

**THE UNIVERSITY OF KWAZULU NATAL  
SCHOOL OF DEVELOPMENT STUDIES**

**Levels, Patterns and Determinants of Child Malnutrition in  
Zimbabwe: Evidence from the 1988, 1994 and 1999 Zimbabwe  
Demographic and Health Surveys**

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## Abstract

Child nutrition has become a well accepted marker of a population's health. Consequently, in the past decades it has been common for health surveys to collect anthropometric measurements of children. Cross sectional data including that of demographic health surveys, therefore, provides a framework for analysis of progress in health of children in the developing world. Using data from the Zimbabwe Demographic Health Surveys (ZDHS) of 1988, 1994 and 1999, this dissertation describes the levels, patterns of distribution, and the changes in determinants of child malnutrition in Zimbabwe between 1988 and 1999.

The study employed complimentary methodology by using both the quantitative as well as the qualitative data. Standardized anthropometric measures (weight and height/length of children 3-35 months) from ZDHS were converted into the three indices (weight-for-age, weight-for-height, and height-for-age) to measure patterns of child malnutrition using the Epi-Info software. In addition, the Statistical Package of Social Sciences (SPSS) was used for the descriptive statistics, bivariate analysis and regression models in the three cross-sectional data sets. Multiple linear regression models were used to analyze the effects of independent variables for child malnutrition in the year 1988, 1994 and 1999. The qualitative methodology was used to compliment and fill the gaps from the quantitative data. Focus group discussion in-depth interviews were held with community stakeholders in two regions in Zimbabwe.

It was observed that malnutrition patterns in Zimbabwe has slightly decreased between 1988 and 1994 before rising again in 1999 based on the current World Health Organization (WHO) standard. Stunting and underweight are more significant forms of malnutrition in Zimbabwe in all the survey years. The education of mothers, child age, had highly significant effects on the nutritional status of children, while other independent variable had varying significance over the years. Factors such as child's age, mother's education, and sources of water, and toilet facilities are important in explaining child malnutrition in Zimbabwe over the past years.

The analysis of anthropometric data from demographic health surveys contributes a useful approach to evaluate and inform child health policy and interventions in the developing countries. The results also demonstrates how the second round and third round assessment of Demographic Health Survey anthropometry can add some advantages of longitudinal measurement to the cross sectional datasets.

## Declaration

This study represents original work that was undertaken by the author. Work of others has been duly acknowledged in the text. This dissertation has not been submitted in any form for a degree to any other university.

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## CHAPTER 1: INTRODUCTION OF THE STUDY

### 1.1 Introduction

The accelerated improvement in reducing child malnutrition is a widely recognized aim of the international community and many countries. In the recent past, the United Nations (UN) Millennium Development Goals (MDG) cemented previous international commitments made of reducing child malnutrition previously made at summits like the World Summit for Children (United Nations Children's Fund (UNICEF), 1990) and the International Conference of Nutrition (Food and Agricultural Organisation of the United Nations (FAO) and The World Health Organisation (WHO), 1996). The role of nutrition in development goes far beyond proving an indicator of progress towards the MDGs, as a nutrition perspective can strengthen key development mechanism and instruments (United Nations, 1989). It is also well known that childhood malnutrition in contributes to increased morbidity and mortality and to various other functional consequences, including impaired cognitive development (Pinstrup-Anderson *et al.*, 1992). In addition, improving child malnutrition is important for developing countries. First, it is a common problem in poor countries, secondly, child malnutrition has short and long term adverse consequences, and lastly, is the reason that if the nutrition of children is improved, the future generations will be healthier and more productive, and this will be an asset for national economic development (Martorell, 1999: 28).

Since the 1980's, the study of child malnutrition in the developing world has become easily achievable given the existence of a series of health surveys conducted under the Demographic and Health Survey (DHS) programme. As the surveys collect data for children under five years as well as other individual level information about each child and the child's family and household, the data from these surveys allows international comparison of the levels and determinants of child health (Madise *et al.*, 1999). Anthropometric indicators of nutritional status are gathered during these surveys as these have consistently shown to be related to the risk of subsequent child morbidity and mortality in a large number of prospective, community-based studies from developing countries (Pelletier *et al.*, 1994).

Studies have also shown that the causes of malnutrition are multi-sectoral and interrelated (Madise *et al.*, 1999). Any efforts to deal with child malnutrition need to take into account the socio-economic, cultural, political environments which differ from place to place (Jonsson, 1995). In this study, anthropometric survey data from three similar surveys were used in conjunction with qualitative data to understand the levels and patterns of malnutrition in Zimbabwe. By applying an analysis to follow-up surveys that measure anthropometric indices in a consistent manner, a comparative analysis of child malnutrition levels, patterns of distribution, and determinants were achieved from representative samples in Zimbabwe for the years 1988, 1994 and 1999.

## **1.2 Background of Child Nutrition in Zimbabwe**

In Zimbabwe malnutrition is primarily a problem of poverty (Government of Zimbabwe and United Nations Children's Fund, 1985). With regards to the period between 1980 and 1992, Tagwirei and Greiner (1994) asserted that Zimbabwe successfully reduced the high levels of child malnutrition inherited at independence in 1980, despite economic setbacks and recurrent droughts. Their findings were consistent with other studies that were conducted in Zimbabwe since independence (Ministry of Health, 1980; Ministry of Health (MOH) Nutrition Department, 1982; Loewenson, 1990; Nemapare, 1999; Sanders, 1982; World Bank, 1983). However, the UNICEF (2004) nutrition fact sheet shows that national nutritional situation in Zimbabwe improved slightly from 1994-1999, but has shown significant deterioration through to 2003. This was portrayed by incidences of older children who were not showing the usual 'catch-up' growth and who were showing evidence of growth failure which are attributable to poverty and the HIV pandemic (UNICEF, 2004: 1).

Nemapare (1999) investigated the health and nutrition status of rural children in Zimbabwe, and revealed that malnutrition declined from 1980 to 1984. However, her study also shows that the numbers of malnourished children stagnated until the early 1990s. In 1994, the number of underweight children rose from 11% in 1988 to 17% in 1994 (UNDP, Poverty Reduction Forum and IDS 1988 cited in Nemapare 1999:1). Furthermore, Nemapare (1999) revealed that children in rural areas were at greater risk of malnutrition, which leads to, stunting and wasting than those in urban

environments. Child malnutrition levels in rural areas were also greater than in urban areas.

Longitudinal studies that have analysed child malnutrition in Zimbabwe are few. Bijlmakers *et al.*, (1998) longitudinal study from 1993 to 1995 of urban and rural households<sup>1</sup> in Zimbabwe gives an account of health outcomes in a time of economic structural adjustment, especially as they relate to the nutritional status of children. During these years the authors found out that there was no change in malnutrition indicators among the children in the urban area. However, in the rural areas, malnutrition measures deteriorated between 1993 and 1994. Bijlmakers *et al.*, (1998) state that the variation across rural and the urban setting was that during these years the rural areas were undergoing a period of short-term food deprivation between 1993 and 1995.

Years of severe drought between 1991 and 1992 had an impact on the malnutrition of children in Zimbabwe. To show the effects of droughts and its effect of child malnutrition, Alderman *et al.*,(2002) longitudinal study uses representations of civil war and drought “shocks” to identify differences in preschool nutritional status across siblings in rural Zimbabwe. Representations of civil war and drought shocks experienced prior to age three to pre-school are linked to nutritional status as measured by height at given age, to subsequent health and education attainments. The study reveals that roughly 1 in 4 children was stunted in Zimbabwe. Furthermore, children who were stunted as pre-school leavers were shorter, had completed fewer grades of schooling and had started school later (Alderman *et al.*, 2002: 14).

A recent nutrition national survey of conducted in 2003 shows levels of malnutrition (stunted 26.5%; severely stunted 8.7%; underweight 17.2%; severely underweight 2.9%; wasted 4.7%, severely wasted 0.7%) (Government of Zimbabwe, 2004). Also a 2005 survey of ten districts across Zimbabwe recorded alarmingly high levels of malnutrition among children. Interviews conducted by the country's Food and Nutrition Council, in collaboration with the Ministry of Health and Child Welfare, showed stunting or chronic malnutrition levels as high as 47 percent among children

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<sup>1</sup> In this study, the urban area was Chitungwiza while the rural setting was the Murehwa District.

aged from six months to 59 months on commercial farms (Irin News, 2005). The survey revealed high rates of wasting or acute malnutrition, ranging between 5.5 percent and 6.7 percent in the southern provinces of Matabeleland, which is triple the rate for the standard stipulated by the Ministry of Health in Zimbabwe. The survey findings also indicate that orphans were three times more likely to be wasted, two times more likely to be stunted and 1.5 times more likely to be underweight than non-orphans (Irin News, 2005). The paper explains further that these high malnutrition levels coincided with high prices for the staple food, maize. As a result malnutrition levels in Harare, the capital city, doubled over the past four years and have significantly worsened in Bulawayo, the second largest city.

With regards to policy in the early days of independence, the Zimbabwean government chose not to follow a strategy that measured progress solely by export oriented growth, but chose to couple economic schemes with social development strategies, and to give priority to the social betterment of the majority of its citizens (Zerai, 1996: 3). Programmes like the Zimbabwe's Equity in Health Programme, the Maternal and Child Health programme and an explicit Population Policy that affirms commitment to infant, child and maternal mortality reduction, reflect the government's commitment to social development. Other strategies that were implemented to improve child health include the integration of traditional healers into the health care infrastructure, balancing curative and preventive health measures, and a focus on redistributing health services so that the poorest of citizens in greatest need have improved access to health services (ibid).

Due to the droughts in the years of 1992-1993 and 1995-1996, Zimbabwe embarked on Child Supplementary Feeding Programmes (CSFP) to combat child malnutrition during drought-induced emergencies. However, irrespective of the reported success of this programme by some sectors, Muntro (2002) who did an assessment of these programmes using household survey data argued that the CSFP failed to feed many malnourished and nutritionally vulnerable children even in areas where the programmes were operating. According to his analysis, the CSFP's impact on nutritional status was likely marginal, especially in 1995-1996.

Zimbabwe has been enduring the country's worst humanitarian situation since independence in 1980. Although the origins of crisis in Zimbabwe are multifaceted, including the HIV/AIDS pandemic, declining economic performance, political polarization, unfavourable environmental conditions, policy constraint, limited donor support for development just to mention a few, Zimbabwe is now considered the country with the world's fastest rise in child mortality (UNICEF, 2002). Despite the reversals in the marked improvements which characterized the first decade post independence, the Zimbabwean government has in the recent past launched the Millennium Development Goals (MDGs) whose commitments include that of achieving primary education, reducing child mortality, improving maternal health, ensuring a global partnership for development and ensuring environmental stability (World Health Organization, 2006). UNICEF (2002) reports that chronic malnutrition levels are now around 27%.

Tagwirei and Greiner (1994) attribute much of the improvements in child malnutrition in the first decade of independence to better vaccination coverage; a huge expansive in rural health care services; strong focus in primary health care, including water and sanitation and control of diarrhoea and acute respiratory infections since independence; and the most successful family planning programmes in the developing world. Major efforts to educate women by the use of few simple, key nutrition messages, as well as the Community Food and Nutrition Programme (CFNP) also contributed to this improvement. Notwithstanding these considerable achievements in Zimbabwe, Tagwirei and Greiner (1994) still contend that malnutrition in children is still a problem, mainly because of food shortages in certain areas at certain times of the year and poor practices in feeding babies. The majority of malnutrition cases in Zimbabwe are due to inadequate food intake, consumption of low nutrient density foods and infectious diseases (Nemapare, 1999:16). Along with poverty that has already been discussed above, recently the lack of access to food and inadequate maternal and childcare have been reported to be the underlying cause of malnutrition in Zimbabwe (Irin News, 2005).

### **1.3 Organisation of the Chapter**

Given this background, the remainder of this chapter is divided into seven sections. The following section, section 1.4, describes a conceptual and analytical framework for analyzing child malnutrition trends and determinants. In this section I discuss the relevance of the framework used in the analysis of child nutrition in the study. Section 1.5 provides a statement of the problem followed by section 1.6 which provides a justification of the study. The aims and objectives of the study are stated in section 1.7. Limitations of the data are discussed in section 1.9 while the hypothesis of the study is presented in section 1.10. Finally, the structure of the thesis is explained in section 1.11.

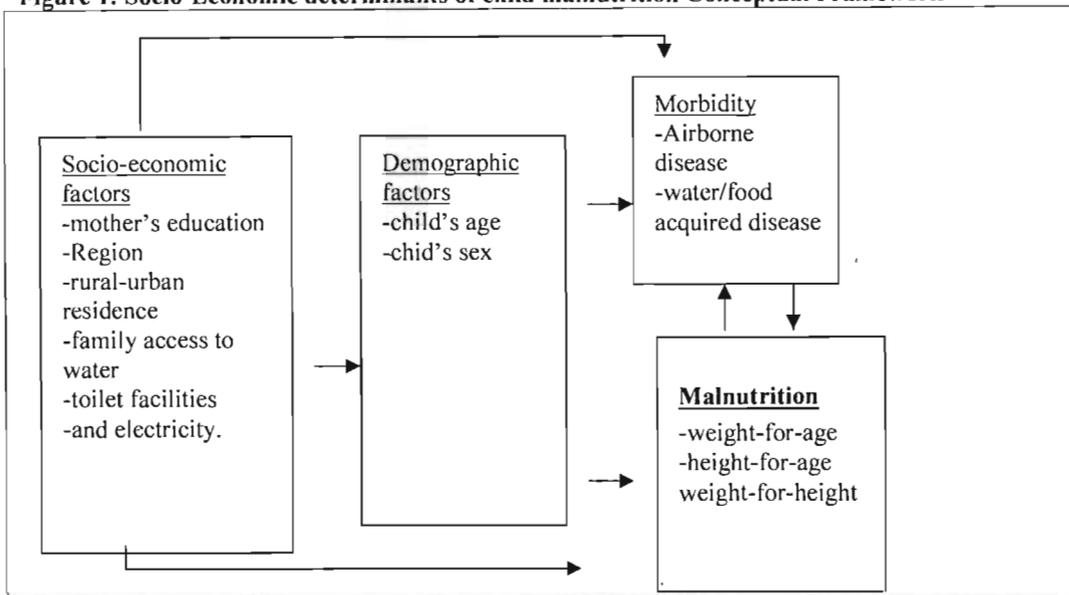
### **1.4 Conceptual and Analytical Framework of the Study**

The proximate determinants framework has been utilised in this study to analyse the levels, trends and determinants of child malnutrition in Zimbabwe. Mosley and Chen (1984) set the stage in providing a comprehensive analytical framework for child survival in developing countries. In their discussion of the need of this framework, Mosley and Chen (1984) note that medical research focuses on biological processes of disease, while on the other hand social science research primarily focuses on the socio-economic differentials and thereby ignore specific causes of death to a large extent. Their objective was to develop an analytical framework that would integrate the two research methodologies, and to introduce a single outcome variable that combined both mortality and morbidity (Hill, 2003: 138).

In all, the development of this proximate determinant approach is based on the premise that socio-economic determinants (independent variables) must operate through more basic proximate determinants that influence the risk of malnutrition (Mosley and Chen, 1984: 27). Hence this approach incorporates both the social and the biological variables. As such growth faltering (malnutrition as measured by weight-for-age, height-for-age and weight-for-height), the dependent variable, are the cumulative consequences of multiple disease processes (ibid). Socio-economic and demographic characteristics, such as the mother's education, can exert their effect

only through the influence of the proximate determinants of child malnutrition. The approach used in this study draws from this model to examine child malnutrition, measured by weight-for-age, height-for-age and weight-for-height of children 3-35 months, as recommended by the WHO (1983). However, the study adapts the morbidity part of the model as the study uses morbidity (child malnutrition) as the endpoint analysis, without factoring in mortality (see figure 1 below).

**Figure 1: Socio-Economic determinants of child malnutrition Conceptual Framework**



So in as much as the model by Mosley and Chen (1984) was developed for the analysis of child survival, it is not the scope of this study to analyse mortality. The study concentrated on child malnutrition as the primary endpoint. Irrespective of this, since the various proximate determinants in the Mosley and Chen framework are shown to be linked to one another, and to socio-economic factors and child health, therefore the framework seems to be appropriate for this study as it makes it feasible to have an integrated analysis of social and biological determinants in the study of child malnutrition.

As explained above, in the proximate determinants framework the socio-economic determinants of child malnutrition operate through the proximate determinants to influence the levels of child malnutrition. In particular, individual variables of the data like mother's education, age of the child, sex of child, and access to water, region, rural urban residence, toilet facilities and electricity were analysed. This use of a

modified Mosley and Chen framework is suitable for this study for a number of reasons. Existing literature on similar studies reflect that child malnutrition is affected by a combination of such contextual factors such as maternal education, income and other community characteristics (Bhuiya and Streatfield, 1991; De Onis *et al.*, 2004). Therefore, in order to accurately examine the trends, levels and determinants of child malnutrition in Zimbabwe, the proximate determinants model proved appropriate

The dependent variable malnutrition will be measured by weight-for-age, height-for-age and weight-for-height from anthropometric measures from ZDHS data. The boxes and arrows in Figure 1 illustrate the relationship of the independent variables in relation to the dependent variable (child malnutrition), closely following the Mosley and Chen's (1984) framework for child survival.

### **1.5 Statement of the Problem**

Malnutrition is becoming more widespread in Zimbabwe as food shortages intensify during the countries worst food crisis due to droughts and the never ending economic crisis. Evidence from the country surveys suggests strongly that malnutrition conditions that affect children in Zimbabwe like marasmus or kwashiorkor are on the increase (Tumwine and Mackenzie, 1992: 32). This is cause for concern since current studies show that children with mild and moderate malnutrition are more likely to be predisposed to diseases and other nutrition related problems (The Zimbabwe Independent, 1999). In addition, nutrition deficiency during the first three years of life may be marked by a reduction in brain cells, which impair intellectual capacity and compromise school performance. Hence by affecting their capacity to learn and to develop, malnutrition reduces the return on investments in education (Tagwirei and Greiner, 1994).

Therefore strategic interventions to address malnutrition in Zimbabwe need to be designed. Moreover, it is important to protect children from malnutrition, as they are nation's most vital resource that will advance the countries future development. Malnutrition is preventable and children should be protected, as the cost of not preventing it is detrimental to the future development of Zimbabwe. Against this backdrop, this study sought to investigate the levels, patterns of distribution and

determinants of child malnutrition in Zimbabwe according to nationally representative demographic health surveys carried out in 1988, 1994, and 1999.

## **1.6 Justification for the Study**

An understanding of the determinants of child malnutrition and its patterns of distribution is imperative given its associated problems and the increasing numbers of affected children when the condition is avoidable. In addition, the case study of this thesis, Zimbabwe, offers an appropriate case in point for studying the trends, patterns of distribution and determinant of child malnutrition since Zimbabwe has to date carried out three successful Demographic and Health Surveys (DHS). These DHS provide data for monitoring a wide range of monitoring and impact evaluation indicators in the areas of population, health, and nutrition (Measures DHS, 2005). Campbell and Hill (1991) point out the major advantages of using large-scale surveys such as the DHS. They point that these surveys are cost-effective, have large sample size combined with wide coverage of the population and they have statistical reliability.

In contrast to available knowledge that exists from a single cross-sectional survey measurement and analysis on child malnutrition, little is known about analyzing second and third round cross-sectional surveys with similar methods to children at later time periods. Using three rounds of cross-sectional survey datasets, this study sought to enhance knowledge about child malnutrition patterns, levels and determinants of child malnutrition over time in Zimbabwe. The thorough analysis of levels, patterns of child malnutrition and the changing determinants in child malnutrition in Zimbabwe over the years are important to improve the implementation of government programmes and assess policy relevance and impact. The study offers a case study of lessons learnt in a developing country. In particular, the results are expected to help promote and strengthen sustainable child health interventions for children.

