIAN GOVERNMENT TO IMPROVE THE NUTRITIONAL STATUS OF ITS NATIONALS*

At its 55$^{th}$ World Health Assembly, WHO reaffirmed that poor feeding practices and their consequences are major obstacles to sustainable socio-economic development and poverty reduction (WHO, 2000).

WHO therefore called upon all member states to devise country specific approaches to improve feeding practices. Zambia had no clearly defined nutrition policy. Thus in order to meet WHO's challenge, and, at the same time, in recognition of the right of children to adequate nutrition as well as access to safe and nutritious food, Zambia adopted a strategy of infant and young child feeding in 2003 (National Food and Nutrition Commission, 2003). It achieved this through the National Food and Nutrition Commission, which was established in 1997 to oversee the nutrition activities in the country. The Commission undertook a situation analysis and presented a draft national food and nutrition policy for the government in October, 2003 (Central Board of Health, 2003).

Amongst other matters, the policy aims to eliminate all forms of malnutrition in the country, ensure household and national food security, and care for the nutritionally vulnerable. It further aims to promote better nutrition and care of people living with HIV/AIDS, carry out research and surveillance, as well as the monitoring and evaluating of the nutrition programmes in the country (National Food and Nutrition Commission, 2003).

In order to address food security, the Agriculture Policy was put in place.

In Zambia the food entitlement for rural households was found to be linked to agriculture (National Food and Nutrition Commission, 2003). Crop production risk was therefore found to be a primary determinant of food security. Urban households depend on wage employment or self-employment and because they purchase their food needs they are more susceptible to insufficient incomes, food price increases and other basic commodities such as fuel and housing.

In an effort to meet its obligation of ensuring food security, the Zambian government pledged to maintain a national food reserve to feed the citizens in the event of national or regional food shortages (Ministry of Agriculture, Food and Fisheries, 1996).

The government also pledged to maintain an early warning system to monitor the food and nutrition situation so that appropriate action could be quickly taken when need arose, as well as to improve co-ordination between the various institutions dealing with food.

The Ministry of Agriculture, Food and Fisheries employed the following strategies:

1. Liberalization of markets – the government withdrew from direct involvement in agricultural marketing by freeing prices, removing subsidies, privatization of parastatals and renting public storage facilities to the private sector.

2. Diversification of food production – one of the strategies taken was to grow crops in accordance with the suitability of the different soil types. The central, southern and eastern plateaus contain the most fertile soils in the country and can grow a wide variety of crops which include maize, irrigated wheat, tobacco, cotton, sunflower, soya beans and other arable crops. However, this area constitutes only 12% of the country. Other regions are much less fertile and their poor production has been compounded by droughts in recent years.

3. Improvement of the economic status of women – through the creation of policies that will allow women more participation in agricultural research, credit and land tenure.

4. Improved use of water resources – through greater use of wells and boreholes, more use of drought resistant crops and adoption of irrigation where it is economically justifiable, as well as maintenance of Zambian fisheries to avoid disruption or pollution.

5. Full utilization of land suitable for agriculture in those areas where land is under utilized.

6. Emphasis on service delivery to smallholders – government intends to put in place policies to encourage the private sector to support small-scale farmers such as through expanded credit facilities in order for them to contribute to the domestic and export markets.

7. Development of the livestock sector – This will help improve the welfare of the rural people through increased food supplies and cash incomes, as well as improvement of the soil quality.

8. Expanded opportunities for outlying regions – such as improvement of infrastructure, improved access to fertilizer and markets.

It is against this background then that this study has tried to investigate the factors associated with the nutritional status of children aged six to fifty-nine months in Livingstone district of Zambia.

### *1.4 DEFINITION OF TERMS*

1. Underweight children – all children with a weight for age below minus two standard deviations (< -2SD) from the median of the reference point.

2. Normal weight children – children with a weight for age above minus two standard deviations (> -2SD) from the reference point.

3. Educational Level – highest level of education attained in school or at college/university.

4. Low level of education – was considered as those with no education up to grade six.

5. Professional – a person having a skill or trade.

6. Non-professional – a non-skilled person or one having no trade.

7. Large family – was considered as any family having seven members and more.

Average family – having four to six members.

Small family – having three members and less.

8. Typical diet – the kinds of food that a person or community habitually eats.

In this study, the acceptable typical diet was considered to consist of breakfast, lunch and supper. The average Zambian child consumes breakfast consisting of either mealie-meal porridge to which pounded groundnuts have been added or with milk; or tea with bread. Lunch and supper consist of nshima that is consumed along with a relish of a meat and vegetable product such as beef and cabbage.

9. Nshima – a stiff porridge made from mealie-meal and water. Nshima is eaten with an accompanying relish such as meat and vegetables. It is the country's traditional diet.

10. Mealie-meal porridge – a light porridge cooked from mealie-meal and water. Milk, butter/margarine or groundnuts are usually added to the porridge in order to increase its nutritional value and it is often eaten at breakfast or in the afternoon.

11. Water source – point at which water for domestic use is collected.

### *1.5 SUMMARY*

Malnutrition is believed to be the major cause of morbidity and mortality in developing countries. Zambia is one of the countries that has been adversely affected by malnutrition.

Factors that are believed to contribute to the poor nutritional status of Zambian children include inadequate food security, illiteracy, poverty, frequent infections and inadequate care of the children. Recognizing therefore that a poor nutritional status is a major obstacle to socio-economic development and poverty reduction, the Zambian government implemented the Zambia National Food and Nutrition Commission in 2003 and the Agricultural Policy to try and address national and household food security.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.0 INTRODUCTION

In this section I review literature on malnutrition. I provide statistics of malnutrition worldwide as well as in Zambia, and then I discuss the definition, causes, predisposing factors, and impact of malnutrition at individual and at national level. I review previous studies done on child nutritional status highlighting the causes of under nutrition. Lastly, I give a summary. .

Under nutrition is believed to be the underlying cause of a large percentage of all child deaths especially in developing countries (Black et al, 2003). It has been authoritatively established that under nourished children experience greater morbidity and mortality from diarrhoea, measles and other infections (Badenhorst et al, 1993; Chopra & Sanders, 1997). According to Roy et al (1993), an estimated 30% of children under the age of five in developing countries suffer from moderate malnutrition while 5% suffer from severe malnutrition.

In Zambia 47% of children under the age of five are believed to be stunted, 5% are believed to be wasted and 28% underweight (Zambia Demographic and Health Survey, 2003). There has been an increase in the trends of under five children who are stunted in the country, rising from 40% in 1992 to 42% in 1996, and to 47% in 2001-2002.

The proportion of children who are underweight has also risen from 25% in 1992 to 28% in 2001-2002. The proportion of children who are wasted has however declined from 5% in 1992 to 4% in 1996. The current trends in nutritional status of the children imply that the problem of malnutrition in Zambia is due to chronic food shortage (Zambia Demographic and Health Survey, 2003).

## *2.1 DEFINITION AND CAUSES OF MALNUTRITION*

Malnutrition is defined as bad or poor nutrition resulting in low weight gain (under nutrition) or excessive weight gain (overweight) (The National Programme of Action for Children in Zambia, 1994). Malnutrition is believed to be a result of the unequal distribution of a country's resources resulting in a widening gap between the rich and the poor. This inequality leads to increased poverty amongst the poor, under nutrition and increased child mortality. The immediate causes of malnutrition are disease and inadequate dietary intake. Children are especially believed to be most vulnerable to the effects of malnutrition in infancy and early childhood through poor diet and exposure to infection, the effects of which include physical and developmental manifestations such as poor weight gain, stunting and impaired immunity (Martorell, 1992; Grisby, 2002).

## *2.2 PREDISPOSING FACTORS*

Protein energy malnutrition results from inadequate protein and/or energy (calories) required for growth and development. In its extreme form it results in marasmus, kwashiorkor and underweight (Wellcome Trust Party, 1970).

Additionally, malnourished children may be affected by micronutrient deficiencies such as calcium, iron, iodine, folate, niacin, riboflavin, as well as vitamin A, C and D. These deficiencies are believed to have a detrimental effect on development and they remain a significant cause of morbidity in developing countries (Waterlow, 1992; Grisby, 2002; Martorell, 1992).

Apart from inadequate food intake other factors such as inadequate hygiene and sanitation, poor water storage, housing quality, income, inadequate feeding and caring practices as well as the educational level of the mother or care-giver play an important role in predisposing a child to malnutrition (The State of The World's Children, 1998).

### *2.3 IMPACT OF MALNUTRITION*

Malnutrition is believed to cause permanent cognitive and developmental deficits as well as reduced physical activity in children (Chopra & Sanders, 1997). Under nourished children portray delayed psychomotor development and changes in behaviour. Physical signs include poor weight gain and slowing of linear growth (underweight and stunting), decreased fat and muscle tissue, dermatitis, hair and skin changes, changes in the nails, conjunctiva pallor, edema, oral changes, abdominal findings such as abdominal distention and hepatomegally (Grisby, 2002).

Poor physical growth is believed to result in reduced intellectual achievement leading to functional impairment in adult life and reduced work capacity, which eventually affect productivity at national level (Abdool-Karim, 2001).

There are three types of anthropometric indicators of malnutrition, namely wasting, underweight and stunting (Martorell, 1992; UNICEF, 1997). The height for age is an indicator of linear growth retardation (stunting). Children whose height for age Z-score is below minus two standard deviations (-2SD) from the median of the reference population are considered short for their age (stunted) and are considered chronically malnourished. Those who are below -3SD from the median of the reference population are considered severely malnourished (Wellcome Trust Working Party, 1970; Waterlow, 1973).

Weight for age is a useful indicator for continuous assessment of nutritional progress and growth. Children whose weight for age is below -2SD from the median of the reference population are classified as underweight. Children whose weight for age is below minus three standard deviations (-3SD) from the median of the reference population are considered severely underweight. The weight for height index measures body mass in relation to body length and thus describes the current nutritional status of the child.

Children whose Z-scores are below minus two standard deviations (-2SD) from the median of the reference population are considered thin (wasted) for their height and are acutely malnourished; while children whose weight for height is below minus two standard deviations (-2SD) from the median of the reference population are considered severely wasted (National Centers for Health Statistics, USA, 1976).

## *2.4 PAST STUDIES ON NUTRITION CARRIED OUT IN OTHER COUNTRIES*

In recent years, under nutrition has been addressed by nutrition surveillance and nutrition intervention programmes. Very few programmes have tried to identify risk factors of malnutrition. Identifying risk factors means that preventive measures can be implemented to reduce or eliminate the incidence of malnutrition.

### *Studies carried out in America*

Dietz (1990) reports on the findings of seven separate surveys performed in Massachusetts over a period of ten years. The initial surveys tried to examine populations at risk for under nutrition, while later surveys reported more on the trends in prevalence of under nutrition without identifying risk factors. The surveys were conducted in low-income areas of Massachusetts.

Cities and towns in Massachusetts were ranked for risk of under nutrition by rates of neonatal mortality, births to teenagers, low birth weight infants, unemployment and children in families below 100% of the poverty level based on the 1980 census. The surveys focused mainly on children aged 0-6 years old and National Center for Health Statistics (NCHS) growth charts were used as reference standards.

Lack of food did not appear to be a major cause of under nutrition. The study found no significant differences in nutritional status between children receiving food aid and those who were not, while low income appeared to contribute to under nutrition.

Fifty percent of underweight children lived in families with incomes less than 100% of the poverty levels and obesity was prevalent in more than 5% of the children. Since the most prevalent factors affecting weight and height are protein and energy intake, the prevalence of obesity suggested that energy intake was not limited in these children but that possibly other factors were a cause of malnutrition such as a deficiency of some micro-nutrients.

Another study was conducted to determine the association of the early introduction of complementary foods before the age of six months to improved nutritional status of children in America. The results of the study showed that there was no advantage in the introduction of complementary foods before six months and that there may in fact be disadvantages such as the increased exposure to contaminated weaning foods (Cohen et. al, 1994).

Another study was conducted in 164 poor households who had underweight and normal weight children in Bogota, Colombia. Normal weight was found to be positively associated with expenditure on food, good sanitation, mother's age, child spacing and socio-economic status. On the other hand, underweight was associated with crowded living conditions and large family sizes (Esrey et. al, 1985).

***Studies carried out in India and other developing countries***

In Punjab, North India, Kielman and McCord (1978) studied the effects of the interaction of nutrition and infection between 1968-1973.

In their study they obtained serial anthropometric measurements and vital statistics of almost 3000 children aged one to thirty six months. The results of the study showed that good nutrition gave the children considerable protection from seasonal attacks of diarrhoea and other infections.

Lamontagne et al. (1998) describe a study that was carried out in Nicaragua to examine the association between maternal employment status, child caregiving behaviours, care support, and the child's nutritional status. Eighty households with children aged 12 – 18 months were randomly selected from ten low-income neighbours. Low income was determined by geographical risk classifications obtained from the Ministry of Health and confirmed by visual inspections. Data was collected by observations for three hours followed by interviews. Three factors were considered in evaluating the child care situation namely:

- Where the care takes place
- Who the caregiver is
- Who is supporting the family and what the demand therefore on the mother's time is.

Results of the study revealed that the children of working mothers had significantly higher weight for height than those of non-working mothers. This result was found even controlling for confounding variables of maternal differentiation, household wealth and child gender ($p = 0.017$). Father's financial support was associated with higher height for age but not significantly higher weight for age or weight for height. Children in poor care group (care by a preteen or care at the work place) were of less height and weight than those in adequate care group.

The study therefore supported the hypothesis that there is a positive association between the earnings of working women and weight for height of children in the study age group, either alone or controlling for other socio-economic variables.

Esrey et. al (1985) reported on six studies carried out in developing countries that investigated the relationship between water supply or excreta disposal and improvement in the nutritional status of children. All six studies reported an association between improved water supply or excreta disposal and improved nutritional status of children. Similarly, a case-control study by Daniels et. al (1990) in Lesotho found an association between improved sanitation and the nutritional status of children, as well as an association between literacy of the mother and child nutritional status.

A case study was conducted by Onyango, Tucker and Eisemon (1994) to examine the effect of household headship on child nutrition in Western Kenya between July – November 1988. Criteria for entry into the study included mothers with a child aged 12 – 36 months and households where the child's father was alive and considered to be a member of the family.

Height, weight, mid-upper arm circumference and triceps skin fold measurements were collected from the children. Questionnaires were also administered to collect information on household demographic structure, decision-making practices, income and diet of the child.

Results of the study revealed that children of female heads consumed a greater variety of foods than children in male-headed households. There was also a lower prevalence of low weights for age amongst children of female heads. However, in statistical analysis head-ship did not relate significantly to nutritional intake or nutritional status.

Another study was conducted by Onyango, Koski and Tucker (1998) in Kenya to examine the relationship between prolonged breast feeding, diversity of weaning food and the timing of introduction of complementary foods with anthropometric measures of nutritional status among 154 children aged 12-36 months. A door-to-door survey of all village households identified the children in the target age. Anthropometric measurements, breast feeding status as well as interviews to describe food intake of the children were taken according to the United Nations procedures.

The study revealed that among the children, dietary diversity was the strongest and most consistent predictor of anthropometric status. The study therefore concluded that for children over twelve months of age, breast-feeding status appears to be less important than the composition of the diet. This suggests that efforts to improve dietary diversity are likely to be very important in the improvement of nutritional status of these children.

***Studies carried out in South Africa***

The social and medical backgrounds of 53 children hospitalized with kwashiorkor at Red Cross War Memorial Children's Hospital between July 1989 – December 1990 were compared with children with non-nutritional diseases.

The aim of the study was to determine the risk factors for severe nutritional disease in children presenting to a teaching hospital. The children were matched for age, sex, race and any non-nutritional illness that the children with kwashiorkor may have had. One or two clinical investigators interviewed the children's mothers after admission of their children.

