

**An Assessment of the Nutritional Status of  
Children under Five Years In Maputaland,  
KwaZulu-Natal**

**2001**

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by

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**Submitted in the Faculty of Arts in partial fulfillment of the  
requirements for the degree of Master of Arts in  
Community Work in the Department of Social Work at the  
University of Zululand**

**Supervisor: Dr. T.A.P Gumbi**

**Date Submitted: December 2001**

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## DECLARATION

I Ziphozonke Lethukuthula Khumalo declare that the research study on. **“An assessment of the nutritional status of children under five years in Maputaland, KwaZulu Natal”** is my own work and all the source I have used have been indicated and acknowledged by means of complete references.



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Ziphozonke Lethukuthula Khumalo

Date: December 2001

## DEDICATION

**This study is dedicated to my mother Thandi.**

## ACKNOWLEDGEMENTS

A number of people particular in the preparation of my dissertation with sincere gratitude I acknowledge the contribution of my supervisor Dr T.A.P Gumbi for the critically review of the manuscript and making many valuable this experience and knowledge and professionalism.

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The almighty God, the omnipotent, through his grace He gives me strength and courage to believe in myself and do my best to meet most of life's challengers and the inspiration to progress.

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**ABSTRACT**

**Malnutrition continues to affect the large number of people, particularly in developing countries. Few studies have reported on nutritional status of children in southern Africa. A comprehensive nutritional survey was conducted on African children aged 0-5 years (n = 172) in two rural areas of Maputaland, namely, Manguza and Ngwavuma. Stunting, underweight, acute under nutrition and lower upper arm measurement were prevalent in children of Maputaland.**

**The average diet contained an adequate amount of portion from the meat and cereals group but had inadequate content milk and fruit/vegetable group as in accordance with expectations of the Department of Health and welfare. The percentage energy obtain from fat in the diet was very low (19%) and from carbohydrates was very high (68%). The amount of plant protein in the diet exceeded that of animal protein. Boys had lower means height and weight than girls with 36% falling below the NCHS 5<sup>th</sup> percentiles weight-for-age. Wasting was only present in 5% and 2 % among girls.**

**Current diet intake was assessed with a diet history and a diet food frequency questionnaire. A high to moderate prevalence of underweight rural areas (19%), a low prevalence of stunting in rural areas (17%) and a high prevalence of wasting in rural area (7%) were identified. Maize-meal porridge and milk were the most commonly used food items, as compared with, vegetables, margarine**



and meat. Most of the children had insufficient (<67% RDA) intake of iron, Zinc, Vitamin C, Niacin and Vitamin B6.

# Table Of Contents

<b>CHAPTER 1</b> .....	<b>1</b>
<b>1.1 INTRODUCTION</b> .....	<b>1</b>
<b>1.2 MOTIVATION FOR THE STUDY</b> .....	<b>3</b>
<b>1.3 STATEMENT OF THE PROBLEM</b> .....	<b>10</b>
<b>1.4 OBJECTIVES OF THE STUDY</b> .....	<b>12</b>
<b>1.5 HYPOTHESIS</b> .....	<b>13</b>
<b>1.6 ASSUMPTIONS</b> .....	<b>13</b>
<b>1.7 RESEARCH DESIGN, METHODOLOGY AND PROCEDURE</b> .....	<b>13</b>
1.7.1 SAMPLING METHOD.....	13
1.7.2 RESEARCH DESIGN.....	14
1.7.3 LITERATURE REVIEW.....	15
1.7.4 COLLECTION OF DATA.....	16
1.7.5 ANALYSIS OF DATA.....	16
<b>1.8 DEFINITION OF TERMS</b> .....	<b>16</b>
1.8.1 SAMPLING.....	16
1.8.2 SAMPLE.....	17
1.8.3 POPULATION.....	18
1.8.4 SAMPLING ELEMENTS.....	18
1.8.5 SAMPLING FRAME.....	18
1.8.6 PROTEIN-ENERGY-MALNUTRITION (PEM).....	19
1.8.7 MALNUTRITION.....	19
1.8.8 ACUTE PEM.....	19
1.8.9 CHRONIC PEM.....	19
1.8.10 KWASHIORKOR.....	20
1.8.11 MARASMUS.....	20
1.8.12 MINERALIZATION.....	21
1.8.13 OVER- NUTRITION.....	21
<b>1.9 VALUE OF THE RESEARCH STUDY</b> .....	<b>21</b>
<b>1.10 OUTLINE OF CHAPTERS</b> .....	<b>21</b>
CHAPTER 1: INTRODUCTION.....	22
CHAPTER 2: LITERATURE REVIEW OF NUTRITIONAL STATUS OF CHILDREN.....	22
CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY.....	22
CHAPTER 4: DATA ANALYSIS AND INTERPRETATION.....	22
CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS.....	23
<b>1.11 SUMMARY</b> .....	<b>23</b>