The study focuses on children aged between 3-35 months of age because these are subjected to the high risk of malnutrition, infection and mortality after the weaning

process. The demographic health surveys carried out so far in the country contain comparable data for this age group. Zimbabwe therefore offers an ideal case to analyse the determinants of child malnutrition given the changing socio-economic circumstance the country has gone through since the 1980's to date. In addition, child health studies are important in all countries as childhood morbidity and mortality is considered a mirror of overall health conditions and mortality of the whole population.

### **1.7 Aim and Objectives of the Study**

The aim of the study is to examine the determinants of child malnutrition in Zimbabwe. The specific objectives of the study are as follows:

- To describe levels and patterns of distribution in child malnutrition in Zimbabwe between 1988-1999, according three nationally representative datasets.
- To examine changes in the social and economic determinants of child malnutrition in Zimbabwe over the period of 1988 and 1999.
- To provide recommendations to influence child health and survival in Zimbabwe.

The purpose of this research is to provide recommendations to influence policy on the child health in Zimbabwe.

### **1.8 Expectations of the Study**

The study anticipates furthering the understanding of patterns and the changes in determinants of child malnutrition in Zimbabwe. This understanding is important for child health in the country given the tumultuous socio-economic climate that pursues currently and its possible implication on health and policy.

## **1.9 Limitations of the Study**

Although the study attempts to adopt a multi-disciplinary approach as recommended by the Mosley and Chen (1984) approach, certain socio-economic determinants at communal level, like political institutions and their effects on child malnutrition were not considered. Although Zimbabwe has to date managed to completed four ZDHS, that is, 1988, 1994, 1999 and 2005, the study could not make use of the latest ZDHS survey conducted in 2005 as the results of this survey had not been released to the public at the time of writing the thesis.

## **1.10 Hypothesis**

While establishing levels, and patterns of child malnutrition in Zimbabwe, the following hypothesis will be tested:

- Adverse socio-economic factors contribute to higher incidences of child malnutrition
- Demographic factors are related to the nutrition status of children
- Adverse environmental factors contribute to poor nutritional status of children

## **1.11 Structure of the Thesis**

This study is comprised of six chapters. The first chapter gave an introduction of the study. It provided a detailed presentation of the statement of the problem, the conceptual framework and the objectives of the study. Chapter two is devoted to the literature review, while the third chapter describes the methodology of the study. Chapter four describes the levels, patterns of distribution and determinants of child malnutrition in Zimbabwe in 1988, 1994 and 1999 according to the quantitative data sources. Chapter five presents findings from the qualitative assessment of the study. A discussion of the results is covered in chapter six. Conclusions and recommendations are also discussed in this sixth chapter.

## CHAPTER 2: LITERATURE REVIEW

### 2.1 Introduction

The purpose of this chapter is to put the study into context by presenting a comprehensive review of relevant literature. Evidence on child malnutrition from several studies, with an emphasis on findings that are relevant to the developing world is discussed. The review focuses on patterns of trends in children's nutritional status, socio-economic and demographic characteristics and their effect on the child nutritional outcomes. In an effort to fully understand the existing evidence, the first section focuses on definitions and terms that are used in existing literature and the study.

### 2.2 Definition of Terms

The terms malnutrition and under-nutrition are used interchangeably in this thesis. The scope of the thesis is also confined to that of child malnutrition, meaning the population aged between 0 – 5 years of age. Malnutrition can be defined as a nutritional disorder or condition resulting from faulty or inadequate nutrition (Cogill, 2003: 55). However, there are many different forms of malnutrition in children. These include protein-energy malnutrition, which is usually measured in terms of body size, and micronutrient malnutrition, which in its mild and moderate forms is not always recognised and is often referred to as “hidden hunger” (Piwoz and Preble, 2000: 17). The common indicators of protein-deficiency malnutrition are low height-for-age (stunting), low weight-for-age (underweight), and low weight-for-height (also known as wasting or acute malnutrition (ibid)). The dynamics that pursue when a child gets malnourished is aptly described by Martorell and Ho (1984: 50) who narrate that:

As dietary intake becomes deficient, children cope by slowing their rate of growth and by reducing their physical activity. At this stage one might observe that gains in height, weight, and other measures are less than normal. On the other hand, biochemical indicators (e.g., serum albumin) are normal and clinical signs of malnutrition are absent. At moderate degrees of protein-energy malnutrition, activity and growth rates are affected to a greater degree and signs of wasting and perhaps some biochemical abnormalities become evident as well. At the final stage of severity, all linear growth ceases, physical activity is severely curtailed, body wasting is marked, and clinical signs (e.g., hair, skin, edema, etc.) are apparent.

It is these responses of the child's body to protein-energy malnutrition that is measured with the standard anthropometric techniques. As mentioned by Martorell and Ho (1984), nutritional status can be operationally defined in terms of either input or output type of indicators. Input indicators are mainly measures of food and nutrient intake as in home diet consumption and breast milk ingestion and are difficult to measure reliably and usually require highly skilled personnel (Martorell and Ho, 1984: 49). The output types of indicators include clinical signs of malnutrition, biochemical indicators, physical activities and anthropometry. The study utilises the output types of indicators.

### **2.3 Types of Child Malnutrition and Related Indices of Measurement**

#### **Anthropometry**

Anthropometry is the study of taking body measurements, especially for the use on a comparison or classification basis (Cogill, 2003: 54). Since the changes in body dimensions reflect the overall health and welfare of individuals and populations, anthropometry is used to assess and predict performance, health and survival of individuals and reflects economic and social well-being of populations (ibid). WHO (1983) states that the most useful and accessible measure of nutrition status is nutritional anthropometry, particularly on children 3-36 months of age. They also state that beyond that period, the data becomes progressively less meaningful and nutrition related. Hence anthropometry is a widely used, inexpensive and non-invasive measure of the general nutritional status of an individual or a population group. However, anthropometric measurements of infants below six months of age for monitoring and evaluation purposes is not recommended since low anthropometric measurements for infants at this age could be a result of prematurity or other endogenous causes (Madise and Mpoma, 1995).

The estimates of malnutrition in children depend on the indices that are used. The most commonly use indicators of malnutrition in children are stunting (low height-for-age), wasting (low weight-for-height) and underweight (low weight-for-age) and formed the analysis for this thesis.

**Stunting: Low height-for-age compared to standard**

Low height-for-age index identifies past undernutrition or chronic malnutrition (Cogill, 2003). Stunting is an indicator of chronic undernutrition, the result of prolonged food deprivation and/or disease or illness (Nandy *et al.*, 2005). Stunting, reflected by deficits in height-for-age, would not be expected to change in a short period of time, and it is recommended, therefore, not to report the figures annually (Cogill, 2003: 8). It therefore cannot measure short-term changes in nutrition. For children below 2 years of age, the term is length-for-age; while for children above 2 years of age, the index is referred to as height-for-age. Since stunting is an indicator of past growth failure, it is associated with a number of long-term factors including chronic insufficient protein and energy intake, frequent infection, sustained inappropriate feeding practices and poverty (*ibid*).

**Wasting: Low weight-for-height compared to standard**

Wasting is a result of a weight falling below the weight expected of a child of the same length or height (Cogill, 2003). Wasting is an indicator of acute malnutrition, the result of more recent food deprivation or illness (Nandy *et al.*, 2005). Causes of this condition include inadequate food intake, incorrect feeding practices, diseases, and infection or, but more frequently, a combination of these factors. Wasting in a population is therefore defined as the percentage of children (3-35 months) falling below -2 standard deviations for weight-for-height plus all children with edema (kwashiorkor) (Cogill, 2003: 9). It is a useful measure for measuring the short-term changes in nutritional status. However, weight-for-height is usually not appropriate for evaluating changes in a population over a longer time periods.

**Underweight: Low weight-for-age compared to standard**

Low weight-for-age index identifies the condition of being underweight, for a specific age (Cogill, 2003). Underweight is used as a composite indicator to reflect both acute and chronic malnutrition, although it cannot distinguish between them (World Health Organisation (2000) cited in Nandy *et al.*, 2005). This measure may be measured yearly, if reported for specific age groups, as it would change more quickly as it is

influenced by short-term effects such as recent outbreaks of diarrhoeal diseases (Cogill, 2003: 8).

These indices described above are then compared against international reference population to establish whether a child has experienced substandard growth. The reference standards that are most commonly used to standardise measurements were developed by the US National Centre for Health Statistics (NCHS) and are recommended for international use by the World Health Organisation (WHO). Although, questions have been regularly raised about the validity of the US based NCHS reference standards for populations from other ethnic groups, available evidence suggests that until the age of approximately 10 years, children from well-nourished and healthy families throughout the world grow at approximately the same rate and attain the same height and weight as children from the industrialised world (Cogill, 2003: 39). Children whose measurements fall below  $-2$  z-scores of the reference population median are considered undernourished, i.e. to have stunting, wasting or to be under weight (ibid). Those children whose measurements fall below  $-3$  z-scores are considered to be severely undernourished. All these indices reflect distinct biological processes, and their use is necessary for determining appropriate interventions (World Health Organisation cited in Nandy *et al.*, 2005).

It is important to note, as argued by Nandy *et al.*, (2005: 210) that because these indices may overlap with individual children, none is able to provide a comprehensive estimate of the number of undernourished children in a population; some children who are stunted will also have wasting and/or be underweight; some children who are underweight will also have wasting and/or be stunted; and some children who have wasting will also be stunted and/or underweight.

### **2.3 An Overview of Child Malnutrition in the Developing World**

Studies show that the rates of child malnutrition are exceptionally high in the developing world as compared to the developed world. De Onis, Frongillo and Blossner, (2000) analysed cross-sectional data on the prevalence of child malnutrition using nationally representative nutritional surveys included in the WHO Global

Database on Child Growth and malnutrition. Their pooled analysis of developing countries estimated that 32.5 per cent of children under 5 years in all developing countries would be stunted in the year 2000. However, this was a progressive fall from 47% in 1980. The prevalence for Asia in 2000 was at 34.4 percent, while for Latin America, Caribbean it would be 12.6 per cent and for Africa it will be at 35.2% in 2000. In all, there is considerable variability in stunting among preschool children between countries and between provinces within many developing countries. Studies also point to the fact that Sub-Saharan Africa is the only region where the number of malnourished children has consistently increased since 1970, and is the only region where it is projected to continue to increase to 2020 (Pinstrip-Anderson, 2000: 1). By then, 30 per cent of the developing world's malnourished children would be residing in Sub-Saharan, up from 10 per cent in 1970 (ibid).

In their study that used cross-sectional data to examine the prevalence of malnutrition of 53 African countries from nationally representative surveys, De Onis, Frongillo and Blossner (2000) also reveal that malnutrition across sub-Saharan Africa is quite distinct across the countries in the sub-continent. The prevalence of stunting declined from 40.5% in 1980 to 35.2% in 2000, which was a decrease of 0.26% percentage points per year. The highest level of stunting was found in eastern Africa where, on average, 48% of preschool children were affected. In all the authors argue that child malnutrition, as measured by stunting, had fallen progressively from 47% in 1980 to about 33% in 2000 (De Onis *et al.*, 2000). However, the data presented in their paper confirms that child malnutrition remains a major health problem in developing countries, as progress has been uneven.

In a comparative analysis of six countries<sup>2</sup> including Zimbabwe, Madise *et al.*, (1999) study reveals the nuances of child nutrition across a number of sub-Saharan African countries. The study shows that the levels of stunting and under-weight are high in sub-Saharan countries as more than a quarter of children aged 1-35 months were stunted. Similarly, the proportion of children who were under-weight was high, as the proportions ranged from 16% in Zimbabwe to 36% in Nigeria (Madise *et al.*, 1999:

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<sup>2</sup> The data was from Ghana, Malawi, Nigeria, Tanzania, Zambia and Zimbabwe.

335). In this study all the measures of malnutrition in Zimbabwe were considerably lower than many other countries.

Recent updates for Southern African countries nutritional status are discussed in a bi-monthly report published by the United Nations Regional Inter-Agency Coordination Support Office (UNRIASCO) for the Special Envoy for Humanitarian Need in Southern Africa (2003). The report shows that Zambia, Malawi and Mozambique continue to have unacceptably high rates of malnutrition, although there were slow national trends improvements in the 1990's for Lesotho, Zambia and Zimbabwe. The latter three countries show deterioration in nutritional status between the years of 2001-2003. In addition this report cautions against the use of national averages alone, as they hide large sub-national differences, as some districts within countries show significant improvements, while others have deteriorated. The report also highlights that the nutritional status is worse off among children who are orphaned, and the current HIV/AIDS pandemic will directly and indirectly increase young child malnutrition. The next section begins to discuss the determinants in child malnutrition in more detail.

## **2.5 Determinants of Child Malnutrition**

### **Socio-economic factors**

Many studies have demonstrated that community level factors, such as the socio-economic status and the environmental factors, that children live in, affect their nutritional status. As such, the high levels of child malnutrition in sub-Saharan Africa are, to a certain extent, a result of the low levels of economic development and high fertility in the region (Madise *et al.*, 1999: 332). This is mainly because much of sub-Saharan Africa is characterised by struggling economies, poor public health services, high inflation, low incomes, and under-developed agricultural sectors (*ibid*). Similarly, others like Martorell and Ho (1984) state their position clearly that the basic causes of malnutrition in developing countries are socio-economic. This is because poverty that is pervasive in the Third world coupled by ignorance of special needs of children and inappropriate cultural beliefs and practices that often cause

families to give their children diets that are less in quantity and quality than those they could provide (Martorell and Ho, 1984: 51).

Poverty is therefore closely linked to malnutrition, not only due to the ability or lack thereof to provide adequate nutritional requirements, but also due to a lack of access to vital resources and misinformation, even in urban environments (Copeland, 2003: 13). A study by Smith, *et al.*, (2005) that analyses determinants of child nutritional status show differentials between the rural and urban settings, suggesting that lower urban malnutrition is due to a series of more favourable socio-economic conditions, which in turn lead to better caring practices for children and their mothers. Also, a study in Vietnam, a country that has achieved impressive rates of socio-economic development, and broad improvements in the health sector, reveals that child malnutrition may still lag far behind as compared to other health indicators (Thang and Popkin, 2003). The study shows that children of rural households, poor households, and ethnic minority backgrounds were significantly more likely to be malnourished than urban residents, children of non-poor households, and the majority population. In all the study reveals that the economic improvements in Vietnam still bypassed the rural poor and minorities, and suggest that targeting economic resources towards these groups will be the most critical to reduce malnutrition in Vietnam.

Similarly in a study done in Ecuador by Larrea and Kawachi (2005) also revealed that there was a higher prevalence of stunting among children in the rural Highlands and among the indigenous people. Furthermore their study reveals that economic inequality at the provincial scale had a statistically significant effect on stunting (Larrea and Kawachi, 2005: 166). Studies by Sommerfelt and Kathry (1994) and those by Yimer, (2000) also showed significantly higher levels of stunting among rural than urban children.

### **Mothers Status and child malnutrition**

The relationship between women's status and child nutrition has been well documented. The survival of infants is critically dependent upon the care provided by their mothers both during pregnancy and childhood (Moen, 1993: 8). For example, a malnourished mother will give birth to a baby with low birth weight, which is the

single most important predictor of child survival (International Food Policy Research Institute (IFPRI), 2003: 1). As such, common practices, such as allowing all the males of the household to eat first, partly explain why 83 per cent of women in India suffer from iron deficiency anaemia, as opposed to 40 per cent in sub-Saharan Africa (ibid). This same article reveals about a study that brought together 36 developing countries in order to identify factors contributing to nutritional status gaps between South Asia and sub-Saharan Africa. The study showed that factors making by far the greatest contribution to a child nutritional status include women's status, sanitation and urbanisation.

Another study that uses three anthropometric indices, that is, weight-for-age, height-for-age and weight-for-height, done by Gunasekara (1999) cited in Ekanayake *et al.*, (2003) reveals an interrelationship between the employment status of the mother and the nutritional status of children in Sri Lanka. This study which uses secondary data of Demographic and Health surveys of 1987 and 1993 shows that children of working mothers are stunted than those of non-working mothers. These findings are corroborated by some authors who have concluded that a women's economic activities may have a negative impact on child care, where the activity is incompatible with simultaneous childrearing or where the mother lacks access to another person able to care for the child (Ware, 1984: 204). This is so because both the level of nutrition and standards of care may be significantly affected by the nature of the mother's employment (ibid). For example, one aspect that may be associated with malnourishment of children because of formal work by mothers is the abandonment of breastfeeding (Menken and Khun, 1996).

The literature also reveals that the relationship is not a simple one on this matter. This is because some studies that have tested the effect of duration of breast feeding show no protective effect against child malnutrition. For example, Balk *et al.*, (2005) recent study findings indicate that the longer a mother breast feeds her child, the greater the likelihood that the child is underweight. The authors explain that this may be due to endogeneity, as other studies point to that long-duration breast-feeders are usually poorer than other women, and they may not be able to provide the same supplementary foods to their children as other women, and themselves may be poorly

nourished, leading to lower-quality breast milk (Perez-Escamilla *et al.*, 1999 cited in Balk *et al.*, 2005: 595).

### **The Impact of Maternal Education**

Studies from many different developing countries have shown that mothers' literacy and maternal education are closely related to child health and survival (Sandiford *et al.*, 1995: 5). In one case, a more educated mother may have enough status and power in her family to take appropriate action when her child needs health care (Moen, 1993: 9). Alternatively, the more educated a mother is, the more likely she is to use maternal and child health services, specifically prenatal care, delivery care, childhood immunisation, and oral rehydration therapy for diarrhoea (UNICEF, 1988 cited in Moen, 1993: 10). A study conducted in Indonesia revealed that education is associated with greater awareness of proper immunisation schedules (Streatfield *et al.*, 1990). Caldwell (1979) also asserts that education itself actually leads to changes in women's values, beliefs, power, or knowledge, which in turn leads to lower child morbidity and mortality either through better domestic child care, or more effective use of health services. As such many studies that used Demographic and Health Surveys (DHS) in Tanzania (Lambert and Sahn, 2002), and in other sub-Saharan countries (Madise *et al.*, 1999) report large and significant effects of education among mothers and fathers on various nutritional indicators.

However, Bicego and Boerma (1993) have posed important questions to this causal relationship and demonstrate that it is not a simple cause and effect relationship. They ask the question, 'to what extent is this observed relationship merely a function of education's link to status? The educational status of mothers are related to living standards, in that an educated mother is more likely to have a higher income and live in better housing than those who are not so educated (Sandiford *et al.*, 1995). The complex relationship between education of mother and a child nutritional status is demonstrated in many settings. For example, a study by Sahn (1994) found no positive significant impact of mother's education on the nutritional status in Cote d'Ivoire after controlling for household income. Another study by Garret and Ruel (1999) which investigated the determinants of nutritional status for child 0-60 month's old using data from Mozambique, showed that maternal education has the greatest

positive effect on child growth for 0-23 months old children, but is not significant for the 24-60 month old children. A study using data from Ghana by Lavy *et al.*, (1996) also showed that maternal education had the largest effect on the height of babies, but the effect declined with the child's age. Using data from the 1986 Brazilian Demographic and Health Survey, Thomas *et al.*, (1991) show that almost all the impact of maternal education can be explained by indicators of access to information, reading papers, watching television, and listening to the radio.

Chowdhury (1982) found evidence in Bangladesh of a link between mother's height and birth weight to the infant, and that educated mothers bear heavier infants with a greater chance of survival because of their own greater height and fitness. Also, another study by Caldwell (1979) in Nigeria shows that mothers with primary education experienced 42 percent less child mortality and morbidity than those with no formal education while those with secondary education experienced 36 percent less child mortality than those with no formal education. In addition, data from ten developing countries showed that a much more common situation is that the fall in child morbidity and mortality levels are associated with the move from primary to secondary education of mothers is twice as important as the original step to primary schooling (Caldwell and McDonald, 1981 cited in Ware, 1984: 196). Likewise, data from developing countries show that the prevalence of stunting was related to maternal education (Witten *et al.*, 2002; Ekenayake *et al.*, 2003).