Differences between children with and without kwashiorkor were found in the educational status of the mothers. Most mothers of children with kwashiorkor were illiterate and unmarried and only 36% received support from the father. Overcrowding was prevalent in homes of children with kwashiorkor, most had low incomes, and most children with kwashiorkor were not breastfed or fully immunized for age. Similarities were found in the ages of the mothers, use of contraception, number of children they had and types of dwellings occupied (Sive et. al, 1993).

Another study was conducted in three rural areas of the North Western province of South Africa aimed at investigating factors that could contribute to low anthropometric status in children aged ten to twelve years. The study also aimed at assessing the disadvantages to the health and well being of the children with low anthropometric status. A convenient sample of 188 boys and 208 girls was selected from three community schools. Anthropometric measurements were recorded and dietary intake as well as non-dietary factors were calculated using a home environment questionnaire. Data analysis was carried out by calculating the odds ratios and 95% confidence intervals.

The study found no significant differences between children with low and with normal anthropometric status. Children with low anthropometric status and children with normal anthropometric status ate mostly a vegetarian diet due to the high cost of meat, the mothers were the main caregivers and all households grew vegetables and kept some livestock.

The researchers recommended long-term observations for better clarification of malnutrition. The researcher further questioned the applicability of the American National Center For Health Statistics reference standard to children in developing countries and further recommended investigation of non-dietary factors such as housing, hygiene, water and sewage disposal in the promotion of health (Walker & Walker, 1997).

Krige and Senekal (1977) carried out a study in Stellenbosch district, South Africa to determine factors influencing the nutritional status of pre-school children of farm workers. No significant differences in the dietary intake of underweight and normal weight children were found, implying that lack of food is not the only cause of under nutrition. The study further found that there was an increased risk to under nutrition in children in large family sizes, households where the mothers were unmarried as well as where the mothers/caregivers had low educational levels.

A community survey was conducted in Mount Frere district of South Africa in 1998 to investigate the status of childhood nutrition in children under the age of seven. 1087 households participated in the study. The final sample was 1677 children.

Data were collected by a structured questionnaire administered by a trained field researcher to the mother or caregiver of the children. All children under seven were also weighed and mid-arm circumference was also taken.

The results revealed that children in that particular district were at risk of developing malnutrition through the early introduction of fluids other than breast milk before the recommended age of six months, through poor weaning practices, large family sizes and poor knowledge of the caregivers about malnutrition (Health Systems Research, 2002).

Another survey was conducted to investigate infant feeding practices and socio-economic factors as possible causes of under nutrition in underweight preschool children. The study took place in Monyamane village in the northern province of South Africa. A matched case-control study design was used in which underweight children between seven to seventy one months were matched to normal weight children according to age and sex. Data on feeding practices and socio-economic factors were collected from the caretakers of the children by personal interviews. Conditional logistic regression was used to investigate the relationship between the two groups for univariate and multivariate analyses. Results revealed that the risk of a child becoming underweight was low when the guardian looked after the child. However, the risk for underweight was high when complementary food was introduced before six weeks, when the mother/caregiver had low maternal education, paternal unemployment and when the household had more than seven children (Steyn et. al, 1998). These findings thus reveal that this study is similar to the study conducted in Monyamane village of South Africa.

### *2.5 SUMMARY*

The causes of malnutrition are multiple. Its effects are far reaching for it causes permanent cognitive and developmental deficits in children as well as reduced physical activity. The immediate cause is inadequate intake of protein and energy as well as micronutrients such as calcium, iron folate, niacin, riboflavin and vitamins.

Studies that have been carried out also reveal the significance of associated factors such as breast feeding for a short duration, introduction of complementary foods before six months and after twelve months, low literacy of the mothers/caregivers, unemployment and absence of the father in the household to underweight in children. Other factors include, giving a child less than three meals in a day, care of the child by a sibling, crowding in the home, poor hygiene and sanitation, as well as the use of coal or wood as domestic fuel source.

Dietary diversity and care of a child by an adult were found to be associated with improved nutritional status. Some studies associated improved immunization status to improved nutritional status, while other studies found no association.

# CHAPTER THREE

# METHODOLOGY

## 3.0 INTRODUCTION

In this chapter, I discuss the methodology used in the study. I briefly outline the advantages and disadvantages of the selected methodology, and I describe the research setting.

This study is a matched case-control study in which a sample of underweight children (cases) was compared to a sample of normal weight children (controls). One group was admitted at Livingstone General Hospital while the other group was attending the under five clinic at the same hospital. Both groups were from the same geographical location and from the same district . Underweight children aged from six to fifty-nine months were matched according to age and sex with a reference group of normal weight children. There were a total of forty-seven children in each group. A structured pre-tested questionnaire was administered to the mothers or caregivers of the participating children. Although a structured questionnaire does not allow the participants to provide detailed answers to the questions, this method nevertheless has the advantage of saving time because the answers required are brief and straight to the point. No names are written on the questionnaires so confidentiality is maintained. The participants are therefore free to give honest answers without fear of being identified.

## *3.1 AIMS OF THE STUDY*

The aim of the study was to investigate the factors that are associated with the children's nutritional status in Livingstone District.

### *3.2 OBJECTIVES OF THE STUDY*

1. To identify socio-economic and demographic factors that are associated to underweight in children below the age of five, in Livingstone district of Zambia.

2. To examine how educational levels, employment status and housing of caregivers are associated with underweight in children aged six months to fifty-nine months in Livingstone.

**RESEARCH QUESTION**

What are the socio-economic factors that are associated with children's nutritional status in Livingstone district?

### *3.3 STUDY PARTICIPANTS*

1.) All children aged from six to fifty-nine months admitted to the children's ward at Livingstone General Hospital with a weight for age below minus two standard deviations (-2SD) from the median of the reference population during the months of October 2003 to December 2003 formed the cases for the study. A total of forty-seven children formed the sample of underweight children.

2.) Forty-seven normal weight aged six to fifty-nine months attending the under five children's growth monitoring clinic at Livingstone General Hospital during the months of October 2003 to December 2003 with a weight for age above minus two standard deviations (-2SD) from the median of the reference population. The forty-seven normal weight children formed the control group for the study.

The final sample consisted of a total of ninety-four children. Forty-seven of these represented underweight children while forty-seven represented normal weight children.

### *3.4 RESEARCH SETTING*

The study was undertaken in the Livingstone district of the Southern Province of Zambia. Zambia covers a total area of 752 612 square kilometers and is divided into nine provinces. It shares boundaries with eight countries. The country's climate is sub-tropical, characterized by three seasons:

Cool, dry season extending from May to August with hot, dry season from August to November and the rainy season from November to April. Annual rainfall decreases from an average of 1000mm in the southern part, where Livingstone is located. The country has a rainy season running from October to April. Most of the land in Livingstone is sandy and hence difficult for meaningful agriculture production. It has a population of approximately 9.67 million people (1997) with annual growth rate of 3.1%. 6.3 million of the population is believed to live in poverty. 40% of the population lives in the urban areas while 60% live in rural areas (ACC/SCN, 1997).

Livingstone, the district where the study was undertaken, has an estimated population of 158 000 people, of which 50% are women (Zambia Reproductive Health News, 1998). Most of the women depend on their spouses' incomes, although some do supplement these incomes with cross-border trading.

Most of the formal public workers are government employees and hence do not get adequate incomes to enable them sustain their lives and those of their families.

Livingstone General Hospital consists of two wings, namely a medical and surgical wing. The surgical wing houses the male and female wards as well as the theatre, gynecology, post natal and labour wards. The medical wing houses, amongst others, the pediatric malnutrition ward and the under five out patient children's growth monitoring clinic. The hospital has approximately a five hundred- bed capacity.

### *3.5 PROCEDURE*

A request was written to the Executive Director of Livingstone General Hospital to obtain consent to conduct the study at the hospital. The Executive Director of Livingstone General Hospital who constitutes a local Ethics Committee, which grants permission to carry out the research, also granted ethical clearance.

### *3.6 ETHICAL CONSIDERATIONS*

A brief explanation was given to the mothers/caregivers by the research assistants on the purpose/benefits of the study. Secondly, they were informed of their rights to refrain from taking part in the study and their freedom to answer questions. Informed consent was obtained from the mothers/caregivers who participated in the study. Participants were also informed that their participation in the study would not prejudice the care that they would receive from the hospital. The questionnaire was completed anonymously in order to maintain confidentiality.

### *3.7 CRITERIA FOR EXCLUSION FROM THE STUDY*

All preterm babies born before an estimated gestational length of 37 weeks were excluded from the study as well as all multiple births.

### *3.8 STUDY DESIGN*

A matched case-control study. The cases were underweight children; the controls were children with normal weight.

### 3.9 *DATA COLLECTION INSTRUMENT*

Data were collected by a structured questionnaire which was adopted from a similar questionnaire which was used in a community survey in Mount Frere District of South Africa in 1998. English is the official language that is used in the questionnaire. For participants who were unable to understand English the questionnaire was translated into Lozi or Tonga, the local languages spoken in Livingstone.

Data that were collected comprised the demographic data of the child, fertility of the mother/caregiver, as well as child feeding practices and breast-feeding history. Data on the use of health services were obtained from the child's Road to Health Card. Data were also collected on the mother/caregivers' knowledge about diarrhoea management and making the oral rehydration solution ORS. In addition data on environmental factors such as housing, water source, toilet facilities and sources of fuel used for cooking were collected.

Data on the socio-economic status of the household, such as the professional status of the head of household, property and livestock owned, as well as literacy and employment status of the mother/caregiver were also collected. The weights of all the children were collected and recorded.

The questionnaire was pre-tested on fifty mothers of children with cerebral palsy on the day that the child attended the physiotherapy clinic at Livingstone General Hospital. Any unclear questions were clarified or removed before final administration to the target group.

### *3.10 DATA COLLECTION*

Data on feeding practices and socio-economic factors in matched groups of underweight children and normal weight children were collected by a structured, pre-tested questionnaire administered by a trained field researcher to the mother or caregiver of the child. Each interview took thirty minutes to complete. The children were all weighed by the clinic nurse using the same scale in the outpatients' department on the day of their admission and on the day of their visit to the under five clinic. All patients who were admitted were interviewed in the ward after admission and the children attending the under-five clinic were interviewed at the clinic on the day of the visit to the clinic. Interviews took place after the children had been seen by the clinic nurse. The trained field researcher invited the mother/caregiver to a separate room for an interview. Follow-up visits on a separate day were then made to the homes of the participants who were admitted as well as the participants who attended the under-five clinic in order to see the physical environment.

The advantage of using interviews is that they are time efficient because questions asked and answers that are given are brief and straight to the point. Mothers/caregivers may also freely express themselves, group influence is avoided and the researcher is also able to check the respondent's expressions. It is also a good method for mothers/caregivers who may not be able to read and write (if necessary, responses may be easily written down by the researcher). Structured responses are easily encoded and analyzed. Less time is also taken to collect responses.

Weight measurements were taken of all the children. Weights were measured to the nearest 0.1 kilograms using the AND Precision Health scale UC-300 (A & D Company Ltd. Japan). Children were weighed with only minimum clothing (diapers for babies and underwear for older children) or naked. For children too young to stand on their own, indirect weights were taken with the mother holding the child. For both measurements the average of two readings was taken.

### *3.11 VALIDITY/RELIABILITY*

The following measures were taken in an attempt to ensure reasonable validity

1) All children admitted to the children's ward with low weight for age in the target group participated in the study. This ensured less sampling error and increased the validity. (All underweight children in the district are managed at the hospital so this ensured more reliability in identifying cases).

2) Field workers were trained prior to the research to ensure standardization.

3) The questionnaires were pre-tested to ensure reliability of data collection.

The same scale was used to obtain recordings of the children's weight which maintained the validity of the study.

### *3.12 DATA ANALYSIS*

Cases and controls were compared in terms of demographic data, feeding and weaning of the children, immunization data, the knowledge of the mothers/caregivers about management of diarrhoea and method of making ORS, environmental factors as well as socio-economic status. These indices were then converted into standard scores (z-scores) using the NCHS reference values of weight-for-age and mid-upper arm circumference for age. A child was defined as wasted if his/her arm circumference was below –2Z-score, below reference value. Similarly, underweight-for-age was defined as a child below –2Z-score of the median value for weight for age.

# CHAPTER FOUR

# RESULTS

## INTRODUCTION

This chapter presents the results of the study that was conducted to investigate factors associated with underweight in children below the age of five in the Livingstone district, Zambia. First the results will be presented using descriptive statistics and then analysis will be made by comparing various factors with the nutritional status of the children. The factors compared with the nutritional status include the age, demographic characteristics of the households, number of people in the household, caregivers of the children, as well as presence of the father and mother in the household. Other factors include breast feeding and feeding practices, diet of the children, introduction of complementary foods, household crop production, livestock and property owned, number of meals consumed per day, consumption of certain foods, as well as the source of drinking water, fuel source and toilet facilities used. Disposal of children's waste, materials that were used to construct the house, child care practices during illness, health knowledge of the mothers/caregivers, knowledge of diarrhoea and oral rehydration solution, food preservation and immunization status of the children were also compared with the nutritional status.

The overall participation rate of the study was 100%. Ninety-four children took part in the study, forty-seven underweight children and forty-seven normal weight children.

*Table 1 Characteristics of the sample*

| *Age Category (in months)* | *Under weight children N (%)* | *Normal weight Children N (%)* |
|---|---|---|
| *6 – 23* | *30 (64)* | *30 (64)* |
| *24 – 35* | *10 (21)* | *10 (21)* |
| *36 – 47* | *4 (9)* | *4 (9)* |
| *48 –59* | *3 (6)* | *3 (6)* |
| *Total* | *47 (100)* | *47 (100)* |

### *4.1 Characteristics of the Sample*

The age distribution of the sample is shown in Table 1. The age of the participants ranged from six to fifty-nine months, while the weight for underweight children ranged from four to twelve kilograms and those for normal weight children ranged from six to nineteen kilograms. Underweight appeared to be more prevalent at the age of six to twenty-three months.

*Table 2 Demographic characteristics of households with underweight and normal weight children*

| **CHARACTERISTIC** | | **UNDERWEIGHT n (%)** | **NORMAL WEIGHT n (%)** |
|---|---|---|---|
| **Gender** | **Male** | **28(60)** | **28(60)** |
| | **Female** | **19(40)** | **19(40)** |
| **Head of the Family** | **Father** | **32(68)** | **28(60)** |
| | **Mother** | **2(4)** | **7(15)** |
| **Educational level of mother/caregiver** | **None** | **1(2)** | **1(2)** |
| | **< Grade 3** | **4(6)** | **0** |
| | **Grade 3-6** | **6(13)** | **1(2)** |
| | **Grade 7-10** | **26(55)** | **25(53)** |
| | **> Grade 10** | **10(21)** | **20(43)** |
| **Professional status of the head of the family** | **Skilled** | **10(21)** | **16(34)** |
| | **Non-skilled** | **37(79)** | **31(66)** |

### 4.2 *Demographic characteristics of households with underweight and normal weight children*

Table 2 shows the demographic characteristics of the sample. Twenty-eight (60%) children were male and nineteen (40%) were female in each sample.

Thirty-two households (68%) of underweight children were headed by the father while two (4%) were headed by the mother. In the sample for normal weight children twenty-eight (60%) households were headed by the father while seven (15%) were headed by the children's mother. The ratio of male to female children was 1.5 to 1 in each sample. All mothers/caregivers of normal weight children had some basic education, with half of them (53%) reaching between grade seven to ten, 43% having gone to grade 12, and 16(34%) having tertiary education. Thirty-one (66%) mothers with normal weight children were non-skilled while 16(34%) were skilled. One mother/caregiver of an underweight child had no formal education. Four (6%) mothers/caregivers of children who were underweight had education of less than grade three and six (13%) had passed grade three to six. A large percentage (55%) had grade seven to ten, ten mothers (21%) went beyond grade ten while ten (21%) mothers were skilled and thirty seven (79%) were non-skilled.