<b>CHAPTER 2</b> .....	<b>24</b>
<b>2.1 INTRODUCTION</b> .....	<b>24</b>
<b>2.2 PROTEIN ENERGY MALNUTRITION (PEM)</b> .....	<b>26</b>
<b>2.3 THE AGE INCIDENCE</b> .....	<b>27</b>
<b>2.4 THE SOCIAL BACKGROUND</b> .....	<b>28</b>
<b>2.5 MALNUTRITION AND POVERTY</b> .....	<b>29</b>
<b>2.6 VITAMIN A DEFICIENCY</b> .....	<b>29</b>
2.6.1 NIGHT BLINDNESS (NYCTALAPIA) .....	30
2.6.2 EPITHELIAL CHANGES (KERATIZATION).....	31
2.6.3 SKIN CHANGES (FOLLICULAR HYPERKERATOSIS) .....	31
2.6.4 PREVALENCE .....	32
2.6.5 SOURCES OF VITAMIN A SUPPLIES.....	32
<b>2.7 VITAMIN D</b> .....	<b>33</b>
2.7.1 VITAMIN D DEFICIENCY .....	35
2.7.2 VITAMIN D FROM SELF SYNTHESIS.....	36
<b>2.8 THIAMINE DEFICIENCY</b> .....	<b>36</b>
2.8.1 LOW INTAKE .....	37
2.8.2 POOR ABSORPTION.....	37
2.8.3 EXCESSIVE DEMAND: .....	37
<b>2.9 INFANTILE BERIBERI</b> .....	<b>38</b>
<b>2.10 RIBOFLAVIN DEFICIENCY</b> .....	<b>39</b>
<b>2.11 NIACIN DEFICIENCY</b> .....	<b>40</b>
<b>2.12 ASCORBIC ACID DEFICIENCY</b> .....	<b>41</b>
<b>2.13 IODINE DEFICIENCY</b> .....	<b>42</b>
<b>2.14 SUMMARY</b> .....	<b>42</b>
<b>CHAPTER 3</b> .....	<b>44</b>
<b>3.1 INTRODUCTION</b> .....	<b>44</b>
<b>3.2 RESEARCH DESIGN</b> .....	<b>45</b>
<b>3.3 RATIONALE FOR THE QUANTITATIVE APPROACH</b> .....	<b>46</b>
<b>3.4 RESEARCH METHODOLOGY</b> .....	<b>47</b>
<b>3.5 SAMPLING</b> .....	<b>47</b>
3.5.1 WHY STRATIFIED RANDOM SAMPLING?.....	51
<b>3.6 DATA COLLECTION METHOD AND PROCEDURE</b> .....	<b>52</b>

<b>3.7 RESEARCH INSTRUMENT</b> .....	<b>52</b>
3.7.1    WHY THE QUESTIONNAIRE? .....	52
3.7.2    NATURE AND STRUCTURE OF THE QUESTIONNAIRE CONSTRUCTED .....	57
3.7.3    TYPE OF SCALE AND SCORING PROCEDURE OF THE QUESTIONNAIRE.....	57
3.7.4    RELIABILITY AND VALIDITY OF THE INSTRUMENT .....	58
<b>3.8    SUMMARY</b> .....	<b>59</b>
<b>CHAPTER 4</b> .....	<b>61</b>
<b>4.1    INTRODUCTION</b> .....	<b>61</b>
<b>4.2    DATA ANALYSIS PROCEDURES</b> .....	<b>62</b>
4.2.1    DESCRIPTIVE STATISTICS .....	62
4.2.2    INFERENCE STATISTICS .....	63
<b>4.3 DIETARY INTAKE</b> .....	<b>64</b>
<b>4.4    BREAST FEEDING</b> .....	<b>66</b>
4.4.1    DURATION OF BREAST-FEEDING.....	67
4.4.2    TERMINATION OF BREASTFEEDING.....	68
4.4.3    BOTTLE FEEDING .....	70
<b>4.5    REASONS FOR EARLY WEANING</b> .....	<b>71</b>
4.5.1    WEANING.....	73
4.5.2    SOLID FOOD .....	73
<b>4.6    TYPES OF FOOD</b> .....	<b>75</b>
<b>4.7    ALLOCATION OF FOOD</b> .....	<b>76</b>
<b>4.8    FOOD CONSUMPTION</b> .....	<b>78</b>
<b>4.9    PROTEIN RICH FOOD</b> .....	<b>79</b>
<b>4.10    FOOD BUYING</b> .....	<b>79</b>
<b>4.10    CHOICE OF INDICATORS</b> .....	<b>79</b>
<b>4.12    INTERPRETATION OF RESULTS</b> .....	<b>80</b>
<b>4.13    IMPLICATION OF FINDINGS</b> .....	<b>81</b>
<b>4.14    DISCUSSION OF RESULTS</b> .....	<b>85</b>
<b>4.15    SUMMARY</b> .....	<b>87</b>
<b>CHAPTER 5</b> .....	<b>88</b>
<b>5.1    INTRODUCTION</b> .....	<b>88</b>
<b>5.2    MAIN FINDING</b> .....	<b>88</b>
5.2.1    INCIDENCE OF MALNUTRITION AT NGWAVUMA AND MANGUZA .....	88
5.2.2    NUTRIENT DEFICIENCIES IN CHILDREN DIET .....	89