The effect of mother's education on child nutritional has also been proved to have varying effect on the gender of the child. A study by Bhuiya and Streatfield (1991) who use a prospective study in rural Bangladesh indicates that although mother's education has a positive impact on child health and survival, the positive effect may not be similar for boys and girls differently. In this study, for boys a change in mother's education from no schooling to 1-5 years resulted in a reduction in the predicted risk of 45% while for girls it was only at 7%. Similarly, a change in mother's education from no schooling to six or more years of schooling reduced the risk of dying by 70% for boys, but only by 32% for girls (Bhuiya and Streetfield, 1991: 259). In this study the different impact of mother's education on survival of different sexes was also affected by the sex discrimination in the community

## **The Impact of Sources of Water and Availability of Toilet Facility**

Many studies which have investigated the household level determinants of child nutritional status continue to show that such factors in the child's immediate environment have a significant impact on growth. Balk *et al.*, (2005) who model household-level socio-economic characteristics and their effect on child malnutrition found out children in households that were electrified and had radios were less likely to be underweight. A study using data from Ghana, Lavy *et al.*, (1996) also suggests that an improvement in water and sanitation infrastructure in rural areas was likely to lead to gains in child nutritional status.

## **Age and gender of the of Child**

The individual level factors of a child have been shown to have an impact on child's nutritional status. The relationship between a child's age and its nutritional status are well documented in the African context (Madise *et al.*, 1999). In fact, for a child of a given sex, age is an important determinant of the physiological characteristics which convert consumption into nutrition and nutrition into higher productivity (Pal, 1999: 1157). Pal's (1999) results show that female children appear to be better nourished than male children in an analysis of six African countries. However, for all six countries in the study done by Pal (1999), it was observed that between the ages of one to four months, there was no significant relationship between the mean z-scores of male and female children. On the contrary, Melville *et al.*, (1988) found that in Jamaica, boys had better nutritional status than girls. Similar findings have also been observed in India, where boys rate higher in nutritional status than their counterparts (Griffiths *et al.*, 2002). Ekanayake *et al.*, (2003) who analyse data from a random sample of 50 mothers with pre-school children in a central province in Sri Lanka found out that a boy child had a higher chance of getting severely malnourished than a girl child. These findings are similar to studies done by Christian and Alderman (2001), showing that boys are more malnourished than girls in Ethiopia (cited in Ekanayake *et al.*, 2003: 16; Yamano *et al.*, (2003).

In a study that used anthropometric data from a cross-sectional study that covered eight villages in the north-western District of Chobe in Botswana, younger children up to the age of ten had a better nutritional status than older children (Gobotswang, 1997). By the age of three years, a child in Chobe was more than twice as likely to be underweight than a 10-month-old (Gobotswang, 1997: 2). The author's results of the regression analysis further reveal that there is a negative association between age and the nutritional status of the child. It is expected that parents give less attention to older children when they give birth to a new child who needs much attention and care (Girma and Genebo, 2002: 4). Sommerfelt and Kathry (1994) and Jeyaseelan (1997) findings also attest to this relationship.

### **Child Nutrition and Morbidity**

Illness is another determinant for child malnutrition among children especially in Africa. Diseases such as diarrhoea, malaria, respiratory infections, and measles, which are common throughout the region during childhood, affect nutritional status (Madise *et al.*, 1999). This is because illness suppresses a child's appetite and results in nutrition loss so that children who are repeatedly ill tend to be undernourished. A recent study by Nandy *et al.*, (2005), that used data from a survey in India shows that children with anthropometric failures are at greater risk of morbidity and are more likely to come from poorer families. Although many studies attest to the fact that poor dietary intakes are clearly the immediate cause of poor nutritional status as measured by physical growth, some researchers have advanced the notion that infectious diseases, and in particular diarrhoeal diseases, are more important than the lack of food per se as causes of malnutrition in children (Mata *et al.*, 1977 cited in Martorell and Ho, 1984: 52).

There is now ample evidence that documents the link between HIV/AIDS and malnutrition. HIV/AIDS and malnutrition are inextricably interrelated. Research suggests that malnutrition increases the risk of HIV transmission from mothers to babies and the progression of HIV infection. In turn, HIV infection exacerbates malnutrition through its attacks on the immune system and its impacts on nutrient intake, absorption, and utilisation (Piwoz and Preble, 2000: ix) Low birth weight is common in newborns in HIV infected mothers, resulting in increased perinatal

morbidity and mortality. Data from several African countries indicate that low weight-for-age and stunting are greater among HIV-infected children when compared with the general population (ibid: 16). However, wasting (low weight-for-height) is believed to be uncommon except among those who have been hospitalised or have progressed from HIV to AIDS, and possibly also among those who are not breastfed (Lepage *et al.*, 1996 cited in Piwoz and Preble, 2000: 16).

In a recent article that analyses the role of micronutrients in HIV infection, Hussey *et al.*, (2005) argue that micronutrient deficiencies are associated with increased morbidity and mortality in relation to infectious diseases like HIV. The authors state that micronutrient deficiencies are common in persons with HIV infection and AIDS in both the developing and the developed world. They occur as a consequence of a number of factors including reduced intake as a result of anorexia that occurs with AIDS and opportunistic infections, excessive losses in the stools in patients with diarrhoea, malabsorption and parasitic infection (Winter, 1996 cited in Hussey *et al.*, (2005: 18). This finding has been confirmed in different settings. A study of stable, HIV-infected children in Cape Town revealed that 62% had two or more trace elements or vitamin deficiencies (Eley *et al.*, cited in Hussey *et al.*, (2005: 18).

## **2.6 Summary**

In summary, studies have demonstrated high levels of child malnutrition in the developing world and various key determinants. Some studies have demonstrated the effect of socioeconomic and environmental factors (Madise *et al.*, 1999; Martorrel and Ho, 1984; Copeland, 2003; Smith *et al.*, 2005; Thang and Popkin, 2003; Larrea and Kawachi, 2004; Sommerfelt *et al.*, 1994; Yimer, 2000). In some studies it has been demonstrated that the women's status in the community and the employment status of mothers may affect the care provided affecting the nutritional status of children (Moen, 1993; IFPDRI, 2003; Gunasekera, 1999, Ware, 1984, Menken and Kun).

Some studies that measure the effect of mother's education and child nutrition in the developing world have reported the significant positive effect of high educational status and good nutrition in children (Sandiford *et al.*, 1995; Moen, 1993; Streatfield

*et al.*, 1990; Caldwell, 1979; Lambert and Sahn, 2002; Chowdry, 1982 and Madise *et al.*, 1999). Some studies have however questioned, reported the lack of a significant relationship between the mother's education and the nutritional status of a child or highlighted the complex nature of the relationship (Bicego and Boema, 1993; Saniford *et al.*, 1995; Sahn, 1994; Garret and Ruel, 1999; Lavy *et al.*, 1996; Bhuiya and Streatfield, 1991). Most of these studies demonstrate that since it is difficult to control for income in the mother's education analysis, it has been difficult to control for the spurious effect between the two.

Studies have also demonstrated that household level factors like residence, access to water, electricity and toilet facilities are associated with the nutritional status of children (Balk et al, 2005; Lavy *et al.*, 1996). Finally studies have demonstrated how the individual child level factors (age, sex, birth spacing and morbidity) play an integral part in determining the nutritional status of the child (Madise *et al.*, 1999; Pal, 1999; Melville *et al.*, 1988; Gobotswang, 1997; Girma and Genebo, 2002; Sommerfelt et al, 1994; Jeyaseelan, 1997; and Piwoz and Preble, 2000).

## CHAPTER 3: RESEARCH METHODOLOGY

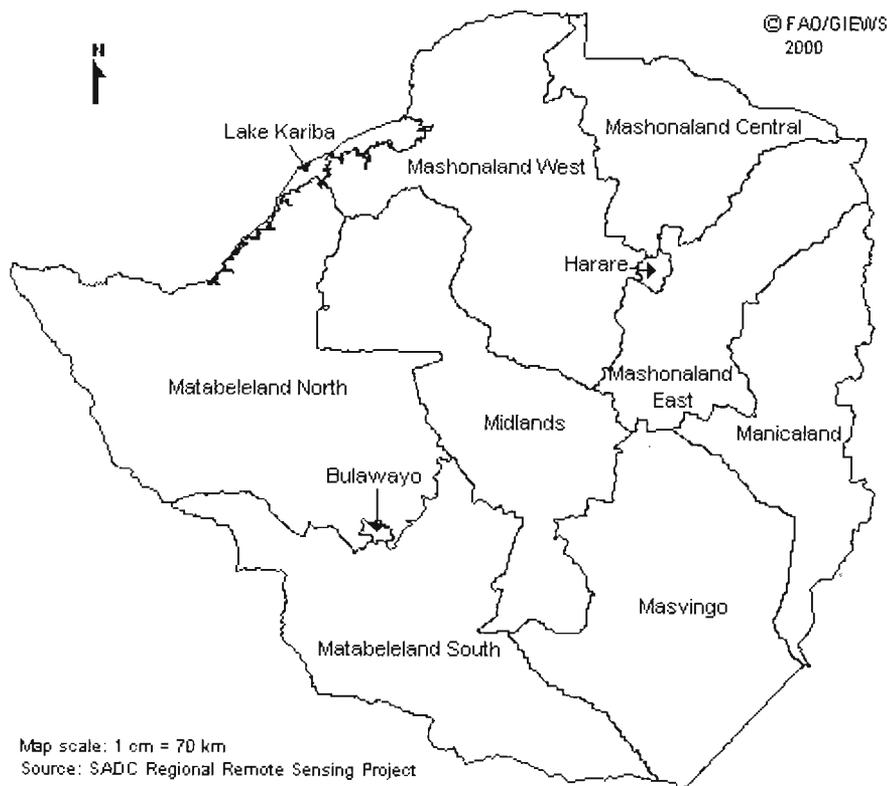
### 3.1 Introduction

This chapter explains methodological considerations relevant to the study. It looks in detail at the context of the study, and the chosen data collection and the analytical tools.

### 3.2 Context of the Study

#### Geography

Zimbabwe is one of the Southern African countries bordered by five other countries, namely, South Africa, Mozambique, Malawi, Zambia and Botswana (see figure 3.1 below).



**Figure 1: Administration Map of Zimbabwe**

Almost the entire surface area of Zimbabwe is more than 300 metres above sea level, with nearly 80 percent of the land lying more than 900 metres above sea level and

about 5 percent lying more than 1,500 metres above sea level Central Statistics Office (CSO) (2000: 1). With regards to the climate, Zimbabwe has experienced a major drought on average every six years during the 20th century (The National Economic Planning Commission, 1993 cited in Muntro, 2002: 246).

## Economy

Mining and agriculture are the backbone of the country's economy, even though the country is richly endowed with some of the world's most impressive manmade and natural tourist attractions, such as the Great Zimbabwe Ruins and Victoria Falls (CSO, 2000:1). The main agricultural exports of Zimbabwe are tobacco, maize, cotton, sugar, and groundnuts. The performance of the Zimbabwean economy has fluctuated since the country gained independence in 1980. In the immediate post independence period, Zimbabwe's real income as measured by the gross domestic product (GDP) per capita rose to a peak of ZWD 484 in 1981, fell slightly to ZWD 477 in 1982 and then declined further to fluctuate around ZWD 453 until 1990 (Bijlmakers *et al.*, 1998: 13). Table 3.1 below summarises some of the economic indicators for the period of 1988 to 1993.

**Table 2: Economic Indicators for Zimbabwe(1988-1993)**

	1988	1989	1990	1991	1992	1993
<b>Domestic Product</b>						
Real GDP(1990, in million Z.\$)	4,143	4,332	4,426	4,641	4,284	4,357
Real GDP per capita (Z.\$)	453	459	455	462	413	407
<b>Prices (1980=100)</b>						
CPI (December)	281.8	321.9	377.3	489.6	716.4	834.2
Inflation Rate	302.0	14.2%	17.3%	29.0%	46.3%	20.0%
Food CPI		364.7	435.4	572.2	984.5	1,182
Food Inflation Rate		17.3%	19.4%	31.4%	72.6%	24.5%

Source: Bijlmakers *et al.*, (1998: 14)

The economic indicators contained in table 1 above did not improve as the years progressed in Zimbabwe. Currently, Zimbabwe's economy is going through a tumultuous stage. Zimbabwe's economy has been sharply contracting since 1998 (Food and Agriculture Organisation of the United Nations: 2004: 2). This is so because the country's GDP (at 1990 prices) declined by around 40 percent between 1998 and 2004 (*ibid.*).

Different poverty lines have been calculated in Zimbabwe stemming from a poverty assessment study that was conducted in 1995. Poverty in this study was defined as the inability to afford a defined basket<sup>3</sup> of basic goods (Government of Zimbabwe, 1996). The survey indicated that 46% of the whole of Zimbabwe population was found to be very poor as they could not meet their basic nutritional requirements, and 16% were found to be poor as they were able to buy enough food but not other goods and services that are considered basic requirements (ibid). The survey also revealed that poverty was more prevalent in rural areas, where 72% of the households were found to be poor or very poor as compared to the urban areas (46%) (ibid).

With regards to the current economic situation, Robertson (2003) states that there are three separate causes of the current situation. Food scarcities are becoming more intense, fuel deliveries have fallen below even the constraint consumption levels and electricity load shedding has become so frequent that the viability of many productive and service-sector businesses is now seriously at risk (Robertson 2003: 24). Inflation, which was peaking at 620% on an annual basis in November 2000, has since then seriously affected economic activity and people's welfare (FAO: 2004: 2). There is evidence from different analysts that explanations of the current can be tracked on many separate paths, but most of their origins go back to the redistribution of land (Robertson, 2003: 27). According to this school of thought the systematic annihilation of almost all commercial farms and a downturn in tourism has caused a worsening shortage and scarcity of foreign exchange (ibid).

## **Population**

According to the CSO (2000) the population in Zimbabwe was 11.8 million in 1997, which was an increase of 1.4 million from 10.4 million in 1992. In 1997, the population of African descent was 99%, while that of European, Asian and Coloured descent made the remaining 1%. Furthermore, the Intercensal Demographic Survey

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<sup>3</sup> In this survey a food basket was identified which was considered to satisfy peoples nutritional requirements, while non-food basket was defined would satisfy requirements for consumer goods and other services, such as clothing, housing, education, health and transportation .

(IDS) estimated the crude birth rates and the crude death rates to be about 35 births per thousand population and 12 deaths per thousand population respectively, yielding a natural increase rate of about 23 per thousand (CSO, 2000: 2). Mortality figures in Zimbabwe have been reported to be on the increase since the 1990's, reversing the gains made in the decade after independence (Bijlmakers *et al.*, 1998). This trend is attributed to several factors that reinforce each other: the declining per capita expenditure on health and the declining quality of health services, the droughts, the HIV/AIDS epidemic and the general deterioration in living conditions for larger segments of the population (*ibid*).

### **3.3 Qualitative Techniques**

Qualitative research attempts to study human action from the perspective of the social actors themselves as the primary goal is in defining and understanding (Babbie and Mouton, 2001). Methods in qualitative research have the ability to provide textual descriptions of how people experience a given research issue (Mack *et al.*, 2005). These methods are especially effective in obtaining cultural specific information about values, opinions, behaviours and social context of child malnutrition in the population under study. Methods such as key informant in-depth interviews and focus group discussion form the qualitative component of this study. Key informant in-depth interviews are optimal for collecting data on individual's personal histories, perspectives, and experiences, particularly when sensitive topics are being explored (Mack *et al.*, 2005: 2). Many researchers have also demonstrated how in-depth interviews with key informants can be used to clarify the findings which emerge with quantitative data and focus group discussions (Scrimshaw and Gleason, 1992).

The term "focus group" is applied to formally constituted, structured group that is brought together to address a specific issue within a fixed time frame and in accordance with clearly spelt out rules and procedure (Khan and Manderson, 1992: 119). Focus groups are an instrument designed to gather information primarily about beliefs, values and understanding (*ibid*). In the context of this study, focus group discussions were used to gain a deep understanding of the study. The methods were ideal for this study for a number of reasons. Firstly, they provided the information with regards to community perceptions, opinions, and attitudes on the problem of

child malnutrition. As eloquently pointed out by Babbie and Mouton (2001: 292) focus group discussions have the ability to:

...provide direct evidence about similarities and differences in the participant's opinions as opposed to reaching conclusions from post hoc analyses of separate statements from each interviewee. Secondly, these are also methods are flexible.

In the context of this study, focus group discussions and key informant interviews were used to understand the sample characteristics of the ZDHS datasets and to clarify some of the themes emerging from the quantitative findings. A qualitative assessment was ideal and instrumental for this study for a number of reasons. Firstly, although the study involves some trend analysis of child malnutrition, the 2005 ZDHS dataset had not been released to the public, and qualitative interviews with child malnutrition programme implementers at the country level enhanced the current relevance of the study given that the latest dataset used in the study, that of 1999, may be largely out of date. Secondly, the qualitative methods provide information which exposes perceptions, opinions, and underlying attitudes and behaviours of the country level child malnutrition programme implementers as well as some community members in Zimbabwe. The qualitative methods also offered flexibility and provided the room for discussions which increased the chances of collecting extra and useful data on the study which was not necessarily revealed by analysis of the quantitative dataset.

Qualitative data from key informant interviews and focus group discussions was analysed according to themes drawn from the objectives. A content thematic analysis (Ulin et al, 2000) approach was utilised to interpret data from the qualitative interviews to produce detailed culturally specific information about the values, opinions, behaviours and social context of stakeholders in Zimbabwe with regards to child malnutrition.

### **3.4 Quantitative techniques**

Quantitative methods result in numeric information, which is usually machine-readable and can be analysed by acceptable statistical test and models (Maxwell, 1998). There are many advantages of using quantitative methods. In summary these include efficiency, approximation and (or modelling) and a powerful language in

research analysis (Tredoux and Durrheim, 2002). Survey data from the 1988, 1994 and 1999 ZDHS's were used in the quantitative analysis of the study. As mentioned before, anthropometric measures from each of the datasets were computed and form the basis of most of the quantitative data analysis. The quantitative data in this study was used to describe the sample malnutrition, trends, patterns of distribution, and causal relations between malnutrition indices and independent variables.

The study seeks to establish trends and interactions between child malnutrition measures and poor socio-economic indicators. Using ZDHS data, anthropometric measures in z-score indices from the 1988, 1994 and 1999 datasets are examined in relation to various independent variables. The study employed a combination of bivariate and multivariate analysis.

### **3.5 Triangulation**

The study employs a mixed-method approach by using both the quantitative as well as the qualitative paradigms. The study was initially envisaged to apply a solely quantitative approach in analysis. It was subsequently expanded to include a qualitative assessment, largely as recognition of the paucity of information on current dynamics on child health of the available quantitative datasets of the 1988, 1994 and 1999 ZDHS. Mosley and Chen (1984) also recommend a multidisciplinary approach to the study of child health.

The main sources of data for the study was the Zimbabwe Demographic Health Surveys (ZDHS) of 1988, 1994 and 1999. Quantitative analysis of these datasets enabled the analysis of trends, levels and determinants of malnutrition. To compliment this, a qualitative component of the study, using face to face in depth interviews and focus group discussions were conducted with relevant stakeholders in two regions in Zimbabwe. There were also secondary data sources in the form of maps, existing nutrition reports and project information, and policy documents were collected from the Nutrition Department, at the Ministry of Health and Child Welfare that were collected as part of literature search for the study.

While acknowledging the strengths and weaknesses of each of the approaches in this study, there were further reasons for choosing a mixed method of qualitative and quantitative techniques for this study. Although qualitative and quantitative methods in social sciences had long been separate spheres, recent innovations have highlighted the complementarity of these methods (Maxwell, 1998). Maxwell (1998) notes that:

In general, quantitative methods can be used to draw statistical inference—that is, drawing empirical conclusions about the entire population based on a sample. In general, qualitative methods cannot be used to draw statistical or empirical inference, but can be used to draw logical or analytical inference (p5).