***Table 3 Number of people living in households with underweight and normal weight children***

| *Characteristics* | | *Underweight Children %* | *Normal weight Children %* |
|---|---|---|---|
| ***Total number of people living in the household*** | ***2-4*** | ***36*** | ***30*** |
| | ***5-7*** | ***43*** | ***34*** |
| | ***8-10*** | ***15*** | ***30*** |
| | ***11-13*** | ***4*** | ***4*** |
| | ***14-16*** | ***2*** | ***2*** |

### *4.3 Number of people living in households with underweight and normal weight children*

More households with normal weight children than households with underweight children had eight to ten people living in the households. Households with underweight children had mostly five to seven people living in the household.

***Table 4 Main caregivers for underweight and normal weight children***

| **CHARACTERISTICS** | | **UNDERWEIGHT CHILDREN** | **NORMAL WEIGHT CHILDREN** |
|---|---|---|---|
| **Main caregivers for the children** | **Mother** | **31(66%)** | **31(66%)** |
| | **Father** | **0** | **0** |
| | **Grandmother** | **11(23%)** | **5(11%)** |
| | **Grandfather** | **1(2%)** | **1(2%)** |
| | **Relatives** | **2(4%)** | **5(11%)** |
| | **Siblings** | **1(2%)** | **1(2%)** |
| | **Maid** | **1(2%)** | **4(9%)** |

*Table 5 Additional caregivers for underweight and normal weight children*

| CHARACTERISTICS | | UNDERWEIGHT CHILDREN | NORMAL WEIGHT CHILDREN |
|---|---|---|---|
| Additional caregivers for the children | Mother | 4(9%) | 3(6%) |
| | Father | 0 | 3(6%) |
| | Grandmother | 0 | 4(9%) |
| | Siblings | 0 | 3(6%) |
| | Relatives | 18(38%) | 21(45%) |
| | Neighbours | 1(2%) | 1(2%) |
| | None | 18(38%) | 11(23%) |
| | Maid | 0 | 1(2%) |

### *4.4 Caregivers of underweight and normal weight children*

Table 4 displays the main caregivers of underweight and normal weight children during the day, while table 5 displays additional caregivers of the children. The children's mothers in both cases were found to be the main caregivers.

In addition to the main caregivers, the study found that most (38%) caregivers of underweight children were assisted by relatives, but eighteen (38%) had no one to help them with childcare, four (9%) were helped by the children's grandmothers, while one (2%) was assisted by neighbours. On the other hand, twenty one (45%) children with normal weight were helped by relatives, eleven (23%) had no one to help them, three (6%) were helped by the children's fathers. In this study it appears that fathers played a negligible role in care giving.

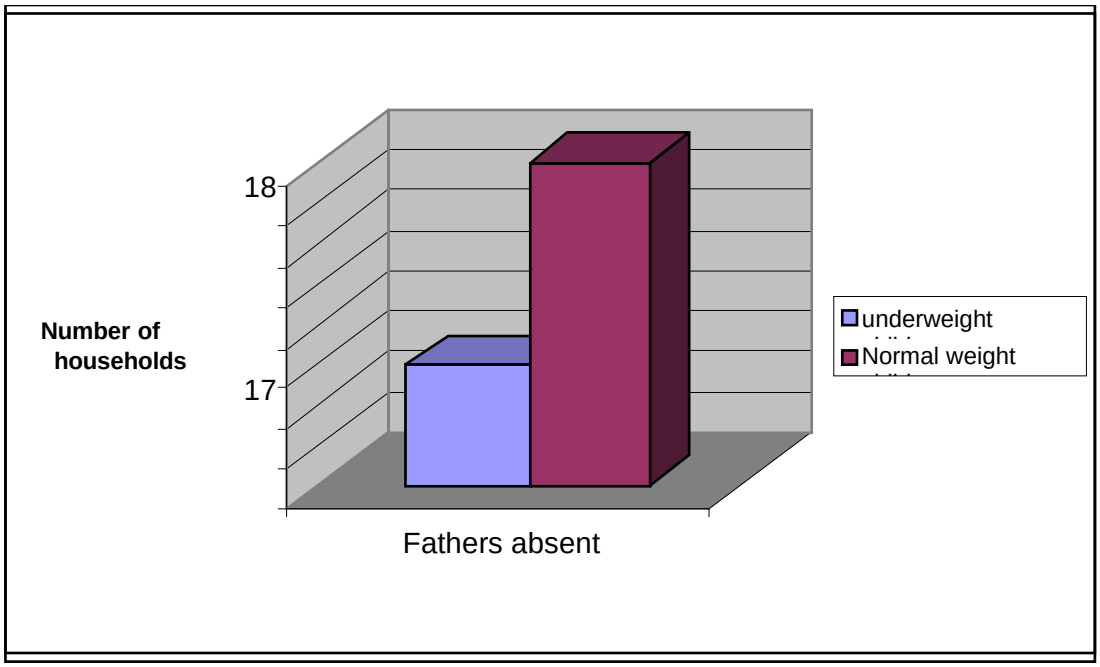



***Figure 1 Households of underweight and normal weight children that lacked the presence of the father***

### *4.5. Households of underweight and normal weight children that lacked the presence of the father*

According to figure 1 more households with normal weight children lacked the presence of the father. Eighteen (38%) households with normal weight children compared to seventeen (36%) households with underweight children had no fathers of the children present in the households.

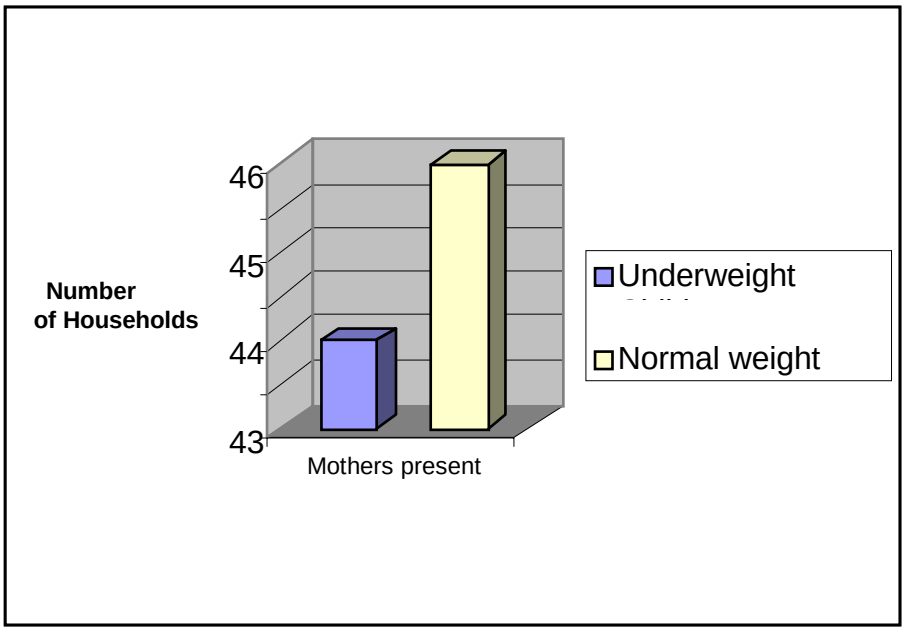



***Figure 2 Households of underweight and normal weight children that had the presence of the mother***

***4.6 Households of underweight and normal weight children that had mothers present***

Most mothers were present in the households of underweight and normal weight children. However, there were more mothers present in households with normal weight children than in households with underweight children. As portrayed in figure 2, forty four (94%) households with underweight children and forty six (98%) with normal weight children had mothers present in the households.

***4.7 Breast feeding practices of mothers of underweight and normal weight children***

Responses to the question: Should a child be breastfed every time he/she demands? were similar in both mothers of underweight children and of normal weight children. 94% responded positively.

*Table 6 Age at which children were introduced to complementary foods*

| *Age At Introduction Of Complementary Foods In Months* | *Underweight n(%)* | *Normal weight n(%)* |
|---|---|---|
| *2 - 3* | *8(17)* | *10(21)* |
| *4 - 5* | *17(36)* | *12(26)* |
| *6 and >* | *22(47)* | *25(53)* |

### *4.8 Age at which underweight and normal weight children were introduced to complementary foods*

There was no significant difference in the age at which complementary food was introduced to underweight and normal weight children.

### *4.9 Food that the children were regularly fed on throughout the day*

Underweight children were regularly fed on mealie-meal porridge with groundnuts in the morning and they had nshima with meat or vegetables at lunchtime as well as at supper-time.

Nshima is prepared from maize, which has been ground into a powder called mealie-meal. The mealie-meal is then cooked with plain water into a stiff porridge called nshima. In order to increase the calories and vitamins in the diet nshima is eaten with any meat or vegetable relish or both and it forms the major diet staple of the Zambian people. The vegetables that were commonly eaten included rape, pumpkin leaves (chiwawa), sweet potato leaves (kalembula), beans, okra (delele), five years and bondwe.

Rape is a green leafy vegetable which is rich in carotene (approximately 900-7580micro grams equivalent per 100g of edible portion or raw leaf) and vitamin A. Five years is a locally grown vegetable which is drought resistant and can survive for long periods of time, hence the name. Bondwe is a wild vegetable that can be easily grown.

Nine (19%) underweight children were regularly fed only on mealie-meal porridge with groundnuts without nshima in the diet. Only fifteen(32%) underweight children were fed on mealie-meal porridge with groundnuts in the morning as well as nshima with vegetables and meat in the diet. There were no underweight children who were regularly given fruit or fruit juice in their diet, one child was fed on tea with bread and butter between meals, one had rice between meals and two (4%) were regularly fed on processed porridge in-between the main meals.

The children with normal weight were regularly fed on mealie-meal porridge with groundnuts in the morning, as well as nshima with meat or vegetables for lunch and supper, or both. Only two (4%) children with normal weight were regularly fed on porridge without nshima in the diet. Thirty three (70%) were fed on mealie-meal porridge with groundnuts for breakfast, accompanied by nshima and meat, fish, kapenta and vegetables as major meals at lunch time and supper. The children of normal weight were also fed on other foods in between the main meals, such as fruits and fruit juice, tea with bread and butter, or rice. Ten (21%) children were given fruit or fruit juice in between their main meals, nine (19%) were given tea with bread and butter in between main meals, while two (4%) were given rice in between.

In addition ten (21%) children were regularly fed on processed porridge in between their main meals, while one child was fed on mealie-meal porridge which was combined with sour milk.

### *4.10 Cultivation of crops in households of underweight and normal weight children*

Eighteen (38%) mothers/caregivers of underweight children and twenty nine (45%) of normal weight children grew crops in their backyards or fields. Twenty-nine (62%) mothers/caregivers of underweight children and twenty six (55%) of normal weight children did not grow any crops.

### *4.11 Types of crops grown by households of underweight and normal weight children*

A larger percentage of mothers/caregivers of normal weight children grew a larger variety of crops than the mothers/caregivers of underweight children. Only seven (15%) households with underweight children grew rape, compared to nine (19%) households with normal weight children. Only four (9%) households with underweight children grew tomatoes, nine (19%) grew pumpkin leaves and two (4%) grew five years, while seven (15%) households with normal weight children grew tomatoes, five (11%) grew pumpkin leaves and seven (15%) grew five years.

***Table 7 Types of crops grown by households of underweight and normal weight children***

| *TYPE OF CROPS GROWN* | *UNDERWEIGHT N (%)* | *NORMAL WEIGHT N (%)* |
|---|---|---|
| ***Rape*** | ***7 (15)*** | ***9 (19)*** |
| ***Tomato*** | ***4 (9)*** | ***7 (15)*** |
| ***Pumpkin leaves (chiwawa)*** | ***9 (19)*** | ***5 (11)*** |
| ***Five years*** | ***2 (4)*** | ***7 (15)*** |
| ***Maize*** | ***4 (9)*** | ***4 (9)*** |
| ***Onion*** | ***1 (2)*** | ***5 (11)*** |
| ***Sweet potato leaves (kalembula)*** | ***8 (17)*** | ***5 (11)*** |
| ***Beans*** | ***1 (2)*** | ***2 (4)*** |
| ***Impwa*** | ***1 (2)*** | ***3 (6)*** |
| ***Sugar loaf*** | ***0*** | ***2 (4)*** |
| ***Cabbage*** | ***0*** | ***4 (19)*** |
| ***Cassava*** | ***1(2)*** | ***4(9)*** |
| ***Egg plants*** | ***2(4)*** | ***2(4)*** |
| ***Groundnuts*** | ***1(2)*** | ***0*** |

Maize was grown by four (9%) households with underweight and four (9%) with normal weight children. One (2%) household with an underweight child grew onions compared to five (11%) with normal weight children. Eight (17%) households with underweight children and five (11%) with normal weight children grew sweet potatoes. One household with an underweight child grew beans, while two (4%) households with normal weight children grew beans. Impwa was grown by one household with an underweight child and three (6%) with normal weight children. No household with an underweight child grew sugar loaf compared to two (4%) with normal children, while cabbage was not grown by any family with an underweight child, compared to four (9%) households with normal weight children. One household with an underweight child grew cassava and four (9%) with normal weight children.

Egg plants were grown by two (4%) households with underweight and normal weight children. Only one household with an underweight child grew groundnuts and no household with normal weight children grew groundnuts.

### *4.12 Number of households that grew crops on a large scale and quantities harvested*

Only five (11%) households with underweight and five with normal weight children grew crops on a large scale. One household with an underweight child harvested 50 kilograms of rape while a household with a normal weight child harvested 75 kilograms of rape. One household with a child of normal weight normally harvested 25 kilograms of tomatoes. No household with an underweight child harvested any tomatoes. 50 kilograms of pumpkin leaves were harvested by a household with an underweight child and none in any household with a normal weight child. 75 kilograms of maize was harvested by three households with underweight children compared to 200 kilograms of maize harvested in five households with normal weight children. No household with an underweight child harvested any onion, while 50 kilograms of onion was harvested by one household with a normal weight child. 25 kilograms of impwa was harvested by one household with a normal weight child and none in a household with an underweight child. One household with an underweight child harvested 25 kilograms of groundnuts while none of the households with normal weight children grew any groundnuts. Other crops that were normally harvested by the households with normal weight children were 25 kilograms of eggplant by one household and 50 kilograms of cabbage by one household.

### *4.13 Number of months in a year that households with underweight and normal weight children had no food*

More than half of the households with underweight children experienced a time when they had nothing to eat in the previous year. Thirty-two (68%) households with underweight children experienced a time when there was nothing to eat, while only fifteen (32%) did not. On the other hand, only eleven (23%) households with normal weight children experienced a time when they had nothing to eat in the same year.

The reasons that households with underweight children cited for lack of food were financial problems due to unemployment (46%), illness of the bread winner or if the bread winner was looking after a person who was ill in the family (13%), and poor harvest (11%). The reasons that households with normal weight children cited for lack of food was unemployment (17%), poor harvest (2%) and paying back debts (2%).

### *4.14 Duration of the period of lack of food in the households of underweight and normal weight children*

Both households with underweight and normal weight children experienced a period of hunger, which lasted for several months. However, a larger percentage of households with underweight children were affected than households with normal weight children.

The period of hunger took several months in thirty-one (66%) households with underweight children while only eight (17%) households with normal weight children were affected for several months. In one household with underweight children and three (6%) with normal weight children the problem lasted for several days.

During the period of hunger sixteen (50%) households with underweight children and six (55%) households with normal weight children asked for food from neighbours, friends or relatives. Six (19%) households with underweight children and three (27%) households with normal weight children asked for credit. Five (16%) households with underweight children compared to three (27%) households with normal weight children worked for food. Three (9%) households with underweight children and one with a child of normal weight found temporary employment. One household with an underweight child relied on obtaining money from house rentals and another household sold wild fruit in order to raise money. One household with a normal weight child sold fat cakes in order to raise money.