5.2.3	RELATIONSHIP BETWEEN POOR NUTRITION STATUS AND MARASMUS.....	90
5.3	FINDINGS OF THE STUDY .....	90
5.4	RECOMMENDATIONS.....	91
	BIBLIOGRAPHY .....	95

## **CHAPTER 1**

### **MALNUTRITION AMONG AFRICAN CHILDREN**

#### **1.1 INTRODUCTION**

Nutritional problems exist all over the world and are particularly noticeable among African children at pre-school level. Among African children there is chronic malnutrition, which is not serious enough to cause them to suffer from kwashiorkor or Marasmus, but results in them being both physically and mentally stunted. Children, especially those under 5 years, are the most vulnerable group in an environment that does not guarantee adequate food and protection.

There is a high nutritional requirement for children under 5 years of age because they are undergoing a period of rapid growth. Good nutrition at this age is vital, as unavailability of certain key nutrients for a given age could result in physical and mental retardation that may be irreversible. In most cases African children are more affected because of their unfavourable social and economical conditions.

This research aims at finding out whether children in the areas of study are well nourished or not and how the community can assist in combating malnutrition and other diseases, which are related to it.

The incidence of malnutrition in children may well serve to indicate that further investigation is required with nutritional status of the whole community, the types of malnutrition and its causes (Rossouw, 1996:29).

Malnutrition is mainly a disease of poverty and it is often seen as a problem of rural poverty because the majority of African people in South Africa live in rural areas. The low-income groups in urban areas, however, are also the victims of malnutrition. The main reason for malnourishment in both urban and rural people is sheer poverty (Tanner, 1996:17).

Of all population groups, preschoolers are the most vulnerable to nutritional deficiencies. For children of developing countries, it is often difficult to obtain sufficient food energy and nutrients. Essential fatty acid (EFA) deficiencies have been known to occur among children that do not suffer from protein energy

malnutrition (PEM) but who are receiving an insufficient amount of food energy (Jacob, 1991:72).

## **1.2 MOTIVATION FOR THE STUDY**

The spectra of hunger and starvation have haunted the world for millennia. If we fail to realize increases in food production in the third world in order to deal with the explosive increase in population it will lead to massive semi-starvation in the 21st century.

The 20<sup>th</sup> century has had its share of starvation, much of it man-made, although in some areas of Africa the vagaries of nature, including aberrant patterns of climate, have been the dominant factor. At present, millions of people in the industrially under-developed countries and in pockets of severe poverty in the industrialized and urbanized areas of the world suffer from chronic under-nutrition impairing health and work capacity. Infants and young children, in particular, are readily and deeply affected.



The aetiology of energy-protein malnutrition is complex and the weight of critical components (such as poverty, lack of information about the nutritional requirements of infants and young children, family disorganization, infections and infestations) varies in different areas. Belts of poverty prevent different nutritional problems in different region problems, and remedial measures must take into account the specific etiological factors.

For any nutrition policy to be of practical value, it is necessary for it to have an effective data collecting system. Some form of an early warning system is essential in a country where under-nutrition has a high incidence rate. In areas with different climates and agricultural regions, a general centralized system for determining the incidence of malnutrition is essential.

Previously, nutritional diseases like kwashiorkor were noticeable diseases. It turned out that many medical doctors were not able to identify these diseases correctly or was trying to boost their salaries by inflating the number of patients seen. Consequently, the system was dropped and subsequently figures were sent to the Department of Health on a voluntary basis (Kotze, 1992).