This definition by Maxwell (1998) begins to suggest the ways in which qualitative and quantitative methods complement each other within this study of child malnutrition in Zimbabwe. The techniques were chosen to benefit from the strengths of each other and to minimise the weakness inherent in applying them individually. This is illustrated in the table below similar to that presented by Carvalho and White (1997).

**Table 3: Quantitative and Qualitative Methods Strengths and Weaknesses**

<b>Methodology Characteristics</b>	<b>Strengths</b>	<b>Weaknesses</b>
Quantitative	Makes aggregation possible	Sampling and non-sampling errors
	Provides results whose reliability if measurable	Misses what is not easily quantifiable
	Allows simulation of different policy options	Fails to capture intra-household issues
Qualitative	Richer definition of problem	Lack of generalisation
	More insight into causal process	Difficult in verifying information
	More accuracy and depth of information on certain questions	

Source: Carvalho and White (1997)

Following below is a description of both quantitative and qualitative data sources that were used in the study.

### **3.5 Sources of Data**

Although it is virtually impossible to determine from one-time measurement the relative contribution of factors that affect growth attainment of an individual child, it

is possible to make some judgements about nutrition and health at the population level from large samples of cross-sectional measurements (McMurray, 1996). The quantitative component of this study utilises all the three ZDHS were conducted in Zimbabwe by the Central Statistical Office (CSO) in the years 1988, 1994 and 1999. All the surveys were undertaken as part of the worldwide Demographic and Health Surveys (DHS) programme, which has been implemented in Africa, Asia, Latin America, and the Near East (Central Statistics Office, 2000). The data collected from mothers and the anthropometrical data on height and weight collected of children in the 1988, 1994 and 1999 ZDHS permit the measurement and the evaluation of the nutritional status of children.

As with all DHS's, the Zimbabwe data for the 1988 ZDHS is a nationally representative survey, self-weighting sample of women 15-49 years who were interviewed between September 1988 and January 1989 (Central Statistical Office and Macro International Inc., 1989). Although the main objective of the ZDHS was to obtain data for estimating levels of fertility and mortality, the survey also collected nutritional data including height, weight, and ages of children. Other socio-economic and environmental level data were also collected. During this survey, individual questionnaire were completed for 4201 women with an overall response rate of 94%. Of the 3140 living children under the age of 5 years that were part of this ZDHS, 1492 children aged 3-35 months are included in the analysis in this study.

The ZDHS 1994 was a second wave survey of the DHS surveys in the country. This was also a nationally representative survey of 5984 households conducted by Central Statistical Office for the Government of Zimbabwe, with technical assistance from Macro International. The fieldwork for this second survey was conducted between July and November in 1994 (Macro International Inc, 1996). Of the 2328 living children aged 0-35 months that were part of this ZDHS, 1897 children aged 3-35 months are included in the analysis. The nutritional data that was collected, including height, weight, age, and other independent variables were also utilised to explore levels, patterns of distribution and determinants of child malnutrition in Zimbabwe.

A third round of the DHS was carried out in Zimbabwe in 1999. The 1999 ZDHS was once again conducted by the Central Statistical Office and was conducted between

August and November in 1999 (Central Statistics Office Zimbabwe and Macro International Inc., 2000). This survey had a sample of 6208 women and 2970 men. Of the 3269 children in the sample aged between 0-5 years, the analysis of this study includes 1455 children aged between 3-35 months.

### **3.6 Qualitative Data Sources**

An official request was made to the Ministry of Health and Child Welfare, through the Food and Nutrition Council in Harare, Zimbabwe. The Minister of Health granted permission and support in terms of staff members to assist in information dissemination for the researcher, as well as giving in-depth information. A request was also granted to the child nutrition partner in Zimbabwe, UNICEF who also granted their assistant through assistants in information to the researcher

#### **Selection of Regions to conduct qualitative interviews**

Samples may be selected in two ways, namely probability and non-probability sampling. According to Marlow (1998: 136) probability sampling allows a researcher to select a sample where each element in the population has a known chance of being selected for the sample. This increases the representativeness of the sample. Instead of this method, a non-probability or purposive sampling method may be used. According to Robson (1993) purposive sampling allows for the researcher's judgement as to "typicality or interest". Hence, a researcher can handpick the sample according to the nature of the research problem and the phenomenon under study, (Marlow, 1998). This study employs purposive sampling in the qualitative assessment component. This was done because of the particular interest in gaining an understanding of the views of relevant stakeholders that are working to address malnutrition at a country level as well the views of child care givers.

The selection of the qualitative assessment of the study was also done to optimise access to information regarding the scope and magnitude of malnutrition in Zimbabwe within the time and resource limits of the study. An effort was made to ensure that different opinions from various stakeholder, different areas and social groups made

input into the study. The study therefore conducted interviews in both a rural and urban setting as well as in two regions in Zimbabwe.

### **Selection of Rural sites for the qualitative assessment**

Mashonaland Central and Matabeleland North were the two provinces that rural areas that were chosen for the qualitative assessment of the study. Data from anthropometry in these areas show that these areas have been worst affect in child malnutrition in the recent past (Food and Agricultural Organisation of the United Nations, 2001). In particular, recent nutrition profiles carried out in Zimbabwe show high levels of child malnutrition in Matabeleland North (24% underweight) as compared to other areas in the country (ibid). The province of Matabeleland North had a population of approximately 700000 in the year 2002 and is divided into seven districts. Focus group discussions were held in Tsholotsho, a communal village in this province.

Shamva is the other communal area in the province of Mashonaland Central was the qualitative assessment was carried out. The village located in the Mazowe valley about 80 km north-west of Harare (Wikipedia, ND). In 2002 the Mashonaland Central is a province that had a population of 998 263 while the Shamva area had a population of 4,617 (ibid).

### **Selection of urban sites for the qualitative assessment**

Harare and Bulawayo were the urban areas that were selected for the study. Two areas, the Budiriro suburb in Harare and Mzilikazi suburb in Bulawayo were selected as research sites for the qualitative interviews. This areas were selected as they constitute typical high density areas in the country, where the majority of the urban population reside.

### **3.7 Selection and Training of Research Assistants**

There were four research assistants that were employed for the purpose of conducting the qualitative component of the study. The research assistants were expected to

administer in-depth interviews with the Ministry of Health officials and UNICEF officials spear heading child nutrition programmes in Zimbabwe. The research assistants comprised of two females and two males. Two of the research assistants were undergraduate students in the social science while two had acquired Zimbabwe Secondary Advanced Level qualifications.

Training of research assistance lasted three days. The purpose of the training was to explain the objectives of the study, equip the research assistants with skills to establish rapport with the participants, and to familiarise them with the research instruments by translating the English questionnaires into Shona for the Harare Region interviews, and into Ndebele for the Bulawayo Region interviews.

### **Pre-testing**

A day after training, a day was taken in the field to pre-test the in-depth interviews and the focus group discussions interview guides in Harare. The purpose of the pre-test was to assess the relevance, validity and cultural acceptability of the questions. The pre-test proved useful because some of the questions which seemed vague were then rephrased for future clients to easily comprehend. The interviews schedules used are shown in Appendix A.

### **3.8 Methodological Limitations**

The multi-disciplinary approach that was employed used in the study unearths vast amounts of information which makes it difficult to analyses given the time schedule of the study.

### **3.9 Data Analysis**

#### **Data Cleaning and transformation of ZDHS Datasets**

Data from the ZDHS was cleaned in several phases. Initially, key variables (age, sex, urban-rural location, education of mothers, and other socio-economic factors) from all three datasets were examined and corrected. Procedures from the Statistical Package

for Social Sciences (SPSS) utilising functions of descriptive statistics, scatterplots, and histograms were used to detect errors in the datasets before correcting them. Children or women who had missing key characteristics were eliminated from the samples of analysis.

After the ZDHS datasets were accessed, there was also need for the transformation of data by changing some of the variables to enable analysis. To enable the analysis of the prevalence of malnutrition, data on height, weight and age of children were utilised. The use of Epi Info software enabled the transformation of these variables into z-scores. The z-scores (standardised scores) are normalised nutritional indicators of children with respect to a reference population. Cases were then assigned as above or below -2 standard deviations of the mean to analyse the prevalence per dataset. The dataset were then imported into the Statistical Package for Social Sciences (SPSS) software for further analysis. The study employed the methods recommended by Tulane University (ND) in the analysis of nutritional status of children in Zimbabwe between 1988 and 1999.

### **The CDC Anthropometric Software package (Epi –Info)**

The analysis in the study utilised the NutStat program (nutrition analysis tool) of the Epi Info CDC anthropometric software package. Among other calculations, the program calculates numbers of the standard deviations from the mean (z-scores) using the references the sex specific 1978 CDC/WHO normalised version of the 1977 NCHS reference curves for height-for-age, weight-for-age, and weight-for-height (Dibley *et al.*, (1987). The value of the z-score shows the number of standard deviations the child is away from the median of the reference population. The z-score is defined as:

#### **Equation 1: Definition of Z-score**

$$\text{Z-score} = \frac{\text{Individual Anthropometric value} - \text{Median of Reference Population}}{\text{Standard Deviation of the Reference Population}}$$

Therefore in this study z-scores were obtained by comparing the anthropometric measures of children from the 1988, 1994 and 1999 ZDHS with distributions of international World Health Organisation Reference populations. A child was then considered malnourished if their weight-for-age z-score, weight-for-height z-score and height-for-age z-score were lower than two standard deviations from the reference median. The creation of z-scores in Epi Info, cases were selected to ensure that the minimum and maximum fall between +5 and -5 standard deviation of the mean for weight-for-age z-scores (WAZ), weight-for-height z-scores (WHZ), and height-for-age z-scores (HAZ). This also ensured that the mean and median values were not drastically different, ruling out any chances of severe polarity of the data to one extreme or the other (Tulane University, ND).

### **3.10 Bivariate analysis**

A bivariate analysis entails the analysis of the relationship between two variables (Tredoux, 2002). The analysis employed thus attempts to find out how the socio-economic variables (independent variables) contribute to the factors responsible for child malnutrition (the dependent variable). At this stage cross tabulations of the dependent and independent variable were used. This was done in order to establish those independent variables that are significant in contributing towards an increase or decrease of child malnutrition among children.

### **3.11 Multivariate analysis**

The multivariate analysis is used to show either the combined effects of a set of independent variables on the dependent variable, or, to show separate effects of each independent variable on the dependent variable by eliminating the obscuring of other variables likely to influence of the dependent variable.

Since the dependent variable in the study is a continuous variable (z-scores ranging from -5 to +5), the linear regression models as opposed to a logistic regression models was used to model the effects of independent variables on the nutritional status of children between 1988 and 1999. The application of the logistic regression is feasible

with anthropometry, since the cut-off point (-2 standard deviation from the mean) can be used to transform the Z-scores into dichotomous dependent variables so that odds can be estimated with the logistic regression models (Choudhury and Bhuiya, 1993). However, given that the approach of using cut-off points as a dependent variable in nutritional analysis makes the questionable assumption that the data are sufficiently reliable to allow meaning classification to either side of a cut-off point and that there are real differences between the children on either side, a better approach to analyse nutrition from cross-sectional data is to treat anthropometric indicators as continuous variables, and focus on covariation (McMurray, 1996: 161). In this view, linear regression is a suitable analytical technique for this purpose, with categorical independent variables converted into dichotomous dummy variables. The multiple linear regression models are employed in this study. The dependent variable in the model is the z-scores for each individual child, for weight-for-age z-scores (WAZ) and height-for-age z-scores (HAZ). The independent variables that have been tested for modelling the best fit of the regression line in this study are illustrated in the table below.

**Table 4: Variables tested in the Multiple Regression Models for ZDHS 1988, 1994 and 1999**

<b>Demographic Factors</b>
Age of the child in months
Sex of the child
<b>Socio-economic and environmental factors</b>
Sources of drinking water which determine exposure to disease
Toilet facilities
Education of Mother
Region
Rural-Urban residence
Electricity
Mother's employment

### 3.12 Summary

The chapter has described the context of the study and it has presented a review of the methods and approaches that were employed in the study. It also looked at the way data was collected and analysed. The chapter also explored factors that influenced the selection of the study area, methodological considerations that included the sampling

strategy and the limitations of the study. Above all, this chapter has demonstrated the usefulness of both quantitative and qualitative approach to research and gave reasons for their integration in this study.

## CHAPTER 4: QUANTITATIVE RESEARCH FINDINGS

### 4.1 Introduction

This section describes the samples that were used in the ZDHS of 1988, 1994 and 1999. Then presented will be the levels of malnutrition through bivariate analysis; and then an examination of the changing determinants of malnutrition by employing multivariate analyses for the three data sets used in the study.

### 4.2 Description of Samples

Table 4.1 below gives a summary of the characteristics of the datasets that were used in this study. The table gives a summary of the child's age, child's sex, mother's age, mother's educational levels, mother's employment status, place of residence, drinking water facilities and toilet facilities of children with valid and complete measurements in the 1988, 1994 and 1999 ZDHS datasets.

#### **Child specific Characteristics**

The working samples used in this analysis contains 1492 children aged 3-35 months in 1988, 1897 children ages 3-35 months in 1994 and 1455 children aged 3-35 months in 1999. In the 1988 and 1994 sample female children slightly outnumber the males while in the 1999 sample, male children are slightly more than the female children.

**Table 5: Selected Characteristics of Children (1988, 1994 and 1999)**

Children's Characteristics	1988		1994		1999	
	N	%	N	%	N	%
<b>Child's Age</b>						
3-5	141	9.5	193	10.2	144	9.9
6-11	260	17.4	390	20.6	242	16.6
12-17	293	19.6	316	16.7	296	20.3
18-23	242	16.2	333	17.6	263	18.1
24-29	304	20.4	325	17.1	268	18.4
30-35	252	16.9	340	17.9	242	16.6
	<b>1492</b>	<b>100.0</b>	<b>1897</b>	<b>100.00</b>	<b>1455</b>	<b>100.0</b>
<b>Child's Sex</b>						
Female	764	51.2	966	50.9	718	49.3
Male	728	48.8	931	49.1	737	50.7
	<b>1492</b>	<b>100.0</b>	<b>1897</b>	<b>100.0</b>	<b>1455</b>	<b>100.0</b>
<b>Mothers Age (years)</b>						
15-19	110	7.4	164	8.6	149	10.6
20-24	397	26.6	567	29.9	472	32.4
25-29	389	26.1	419	22.1	369	25.4
30-34	312	20.9	390	20.6	206	14.2
35-39	184	12.3	219	11.5	163	11.2
40-44	73	4.9	118	6.2	73	5.0
45-49	27	1.8	20	1.1	23	1.6
	<b>1492</b>	<b>100.0</b>	<b>1897</b>	<b>100.0</b>	<b>1455</b>	<b>100.0</b>
<b>Mothers education</b>						
Secondary +	301	20.2	660	34.8	679	46.7
Primary	925	62.0	995	52.5	657	45.2
None	266	17.8	242	12.8	119	8.2
	<b>1492</b>	<b>100.0</b>	<b>1897</b>	<b>100.0</b>	<b>1455</b>	<b>100.0</b>
<b>Mothers Currently Working</b>						
Yes	.*	-	952	50.2	774	53.2
No	.*	-	945	49.8	681	46.8
			<b>1897</b>	<b>100</b>	<b>1455</b>	<b>100.0</b>
<b>Place of Residence</b>						
Urban	346	23.2	421	22.2	346	23.8
Rural	1146	76.8	1476	77.8	1109	76.2
	<b>1492</b>	<b>100.0</b>	<b>1898</b>	<b>100.0</b>	<b>1455</b>	<b>100.0</b>
<b>Has Electricity</b>						
Yes	.*	-	373	19.7	1066	73.3
No	.*	-	1524	80.3	389	26.7
			<b>1897</b>	<b>100.0</b>	<b>1455</b>	<b>100.0</b>
<b>Drinking water source</b>						
Good water	1083	72.6	1397	73.6	1117	76.8
Bad water	409	27.4	500	26.4	337	23.2
	<b>1492</b>	<b>100.0</b>	<b>1897</b>	<b>100.0</b>	<b>1455</b>	<b>100.0</b>
<b>Toilet Facility</b>						
Good toilet	880	59.0	1035	54.6	914	62.9
Bad Toilet	612	41.0	862	45.4	540	37.1
	<b>1492</b>	<b>100.0</b>	<b>1897</b>	<b>100.0</b>	<b>1455</b>	<b>100.0</b>

Source: ZDHS 1988, 1994 and 1999

.\*Variable missing in dataset or variable not comparable with similar variables in other datasets.

Figure 4.1 below illustrates the clumping of child ages in the three datasets that were employed for this study.

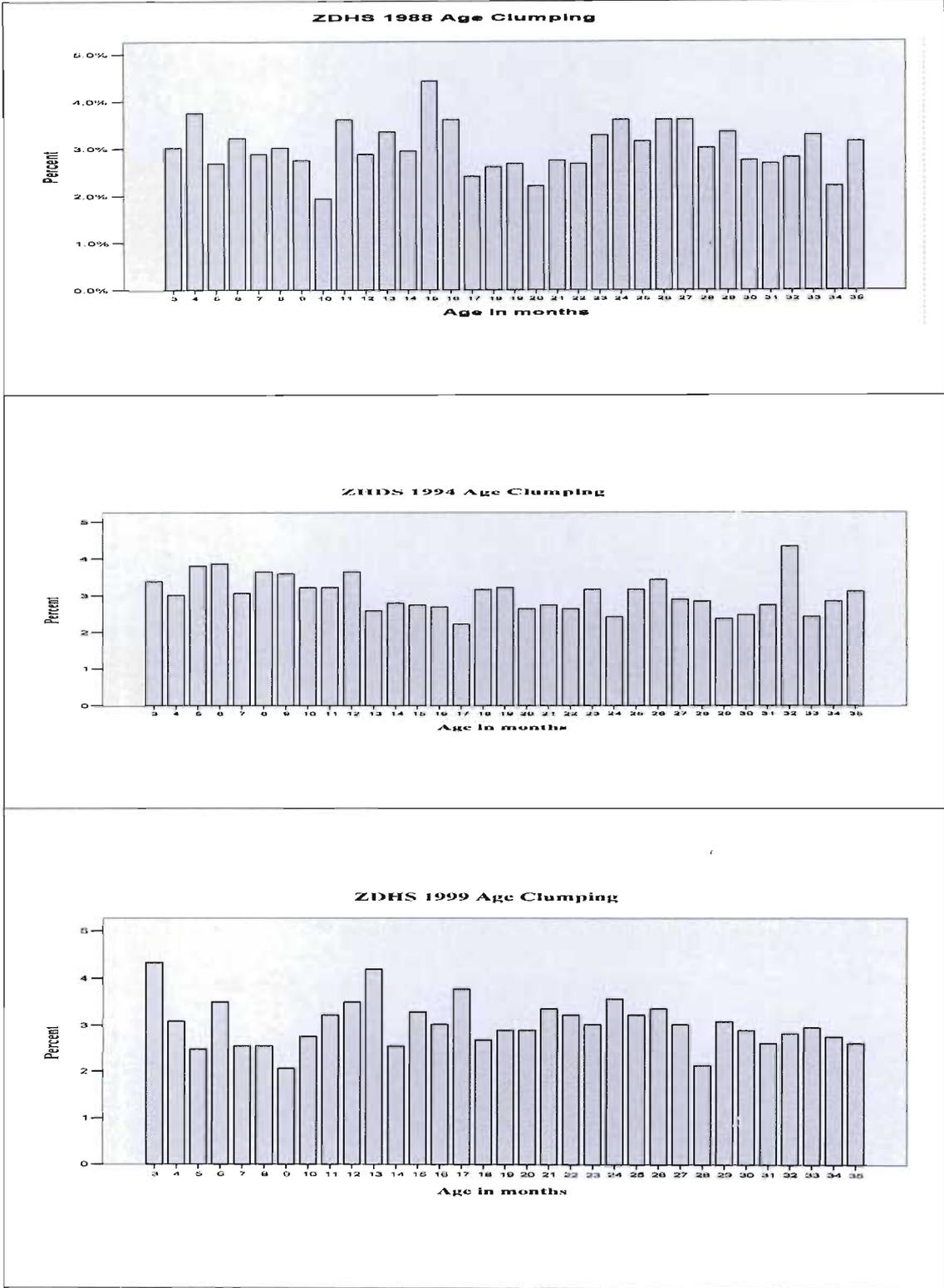


Figure 2: Age Clumping Display 1988, 1994 and 1999 ZDHS Datasets

The illustration above indicates the effects of the phenomenon of age heaping, rounding off up of a child's age due to recall bias from mothers reporting their child's

age during the surveys. The effect of age heaping is not outstanding for the three datasets. There are obvious slight peaks in all three datasets at the one year (12 months) and half year (6 months) intervals. The dataset do not display massive rounding up of the child age by mothers and therefore it is assumed that there was low prevalence of the child being misclassified as malnourished since age heaping can substantially affect the calculations of WAZ and HAZ (Tulane University, ND).