### *4.15 Number of meals that adults had per day in households with underweight and normal weight children*

Adults in households of both underweight and normal weight children had mostly three meals per day. Thirteen (28%) adults in households with underweight children had two meals and less per day, while eight (17%) had four to five meals per day. Only four (9%) households with normal weight children had two meals or less per day and eleven (23%) adults had four to five meals per day.

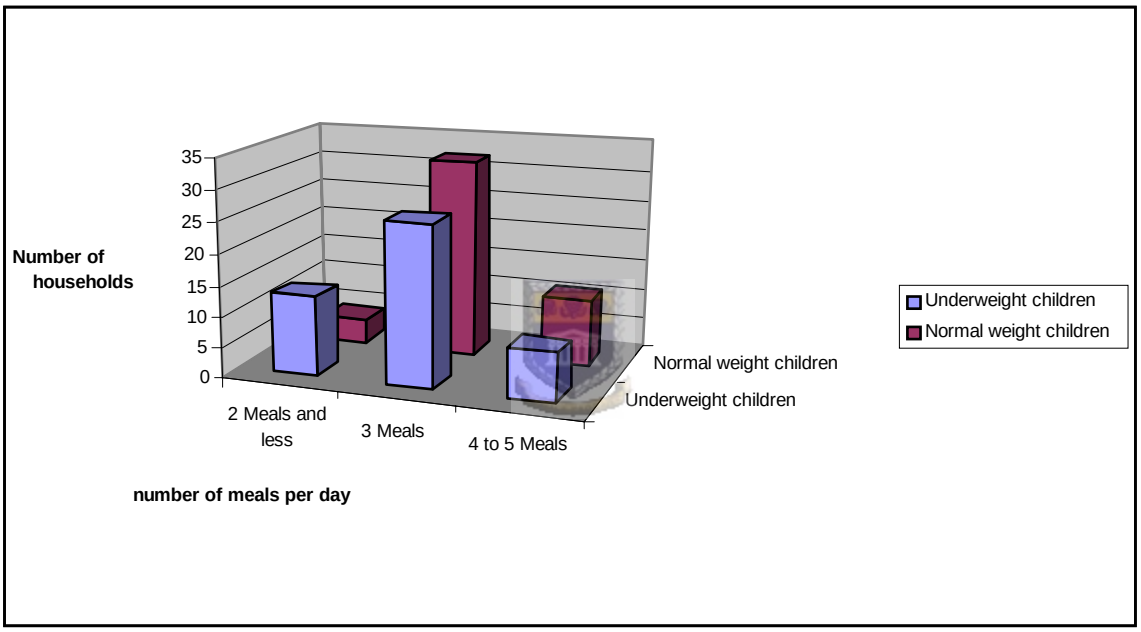



***Figure 3 Number of meals that adults in households with underweight and normal weight children had per day***

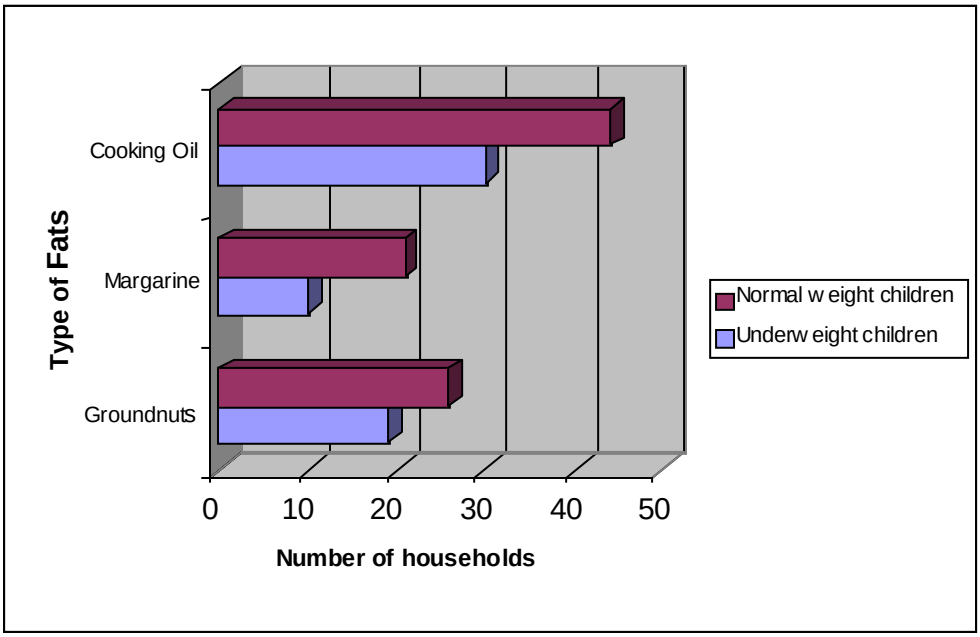



***Figure 4. Consumption of cooking oil, margarine and groundnuts in the households with underweight and normal weight children***

### *4.16 Consumption of peanut butter or groundnuts in households of underweight and normal weight children*

Only nineteen (40%) households with underweight children, compared to twenty-six (55%) households with normal weight children provided their children with peanut butter or groundnuts everyday. The rest of the households of both underweight and normal weight children could only provide groundnuts or peanut butter a few times in a month.

### *4.17 Consumption of margarine/butter in households of underweight and normal weight children*

Most households did not provide margarine or butter to their children daily.

Only ten (21%) households with underweight children compared to twenty-one (45%) with normal weight provided margarine or butter everyday to their children. The rest of the households of both underweight and normal weight children could only provide margarine or butter for a few days in a week or month.

### *4.18 Consumption of food with cooking oil or fat added in households of underweight and normal weight children*

Thirty (64%) households with underweight children compared to forty four (94%) with normal weight children added cooking oil/fat every day to their food. The rest of the households added cooking oil only for a few days in a week or in a month.

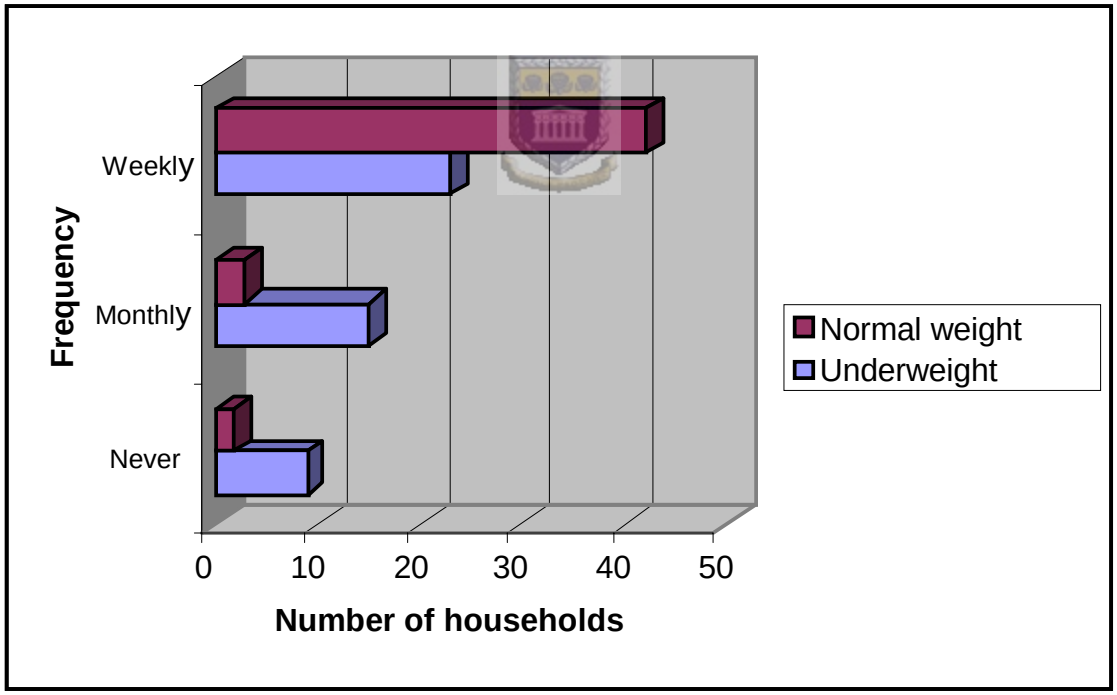



***Figure 5 Frequency of meat consumption in households with underweight and normal weight children***

Nine (19%) households with underweight children and two (4%) with normal weight children never consumed meat at all. Fifteen (32%) households with underweight children and three (6%) households with normal weight consumed meat only once a month. Twenty-three (49%) households with underweight children and forty-two (68%) households with normal weight children only consumed meat once in a week

***Table 8 Main source of drinking water in households with underweight and normal weight children***

| *Type of Water Source* | *Underweight n(%)* | *Normal weight n(%)* |
|---|---|---|
| ***Communal tap*** | ***16(34)*** | ***6(13)*** |
| ***Communal borehole*** | ***1(2)*** | ***-*** |
| ***Tap inside the house*** | ***6(13)*** | ***21(45)*** |
| ***Tap outside the house*** | ***23(49)*** | ***20(43)*** |
| ***Shallow well*** | ***1(2)*** | ***-*** |
| ***Total*** | ***N=47*** | ***N=47*** |

### *4.19 Main source of drinking water in households with underweight and normal weight children*

In this study, sixteen (34%) households with underweight children and six (13%) with normal weight children used communal taps as their main source of water. One (2%) household with an underweight child collected drinking water from the boreholes, while no household with a normal weight child collected water from the boreholes.

Six (13%) households with underweight children had piped tap water inside their houses compared to twenty-one (45%) households with normal weight children.

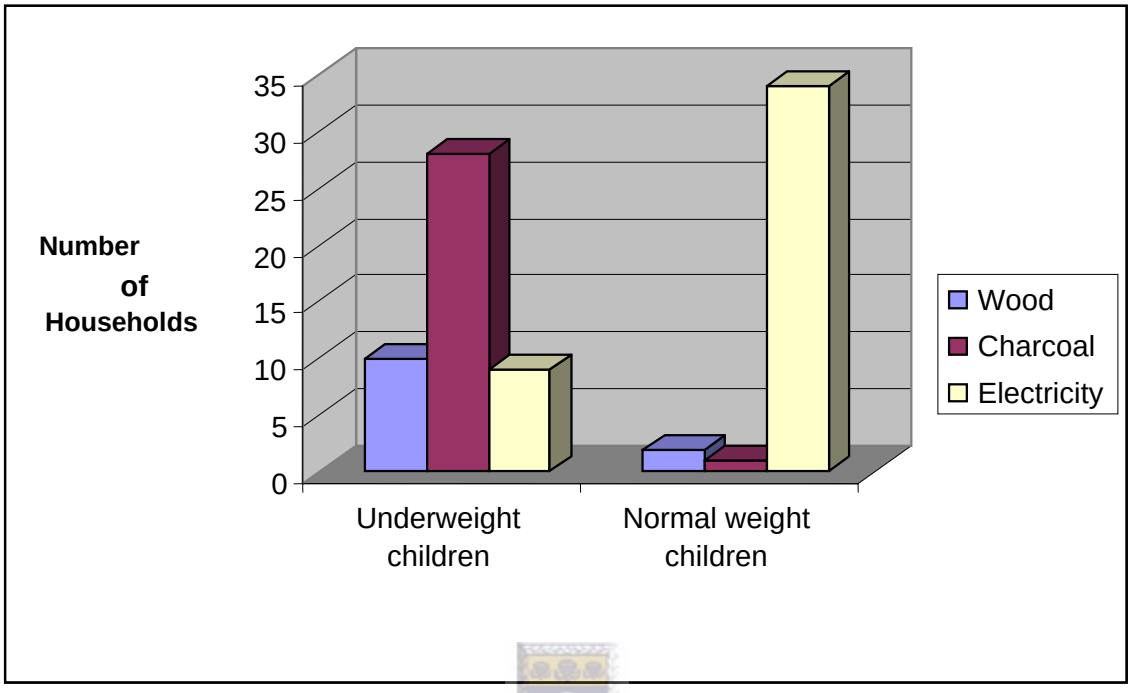



***Figure 6 Types of fuel sources used for cooking in households with underweight and normal weight children***

### *4.20 Main fuel source used for cooking in households of underweight and normal weight children*

Ten (21%) households with underweight children and two (4%) with normal weight children used wood as their main fuel source for cooking. Twenty-eight (60%) households with underweight children and one (2%) with a child of normal weight used charcoal as their main fuel source for cooking. Only nine (19%) households with underweight children used electricity for cooking, while most households (73%) with normal weight children used electricity as their main source for cooking.

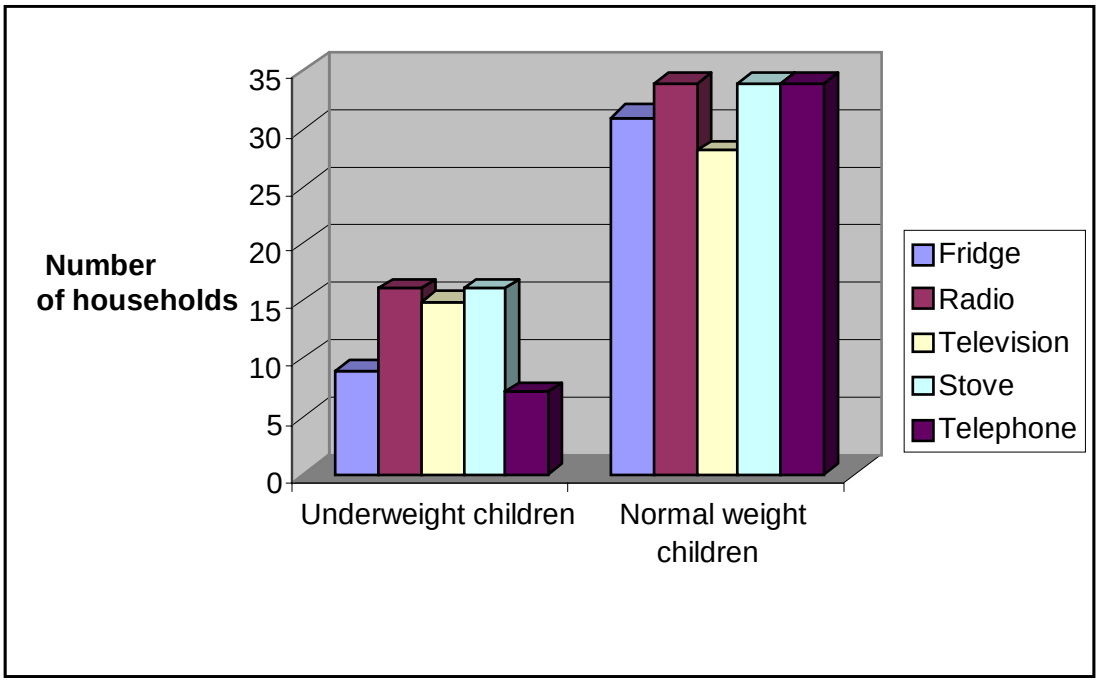



***Figure 7 Appliances owned by households of underweight and normal weight children***

### *4.21 Appliances owned by households of underweight and normal weight children*

Figure 7 reveals that more households with normal weight children than underweight children owned a larger number of appliances.

***Table 9 Livestock owned by households with underweight and normal weight children***

| *TYPE OF LIVESTOCK OWNED* | *TOTAL NUMBER OF HOUSEHOLDS* | |
|---|---|---|
| | *UNDERWEIGHT n(%)* | *NORMAL WEIGHT n(%)* |
| ***Chickens*** | ***3(6)*** | ***3(6)*** |
| ***Hares*** | ***1(2)*** | ***-*** |
| ***Ducks*** | ***-*** | ***3(6)*** |
| ***Pigs*** | ***-*** | ***1(2)*** |
| ***Total*** | ***N=4*** | ***N=7*** |

### *4.22 Livestock Owned by households with underweight and normal weight children*

Most households with underweight and normal weight children did not own livestock. Results were almost similar for the two groups. Only four (17%) households with underweight and seven (15%) with normal weight children owned livestock. Chickens were the livestock commonly owned in households of both the cases and controls.