In a hospital based study in the Ngutu district in KwaZulu-Natal (Schlemmer & Stop-forth, 1994), using the same diagnostic criteria as Margo *et al.* (1996), reported 27% of the children suffering from PEM. It can reasonably be argued that in this hospital-based study, the population was biased in favour of ill children and consequently would overestimate the PEM problems. The main reason for malnourishment in both urban and rural people is sheer poverty (Neser, 1965).

Extreme poverty is more prevalent in rural areas than in urban African communities. The majority of rural people do not have enough money to buy good quality foods to prepare well-balanced meals for their families (Ndlovu, 1985).

Many of the families have only one parent, usually the mother who lives with the children in rural areas. Men in many households are migrant workers and they live near the cities and towns where they find employment. They usually send money to their families who are left behind in rural areas. More often the money is inadequate to enable their families to buy sufficient food to meet their dietary requirements (Robinson, 1972).

Poverty usually results in vicious cycles. Limited buying power compels poor people to make do with inadequate diets that contain some essential nutrients and

this causes malnutrition and illness. The resulting illness means lowered work capacity, reduced ability to learn and greater costs for medical services (Robinson, 1972). Undernourished infants and children are much more likely to succumb to infectious diseases than children in a good nutritional state, since poverty causes a large number of children die from communicable diseases like measles, bronchopneumonia, gastroenteritis and whooping cough, which are often caused by lowered organic resistance owing to conditions of malnourishment (Lotham, 1990).

Many families lack the skill of knowing how best to use the available amount of money. They do not realize that the most important factor is to spend money on the right types of food that will provide their families with a balanced diet. A number of people spend more money on items like clothes, furniture, alcohol and gambling than on food.

Most mothers in urban and rural areas are ignorant of proper methods of food preparation and cooking and therefore destroy some essential nutrients. Ascorbic acid is best when vegetables like cabbage or spinach are cooked for a long time.

People at all educational levels may lack knowledge regarding the importance of an adequate balanced diet. However, illiterate Africans are at a disadvantage because they cannot secure employment to earn a satisfactory income. They can only afford to buy a limited amount of food that does not provide all the required nutrients. Formal education provides basic information on health and nutrition, which the illiterate cannot obtain. The problem of ignorance needs to be taken into account in specific nutrition and health education programs.

Malnutrition or even poor nutrition in the very young growing child results in growth deficits. Whatever food is ingested has to be utilised to maintain essential body functions and thus essential growth in stature must take second place, resulting in stunting. This is a vital adaptation on the part of the growing organism and is well illustrated in nature.

Stunting as an adaptation is not a new concept. In 1974 Rao and Gatyannarayana stated, and I quote, "children who have evidence of past chronic malnutrition with normal weight-for-height may be considered as having successfully adapted themselves to a low dietary intake". Should food become plentiful, for whatever reason, these young stunted children will catch up (Hansen, 1981), but restrict it

once more and the same children will stop growing and return to their previous pattern, similar to that of their unsupplemented siblings. They cannot maintain both accelerated linear growth and vital body functions, as was shown in an excellent study by Baerth (1986).

This raises the question of what stunting really means in terms of health. Waterlow and Rutishauser (1974) conclude that reduction in physical size in itself is of little importance and Rao and Naidu observed that “linear growth cannot usually be increased above optimal or generic potential” even when supplemented. This again raises a further question: at what age in the life cycle of man does stature become important?

The assessment of the nutritional status of children has always been in relation to the weight attained for height and standards are readily available for comparison (Metropolitan Life Insurance Company, 1999). Why then are all children expected to reach a standard or stature applicable to affluent groups and at the same time maintaining a body weight in relation to this? The healthy, if stunted, child raised in poor circumstances grows steadily along the same growth curve, albeit at a lower level than that of his well circumstance taller peers. Why is he

then regarded as malnourished when he does not weigh the same as the white child at any given age? Indeed, Tanner (1976) pertinently remarks, “growth is indeed a fine yardstick of the health of individuals and populations, perhaps the best there is. But it remains so as long as we view our standards as a sensitive balance to be adjusted if conditions change and not an immutable ceiling to which we should all eat our way”.

Nutritional Marasmus, “severe protein-calorie deficiency occurring throughout most of the first 12 months of life among populations where malnutrition is endemic” results in a severe deficit in intellectual functions. The deficit does not ameliorate with age (Pollitt & Thomson, 1993).

Kwashiorkor which is described “severe but acute protein-calorie deficiency occurring during the second year of life among populations where malnutrition is endemic” may, but generally does not, result in a long-term impairment of intellectual function (Pollitt, 1993).