### **Parental Characteristics**

The educational level of the mothers in this study is defined as the highest level of schooling attended by the mothers that participated in the survey. The mothers education was categories into three groups, that is, no education, primary education and secondary education and higher. The three surveys reveal that mothers' education in all three surveys in Zimbabwe is quite high. Most of the mothers have attained primary education in the first two waves of the survey (62% in 1988, 53% in 1994) while most of the mothers in the 1999 survey have secondary education and higher (47% in 1999)). It also apparent from table 4.1 above that the proportion of mother in the sample who did not have any education has declined consistently through the years (17.8% in 1988, 12.8% in 1994 and 8.2% in 1999). The proportion of mothers with secondary education or higher has also increased throughout the years (20.2% in 1988, 34.8% in 1994 and 46.7% in 1999).

The average ages of mothers in surveys were about 28 years in 1988 and 1994, while it was 27 years in the 1999 survey. An analysis of mother's workings status was done for the 1994 and 1999 surveys, and the mother's employment status was categorised into those who were currently working and not currently working. This classification did not distinguish between those working outside the home and those working for cash or working for other family members. The 1988 dataset had too many missing values for the "Respondent currently working" variable and hence was left out in the analysis. The proportion of mothers who were currently working in the surveys was 50% 1994 and in 53% in 1999.

### **Household and Community Characteristics**

As already mentioned, the majority of Zimbabwe's population resides in the rural areas. Table 4.1 above shows the proportion of households in the survey and their rural or urban residence status. The 1988 sample consists of 77% households from rural areas; the 1994 sample has 78% of households from rural areas while the 1999 sample has 76% households from the rural areas. These results indicate the similarity (a majority) of rural-urban residence of the populations sampled in the three surveys.

Consequently the proportion of modern amenities of the sample is evidently those of a rural sample. The proportion of households with piped water in their dwelling was 22% in 1988 and 1994 and 14% in 1999. However, in general, the country has made great progress in providing safe water as on average the proportion of households with safe sources of water (piped or protected wells/boreholes) was 73% in 1988, 74% in 1994 and then 77% in 1999. The proportion of household with good toilets (flush toilets, pit latrines, Blair toilets) as opposed to a bad one (no facilities) was 59% in 1988, then 55% in 1994, before it increased to 63% in the 1999 sample. A small proportion of the sample groups also have flush toilets in their households.

#### **4.3 The Distribution of Nutrition Indicators (1988, 1994, 1999)**

The findings from the 1988, 1994 and 1999 ZDHS suggest that the pattern of nutritional status of children has changed since the first survey in 1988. Figure 4.2, 4.3 and 4.4 shows the prevalence rates by age group of height-for-age, weight-for-age, and weight-for-height distributions for the samples in Zimbabwe in 1988, 1994 and 1999. The percentage of children who were stunted in 1988 was 26%, 23% in 1994 and 27% in 1999. In this case, stunting levels decreased in the 1994 sample and then increased again in 1999 sample. The proportion of children who were underweight in the 1988 sample was 12%, 17% in 1994 and 16% in the 1999 sample. The proportion of children who were wasted was 1% in 1988, 6% in 1994 and 7% in 1999 amongst the age groups of children 3-35 months. In this case the levels of wasting in children have increased in all cross sectional surveys carried out in 1994 and 1999 as compared to the 1988 survey.

Another striking pattern that is visible in all three datasets from the figures below is that stunting is more prevalent than wasting and underweight patterns across all years of the ZDHS. The figures below also illustrate that the prevalence of nutritional deficits in the Zimbabwean samples changes with the age of the child. All the surveys display a vulnerable age group (13 months- 24 months) where malnutrition measures peak. Although the 1999 sample shows a slight improvement beginning to show after the third year of the child life, the same is not apparent in the 1994 and 1999 sample.

Although the percentage of children who have stunted decrease in 1994, the percentage increased slightly in 1999. The percentage of children who have wasted and who are underweight has also increased slightly through the years. The figures also show that nutrition deteriorates sharply (shown by peaks in the malnutrition measures-height-for-age, weight-for-age and weight-for-height) after the first six months of the life of the child.

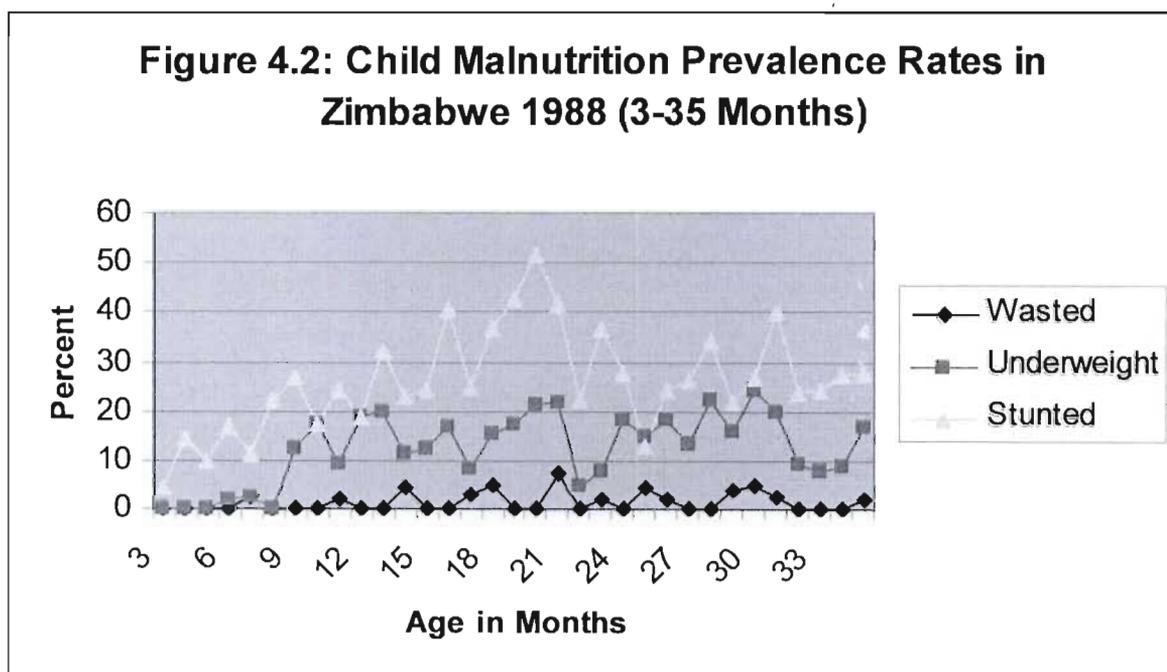
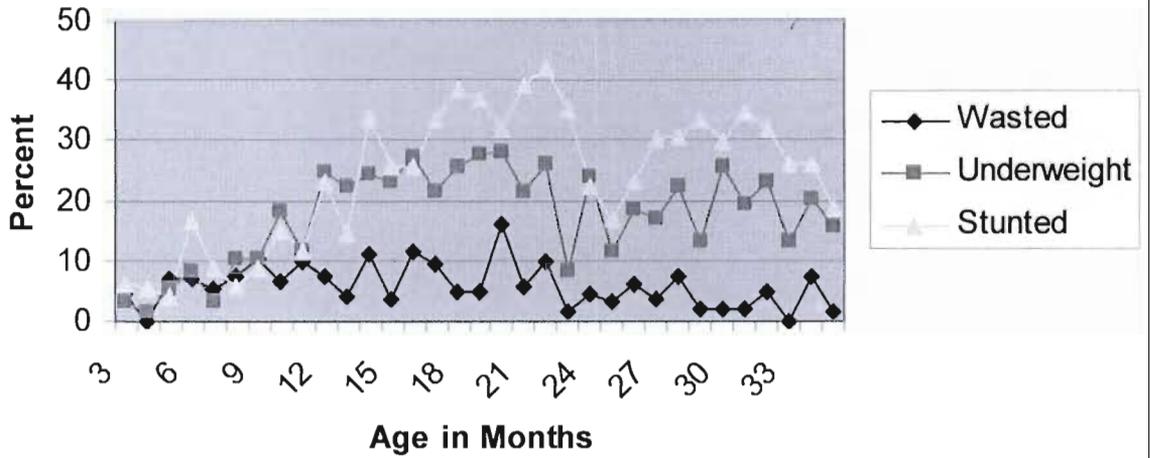
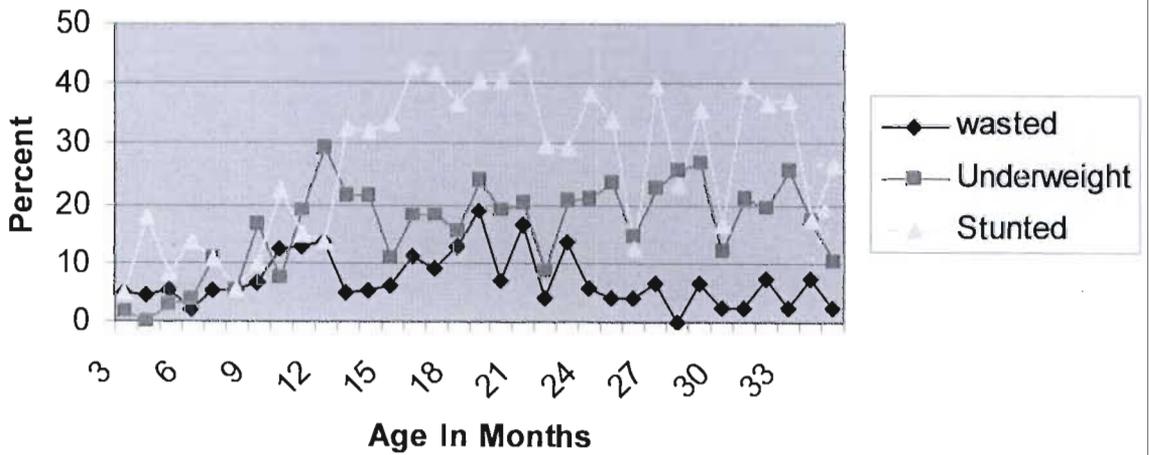


Figure 4.2-4.4: Child Malnutrition Prevalence Rates

**Figure 4.3: Child Malnutrition Prevalence Rates in Zimbabwe 1994 (3-35 Months)**



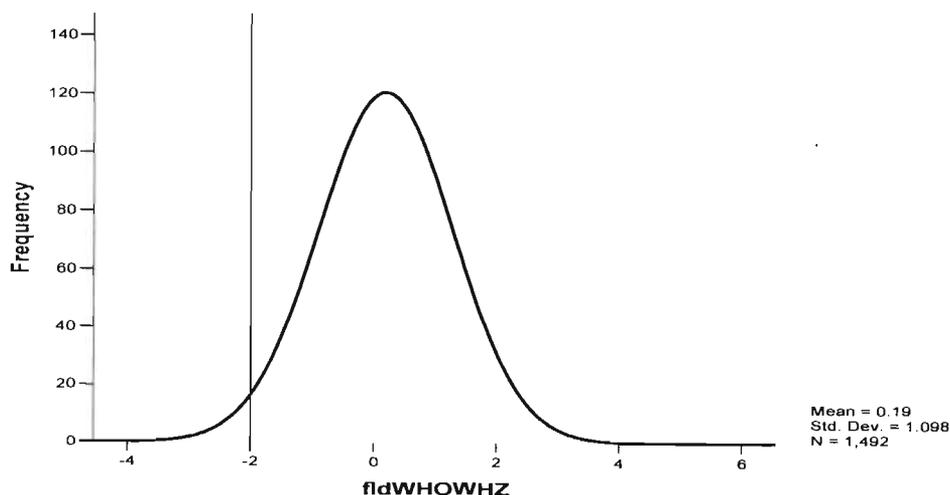
**Figure 4.4: Child Malnutrition Prevalence Rates in Zimbabwe 1999 (3-35 Months)**



Wasting, an indication of short term nutritional deficiency, is higher among the older children in comparison to younger children in all the years surveyed. Wasting is usually a result of acute malnutrition and is typically brought on by a short-term food crisis. The largest proportion of children with nutritional deficiency (stunting, underweight and wasting) is observed for children 6-23 months in 1988, 12-23 months in 1994, and 12-29 months in 1999.

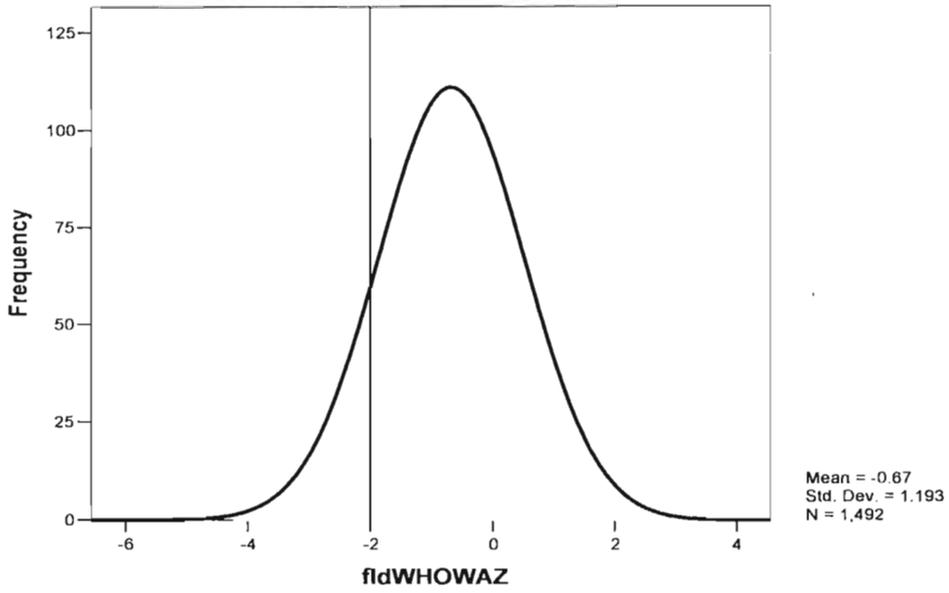
Figure 4.5, 4.6 and 4.7 show the height-for-age, weight-for-age and weight-for-height distributions in Zimbabwe in 1988 as compared to the reference median.

**Figure 4.5: Distribution of Weight-for-height Zimbabwe 1988**

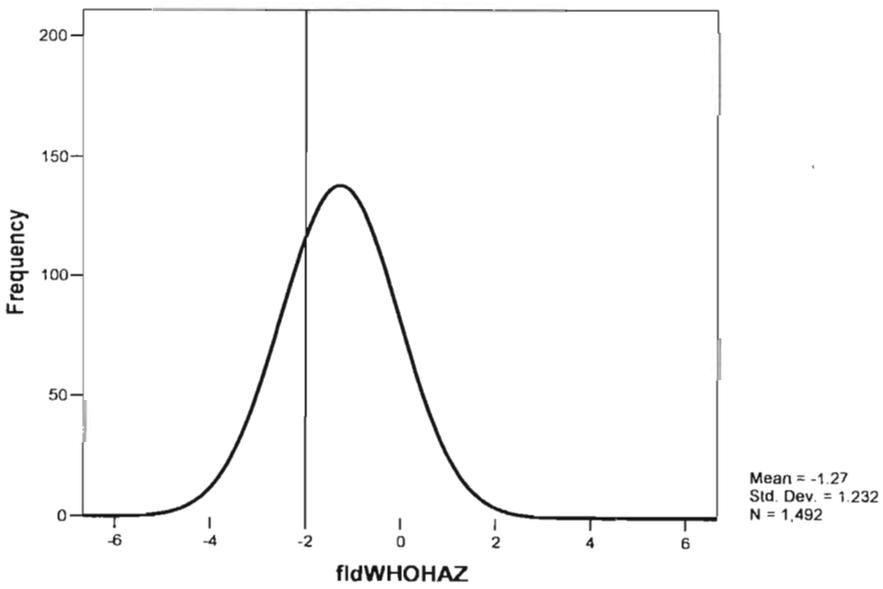


**Figure 4.5-4.13: Distribution of Anthropometric measures in Zimbabwe**

**Figure 4.6: Distribution of Weight-for-age Zimbabwe 1988**



**Figure 4.7: Distribution of Height-for-age Zimbabwe 1988**



It is apparent that the distributions for the three indicators in child malnutrition in Zimbabwe in 1988 are close to the normal curve in shape, although those for height-for-age and weight-for-age are noticeable displaced to the left of the reference median. The patterns portrayed in the figures above indicate that a large proportion of the samples in 1988 failed to achieve the reference median height and weight for their age. Figure 4.8, 4.9 and 4.10 below show similar trends for the 1994 patterns in Zimbabwe.