### *4.23 Toilet facilities used by households with underweight and normal weight children*

The current study reveals that twenty (43%) households with underweight children and thirty six (77%) with normal weight children used flush toilets. However, out of this number, two (4%) flush toilets in the households with underweight children were not functional.

Two (4%) households with underweight children and two households with normal weight children used ventilated pit latrines, while eighteen (38%) households with underweight children and four (9%) households with normal weight children used pit latrines that were not ventilated. One household with a child who was underweight used manholes as a toilet facility, while six (13%) households with underweight children and five (11%) with normal weight children had no toilet facilities and the members used the bush.

Possibilities of being underweight appear to be high if a household uses pit latrines, or if no toilet facility is available. Underweight is less likely to occur if a flush toilet is used.

***TABLE 10 Disposal methods of children's waste used by households with underweight and normal weight children***

| *DISPOSAL METHOD USED* | *UNDERWEIGHT n(%)* | *NORMAL WEIGHT n(%)* |
|---|---|---|
| *Discarded in the latrine* | *26(55)* | *36(77)* |
| *Discarded in rubbish pit* | *3(6)* | *4(9)* |
| *Discarded in nearby bush* | *1(2)* | *0* |
| *Buried* | *13(28)* | *5(11)* |
| *Washing the nappy* | *1(2)* | *2(4)* |
| *Total* | *N=47* | *N=47* |

***4.24 Disposal methods of children's waste used by households with underweight and normal weight children***

The majority of the mothers and caregivers disposed of the children's waste in the latrines. Twenty-six (55%) mothers/caregivers of underweight children, as well as thirty-six (77%) mothers/caregivers of normal weight children discarded their children's waste in the latrine. Three (6%) mothers/caregivers of underweight children discarded their children's waste in the rubbish pit within the yard, while one (2%) discarded the waste in the nearby bush. Four (9%) mothers/caregivers of normal weight children discarded the children's waste in the rubbish pit and none of the mothers discarded the waste in the bush. Thirteen (28%) mothers/caregivers of underweight children and five (11%) of normal weight children buried their children's waste.

One (2%) mother/caregiver of a child who was underweight and two (4%) of mothers/caregivers of normal weight children disposed of their children's waste by washing the nappy at the tap in the back yard.

### *4.25 Materials that were used to construct the houses in which underweight and normal weight children Lived*

Thirty-three (70%) households with underweight children lived in houses built of cement blocks, nine (19%) lived in houses built out of mud, four (6%) lived in houses built of reeds and one (2%) lived in a house built of concrete. On the other hand, forty four (94%) households with normal weight children had houses built out of cement blocks, three (6%) had houses built of reeds and two (4%) had houses built of concrete. There was no household with a child of normal weight which had a house built out of mud.

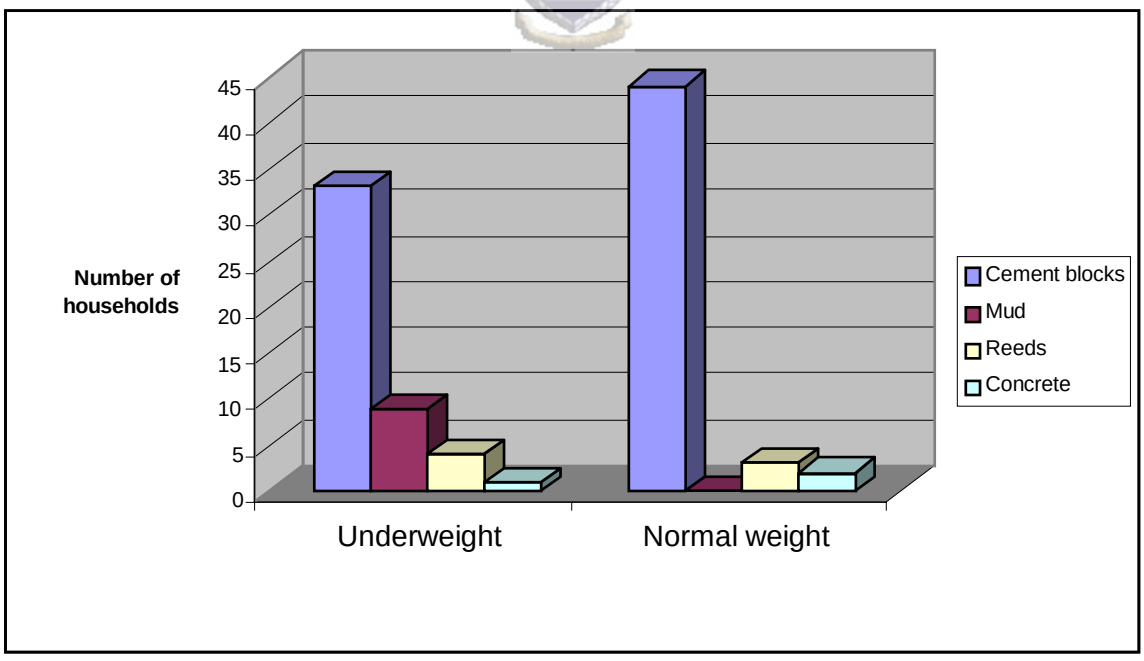



***Figure 8 Materials used to construct the houses in which underweight and normal weight children lived***

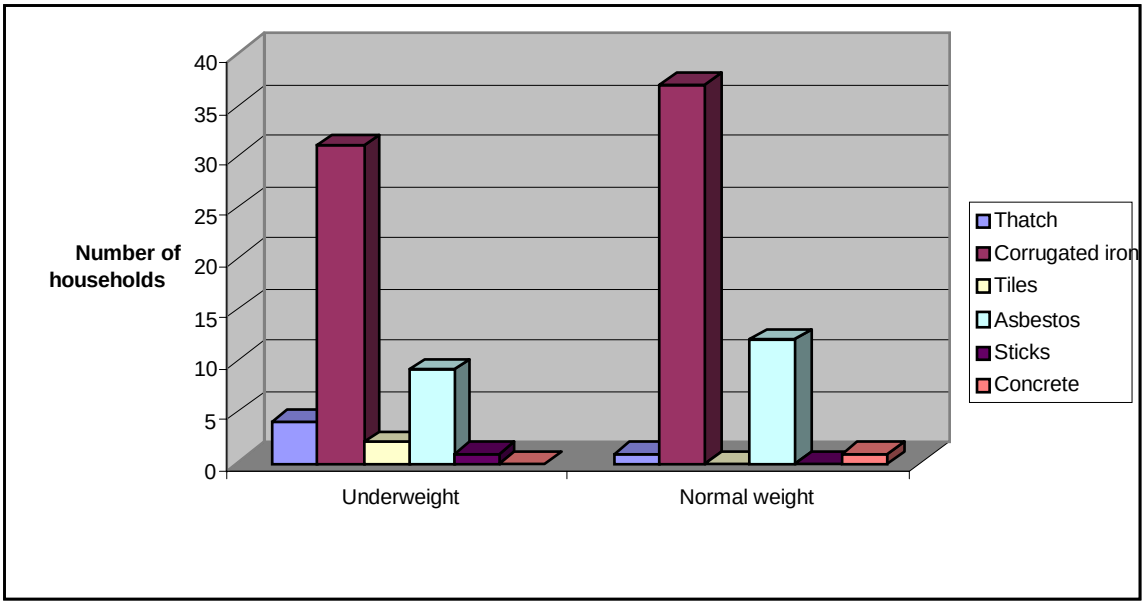



***Figure 9 Roofing materials used for houses in which underweight and normal weight children lived***

The roofs of most the houses in which the participants lived were made of corrugated iron (zinc) sheets. Thirty (63%) households with underweight children and 37(79%) with normal weight children had houses with corrugated iron (zinc) roofing sheets. Nine (19%) households with underweight children compared to twelve (26%) with normal weight children had houses with asbestos roofing. Four (6%) houses in which underweight children lived had roofs made of thatch, while two (4%) had a roof made of tiles and one house had a roof made out of sticks. Twelve (26%) houses in which children with normal weight lived had asbestos roofing sheets, one (2%) house had a roof made out of thatch and another house had a roof made out of concrete.

### *4.26 Knowledge of mothers/caregivers of underweight and normal weight children about causes of diarrhoea*

Eleven (23%) mothers/caregivers of underweight children compared to three (6%) with normal weight children believed that diarrhoea in children was due to teething. Seven (15%) mothers/caregivers of underweight children attributed diarrhoea to dirty surroundings, eleven (23%) attributed diarrhoea to eating decomposing food, nine (19%) believed that it occurred as a result of contamination of food by flies, while twenty two (47%) attributed it to poor personal hygiene. Twenty-seven (57%) mothers/caregivers of underweight children believed that they could get diarrhoea by drinking dirty water, seven (15%) cited dirty surroundings, fourteen (30%) believed that eating food which was poorly cooked could cause diarrhoea and five (11%) believed that food allergies could be a cause of diarrhoea. One (2%) mother/caregiver of a child with normal weight believed that diarrhoea was caused by certain ailments, thirteen (28%) believed it occurred as a result of eating decomposing food, 18(38%) said it was due to eating food contaminated by flies and thirty nine (74%) attributed diarrhoea to poor personal hygiene. Twenty (43%) mothers/caregivers of children with normal weight believed that drinking dirty water could be a cause of diarrhoea, seven (15%) cited dirty surroundings and twelve (26%) believed that eating poorly cooked food could be a cause of diarrhoea.

***Table 11 Knowledge of mothers/caregivers of underweight and normal weight children about sugar, salt solution***

| ***Knowledge about correct way of making sugar salt solution*** | ***Yes n(%)*** | ***No n(%)*** | ***Total*** |
|---|---|---|---|
| ***Underweight*** | ***1(2)*** | ***46(98)*** | ***N =47*** |
| ***Normal weight*** | ***1(2)*** | ***46(98)*** | ***N = 47*** |

Forty-six (98%) mothers/caregivers with underweight children and forty six (98%) with normal weight children did not know how to make sugar, salt solution correctly at home. Only one (2%) mother/caregiver of an underweight child and one (2%) with a child of normal weight knew how to make sugar, salt solution correctly at home.

About a third of both mothers/caregivers of underweight and of normal weight children would give more fluid to a child with diarrhoea. One (2%) mother/caregiver of an underweight child and six (13%) of the mothers/caregivers of children with normal weight would give less fluid. Nine (19%) mothers/caregivers of underweight children and eight (17%) of normal weight children would not change the way that the children are normally given fluid when they are not ill. Only one mother/caregiver with an underweight child would stop giving fluids to the child while one mother/caregiver would give fluid only on instructions from a health provider and another would give fluid according to her judgment about the severity of the child's condition. An interesting finding in the research was that most of the participating mothers and caregivers would not give any other fluid to a child with diarrhoea other than oral re-hydration solution (ORS), breast milk or water.

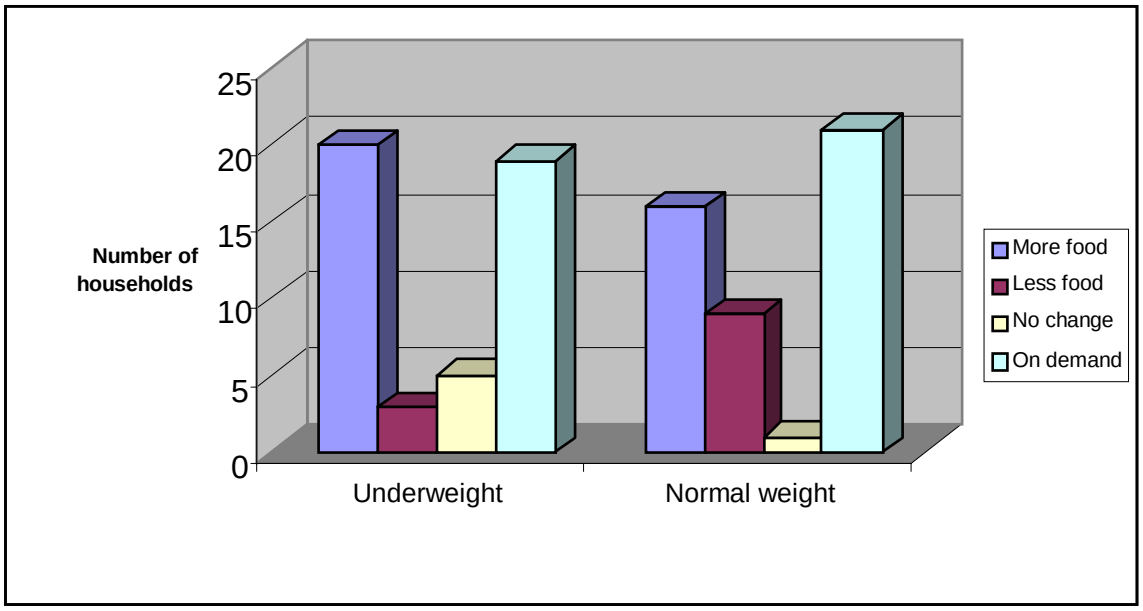



***Figure 10 How diarrhoea is treated by caregivers***

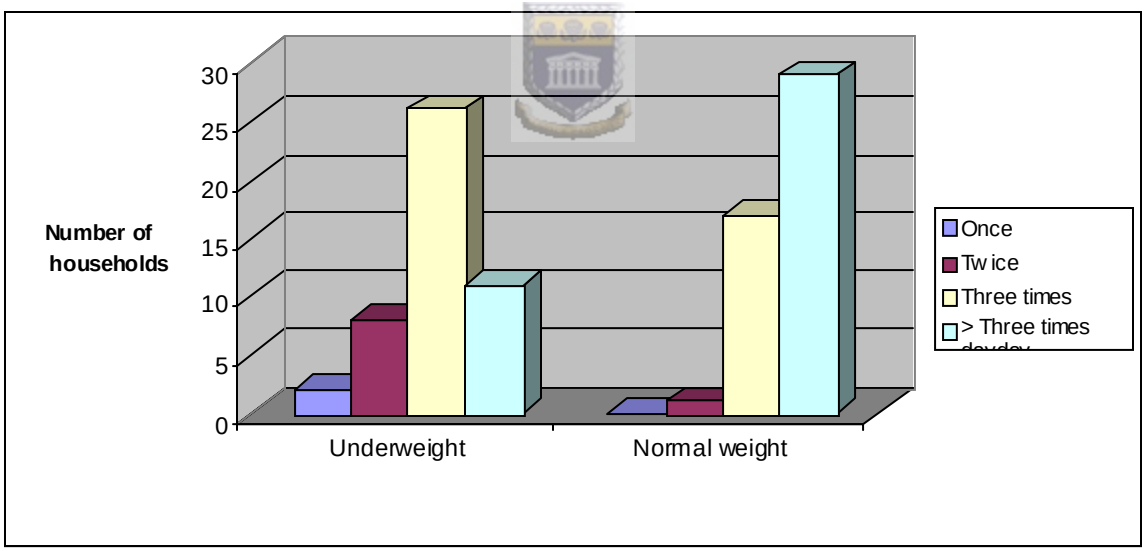



***Figure 11 Number of times in a day that food was consumed in households of underweight and normal weight children***

The majority of the households with underweight children consumed food three times a day. Two (4%) households with underweight children consumed food once a day, eight

(17%) consumed food twice a day, twenty six (55%) consumed food three times a day and eleven (23%) households consumed food more than three times a day.

According to the figure above, the majority of the households with normal weight children consumed food more than three times a day. One household with a child of normal weight consumed food twice a day. Seventeen (36%) households with normal weight children consumed food three times a day and twenty-nine (62%) households consumed food more than three times a day. In the study the frequency of consuming food in the home was significantly associated with improved nutritional status of the children. Risk to underweight increased when food was consumed less than three times in a day ($p = 0.0001733$; chi-squared = 14.10, Odds Ratio = 5.27).

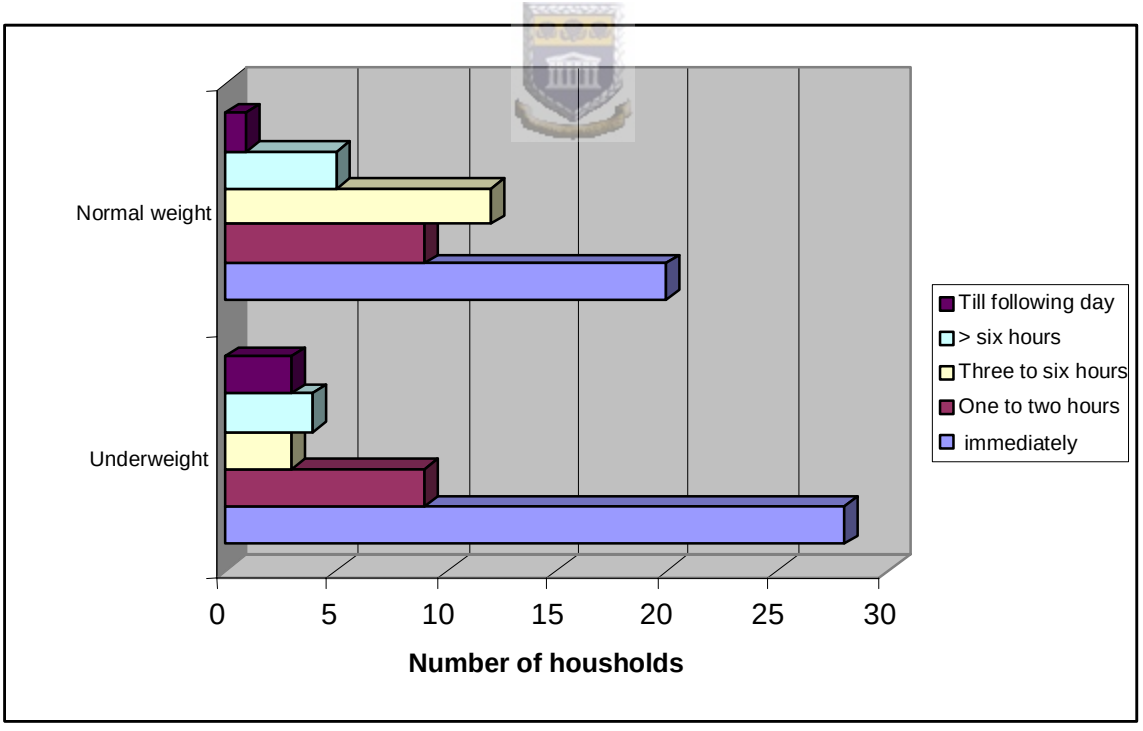



***Figure 12 Length of time that cooked food was kept before being consumed in households of underweight and normal weight children***

Twenty-eight (60%) households with underweight children consumed their food immediately after it was cooked, nine (19%) households kept the food for one to two hours and three (6%) households kept the food for three to six hours. Four (9%) kept the food for more than six hours and three (6%) households kept the food until the following day before it was consumed. Twenty (43%) households with normal weight children consumed their food immediately after it was prepared. Nine (19%) households kept the food for one to two hours, twelve (26%) households kept the food for three to six hours and five (11%) households kept the food for more than six hours before it was consumed. One household with a child of normal weight kept the food till the following day before the food was consumed.

4.32. Immunization of underweight and normal weight children

***Table 12 Immunization status of underweight and normal weight children***

| ***Immunization Status*** | ***Underweight N(%)*** | ***Normal weight n(%)*** |
|---|---|---|
| ***Fully immunized for age*** | ***41(87)*** | ***43(91)*** |
| ***Not fully immunized for age*** | ***5(11)*** | ***4(9)*** |
| ***Unknown*** | ***1(2)*** | ***-*** |
| ***Total*** | ***N = 47*** | ***N = 47*** |

Forty-one (87%) underweight children were fully immunized for age, five (11%) were not fully immunized for age, while the immunization status of one (2%) child was unknown because his mother were deceased.

The immunization status for all normal weight children was known. Forty-three (91%) normal weight children were fully immunized for age, while four 9%) were not fully immunized for age.

# CHAPTER FIVE

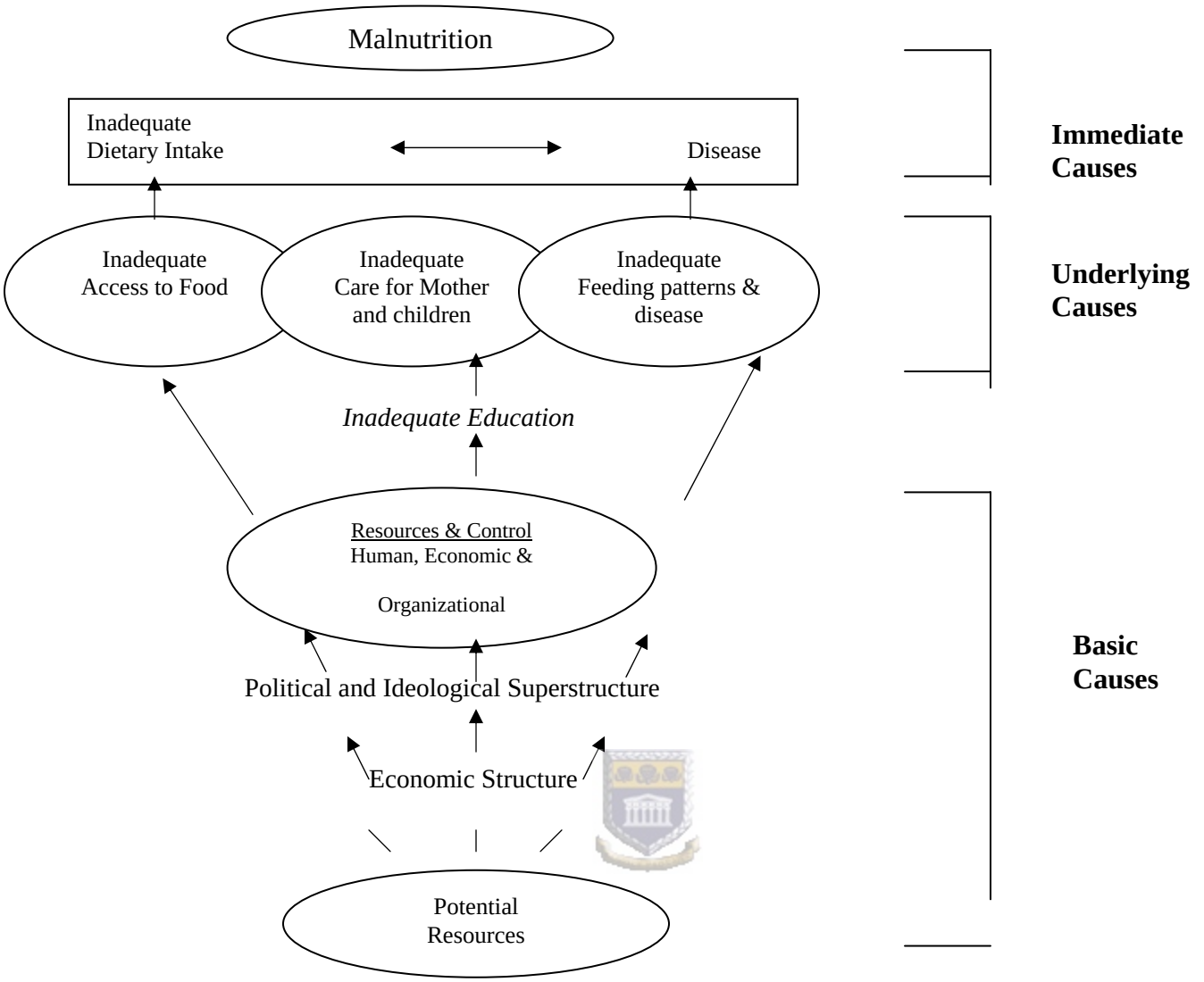
# DISCUSSION

## 5.0 INTRODUCTION

In this chapter I discuss the results of the study that I conducted to investigate factors associated with underweight in children below the age of five in Livingstone district, Zambia. The factors associated with underweight will be discussed and analyzed using the UNICEF Conceptual Framework, which is presented in figure 15. Firstly, the basic, underlying and immediate causes of underweight in the children of Livingstone district will be discussed. Then the limitations of the study will be presented and lastly, a conclusion of the discussion will be presented.

### *5.1 Basic causes of underweight in children in Livingstone district*

The basic causes of underweight in children in Livingstone seem to be related to the poor state of the national economy and the policies that govern it, which came about as a result of the conditions imposed on the country by the International Monetary Fund and the World Bank. Due to the poor state of the country's economy, resources are insufficient for the development of the country, resulting in a widening gap between the rich and the poor, and an increase in poverty levels.




**Adopted from the UNICEF Conceptual Framework, 1990**

***Figure 15 Causes of Malnutrition***

The current study found that most heads of the households with underweight children had had only reached a basic level of education and were unemployed. This was likely to be a result of the restructuring of the education sector, which reduced the number of school places available for the pupils and resulted in the failure to accommodate all pupils. Education therefore became accessible only to a few elite and resulted in increased illiteracy, unemployment and increased poverty levels in the country.

Although the education policy currently allows schools to offer free education to all pupils up to grade seven, very few households with underweight children can afford to proceed beyond this level and this has contributed to low literacy especially amongst households of low socio-economic status.

Another contributing factor made clear by this study is that most heads of the households with underweight children in Livingstone District are unemployed. Their unemployment can be attributed to the massive unemployment that occurred as a result of restructuring of the civil service, and the privatization of industries undertaken by the Zambian government.

The fact that some households with underweight children in the current study lived in houses made from mud and reeds could be attributed to the unfair housing policies implemented by the government. The households with underweight children that lived in houses built from mud and reeds raise a health concern because this may have contributed to the children developing frequent infections and eventually becoming underweight.

These results are in agreement to Coutsoudis et. al (1994) who found that the children in informal shack settlements had poor health status because of the type of materials from which their houses were constructed.

The current study also found that households with underweight children were concentrated in the high-density areas where facilities are mostly communal and sanitation is compromised.

The increased cost of building materials and the cost of rentals in the high density areas further forced some households with underweight children to live in make-shift homes constructed out of inferior building materials such as mud and reeds. Where people live is a reflection of their socioeconomic status because the type of housing that they occupy is determined by the amount of money that they have to build the house or pay rentals. The fact that the houses were built from mud and reeds clearly demonstrated that the households were of low socioeconomic status. Provision of improved housing could have a marked influence on the health status of the children.

According to Ramphele et. al (1991), houses built from mud and reeds are indicative of material and social impoverishment of the households. A study by Ramphele et. al found that undernourished children were born in materially disadvantaged households with no cash incomes. Another study performed by Christiansen et. al (1975) in Bogota Columbia found equally that physical growth of children was positively associated with socio-economic status.

In the current study the households living in houses built out of mud and reeds did not have access to basic facilities such as piped water, flush toilets or electricity. This greatly compromised hygiene and sanitation in the home, predisposing the children to frequent diarrhoeal infections and caused an adverse effect on their nutritional status. Lack of electricity predisposes children to frequent chest infections as a result of exposure to the cold, especially in winter.

Exposure to smoke from charcoal as the mothers cooked indoors may have further exposed the children to chest infections. Inadequate space in the homes further increased the risk of cross-infection among the occupants.

The households of underweight children in this study further used communal taps or tap in the back yard, charcoal as the main fuel source and owned less property and livestock. They mainly used flush toilets but because they lived in densely populated areas, these toilets were located outdoors or were communal toilets. Sanitation and hygiene are often compromised in shared facilities, sometimes accompanied by lack of water. These are a further reflection of the low socio-economic status of households with underweight children and are an indication of poor provision of social services by the Zambian government.

This is acknowledged by Daniels et. al (1990) who state that the impact of latrine ownership appears to be greater among households who have higher socioeconomic status and better water-use, as well as hygiene practices. Results of the current study are similar to the results of a study by Steyn et. al (1998) who also found that households with underweight children used outdoor taps and wood for cooking. Studies by Esrey et. al (1985) further confirm this because they found an association between improved water supply, excreta disposal and improved nutritional status of the children.

Use of communal taps compromises the nutritional status of children over a prolonged period because of the time the mother/caregiver spends in getting to the water source as well as the actual time spent in queuing to collect the water that could have been spent on

child care. Since households with underweight children in the current study did not have access to piped water indoors, domestic water had to be stored in containers, which increased the risk of contamination. According to Esrey et. al (1985), an uncontaminated source water may become polluted by the time it is ingested, and water storage in home containers may result in increased contamination depending on storage conditions. Sanitation in a home is greatly enhanced when there is running water available because high standards of hygiene can be maintained by methods such as frequent hand washing as well as the proper cleaning of utensils and food (Esrey et. al, 1985; Christiansen et. al, 1975; Von Schirnding & Yach, 1992). The importance of hygenic sanitation is demonstrated by Roy et. al, (1993) who emphasize that the control of infectious disease is largely dependent on measures such as sanitation. Frequent attacks of infectious disease have been shown to be the common cause of growth faltering. The adverse effects of poor sanitation are compounded by the use of charcoal as a source of fuel for this increases the risk of respiratory infection through indoor air pollution (Von Schirnding & Yach, 1992). The ownership of property and appliances concurs with higher socio-economic status. As a result of their low socio-economic status the households with underweight children could not afford to purchase appliances such as stoves, refrigerators, telephones, television sets or radios. This means that they had inferior cooking facilities and poor food preservation methods. Because of inferior cooking facilities their meals may not have been well prepared as a result of the length of time required in food preparation while using charcoal. This could have predisposed the children to diarrhoea.

The lack of proper food preservation methods further predisposed the children to frequent diarrhoea as a result of ingesting food that was starting to deteriorate.
The lack of telephones, television sets or radios meant that the households lacked the means of receiving or sharing of information and were therefore not informed or educated in a many areas such as health issues. The nutritional status of the children was therefore further compromised as a result of the mothers/caregivers' limited education and lack of adequate health knowledge.

***Knowledge about malnutrition and practices during child illness***

The health reforms that were instituted in 1991 by the new government then, ironically contributed to a poor health services in the district as a number of health staff were allowed to take voluntary separation, thus reducing significantly, the number of health staff that remained to run the health services. With inadequate health staff in health institutions it became difficult to provide knowledge and health information to the mothers/caregivers of the children.

In this study, the mothers/caregivers' lack of knowledge about malnutrition, as well as causes and management of diarrhoea indicate that the health services may not be reaching the population with the greatest need. Another possible explanation could be that, although services at under five growth-monitoring clinics are free the mothers/caregivers of underweight children might not have regularly accessed them because their time was too taken up with domestic duties. Overcrowding at the clinics due to staff shortages following the restructuring of the health system may have also been a discouragement to the mothers, who had to use precious time up in waiting.

The findings of the current study are in agreement with the findings of a study by Cooper et. al (1991) which found an increased demand for essential services such as housing, food hygiene, refuse removal and health services in high-density areas. This is believed to have a major implication for health and provision of appropriate health services. The study further found that the mothers/caregivers in such areas were also the least informed about health issues. Children in such areas were therefore believed to be at risk of poor nutritional status.

### *5.2 Underlying causes of underweight*

The study found that the underlying causes of underweight in the children in the district was inadequate access to food, the poor state of the country's economy, inadequate care of children, as well as poor access to health services and the unhealthy environments in which the children were brought up.

Marked differences were found in the diets of underweight and normal weight children in the district. Normal weight children were fed more frequently than underweight children were and their diets had more variety. This was an indication of inadequate access to food by households with underweight children.