**Figure 4.8: Distribution of Weight-for-height z-scores Zimbabwe 1994**

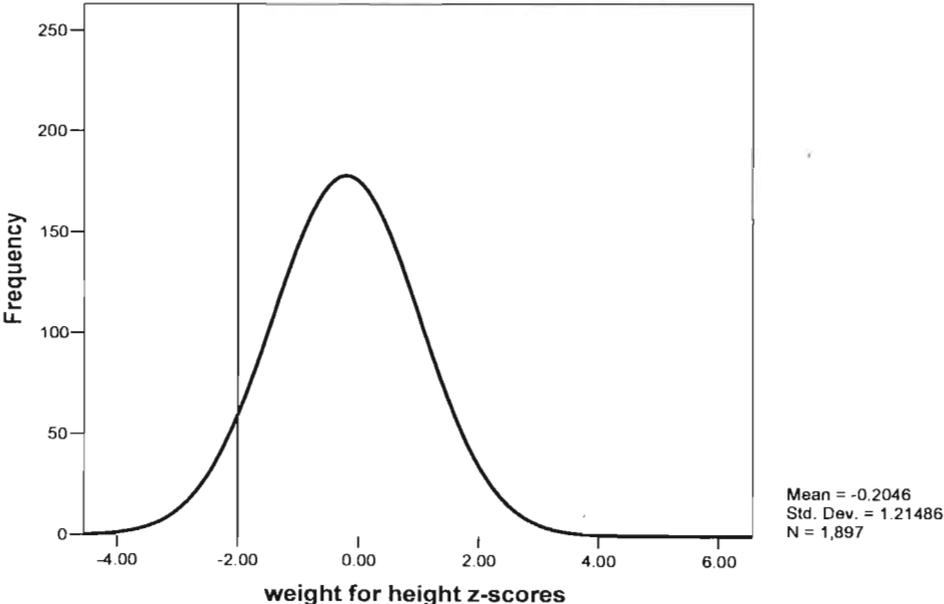


Figure 4.9: Distribution of Weight-for-age Zimbabwe 1994

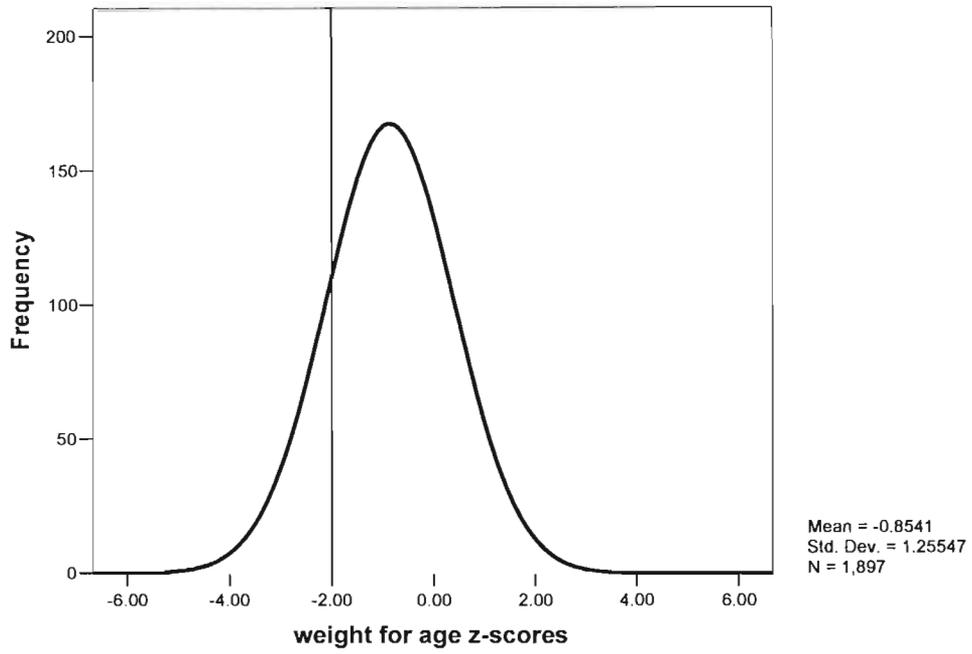


Figure 4.10: Distribution of Height-for-age Zimbabwe 1994

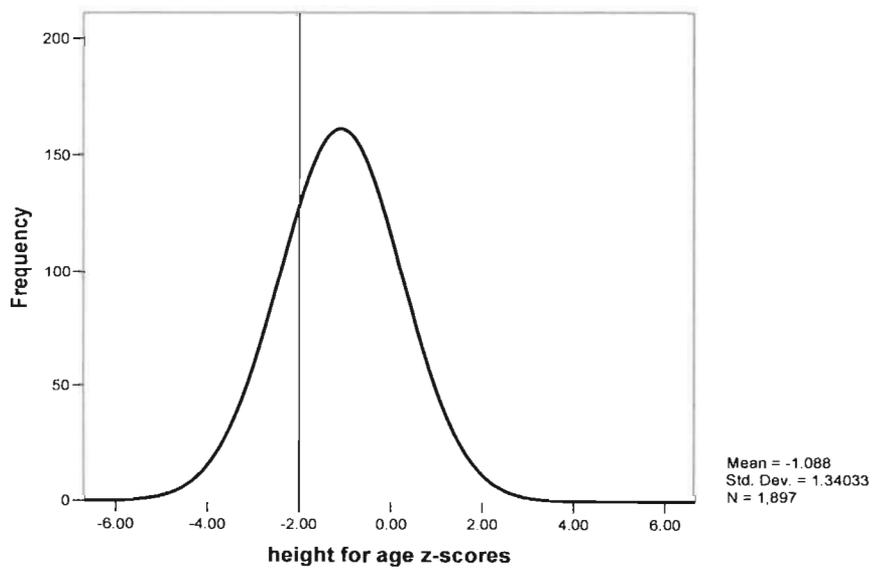
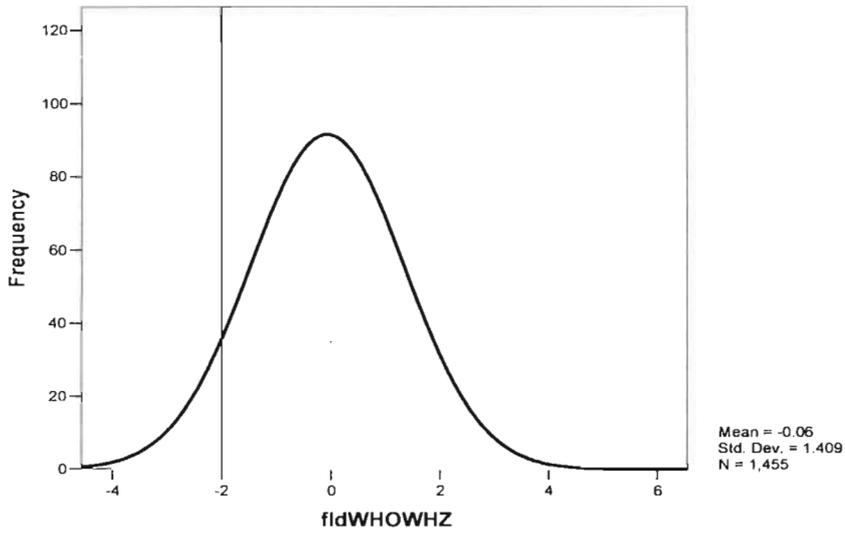
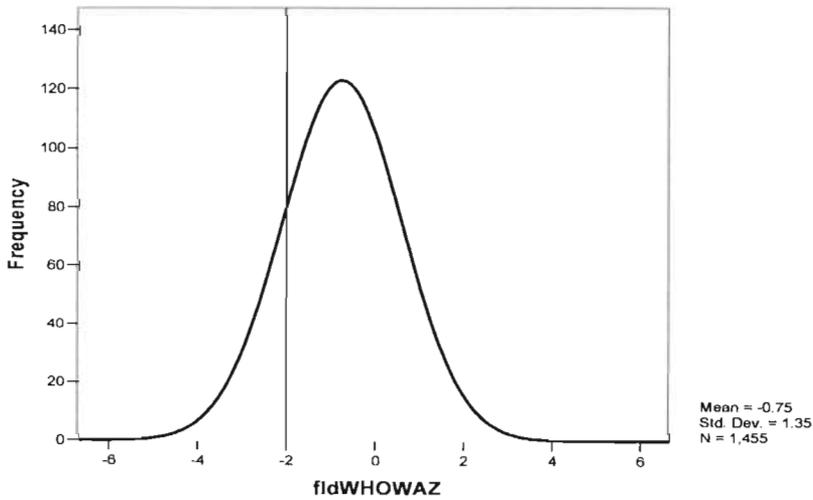


Figure 4.11, 4.12 and 4.13 below illustrate the patterns of distribution of the child malnutrition indicator for Zimbabwe in 1999.

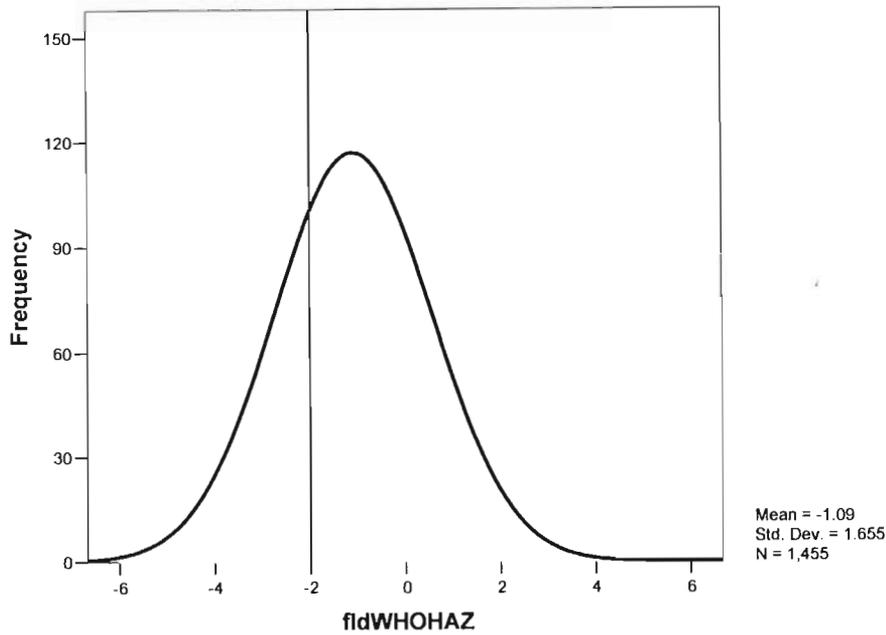
**Figure 4.11: Distribution of Weight-for-height Zimbabwe 1999**



**Figure 4.12: Distribution of Weight-for-age Zimbabwe 1999**



**Figure 4.13: Distribution of Height-for-age Zimbabwe 1999**

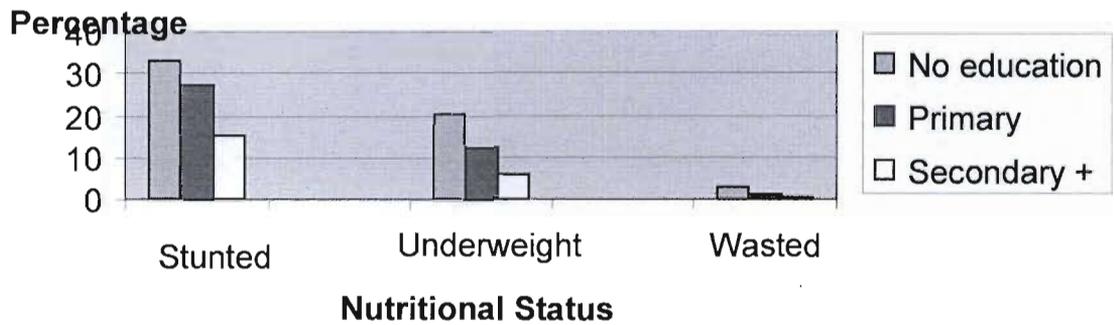


As was illustrated by the 1988 and the 1994 data, the last three figures also illustrate that a large proportion of the samples in 1999 failed to achieve the reference median height and weight for their age, as shown by the noticeable displaced to the left of the reference median for height-for-age and weight-for-age distribution for the country's data.

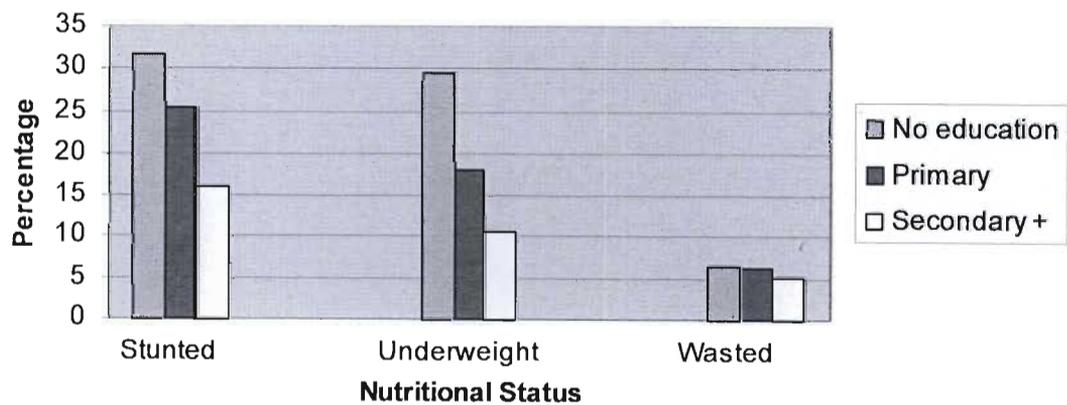
### **4.3.2 Bivariate Analysis**

The figure 4.14 to figure 4.16 below shows nutritional status by mother's education. The differentials in stunting vary significantly by mother's education. In all three years the highest prevalence rates are observed for mother with no education. Similarly, a higher proportion of children are underweight and wasted for mothers with no education, as compared to the other education categories.

### Percentage of Children, 3-35 months old, who are Stunted, Underweight and Wasted by Mothers Education-Zimbabwe 1988



### Percentage Children, 3-35 months old, who are Stunted, Underweight, and Wasted by Mothers Education-Zimbabwe 1994



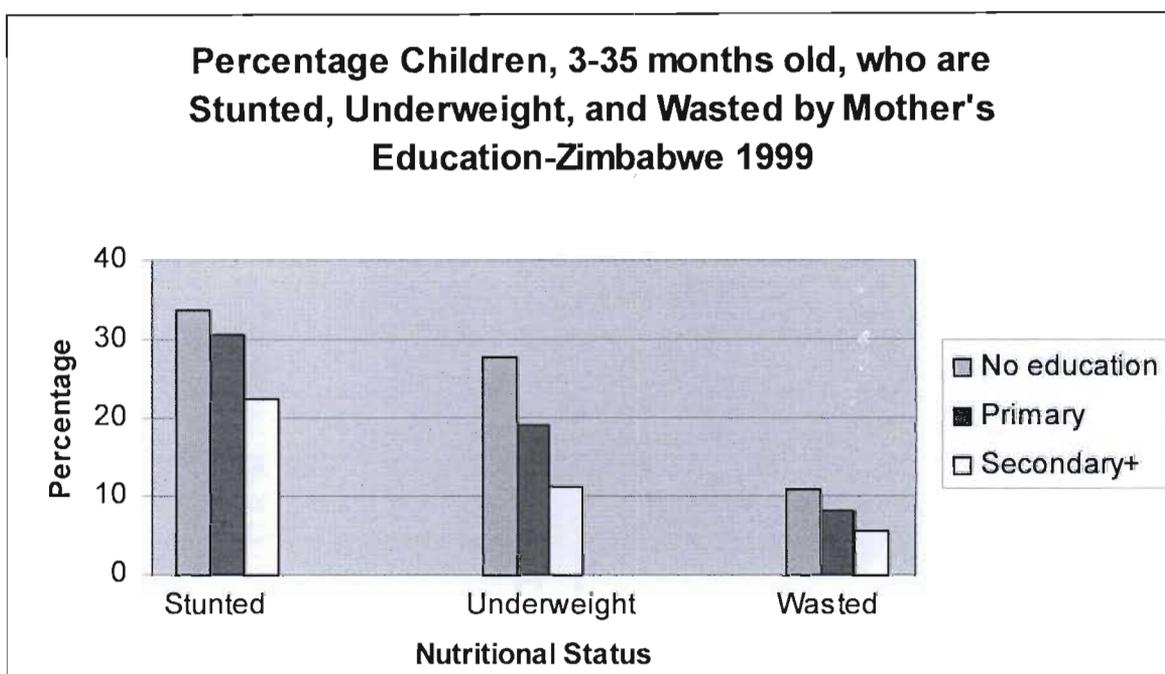


Table 4.3 below also presents the proportion of children who are stunted, underweight and wasted by age, gender, region, urban rural residence in the ZDHS of 1988, 1994 and 1999. The bivariate analysis revealed that there is no difference in the levels of stunting, wasting and underweight between boys and girls in any of the years.

It is interesting to compare the rural and urban variations in the children's nutritional status across the three surveys. Table 4.3 shows this variation. Between the three surveys, the differences of stunting and underweight were significant ( $p < 0.001$ ) between the areas, although for wasting there was no significant difference in the 1994 and the 1999 survey. It can be concluded that children in urban areas in Zimbabwe generally have better off nutritional status than those children in the rural areas.

The bivariate analysis shown in table 4.3 below also shows that there were significant geographical differences ( $p < 0.001$ ) for stunting and underweight by region of children in all three years of the survey except for wasting in 1988. The prevalence of underweight children increased consistently in the 1994 and 1999 datasets in Manicaland and Mashonaland South regions.

**Table 6: Stunting, Wasting and Underweight Rates**

Background Characteristics	Stunted			Wasted			Under-weight			Background Characteristics	Stunted			Wasted			Under-Weight		
	1988	1994	1999	1988	1994	1999	1988	1994	1999		1988	1994	1999	1988	1994	1999	1988	1994	1999
<b>Child's Age In Months</b>										<b>Regions</b>									
3-5	9.9	5.2	9.7	0.0	4.1	4.9	0.0	3.6	1.4	Mashonaland Central	29.7	28.4	24.5	1.4	5.5	8.6	11.4	20.4	18.5
6-11	20.0	11.0	13.2	0.8	7.7	7.4	6.5	10.3	10.3	Manicaland	27.9	21.7	37.1	0.9	6.9	2.8	16.2	12.5	17.5
12-17	27.6	25.7	32.8	1.0	7.9	8.4	14.8	24.1	20.0	Mashonaland east	31.0	22.5	32.7	2.0	2.1	15.9	14.3	12.0	18.7
18-23	38.2	37.2	37.0	2.5	6.9	12.2	14.5	22.7	17.9	Mashonaland west	20.8	22.9	33.3	2.6	7.5	20.0	16.2	21.5	18.1
24-29	24.5	25.7	30.8	1.6	4.6	4.9	17.2	17.6	22.0	Matabeleland north	34.3	29.9	28.9	0.0	10.5	8.1	15.9	26.5	27.4
30-35	28.2	27.9	28.9	1.6	3.2	4.1	14.7	19.8	17.8	Bulawayo	18.4	14.5	24.7	0.0	2.8	2.8	6.1	8.3	18.5
										Midlands	24.1	12.7	22.8	0.9	7.7	3.3	14.8	14.7	12.5
										Masvingo	28.1	26.0	29.2	1.0	2.2	11.0	9.5	16.5	10.3
	P=0.000(1999)			P=0.004(1999)			P=0.000(1999)			Harare /Chitungwiza	8.0	20.5	19.4	2.7	6.1	4.6	4.0	15.0	4.6
	P=0.000(1994)			P=0.042(1994)			P=0.000(1994)			Matabeleland South	27.4	23.0	19.3	0.9	5.0	1.5	9.4	15.5	9.6
	P=0.000(1988)			P=0.360(1988)			P=0.000(1988)												
											P=0.000(1999)			P=0.000(1999)			P=0.000(1999)		
											P=0.000(1994)			P=0.003(1994)			P=0.000(1994)		
											P=0.002(1988)			P=0.644(1988)			P=0.038(1988)		
<b>Gender of Child</b>										<b>Urban-Rural Residence</b>									
Female	25.2	22.0	24.7	1.0	4.5	7.0	11.4	14.7	15.3	<b>Urban</b>	12.7	17.1	21.2	1.4	5.5	2.6	6.6	10.7	8.1
Male	26.4	24.0	29.3	1.7	7.4	7.5	13.4	19.4	17.0	<b>Rural</b>	29.7	24.7	28.8	1.3	6.0	8.7	14.1	18.8	18.7
	P=0.050(1999)			P=0.713(1999)			P=0.402(1999)				P=0.005(1999)			P=0.000(1999)			P=0.000(1999)		
	P=0.305(1994)			P=0.006(1994)			P=0.007(1994)				P=0.001(1994)			P=0.663(1994)			P=0.000(1994)		
	P=0.572(1988)			P=0.311(1988)			P=0.255(1988)				P=0.000(1988)			P=0.842(1988)			P=0.000(1988)		
<b>Has electricity</b>										<b>Mothers Education</b>									
Yes	-*	14.8	20.9	-*	4.8	3.1	-*	8.6	8.5	Secondary+	15.0	16.0	22.4	0.3	5.2	5.7	6.0	10.8	11.2
No	-*	25.0	29.2	-*	6.2	8.7	-*	19.1	19.0	Primary	27.2	25.5	30.5	1.2	6.2	8.1	12.1	18.1	19.2
	P=0.002(1999)			P=0.000(1999)			P=0.000(1999)			No Education	33.1	31.8	33.6	3.0	6.6	10.9	20.4	29.5	27.7
	P=0.000(1994)			P=0.324(1994)			P=0.000(1994)				P=0.001(1999)			P=0.069(1999)			P=0.000(1999)		
											P=0.000(1994)			P=0.582(1994)			P=0.000(1994)		
											P=0.000(1988)			P=0.018(1988)			P=0.000(1988)		
<b>Overall Rate</b>	<b>25.7</b>	<b>22.9</b>	<b>26.9</b>	<b>1.3</b>	<b>5.9</b>	<b>7.2</b>	<b>12.3</b>	<b>17.0</b>	<b>16.2</b>		<b>25.7</b>	<b>22.9</b>	<b>26.9</b>	<b>1.3</b>	<b>5.9</b>	<b>7.2</b>	<b>12.3</b>	<b>17.0</b>	<b>16.2</b>

-\*Variable missing in dataset or variable not comparable with similar variables in other datasets.