The results of the study differed from the results of Sive et. al (1993), Dietz (1990), Walker and Walker (1997) and Krige and Senekal (1977) who reported similarities in the dietary patterns of children who have normal weight and children who develop underweight in the community.

The current study found that mothers of underweight children were less educated and were unemployed. The results are similar to a study carried out by Lamontagne et. al (1998) who also found that mothers of underweight children were less educated and were not employed. Maternal education is believed to be positively associated with nutritional status.

The households of underweight children had inadequate access to food primarily due to insufficient funds resulting from low educational standards, low literacy levels and unemployment of the household heads.

The fact that the heads of households with underweight children were unemployed or employed in the informal sector resulted into a lack of adequate finances to purchase enough food to sustain the nutritional status of their children or to cater for other basic needs. Local crop production was also generally low due to frequent drought in the province, lack of land for cultivation, poor soil quality, increased cost of fertilizer and the increased cost of water for irrigation. Most of the households with underweight children also could not rear any livestock because of limited finances, further lowering their access to food.

Culturally, women perform most domestic food production in Zambia. The ability of women in households of underweight children in the study to produce enough food to feed large families was further limited because most of the women had to balance their time with other domestic duties such as child minding, food preparation and collecting water.

Due to financial difficulties that the households experienced additional help could not be employed. This resulted in the women not having enough time to carry out the demands of crop production such as transplanting, weeding, watering and fertilizer application, and so this lack of time brought about poor agricultural yields. This all resulted into poor access to food as well as instability in their food source. In the absence of adequate access to food therefore, it is not possible to improve child feeding practices. These factors therefore impacted negatively on the nutritional status of the children.

***Inadequate care of the children and their mothers:***

Care in this study refers to the practices of caregivers, which include care for babies/children, breast-feeding and complementary feeding, as well as food preparation and hygiene practices.

According to this study, the children's mothers were the caregivers because the fathers did not play any role in care giving. This indicates that the incidence of underweight children increased in households headed by fathers because of their poor care giving. Underweight was also prevalent in households where the head was unskilled or semi-skilled, with an educational level of less than grade ten.

A considerable number of the mothers of underweight children had no one to assist them with childcare. This was of concern because childcare is usually compromised in the absence of adequate substitute care and may have contributed to the children developing underweight in the current study.

This is because much of the mother's time is devoted to domestic duties, and less time is therefore spent on the physical care of the child such as on meal preparation and feeding, in the variety of the meals, in the prevention and treatment of diarrhoea, as well as in the emotional care of the child. A study by Lamontagne et. al (1998) also found that children who came from households where mothers did not have additional help with childcare were at greatest risk of underweight.

The fact that the mothers/caregivers of underweight children were either unemployed or were employed in the informal sector, often under very difficult conditions, is another contributing factor in the poor health status of their children. Informal employment left them with less time to provide proper meals for their children or devote time to their care. Because of the physical demands of their work, the children may have been often left in the care of siblings or carried to work with the mothers and may have ended up being exposed to severe hazardous conditions in which their mothers/caregivers worked. Children left in the care of siblings are also believed to be at risk of underweight. The low literacy and limited health knowledge of the siblings usually make them inadequate caregivers for their younger brothers and sisters.

Moreover the poor unhygienic, high-density environments in which such caring is usually done further expose the children to frequent infections, diarrhoea and eventually lead to underweight. Steyn (2000) re-affirms that lack of knowledge, particularly with regard to infant feeding practices is one of the factors contributing to underweight in children.

In the current study, the low immunity status of underweight children could have further predisposed them to risk of infection and underweight. The fact that a large number of underweight children were not fully immunized for age is also suggestive that health services were not fully accessed.

According to the study, growth faltering in the children in Livingstone district sets in before the child's second birthday. The study reveals that underweight was more prevalent from 6 to 23 months. This is the period when children are most active and have increased biological need for food. During this period the children are introduced to complementary foods and weaned onto an adult diet. It is also a time when the children are most active and are most dependent on their mothers/caregivers for their diverse nutritional needs, care and guidance. Since the children cannot feed themselves the mothers/caregivers need to appreciate the food requirements of the children, as well as devoting their time, skill and patience to the upbringing of the children. If the care and feeding practices are inadequate during this period, growth faltering will set in.

The inability of households with underweight children to provide enough food for their children, the early introduction of complementary foods combined with inadequate care that the children were given certainly contributed significantly to growth faltering in the children.

***Unhealthy environments***

It is a known fact that the age of 6-23 months is a period when the children begin to walk and explore their surroundings.

If high standards of sanitation and hygiene are not maintained by the mothers/caregivers during this period it increases the susceptibility of the children to frequent infections and diarrhoea, which eventually results into underweight.

The fact that mothers/caregivers of underweight children in the current study did not have sufficient health knowledge suggests that they may have been unable to maintain high standards of hygiene to prevent the children developing frequent infections and diarrhoea. This is particularly likely because the children were brought up in high-density areas with communal facilities and unsatisfactory sanitary conditions. The children in the study were therefore exposed to unhealthy environments and were susceptible to frequent infections, diarrhoea and eventually developed underweight.

Burial of the children's waste in the back yard of households with underweight children increased the risk of fecal contamination of yards and gardens, leading to the risk of the children developing diarrhoea and helminthic infestation. Of concern also were the mothers and caregivers who disposed of their children's waste in the rubbish pit or in the nearby bush. Similarly, Coutsoudis et. al (1994) found a high prevalence of helminthic infestation in underweight children in Kwazulu-Natal. Fecal contamination of yards and gardens increases risk of diarrhoea as a result of poor hygiene, contributing to weight loss and eventually leading to growth faltering.

Hookworm is a common helminthic infestation found in the Zambian communities, which causes poor iron status and low haemoglobin due to increased blood loss.

Underweight children in the current study may have been predisposed to risk of anemia as a result of hookworm infestation, which may have compromised their nutritional status. The iron deficiency anemia could have been further worsened by a deficiency in the diet because the households with underweight children rarely consumed red meat and eggs. Iron-deficiency anemia is also associated with delayed psychomotor development and changes in behaviour in the first two years of life. It is believed to result in long-lasting developmental disadvantages (Steyn et. al, 1994) and therefore emphasizes the need for improved sanitation, parasitic control and iron intervention supplementation programmes in the affected households.

Crowding in the homes of underweight children could have further predisposed the children to cross-infection. Improper clothing could have also exposed the children to frequent chest infections, while infrequent hand washing, poor food preservation and poor water storage could have predisposed the children to diarrhoea, eventually leading to underweight.

Children also receive their regular immunizations between the age of six months to twenty-three months. The mothers/caregivers of underweight children were not vigilant in ensuring that the children received all required immunizations and they predisposed these children to risk of infection and growth faltering. Inadequate care of the children at this time therefore greatly compromises their nutritional status.

***Poor access to health services***

Of great concern in this study was that 98% of mothers/caregivers of both underweight and normal weight children did not know how to make oral rehydration solution (ORS). Byarugaba (1991) reported similar findings. The study by Byarugaba found that mothers of underweight children in the Umtata district of Transkei did not know the proper method of constituting ORS but instead relied on commercially prepared ORS sachets. This is of concern because of the key role that ORS plays in reducing diarrhoea and associated under nutrition.

In Livingstone, particularly where temperatures are high, combined with poor hygiene and sanitation, low literacy of the mothers, as well as poor feeding practices, diarrhoea prevalence is increased. It therefore becomes crucial for mothers to know the first line management of diarrhoea in order to prevent dehydration and under nutrition.

Of even greater concern was the fact that the mothers did not know that they could administer any other fluids than ORS to a child with diarrhoea. This raises much worry in view of the fact that diarrhoea is one of the leading causes of child mortality in the country (The National Programme of Action for Children in Zambia, 1994). Mothers/caregivers need to know the management of diarrhoea at home even before they access a health facility in order to prevent any deaths from diarrhoea and dehydration.

The fact that mothers were not aware that they could administer any other fluid to a child with diarrhoea in the absence of ORS is a further indication that health facilities are not being adequately accessed or that not enough health education is being given to the mothers at health facilities.

Contributing factors could have been time constraints by the caregivers, staff shortages or even demoralization by the health staff due to poor conditions of service. Therefore deaths due to diarrhoea that could have been prevented are currently not being prevented. This calls for more effort on health staff to intensify health education and health promotion efforts.

According to Werner et. al (1997), home made ORS is made by mixing eight teaspoons of sugar and half a teaspoon of salt, in a litre of water and they stress the importance of continuing to feed a child with diarrhoea. In a situation where ORS is not available they further recommend that other fluids such as soup, rice water or yogurt drink could be given to the child instead, or plain water if a child is less than six months old.

In this study the mothers of underweight children were not able to identify under nutrition in their children. The results of this study differ from the study by Roy et. al (1993), which found that economically advantaged mothers were less able to identify better nutritional status in their children. The inability of the mothers to identify signs of malnutrition is further suggestive of a lack of knowledge and understanding about malnutrition as a result of poor access to health information or to the inadequate quality of services being offered at health facilities. Efforts need to be intensified by health staff to educate mothers and possibly include practical sessions on malnutrition and by the government to improve access to primary health care.

What was observed during this study is that there is a great deal of stigma attached to malnutrition in the district, which further suggests a lack of clear understanding about the causes of malnutrition in the community. During the study it was not unusual to find that some mothers with severely undernourished children kept them hidden away in their homes. Health education and promotion will need to be intensified in the district.

This study found that the children in the age group of six to twenty three months in Livingstone district were therefore exposed to a high risk of underweight through inadequate feeding patterns, poor childcare, poor hygiene and sanitation and poor access to health facilities.

### *5.3 Immediate causes of underweight*

The immediate causes of under nutrition in the children of Livingstone district were inadequate feeding patterns and disease**.** Most children below the age of five in the district were given less than three meals in a day and had frequent infections, which greatly compromised their nutritional status. Many complex factors such as household income, food prices, individual preferences and beliefs, as well as geographical, environmental, social and economic factors influence feeding patterns.

#### *Insufficient food intake*

Under nutrition in the children in the district was a result of insufficient food intake due to most of the households with underweight children being food insecure. Unemployed fathers headed most households with underweight children.

Since food security in the district is primarily a matter of income security, the households headed by unemployed fathers had no income security and were therefore unable to provide adequate quantities of food to their children. Steyn (2000) emphasizes that the three most important requisites of household food security are an adequate local food supply, as well as stability and accessibility of the food supply. The fact that most fathers were present all the time in households of underweight children may have depleted food reserves and further contributed to the children's insufficient food intake. Most households in the district also did not cultivate crops or keep livestock, an indication of instability of the food supply. The situation was further worsened by drought that was experienced in some parts of the country, which further lowered food supply.

Prices for the little available food in the district increased during the period of observation and in order for households to have access to food they needed a steady supply of cash. As earlier stated, due to unemployment, the households with underweight children lacked adequate financial resources to purchase food. This resulted in frequent periods of food shortages and the children eventually developing underweight.

***Early introduction to complementary foods***

Apart from insufficient food intake, the study found that from the age of six to twenty three months some of the underweight children were also exposed to inadequate feeding patterns through the early introduction to complementary foods before six months. Such children, who were not being breast fed, were given less than three meals in a day. Similar results were found by Cohen et. al, 1994; Steyn et. al, 1998 and Onyango et. al, 1998.

The underweight children in this study were therefore exposed to a risk of diarrhoea and underweight through the early introduction of complementary foods and infrequent feeding.

The early introduction of complementary foods not only carries a risk of diarrhoea through poor hygiene and food contamination, but studies (Sachdev et. al, 1991; Cohen et. al, 1994) have shown that infants receiving complementary foods early in life significantly decrease their breast milk intake.

It may be assumed that some of the children in Livingstone district were introduced early to complementary foods (mostly at four months) because their mothers believed that the children were not getting enough milk from the breast as a result of the others/caregivers themselves being under nourished. This is expected because of the impoverished conditions in which they live.

***Insufficient intake of calories***

Most households with underweight children did not add groundnuts to the children's porridge and this lowered the nutritional value of the porridge. The underweight children, as a result, did not receive enough calories required for normal growth and this further contributed to growth faltering. Moreover, if food given to children is of poor quality, such as thin porridge diluted with water, children do not receive enough calories required for normal growth leading to growth faltering. Similarly, children who are breast fed for longer periods by mothers who survive on marginal diets due to poverty may not benefit from prolonged breast-feeding because of insufficient calories.

Apart from porridge without groundnuts, the diet of underweight children was also low in calories because the major midday and evening meals consisted only of nshima with vegetables. The insufficient number of meals that the children were given worsened this. Nshima, which is the Zambian staple, is cooked from maize meal into a stiff porridge, which is often consumed with a vegetable and a meat product in order to raise its nutritional value. The fact that households with underweight children could not afford to purchase meat products resulted in the children being fed mostly on only nshima with vegetables. A diet of nshima, which is consumed with only vegetables, is therefore low in protein and calories and is believed to contain only half the calorie content of an average British meal (Quinn et. al, 1990). Young children therefore have to eat large quantities of the staple diet in order to satisfy their protein and calorie requirements and in order for them to do so they would have to have frequent meals more than three times in a day, since their stomachs are small.

The children in the households with underweight children were exposed to risk of underweight through the low nutritional value of their food and the few meals that they were given further worsened the problem of inadequate calorie intake and resulted in underweight.

The nutritional status of a child depends directly on the actual quantities and types of food consumed, as well as on his health status. Too few meals contribute to the problem of inadequate calorie intake. Because the underweight children had less than three meals a day contributed to their developing underweight in their first year of life.

Increasing the calorie content of the children's diet by including foods rich in oil such as groundnuts or margarine and increasing the frequency and quantity of feeding could greatly improve the nutritional status of the children. Unfortunately most households with underweight children could not afford to buy cooking oil, margarine, groundnuts or meat, nor could they provide adequate quantities of food to cater for the nutritional needs of the children.

Low levels of food consumption as a result of poor access to sufficient quantities of food, insufficient funds to purchase food due to illiteracy and unemployment combined with crop failure are all a reflection of low socio-economic status. Because the households with underweight children were of low socio-economic status, these factors all contributed to inadequate feeding patterns in the households with underweight children in the Livingstone district.

The results of the current study are in agreement with the study by Esrey et. al, 1985 which also found that low expenditure on food, poor sanitation and low socio-economic status were associated with underweight.

***Inadequate sanitation and hygiene***

Inadequate sanitation and hygiene further exposed the children to frequent diarrhoea from food contamination, as well as frequent helthimic and chest infections. Diarrhoea causes a decline in the nutritional status, lowered immunity and frequent infection. According to Quinn et. al (1990), during diarrhoea a significant amount of energy is lost each day.

Malaria, which is a major killer in the district, frequently infects children due to their compromised immunity as a result of their poor nutritional status as well as poor sanitation. Indeed, infections cause a severe drain on the nutritional status of children. During illness a child's ability to absorb calories and nutrients from food is impaired. This is worsened by loss of appetite and some cultural practices where food is withheld from a child who is ill.

### *5.4 Limitations of the study*

In the study, height for age measurements were not taken due to the length of time needed to see improvement in height for age. Also a cross-sectional study would have been more satisfactory because it would have identified and included children who were not attending the formal health services.

### *5.5 Conclusion*

The objective of the study was to investigate socio-economic factors associated with the nutritional status of children below the age of five in Livingstone district. Underlying causes of underweight included inadequate access to food, poor socio-economic status, unemployment and lack of a stable source of food by the caregivers. Harsh conditions under which their mothers/caregivers worked led to insufficient time to provide adequate care of the children, to access health facilities or to bring the children up in healthy environments conducive to their health.

The immediate causes of underweight were inadequate feeding patterns and disease as the mothers/caregivers lacked adequate finances to purchase food of high nutritional value needed for adequate child growth or to access health promoting housing and environments.

The study revealed that there was an association between the educational levels of the mothers, the use of communal taps to obtain water, poor child waste disposal methods, as well as the use of charcoal as a source of fuel and underweight in the children. The study also found that lack of food in the household and low frequency of feeding the children, as well as inadequate housing were strongly associated with underweight. These were the core factors that were associated to underweight.