Source: ZDHs, 1988, 1994 and 1999.

#### **4.4 Multivariate analysis of Child height-for-age and Weight-for-age**

Since the study is interested in comparing the contribution of the different independent variables to the prediction of child malnutrition in Zimbabwe over the period 1988- 1999, the standardised coefficients, than unstandardised coefficients in the regression models will be employed. Standardised values for each different value mean that they have been converted to the same scale so that they can be comparable. The standardised beta values indicate the number of standard deviations that scores in the dependent variable would change if there was a one standard deviation unit change in the predictor variable. In this case therefore, the variable with the largest beta value makes the strongest unique contribution, and vice versa (Pallant, 2005). The variables that are to be discussed from the model are those that make significant unique contributions to the prediction of the dependent variable, in this case, child malnutrition. The cut off point for significance in this study is .05.

##### **Independent variables tested in Models**

The linear regression models in models tested include child characteristics (age, gender), parental characteristics (education, and currently employed), and household characteristics (Region, rural urban residence, sources of water, toilet facilities and electricity). Appendix 4 lists the variables for inclusion in the regression models, and their reference categories in the linear regression models.

##### **Sources of water**

In recoding this independent variable for the models, those households with piped water, a community tap a protected well and boreholes were recoded as having “good water”. Those households accessing water from unprotected wells, spring water/streams, ponds/dams and other sources were recoded to be households having “bad water”.

## **Type of Toilet Facility**

In recoding this independent variable, houses utilising their own “own flush toilet”, “shared flush toilet”, “and traditional pit latrine” and “ Blair toilet” were recoded to be having a “good toilet”. Contrary to this categorisation, households in the survey utilising “no facilities or “other” facilities were characterised as households with a “bad toilet”.

## **Other Independent Variables**

To ensure consistency in all the variables in the datasets, all other variables were recoded in the format shown in table 4.4 above.

### **4.5 The Standard Multiple Linear Regressions**

Although throughout this presentation, the study has presented findings for all the nutritional indicators in anthropometry (weight-for-age; height-for-age; weight-for-height), the next section only focuses on modelling stunting (height-for-age) and underweight (weight-for-age), and not on wasting (weight-for-height). Weight-for-height was not considered in the analysis because there were no consistent significant variations in the bivariate tabulations in Table 4.4 above. Also, it is beyond the scope of this study to analyse each indicator of child nutrition. Table 4.4 above presents the standardised height-for-age and weight-for-age regression models for the Zimbabwe surveys of 1988, 1994 and 1999.

**Table 7: Multiple Regression Estimates**

**Multiple Regression estimates of covariation with growth attainment in Zimbabwe, 1988, 1994 and 1999**

*Characteristics	1988			1994			1999		
	Beta	T	Sign.T N=1492	Beta	T	Sign. T N=1897	Beta	T	Sign T N=1453
<b>Height/Age</b>									
Child's age	-0.116	-5.045	0.000	-0.281	-12.889	0.000	-0.241	-9.499	0.000
Mothers education	-0.053	-1.990	0.047	-0.118	-4.958	0.000	-0.045	-1.616	0.106
Sex of child	-0.040	-1.579	0.115	-0.029	-1.320	0.187	-0.060	-2.357	0.019
Region	0.050	1.939	0.053	0.000	0.012	0.990	0.045	1.448	0.148
Rural-urban residence	-0.145	-4.849	0.000	0.010	0.258	0.797	0.067	1.446	0.148
Source of water	-0.049	-1.845	0.065	0.008	0.341	0.733	0.001	0.022	0.983
Toilet facilities	-0.057	-1.982	0.048	-0.050	-1.958	0.050	-0.027	-0.916	0.360
Electricity	-*			-0.052	-1.442	0.149	-0.086	-2.064	0.039
Currently Employed	-*			-0.024	-1.106	0.269	-0.072	-2.823	0.005
<b>Weight/Age</b>									
Child's age	-0.289	-12.060	0.000	-0.243	-11.154	0.000	-0.267	-10.708	0.000
Mothers education	-0.100	-3.904	0.000	-0.147	-6.181	0.000	-0.081	-2.939	0.003
Sex of child	0.000	0.14	0.989	-0.063	-2.903	0.004	-0.048	-1.926	0.054
Region	0.054	-2.213	0.027	0.006	0.256	0.798	0.064	2.113	0.035
Rural-urban residence	-0.136	-4.780	0.000	-0.016	-0.427	0.669	0.055	1.210	0.227
Source of water	-0.004	-0.175	0.861	-0.017	-0.722	0.470	0.007	0.252	0.801
Toilet facilities	-0.088	-3.194	0.001	-0.059	-2.318	0.021	-0.062	-2.152	0.032
Electricity	-*			-0.046	-1.299	0.194	-0.096	-2.347	0.019
Currently Employed	-*			-0.046	-2.095	0.036	-0.052	-2.076	0.038

-\*Variable missing in dataset or variable not comparable with similar variables in other datasets.

Source: ZDHS, 1988, 1994 and 1999

### Patterns of Covariation

The linear regression models shown above illustrate the covariation of the dependent and the independent variables in the models tested. A negative Beta value indicates that a

factor is negatively associated with growth attainment, while a positive value indicates that a factor is positively associated with growth attainment (McMurray, 1996).

#### **4.5.1 Height-for-age**

##### **Child's Age**

The results of the regression add support the argument that a child's age has a significant effect on the nutritional status of children in all the survey years. There is a -0.116 point change in a child's oldest age group (30-35 months) for each unit increase in nutritional status (HAZ score) in 1988; a -0.281 point change in a child's oldest age group for each unit increase in nutritional status (HAZ Score) in 1994; and a -0.241 point change in a child's oldest age for each unit increase in nutritional status (HAZ score) in 1999. All these are highly significant in all the three survey years ( $p=0.000$ ). It is therefore likely the child's age has had a genuine effect on the nutritional outcome of children in Zimbabwe with the effect in the 1994 survey being slightly more (as indicated by the higher  $B=-0.281$ , as compare to the other survey years). In the 1994 and 1999 model shown above, child's age makes the strongest unique contribution to the nutritional status of the child as it has the largest values (Beta=-0.281;  $p=0.000$  for 1994; Beta=0.241;  $p=0.000$  in 1999)

##### **Mothers Education**

Similarly, the results of the regression add support to the argument that a mother's education has a significant effect on the nutritional status of children in all the survey years. There is a -0.053 point change in no education for each unit increase in nutritional status (HAZ score) in 1988; a -0.118 point change in no education for each unit increase in nutritional status (HAZ Score) in 1994; and a -0.045 point change in no education for each unit increase in nutritional status (HAZ score) in 1999. All these are highly significant in all the two survey years ( $p=0.047$  in 1988;  $p=0.000$  in 1994) except for 1999 ( $p=0.106$ ).

### **Sex of the child**

The coefficients of sex of the child in all the surveys were somewhat small in all the surveys (B=-0.040 in 1988; -0.029 in 1994; -0.060 in 1999) and the difference was not significant in two years (p=0.115 in 1988; p=0.187 in 1994) except for the final year (p=0.019) where there is a -0.060 point change from males to females for each unit increase in nutritional status.

### **Region**

For region, there is a 0.050 point change in for each unit increase in nutritional status (HAZ score) in 1988; a 0.000 point change in 1994 and a 0.045 change in 1999. This is significant in 1988 (p=0.053; and not significant for 1994, p=0.990 and 1999, p=0.148). In other words being in Matabeleland South had only a genuine effect on the nutritional status only in the year 1988.

### **Rural-Urban Residence**

There is a -0.145 point change in a rural area for each unit increase in nutritional status (HAZ score) in 1988 (p=0.000). This shows that rural-urban residence had a genuine effect on the nutritional status of the child only in the year 1988 as in the years 1994 (p=0.797) and 1999 (p=0.148) the difference was not significant. In the 1988 model shown above, the rural-urban residence of a household makes the strongest unique contribution to the nutritional status of the child (Beta=-0.145; p=0.000).

### **Sources of Water**

The coefficients for sources of water are somewhat small (-0.049 in 1988; -0.008 in 1994; -0.001 in 1999) and the differences are not significant ( $p=0.065$  in 1988;  $p=0.733$  in 1994;  $p=0.983$ ).

### **Toilet Facilities**

For poor toilet facilities, there is nearly similar size for each unit increase in nutritional status in the years 1988 and 1994 (-0.057 in 1999 and (-0.050 in 1994). These are significant in the models ( $p=0.048$  in 1988 and  $p=0.050$  in 1994). The type of toilet facility in 1999 has no genuine effect on the nutritional status of the child ( $p=0.360$ ).

### **Electricity**

Between the 1994 and the 1999 survey having electricity has a genuine effect on the child only in 1999 ( $p=0.005$ ). In 1999, there is a -0.086 point change in having no electricity in the household for each unit increase in nutritional status (HAZ score). In 1994 the difference in having no electricity in the household was not significant.

### **Mother Currently Employed**

Mother's employment status had a significant difference in 1999 ( $p=0.005$ ) and not in 1994 ( $p=0.269$ ) in its effect to the nutritional status of a child. In 1999, there is a -0.072 point change in a mother not being currently employed for each unit increase in nutritional status.

## **4.5.2 Weight-for-age**

### **Child's Age**

As with HAZ models explained above, child ages has a highly significant ( $p=0.000$  in all years) effect on the nutritional status of the child. A child's age also has the strongest unique contribution (Beta= -0.289 in 1988; Beta= -0.243 in 1994; and Beta= -0.267 in

1999) to the nutrition status as measured by the WAZ score. There is a -0.289 point change in the oldest age group for each unit increase in nutritional status (WAZ score) in 1988; a -0.243 point change in the oldest age group for each unit increase in nutritional status in 1994; and a -0.267 point change in the oldest age group for each unit increase in nutritional status in 1999.

### **Mothers Education**

For educational level, there is a smaller change for each unit increase in the nutritional status as compare to child's age for the WAZ score. There is a -0.100 point change in 1988; a -0.147 point change in 1994; and -0.081 point change in 1999; in poor education for each unit increase in nutritional status as measured by the WAZ score. All these were also highly significant in the equation ( $P=0.000$ ). Education once again has a genuine effect on the nutritional status of the child in this model.

### **Sex of Child**

The coefficients for sex of child are very small (Beta=0.000 in 1988; Beta=-0.063 in 1994; and -0.048 in 1999). The results also show that there was a larger unit increase for education in the 1994 and 1999 sample as compare to the unit change in 1988. The difference was not significant in 1988, but was significant in 1994 ( $p=0.004$ ) and 1999 ( $p=0.054$ ).

### **Region**

The results of the regression above show that residing in a region had a significant effect on the nutritional status of child only in 1988 ( $p=0.027$ ) and 1999 ( $p=0.035$ ). Region of resident has no significant difference to nutritional status in 1994 ( $p=0.798$ ). There was a slightly larger change for each unit increase in nutritional status in 1999 (Beta=0.064) and compared to 1988 (Beta=0.054).

### **Rural-urban Residence**

There was a -0.136 point change in residing in a rural area for each unit increase in nutritional status (WAZ score) in 1988. The difference was highly significant ( $p=0.000$ ). The difference in rural-urban residence in 1994 and 1999 were not significant.

### **Sources of Water**

The beta coefficients for sources of water were somewhat small (Beta=-0.004 in 1988; Beta=-0.017 in 1994 and Beta=0.007 in 1999) and the differences were not significant ( $p=0.861$  in 1988;  $p=0.470$  in 1994 and  $p=0.801$  in 1999).

### **Toilet Facilities**

Although the coefficient for type of toilet facilities were also small (Beta=-0.088 in 1988; -0.059 in 1994; and -0.062 in 1999) they were all significant in the equations ( $p=0.001$  in 1988;  $p=0.021$  in 1994 and  $p=0.032$  in 1999).

### **Electricity**

In 1994, the coefficient for electricity was small and not significant ( $p=0.194$ ). In 1999, there is a -0.096 point change in living in a household with no electricity for each unit increase in nutritional status (WAZ score). This was significant in the equation ( $p=0.019$ ).

### **Mother Currently Employed**

The coefficients for mothers employment status are small and nearly similar in the 1994 (Beta=-0.046) and 1999 (Beta=-0.052) surveys. The differences were also significant (p=0.036 in 1994; and p=0.038 in 1999) in the equations.

#### **4.6 Summary**

In this chapter, I have computed malnutrition trends and illustrated the patterns of distribution for child nutritional status and health. I have also estimated models of child nutritional status for Zimbabwe using the demographic and health surveys of 1988, 1994 and 1999. These models show that only some of the explanatory variables tested attained statistical significance. In general the result show that although there were some gains in reducing the prevalence of child malnutrition in the 1994 ZDHS sample, various age groups show increases in nutritional deficiency in children of various age groups in the 1999 ZDHS sample. In general, the models computed attest to the fact that mother's education and child's age have a salutary impact on child nutritional status in all three surveys that have been conducted in Zimbabwe.

## CHAPTER 5: QUALITATIVE ASSESSMENT RESEARCH FINDINGS

### 5.1 Introduction

This section presents results from the qualitative data. This chapter presents the findings from in-depth interviews with nutrition stakeholders in Zimbabwe and focus group discussion with communities in both rural and urban settings follow.

### 5.2 Characteristics of the Qualitative Sample

The study sought to optimise relevant characteristics of a sample in order to gain sufficient in-depth information about child malnutrition in Zimbabwe. Table 1 below indicates the key demographic characteristics of the focus groups conducted in the study. In-depth stakeholder interviews were conducted with 6 respondents who are currently involved in the field of child malnutrition in Zimbabwe. The in-depth interviews that were held with 5 staff members from the Ministry of Health and Child Welfare (MOHCW) in the Nutrition Unit were conducted with Nutrition Surveillance Officers. Another interview was also conducted one staff member from UNICEF who is the head of nutrition partner programme in addressing child malnutrition in the country.

The focus group discussions comprised of 4 groups from both the urban and rural settings chosen for the study, with 5-8 people in each group. The literature review and evidence from the quantitative analysis shows that rural-urban residence and socio-economic status are key factors in determining the nutritional status of children. 2 of the FGDs were held in the rural setting 2 focus groups were held in urban areas of Harare and Bulawayo. The study also sought to ensure that relevant demographic variables were included in the sampling scheme. The inclusion of males and grandmothers in the sample

is based on the fact that with more mothers caring for children dying due to HIV/AIDS, more men are themselves becoming caregivers. Also, as mothers migrate in search for employment, care giving roles are performed either by males or grandmothers. The interviews were conducted in two of the most populous regions of the country in Harare, Shamva, Tsholotsho and Bulawayo. Although there was effort to include different segments of community members, participant turnout in all the desired segments were not reached in the focus group discussion composition. Table 5.1 below shows the characteristics of participants in the qualitative assessment.

**Table 8: Characteristics of Respondents for the Qualitative Assessment**

<b>KEY INFORMANT WORKING IN CHILD MALNUTRITION IN ZIMBABWE</b>					
<b>United Nations Children’s Fund (UNICEF)</b>			<b>Ministry of Health and Child Welfare Nutritionists (Nutrition Department)</b>		
1			5		
<b>FOCUS GROUP DISCUSSIONS</b>					
<b>Segments</b>	<b>Harare <i>Urban Area</i></b>	<b>Bulawayo <i>Urban Area</i></b>	<b>Shamva <i>Rural Area</i></b>	<b>Tsholotsho <i>Rural Area</i></b>	<b>Total</b>
Pregnant Mothers	1	1	0	0	2
Mother of Baby < than six months	1	1	0	0	2
Mother of baby > that six months	1	0	2	1	4
Males who has live with children	1	2	1	2	6
Grandmothers in community	1	1	2	3	7
<b>Totals Participants</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>21</b>

### **5.3 Levels and Patterns Child Malnutrition in Zimbabwe**

Most of the FGD and IDI's participants attest to the fact that child malnutrition was a problem in Zimbabwe and was on the increase given the current hard economic times. This was irrespective of whether or not children are residing in the rural or urban areas. One of the participants indicated that:

“Malnutrition of children has been increasing in the urban sentinel sites of both Harare and Bulawayo. This is caused by a number of reasons especially the high cost of living and the ever increasing inflation rates that the country is experiencing.” (Key Informant, IDI).

Other key informant discussed the changes that had occurred in Zimbabwe over time and the way that the relationship between the rural areas and the urban areas has had to shift given the countries challenging economic climate.

“The levels [of child undernutrition] have changed over time and at the moment the countries is at their worst, as the averaged Zimbabwean cannot live the life that they used to live in the past. In the past we used to go to the rural areas to get the peanuts, the beans, because of droughts again these foods are no longer available. In some instances we have to now buy these foods from town[the urban area] to take them to our rural folks, which means our food security base and economy base have been greatly eroded. This has affected the health of children especially in our rural areas” (Key Informant, IDI).

As expected, the qualitative interviews reveal that that there is generally a seasonal variation of malnutrition prevalence, with serious cases of child malnutrition being witnessed within periods when food supply is short. As indicated by this statement from a key informant who explained that:

“...things went down a bit following the drought as people were affected, a lot of kwashiorkor, marasmus were coming up. After the drought people started harvesting and things were better...In a year, you can say people have harvested at around this time [April], you can see figures [malnutrition figures] getting better[lower] now, and then around January people haven't

harvested, and December, you can see that. Around May and April people are now harvesting you can see figures going down.” (Key Informant, IDI).

It was evident from many conversations that I had with participants that, the recurrent droughts that occur in the country contribute to child malnutrition levels and patterns of distribution of the condition in the country. There was general consensus in the focus groups that were carried out in two regions that life was “tougher” in Zimbabwe now and “thing were only getting worse by the day”. As one participant put it:

“...my children, you know that things are getting harder. Children in past had no problems, we could buy all the things we need for the house. I see that children are thin [malnourished] these days. There is hunger in the families now, and it now more...where can a family get Z\$650000[going price for a loaf of bread] to buy bread for a family with eight people. It is hard my children” (Grandmother in the community, FGD).

#### **5.4 Determinants of Child Malnutrition**

It was not surprising from both in-depth interviews (IDIs) and focus group discussions (FGDs) that the causes of child malnutrition are multi-faceted within Zimbabwe. Although “poverty and food security” have been seen as the major cause of child malnutrition in Zimbabwe by most of the government and other professional working to reduce child malnutrition, there are additional factors that are also at play. One stakeholder told me that:

“Malnutrition is not only a factor of food. In some cases where there is a food shortage we also notice that illness is a factor, it could be because of unhygienic preparation of food or just the illness of the child, and the care giver does not know how to take care of the child or they are slow to seek medical advice, in the end the child has diarrhoea and loses a lot of nutrients.” (Key Informant, IDI).

The interaction between nutrition and disease is one that is well established in the literature and resonated in many of the conversations with many child malnutrition stakeholders in Zimbabwe. In particular, many of the interviews conducted revealed that

those households that had sick member are increasing at risk at having more likelihood of children who are malnourished in the household. One of the participants explained:

“We have seen about nine causes of child malnutrition namely, food and security, illness, [and] the fact that there the head of the household is chronically ill or there is chronically member who is ill within that household. We have also looked at water and sanitation in particular diarrhoea is linked to malnutrition.” (Key Informant, IDI).

There were consistent reports from the interviews with nutritionists within the country that “children coming from households where a member is chronically ill were at risk of being malnourished.” On commenting on the determinants of child malnutrition another stakeholder stated that:

“...mainly its poverty and food and security, and then this time what is actually aggravating the situation is HIV/AIDS. As HIV/AIDS comes along with other sicknesses like TB [tuberculosis] and all those actually aggravate malnutrition” (Key Informant, IDI)

Given the high prevalence of HIV/AIDS in the region, this reported relationship between illness and child malnutrition is a cause for concern for the nutrition status of children in Zimbabwe.

There were also reports of various determinants of child malnutrition depending on the region of the country. A government worker in the Bulawayo region also explains the causes of child malnutrition in their region:

“Yes there is also lack of knowledge here and there but in my own experience, most communities do not care for the children adequately not because they do not have the knowledge but because they do not have the resources. The period that is usually problematic is the complementary feeding period when the child stops depending on breastfeeding as is being adjusted to the normal family meal. There are special foods that the children should eat but most of our families cannot afford and they give children plain porridge without anything else... and plain porridge does not give anything and the protein content is low, the energy content is low, the vitamin content is low and this is part of what results in stunting ” (Key Informant, IDI).

Trends analysis conducted in the quantitative analysis (Chapter 4) of this study also show that the complementary feeding period after 6 months is usually the period that measures of child malnutrition increase.

Key informant interviews with government officials and NGO programme implementers of child nutrition programs also highlighted on the varying determinants of child malnutrition between the rural and the urban settings. One participant reported that:

“In urban areas it might be chronic illness, food access and availability which is more prominent as the determinant of child malnutrition, while for the rural areas it is water and sanitation, food and security. This is so because the chronic illness and disease burden which is concentrated mainly in the urban areas. This new trend affects where the household is directing their finances and care giving practices to the children are also going to be compromised. It means that households may be using their resources to take care of the ill and also that the capacity of household may be reduced.” (Key Informant, IDI).

From this, it can be concluded that the environmental factors that a child lives is an important determinant of a child nutrition status.

## **5.5 Care Practices**

The harsh economic climate that the country is facing is having a negative impact on the feeding practices of many families and consequently on the health of children. There was general consensus in the focus group discussions that the number of meals for children has since gone down given the ever rising challenges in household food insecurity of many people. In one of the discussion it was stated that:

“In our areas you now find that the mothers take the child to work in the fields, and you find that since the mothers are busy they are not really particular about how many times the child has eaten, and the food that they eat there at work or in the field, is such that a child is being treated as an adult, they are not particular about how many times the child is eating or what they are eating, maybe because they don't have appropriate food so they just give the child what they have.” (Mother of baby over 6 months, FGD).

As put across by one of participants in the key informant interviews, the emerging prevalence of “bad child care practices” that may be emerging within the Zimbabwean community may not be solely due to the nutritional ignorance of mothers but rather are caused by the prevailing socio-economic challenges that make it difficult for even knowledgeable mothers to provide the right kind of food for their children. Another participant puts it that:

“In some areas you find that there is plenty of food, if a mother is selling at the market selling bananas, avocados, and other fruits, but because she wants money she can’t afford to give the child a banana or she will buy a bun [bread roll] as it may cost less than the bananas she is selling so that she can get maximum profits. So continuous education is necessary...” (Grandmother, FGD).

Mothers who attended the focus group discussions believed that young infants can be well nourished if they were breastfed and all agreed that there was need for an adequate period of exclusive breastfeeding for children below six months. The findings also indicate that feeding bottles were not commonly used in the rural area, but were common at times to those mothers who were working in the urban areas. The focus group discussions also brought to light that the duration of breastfeeding was given to most children throughout the first six months of their life.

## **5.6 Zimbabwe Nutrition Strategy and Policy**

In general the qualitative assessment enhanced the researchers understanding of the efforts that the government in making in effort to reduce the problem of child malnutrition. Core interventions that were discussed by many officials include the Child Supplementary Feeding Programme, which is generally “targeted at families in the country with the greatest need.” Other programmes that were discussed at great lengths in the interviews include the Vitamin A Supplementation Programme, and the Expanded Programme on Immunisation (EPI) which have all contributed ensuring health for children in the country. All participants from the ministry working to reduce child

malnutrition problems felt that the countries nutrition policies and strategies were effective in addressing child nutrition problems. All of the participants also felt there was political will by all levels of leadership in the country to address the problem. Irrespective of an adequate policy document and national strategy to deal with child malnutrition in Zimbabwe, the “economic constraints” were reported in all regions as hampering the operationalisation of many of the action plans. One official said that:

“The nutrition strategy is working well but the only thing that may be a problem is in terms of emergencies the response is slow, again because of economic constraint in the country they don’t have the resources. Let us say there has been a drought in a certain area and children are going to be affected, instead of quickly mounting an appropriate feeding programme it takes time for them [government] to get the resources together before they start. And also politically to accept that we have a problem may take time so it also delays NGO’s action to assist in time as they wait for invitation from government... but the programmes themselves are in place and they are good.”  
(Key Informant, IDI).

Another example given on this matter was the existence of not iodised salt in the country irrespective of the policies which calls for all salt that is sold to be iodised. It was reported that most if this salt not iodised “was getting into the country through cross boarder traders and other small traders since the introduction of free trade.” In this case, the country’s policy to deal with iodine deficiency disorders was being hampered by the economic trade opportunities of sectors of the economy as well as lack of “harmonised regional policies” that countries in the region may abide by.

## **5.7 Summary**

In this chapter I have presented the findings from the qualitative component of the study. In general, the results confirm findings from the quantitative analysis on the trends, patterns of distribution and determinants of child malnutrition. Besides shedding light on the nutrition policy framework in Zimbabwe which was lacking in the quantitative analysis, the findings of the qualitative assessment also highlight the negative role of the current economic climate and the role of illness in the nutrition status of children.

## **CHAPTER 6: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS**

### **6.1 Introduction**

This chapter will firstly discuss the findings that were presented in chapter 4 and 5. The conclusions drawn from the study will then follow before an examination of policy and research implications.

### **6.2 Discussion of Main Findings**

The results from the main data sources, the three datasets from the Zimbabwe Demographic Health Surveys, suggest variations in child malnutrition prevalence across the measures in stunting, wasting and underweight, which have fluctuated across the survey years. Evidence of variation in the nutritional status of children in Zimbabwe, as opposed to consistent downward or upward trend is evident as one begins to analyse other sources of data from in-country surveys. Although the data indicate variations in levels of stunting, from 26% to 23% between 1988 and 1994, it then increased to 27% in 1999. This prevalence in stunting seem not to have changed between then and 2003 as shown by other reports in the country (Government of Zimbabwe, 2004). Therefore long term child malnutrition in Zimbabwe as indicated by the increases in stunting seem to be a dire problem that needs to be attended to. These results also confirm reports from the qualitative study, in which increased food deprivation in communities in the last few years have been seen to contribute to the poor health of children in Zimbabwe. Similarly, the prevalence levels for underweight seem to have increased from 1988 and 1994, but then seem to have stagnated around 17% between 1999 and 2003 (Government of Zimbabwe, 2004).

The current study also portrays variations of nutritional status between the age categories. The study shows that all child malnutrition indicators in the surveys peak between 9-23

months of age. This corroborates other studies done in Zimbabwe (Bijlmaker *et al.*, (1998), which indicates that stunting begins early among Zimbabwean infants. As indicated by the current study, Bijlmakers *et al.*, (1998) also found out that stunting was worst in the category 12-23 month in an urban and rural area in their two study areas in Zimbabwe in 1993. Tagwirei and Greiner (1994) also suggested that infants may be stunted at birth due to the poor nutritional status of mothers, although this is difficult to prove because reliable community-based data on birth are very hard to come by (Bijlmakers *et al.*, 1998: 72).

In terms of stunting, the models computed show that child's age largest beta values in the 1988, 1994 and 1999 models, making it the strongest unique contributor to child malnutrition in Zimbabwe. It can be noted that the beta value of child's age increased consistently in the models over the years, from -0.116 in 1988, -0.281 in 1994 and then to -0.241 in 1999. This also indicates and confirms previous results that older children are more likely to be malnourished in Zimbabwe, especially at the weaning stage. This confirms other studies done in Zimbabwe (Tagwirei and Greiner, 1994). Similarly, in terms of wasting, child's age continues to have the largest beta values in all the survey years, once again making the strongest contribution to the child nutrition indicator. The larger beta values in these years (-0.289 in 1988; -0.243 in 1994; -0.267 in 1999) are noteworthy. In terms of the pattern, it fluctuated in 1994 and then increased in value again in 1999.

Within the 1988 stunting model, rural-urban residence had the strongest unique contribution to the nutritional status of children. In the subsequent surveys (1994 and 1999), the age of the child seems to have gained more importance in explaining height-for-age. Other variables had varying importance over the years. In the wasting model the age of the child had a salutary impact on the nutritional status of the child in all years.

The variations in nutritional status of children that were portrayed in the current study between the rural and urban setting in this study have also been confirmed in other studies in Zimbabwe (Tagwirei and Greiner, 1984; Bijlmakers *et al.*, 1998; Nemapare,

1999). In all the three ZDHS, stunting and underweight is worse off in rural areas compared to urban areas. The reasons also given for such variations in the qualitative data were that the food security base in the rural areas has been mainly eroded by droughts, and has been aggravated by current economic stagnation in the country. Although some sources in Zimbabwe have found that wasting may be worse off in the urban areas (Bijlmakers *et al.*, 1998), the current study found no difference in wasting between the rural and urban children nutritional status in some of the survey datasets (1994 and 1999).

In the stunting and underweight models that were computed, the patterns of malnutrition show that the effect of rural-urban residence on the nutritional status of the child was only significant for the 1988 model. The qualitative findings of this study offers some explanation that in the recent past, the difference between the urban and rural setting has been blurred by the harsh economic climate that is affecting the whole country.

Education statuses of the mothers have a significant impact on the nutritional status of children in this study. The results are in tandem with other studies in other regions discussed in chapter 2 (Pal, 1999; Sandiford *et al.*, 1995; Moen, 1993; Streatfield *et al.*, 1990; Caldwell, 1979; Lambert and Sahn, 2002; Chowdry, 1982 and Madise *et al.*, 1999). Thomas *et al.*, (1991) have explained that the impact of maternal education can be explained by indicators of access to information, reading papers, watching television, and listening to the radio.

The employment status of the mothers had significant effect on the nutrition status of the child. These findings are in contrast to findings by some authors who have concluded that women's economic activities may have a negative impact on child care (Ware, 1984). Although the nature of employment of mothers was not analysed in this study, it is possible that the income effect, money brought by working mothers, has a positive impact on the nutrition of children in Zimbabwe.

Although many studies have indicated the link between child nutrition and morbidity (Martorell and Ho, 1984; Piwoz and Preble, 2000 and Hussey *et al.*, 2005), the findings from the qualitative assessment of this study shows that the dynamic of this relationship is a complex in Zimbabwe in this era of HIV/AIDS. This study also indicates anecdotal evidence of the indirect effects of having ill household member and its negative effect on the nutritional status of children. Responses from participants in the qualitative assessment pointed out to the channelling of resources to a sick household member and how this often led to the negation of ensuring adequate resources for the nutritional requirements of the household. Given that most efforts in reducing morbidity are focused on the individual illness of children, further research in Zimbabwe is urgently needed to assess this dynamic on illness of other family member's effect on child nutrition in an effort to fully understand and come up with relevant interventions.

### **6.3 Conclusions and Policy Implications**

In conclusion, the study shows that the levels of malnutrition in Zimbabwe are still exceptionally high compared to the reference population. The most prevalent form of child malnutrition in Zimbabwe indicates that the effects of long term food deprivation and disease among children in the country have a serious impact on the health of children. Ranking the variables influencing the nutritional status of children in Zimbabwe puts child's age, mother's educational status, sex of the child and availability of electricity in the household as key determinants. However, the findings of this study indicate that a more complete analysis of the situation of children in Zimbabwe needs a study that links poverty and other socioeconomic factors, malnutrition and disease among other factors.

The findings of the study have important policy implications. An obvious is that of targeting the vulnerable 9-23 age group in Zimbabwe is crucial if malnutrition is to be dealt with effectively. As shown this is the age group in which weaning is common in Zimbabwe, and hence timely intervention in terms of appropriate community based programmes is essential. Given the economic challenges being faced by many families in

the country, the role of non-government organisations (NGO's) is critical in partnering with government efforts to alleviate poverty. In addition, education is an important determinant of child health outcomes in Zimbabwe irrespective of the volatile economic situation that have persisted over the years. Current government efforts to ensure education for all, especially for the girl child need continued prioritisation in the face of dwindling social expenditure in the country.

The findings that link the higher prevalence of child malnutrition the with the food security suggest interventions programmes that should focus not only on the individual malnourished children as the only target, but also on their families and communities to increase food security in general. In addition, the increased contribution of chronic illness to nutritional status of families needs to be acknowledged as a growing problem especially in the era of HIV/AIDS. Community and home based care programmes may have to include care packages that include a standard food parcels for the affected households in such situations. In this regard, interventions should therefore focus on families' too and not only on individual malnourished children. Future programmes that may have the potential impact of food and nutrition need to dovetail strategies of poverty alleviation in conjunction with AIDS awareness and prevention programmes.

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## Appendix 1: Sample of Question Guide

### IN-DEPTH INTERVIEW GUIDE FOR STAKEHOLDERS WORKING IN CHILD MALNUTRITION ANALYSIS AND PREVENTION

Name of Interviewer \_\_\_\_\_ Place \_\_\_\_\_  
Date of Interview \_\_\_\_\_ Venue \_\_\_\_\_  
Time Started \_\_\_\_\_ Time Ended \_\_\_\_\_

#### Introduction

I am working for a research project that is mainly concerned with the analysis of child malnutrition, its levels, patterns of distribution and determinants in Zimbabwe. I would appreciate it if you could talk with me.

#### BACKGROUND CHARACTERISTICS OF THE NUTRITION STAKEHOLDER

Name of Participant \_\_\_\_\_  
Name of Organisation \_\_\_\_\_  
Position of Participant \_\_\_\_\_  
Gender of Participant \_\_\_\_\_  
Qualifications of Participant \_\_\_\_\_

#### LEVELS AND TRENDS, DETERMINANTS OF CHILD MALNUTRITION IN ZIMBABWE

1. Do you perceive child malnutrition as problem in Zimbabwe?
2. What is the role of your organization in ensuring nutrition in Zimbabwe? When did you start being involved in child malnutrition? How is the nutrition department organised in your organisation?
3. What types of malnutrition exist and where (differentials by province or region)?

4. What is the pattern is the child malnutrition distribution in Zimbabwe? Who is ill (by age, location in the community, socioeconomic status?)
5. What mechanisms are you using to identify those children are not growing well?
6. Looking at the trend in child malnutrition in Zimbabwe do you what has been the trend of malnutrition in Zimbabwe, dating back from independence till to date, has the level stayed the same or do you see change? If yes, what changes have occurred with regards to levels of malnutrition in Zimbabwe from independence till to date?

#### **DETERMINANTS OF CHILD MALNUTRITION IN ZIMBABWE**

7. In your opinion what is the causes (Long term and immediate causes) of child malnutrition in Zimbabwe? To what extent would your say that the causes are political, economic or a manifestation of physical environments?
8. How are these bound by broader issues (factors like) of poverty, equity, and basic human rights?
9. Is it really insufficient availability of food at the household and individual level? Food availability at regional and local levels (trends in food exports, imports and confessional aid may be analysed)
10. To what extent would you say that child malnutrition is caused by adverse nutrition behaviour in Zimbabwe? (Feeding, dietary habits, hygiene, poor health, particularly infectious diseases)
11. If yes to poor health, ask, what are the most prevalent diseases for children in different regions in Zimbabwe? What have been the changing trends of these from 1988 to present?

12. Is there treatment, and how accessible are services for families in different regions (money, time, and distance)?
13. What is the prevalence of breastfeeding of women in Zimbabwe? Is there a regional difference in this practice?
14. What is the percentage of children at age... receiving complementary foods? What is the age of introduction to complementary feeding for children?
15. What are the existing health and nutrition services?

## **CHILD MALNUTRITION PREVENTION PROGRAMMES IN ZIMBABWE**

In the next section I would like to take some time to reflect on existing programs of child malnutrition in Zimbabwe

16. What is the national nutrition strategy in Zimbabwe?
17. In your opinion how well do you think that the national nutrition strategy of Zimbabwe address child malnutrition?
18. What has been the national nutritional strategy and how has this strategy evolved from independence till present?
19. What programmes is the government/UNICEF involved in order to address malnutrition in Zimbabwe?
20. Who proposed the programmes?
21. How are they implemented?

22. What is the role of the government/Unicef in implementing these programmes?
  
23. Which vulnerable groups have been targeted? Are existing programs addressing the right problem in the right way for the right people? How well does the current national strategy address issues discussed above (of poverty, equity, and basic human rights, issues of availability of food at the household and individual level)?
  
24. How have nutrition services been delivered?
  
25. What was the coverage in a given community or region?
  
26. Was there complimentary delivery of health and education services?
  
27. What type of impact evaluation was conducted? What were the results?
  
28. What problems are you facing in implementing the programme (institutional and environmental)?
  
29. What efforts have been taken by the implanting partners to ensure sustainability of the child malnutrition programmes?

Thank you very much for you time. Do you have any documents that may assist us in this research?

**End of Interview**

## Appendix 2: Sample of Focus Group Guide

<b>FOCUS GROUP GUIDE- CHILD MALNUTRITION STUDY</b>
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TOPIC	DISCUSSION	PROBES
Introduction	Facilitator and Observer names	
Topic of Interview	We would like to talk about child malnutrition, the levels, and its determinants. We would like to know about what you do normally and ask your opinions. We would like to know your thoughts on the topics and the discussion will take about one hour long.	
Confidentiality	We are the only one that who will know the details of this study and no names will be used in any of the written reports.	
Motherhood	As you all have young children, can you say something about how your child makes you feel?	Happy, Why? Proud, Why? Link to future
Perceptions of Malnutrition	Is malnutrition a problem in your community/country?	Why? How do you know it's a problem? What makes you say that it's a problem?

<p>Health background and changes in health of children over time</p> <p><b>End of Interview</b></p>	<p>You all have young children; can you tell us what you think about the health of your children or the children in your community?</p> <p>Do you feel that the feeding of the child affects health? Why?</p> <p>Lets talk about how you have fed you child over the years, lets discuss how feeding has changed over time?</p>	<p>Healthy, why? Sickly, Why?</p> <p>Comparison of children in the past and children now?</p> <p>Competence of mothers to keep children happy?</p> <p>Breastfeeding, sadza, other foods: what are the benefits and risks of the food mentioned?</p> <p>General changes in breastfeeding? Reason? Different feeding when mothers are not present?</p>
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### Appendix 3: Variables tested in models and reference categories for linear regressions

<b>Demographic Factors</b>
<b>Age of the child in months</b> 3-5=0 6-11=1 12-17=2 18-23=3 24-29=4 30-35=5 (Reference Category)
<b>Sex of the child</b> Female=0 Male=1 (Reference Category)
<b>Socio-economic and environmental factors</b>
<b>Sources of Drinking Water</b> Good Water=0 Bad Water=1 (Reference Category)
<b>Toilet facilities</b> Good Toilet=0 Bad Toilet=1(Reference Category)
<b>Education of Mother</b> Secondary +=0 Primary=1 None=2 (Reference Category)
<b>Region</b> Manicaland=0 Mashonaland Central=1 Mashonaland East=2 Mashonaland West=3 Matabeleland North=4 Bulawayo=5 Midlands=6 Masvingo=7 Harare=8 Mashonaland South=9 (Reference Category)
<b>Rural-Urban residence</b> Urban=0 Rural=1(Reference Category)
<b>Has Electricity</b> Yes=0 No=1 (Reference Category)
<b>Mother's Currently Working</b> Yes=0 No=1 (Reference Category)

Source: ZDHS, 1988, 1994 and 1999