However other factors namely, poor professional status of the head of household, early introduction of complementary foods and inadequate feeding patterns as well as poor immunization status of the children (indicative of low socio-economic status) also contributed to underweight in the children. The weak association that was found between these factors and underweight could have been due to some confounding factors such as child gender, mother's age, mother's marital status, the person who controls the income in the home or the sample size that the study did not address.

# CHAPTER SIX

# SUMMARY, CONCLUSION AND RECOMMENDATIONS

## 6.1 SUMMARY

The improved nutritional status of children is important for the future development of the country. The challenge lies with all of us to ensure that the prevalence of malnutrition is reduced or completely eliminated in the communities in which we live. This can be done by early identification of the risk factors to malnutrition and working together towards reducing or eliminating these risk factors.

The results of this research revealed a distinct picture of the factors related to the nutritional status of children in Livingstone district. The study revealed that the households with underweight children who participated in the study were of low socio-economic status, while the households with normal weight children were of high socio-economic status. Fathers headed the households with underweight and normal weight children and the main caregivers of both cases and controls were the children's mothers. However, due to the differences in the socio-economic status of the mothers of the two groups, the quality of child care given to underweight children was greatly compromised as a result of the low literacy levels of the mothers, unemployment and the time-consuming domestic duties that their mothers performed.

Underweight and normal weight children did not differ significantly in terms of the head of the households, breast feeding practices, domestic food production or livestock rearing.

However, apart from quality of childcare, significant differences were found in the educational levels of the mothers and in the skill and employment status of the head of the house. Mothers/caregivers of underweight children had lower educational levels while the heads of the households were unskilled and unemployed. These created financial difficulties and frequent food shortages in the homes of underweight children. Because of this, the diets of underweight children were greatly affected. Not only were the quantities of food inadequate, but the diet of the children also lacked all the required components and variety of a balanced diet. There were differences in the location of the houses between the two groups, with normal weight children mainly living in low-density areas and underweight children living in high-density areas. High-density areas had a negative impact on the nutritional status of the children because of communal facilities used and, in some cases, because of the inferior type of housing that the households with underweight children occupied. Childcare was compromised as the mothers/caregivers spent time in drawing water, collecting firewood, and preparing food and other household duties. Care was further compromised in cases where mothers carried the children with them as they went to work in the informal sector or left the children under the care of a minor. The hygiene and sanitation of underweight children was affected by poor water storage facilities and use of communal facilities such as taps and toilets.

This was particularly critical if the water supply was insufficient and if the disposal methods of child waste were poor. Also underweight children did not regularly attend growth-monitoring clinics resulting in poor immunization status and promoting a further risk of infection. All these impacted negatively on the nutritional status of the children, leading to underweight.

### *6.2 CONCLUSION*

The study highlights the need of raising the status of women by creating opportunities, which enable them to attain better education. Increased education and literacy appear to influence the mother's understanding of the child's nutritional needs and care. If the mothers and caregivers are literate and have some education they are able to provide better nutrition and care to their children. Educated mothers also have opportunity of being employed in better paying jobs. Not only does this increase household food security but also ensures that children are provided with frequent meals of high nutritional value.

### *6.3 RECOMMENDATIONS*

#### *6.3.1 Government encouragement to increase agricultural food production*

The government should be encouraged to implement policies that will ensure that the price of agricultural farming implements, seeds and fertilizer are affordable to most people in order to boost agricultural food production in the country. In that way, food security will be assured at a national and household level. The government should further be lobbied to improve the provision of water, and to maintain public infrastructure and food storage facilities to avoid post-harvest losses. Not only should we aim at growing enough food to feed the nation but we should also aim to grow surplus for export and improve the financial situation of the country.

#### *6.3.2 Lobbying government to increase employment opportunities*

The government should be lobbied to increase employment opportunities for its citizens or to provide some income-generating activities so that poverty levels are reduced in the country.

#### *6.3.3 Lobbying government for provision of free basic education and health care*

The Zambian government should also be lobbied to provide free basic education to a higher level than at present and improve health care provision for its citizens, with more emphasis on increasing female education. An educated nation is a healthier nation and women are at the centre of maintaining the health status of their families.

#### *6.3.4 Intensify family planning efforts*

The government, religious organizations and other organizations should intensify family-planning efforts in order to control population growth. Controlled population growth will enable the government to budget better for the country in many areas including nutrition.

Teenagers should be targeted as a group because teenage pregnancies are extremely common in this country. This problem is exacerbated by the father being unknown leading to a situation of 'fatherless' children.

### *6.3.5 Networking between community, health staff and other sectors*

Networking should be encouraged between the health sector, community members and others sectors such as the agricultural sector, education sector and health sector so that together they are able to identify nutrition problems in the community and suggest ways to solve them. They could also work together to provide food demonstrations in the communities using local products and education on the importance of various food stuffs in terms of the nutritional value, cost and availability. Community members should be encouraged to meet regularly to share information about infection control, nutrition promotion, proper water and food storage, and home production of sugar, salt solution to combat diarrhoea, as well as feeding and weaning practices.

### *6.3.6 Provision of safety nets for the most vulnerable in society*

All opportunities for the provision of safety nets for the most vulnerable in the society such as orphans must be exploited. Government should be encouraged to provide these safety nets or to work hand in hand with organizations that are interested in alleviating poverty.

### *6.3.7 Use of research results as baseline data*

The results from this study could be used as baseline data on the nutritional status of the children in the district. as no similar research has been carried out before. A similar study could be repeated to include nutrient intakes and quantitation.

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**APPENDAGES:**

## 8.0 APPENDICES:

**APPENDIX 8.1 QUESTIONNAIRE**

**The University of the Western Cape**

**Public Health Department.**

### CONSENT FORM

I am a post-graduate student with the University of Western Cape, School of Public Health. I am carrying out a research to investigate the factors associated with the nutritional status of children aged six to fifty-nine months in Livingstone. Consent is sought from you for participation. You are free to participate or to refrain from participation. All information gathered is confidential and will not prejudice you in any way.

Do I have your consent?

Yes_____ No_____

**Signed:_____**

**The purpose of this study is to determine the factors associated with the nutritional status of children aged six to fifty-nine months in Livingstone, Zambia.**

| | |
|---|---|
| **SURVEY NUMBER** | |
| **HEAD OF THE FAMILY** | |
| **PERSON INTERVIEWED** | |
| **NAME OF THE DISTRICT** | |
| **DATE OF INTERVIEW** | |
| **NAME OF THE INTERVIEWER** | |
| **SEX OF THE CHILD** | |
| **DATE OF BIRTH** | |
| **AGE IN MONTHS** | |
| **PROFESSION OF HEAD OF FAMILY** | |
| **EDUCATIONAL LEVEL OF MOTHER/CAREGIVER** | |

## 1. HOUSEHOLD INFORMATION

1.Number of people living in the house

1. Children who are 7 years and under
2. Children who do not attend school (older than 7 years)
3. School going children (older than 7 years)
4. Adults

2. Which of the following is true for the mother:

1. She stays at home all the time
2. Comes home at weekends
3. Comes home at the end of the month
4. Comes home before the end of the month
5. There is no mother in the family
6. Other ……(specify)

3.Which of the following is true for the father

1. He lives at home all the time
2. Comes home weekly
3. Comes home monthly
4. Comes home less often than a month
5. There is no father in this family
6. Other ……(specify)

4.Who takes care of the children most during the day ?

1. Mother 2. Father

3. Grandmother 4. Grandfather

5. Siblings 6. Relatives (friends)

7. Other …….(specify)

5. Who else (in addition to the main carer) takes care of the children?

1. Mother 2. Father

3. Grandmother 4. Grandfather

5. Siblings 6. Relatives (friends)

7.Other ……(specify)

**2. NUTRITION**

2.1 Should the mother breastfeed a child everytime he/she asks? 1. Yes 2. No

2.2 At what age (in months) should the mother introduce solids to the child?

2.3 Describe solid meals that you often give your child at the time of weaning.

……
……
……

How many times is the child given solid meals during the day?
(explain)……
……..

2.4 What food is your child specifically fed throughout the day ? (explain)

……
……
……

……
……

**3.SOCIO-ECONOMIC**

3.1 Do you grow any type of crops in your backyard or field? 1. Yes 2. No

b.) If yes, what crops do you grow?

……
…….

c.) How much is normally harvested?

| Crops | How much (in 25 kilograms bags) |
|---|---|
| …….. | …… |
| ……... | …… |
| …… | …… |
| …… | …… |

3.2 How many months in a year do you rely on solely on bought mealie-meal?

……..

3.3.1 In the last year (2002) was there a time when you and your family had nothing to eat?

1. Yes 2. No

3.3.2 If yes, when was that and why?

……
……
……
…….

3.3.3 How long did it last? 1. Days 2. Weeks

3.3.4 What did you do?

1. I asked for food from the neighbours, friends or relatives.
2. I asked for credit from the store
3. I worked for food
4. Other …….(specify)

3.3.5 How many meals do adults in your family currently have per day?

1 2 3 4 5 6 (circle appropriate number)

3.4 In a week, how often do children in your family eat the following?

Peanut butter or food with groundnuts?

1. Never
2. Once a day
3. Everyday
4. Once a week
5. Other …….

Margarine/buttercup

1. Never
2. Once a day
3. Everyday
4. Once a week
5. Other ……..

Food with cooking oil or fat added

1. Never
2. Once a day
3. Everyday
4. Once a week
5. Other ……..

3.5 In a month, how often is meat consumed in your family?

1. Never 2. Not every month

3. Once a month 4. More than once a month

5. Once a week 6. More than once a week

7. Other …….

3.8 When food is not enough to serve everybody in your household who gets first preference?

1. Father 2. Mother

3. Boys 4. Girls

5.Grandparents

6.Other (explain)

3.9 What is the main source of drinking water? (explain)

……

……

……

3.10 How long does it take you to walk to that place, to get water and return?

1. 30 minutes or less

2. more than 30 minutes but less than 1 hour

3. At least 1 hour but less than 2 hours

4. 2 hours or more.

3.11 What do you mostly use for making a fire for cooking?

1. Wood 2. Charcoal

3. Paraffin 4. Gas

5. Electricity 6. Other

3.12 a.) Do you own the following?

1. A refrigerator 1. Yes 2. No

2. A radio 1. Yes 2. No

3. A television 1. Yes 2. No

4. A stove 1. Yes 2. No

5. A telephone 1. Yes 2. No

6. Livestock 1. Yes 2. No

3.12 b.) If you do have livestock, what type of livestock is it? And how many?

| **Type** | **Number** |
|---|---|
| …….. | …….. |
| …….. | …….. |
| …… | …….. |

3.13 How long does it take you to get to the nearest store/market to buy food?

1. 30 minutes or less
2. More than 30 minutes but less than 1 hour
3. At least 1 hour but less than 2 hours
4. 2 hours or more.

3.14 a.) What type of toilet do you have?

1. Ventilated pit latrine
2. Pit latrine
3. Flush toilet
4. Bucket toilet
5. Other (specify)

b.) If you have a toilet, does every member of your family use the toilet?

1. Every member of the family uses it.
2. Adults use it, children do not
3. Other (specify).

c.) How is children's waste disposed? Is it

1. Burnt
2. Discarded in the latrine
3. Buried
4. Other(specify)……
   ……
   ……

d.) If buried, where is it buried?

……

……

3.15 What is the main building in your home made of ?

1. Concrete 2. Reeds

3. Stone 4. Blocks (cement)

5. Mud 6. Other(specify)……..

3.16 What is the roofing of the main house made of ?

1. Thatch 2. Corrugated iron (zinc)

3. Tiles 4. Asbestos

5. Other (specify) ……

**4 HEALTH ISSUES**

4.1 What do you think are the causes of diarrhoea (watery stool) ?

……

……

……

4.2 Do you know how to make sugar salt solution (sss) ? 1. Yes 2. No

b.) If yes, can you tell me how it is made ?

1. 1 litre boiled water, 1 teaspoon salt, 8 teaspoons sugar.
2. 1 litre boiled water, half teaspoon salt, 8 teaspoons sugar.
3. Other (explain)……..

4. If the child has diarrhoea do you continue to breastfeed ? 1. Yes 2. No

5. If the child has diarrhoea do you give fluid by mouth ?

1. Yes - more fluids 2. Yes - less fluids

3. No change 4. Stop giving fluids

5. Don't know 6. Other (specify)……

6. If the child has diarrhoea do you give any food by mouth ?

1. Yes – more food
2. Yes – less food
3. No change
4. Stop feeding
5. I give food on demand
6. I don't know
7. Other (specify)

7.Which of the following is true ?

I will stop breastfeeding if my child :

1. has diarrhoea 1. Yes 2. No
2. has fever (high temperature) 1. Yes 2. No
3. is coughing 1. Yes 2. No

8. Which of the following factors do you think can help prevent diarrhoea in children ?

a. Wash hands before eating 1. Yes 2. No

b. Keep nails short 1. Yes 2. No

c. Wash hands with soap after using the toilet 1. Yes 2. No

d. Give enema to the child 1. Yes 2. No

e. Give traditional herbal medication 1. Yes 2. No

f. Do not keep food too long after cooking 1. Yes 2. No

9. How is water stored in your home ?

1. Stored in a plastic container covered
2. Stored in a plastic container uncovered
3. Stored in a metal container covered
4. Stored in a metal container uncovered
5. Other (specify)……

10.How is water taken from the big storage container ?

1. Tilt the container to get water
2. We use a pipe to suck water
3. Other (specify)……

11. In the house, how is water taken from the container for drinking ? (Bucket)

1. Tilt the container to get water.
2. We use a cup/jug for drinking that is kept in the water container (Bucket)
3. We use different drinking cups/jugs
4. Other (specify) …….

12. How many times is food cooked in your home ?

1. Once a day
2. Twice a day
3. Three times a day
4. More than three times a day

13. How long is the cooked food kept ?

1. Eaten immediately
2. 1 – 2 hours
3. 3 – 6 hours
4. More than 6 hours
5. Until the following day
6. Other (specify) ……

14. How is cooked food stored in your home ?

1. It is left in the pot that was used for cooking.
2. It is left in containers covered
3. It is left in containers uncovered
4. Other (specify) ……..

## 5. GROWTH MONITORING

1. How much schooling has the mother had ?
    1. No schooling
    2. < grade. 3
    3. Grade 3 – grade 6
    4. Grade 7 – grade 10
    5. > grade 10

1.Can she read a sentence in English ? ( ask her to read one of the following sentences )

a.) Body building food

b.) Protective food

c.) Instructions for making ORS (oral rehydration solution)

1. Ask the mother/caregiver

Does the child have a Road to Health card ? 1. Yes 2. No

Request the Road to Health card 1. Yes 2. No

5.3.1 Did the child get all the immunizations for her age ? 1. Yes 2.No

5.3.2. If no, which immunizations did the child miss ? (check the card for missed immunizations)

OPV (0), BCG 1.Yes 2. No

OPV (1), DPT (1) 1. Yes 2. No

OPV (2), DPT (2) 1.Yes 2.No

OPV (3), DPT (3) 1. Yes 2. No

MEASLES (1) 1. Yes 2. No

OPV (4), DPT (booster), MEASLES (2) 1. Yes 2. No

VITAMIN A SUPPLEMENTATION 1. Yes 2. No

5.4 What signs will make you realize that a child is not well nourished ? (choose)

1. Oedema 2. Peeling skin

3. Irritability 4. Brown sparse hair

5. Distended abdomen 6. Big appetite

7. Moon face 8. Lack of physical activity

5.5 Do you think your child is well nourished ? 1. Yes 2. No

5.6 Do you have any questions ? 1. Yes 2. No 3. Don't know know

If yes, you may ask your questions

……

……

……

……

***Thankyou for your time.***