### **1.3 STATEMENT OF THE PROBLEM**

Since the researcher started at a tertiary institution four years ago, he has heard and listened to a number of students expressing their dismay about nutritional problems. They highlighted that their families have not offered them good nutrition or a balanced diet in order for them to grow very well. They agreed that information regarding nutrition has not been introduced in pre-school level.

Sue Schofield (1979) argues that lack of reliable and comparable data on the incidence of nutritional deficiencies is prevalent throughout the less developed world.

Poverty is the underlying cause of most malnutrition. Jean says, I quote “the majority of low-income families are located in rural areas where the most acute nutritional problems are found now and will be located in the future except when as famine victims they fled to city centers to seek jobs and food” (Sue Schofield 1979).

Nutrition affects the individual, but when large numbers of persons within a population are found to have similar nutritional problems, the emphasis shifts from individual health to public health. Beal (1994), states that when a nutritional problem is widely prevalent, indicating the need for governmental intervention by public health programs with a focus on nutrition, basic data on the extent and causes of the problem are essential (Hibacnt *et al.*).

Ignorance of nutritional requirements and balanced diets prevails among both urban and rural Africans, especially the illiterate. A large number of people do not understand the function of food in the body. Children of ignorant parents usually suffer and sometimes die of malnutrition because their parents do not know that a child who is fed on porridge or who is never hungry can suffer from a physical disease such as kwashiorkor because of lack of essential nutrients in his diet.

Wes and Scott (1977) state that children under 5 years of age living in rural villages have severe under-nutrition and that there is a high rate of affected children. They concluded that dietary knowledge or understanding and raised income is necessary to ensure that children are well nourished.



PEM is regarded as the most serious nutritional problem in the developing countries. The majority of all health problems in among South African blacks have never been reported before the age of 5 years (Wagstaff, 1982:70). PEM includes all kinds of malnutrition due to containing protein and energy giving nutrients resulting in diseases like kwashiorkor and Marasmus (Ndlovu, 1985:49).

#### **1.4 OBJECTIVES OF THE STUDY**

The objectives of the study are as follows:

- a) To investigate the incidence of malnutrition at Ngwavuma and Manguza;
- b) To identify nutrient deficiencies by studying the children's diets; and
- c) To find out if there is any relationship between poor nutrition status and marasmus and kwashiorkor.

## **1.5 HYPOTHESIS**

The deficiency of protein-energy malnutrition is the cause of poor nutrition and is the major problem of marasmus, kwashiorkor, anaemia and rickets.

## **1.6 ASSUMPTIONS**

It is assumed that the majority of young children under the age of five in African rural areas suffer from malnutrition caused by poor intake of nutrients.

## **1.7 RESEARCH DESIGN, METHODOLOGY AND PROCEDURE**

The field of study covers the area of Ngwavuma and Manguza. The population of both areas is about 200 people who have been living there for some years.

### **1.7.1 Sampling method**

The sampling procedure that was adopted in this study is the probability sample. The sampling frame that the researcher established was constituted from the

official list of plots in Ngwavuma and Manguza. The sampling frame operation defines the population by providing the basis for sampling.

The method that was used is the qualitative method. A table of stratified random sampling will be used to select 100 households from the official list of plots in Ngwavuma and Manguza. Those households which did have any children under the age of five or whose occupants were not present and could not be contacted by the interviewer were substituted by the next sampled house having the next highest plot number.

The research instruments that were used throughout were interviewing face-to-face interviewing and a questionnaire. Records found in clinics and social welfare offices during the visits were also used in order to collect data.

### **1.7.2 Research design**

The research questions of this study were crystallized by the research problem as to how mothers perceive the effectiveness of a balanced diet for their children. The

researcher also undertook to assist them with information with good protein intake for their health. As a complete plan of action the research design involved “thinking, imagining and thinking some more” on the strategies of how to handle the research problem so as to develop accurate objectives systematically collected under controlled conditions.

The questionnaires were distributed among the targeted population by the researcher for them to complete in their own time, and face-to-face interviews were used with those who could not read and write. The information was collected in the clinic using records, while other questionnaires were given to people who were visiting the clinic and welfare offices.

### **1.7.3 Literature review**

A literature review is based on the information covers the books that has been read, but the knowledge accumulated and that we learn from and build on what others have done.

Reviewing the accumulated knowledge about a question is an essential early step on the research process no matter which approach to social science you adopt.

#### **1.7.4 Collection of data**

The data was collected with the aid of questionnaires, face-to-face interviews and clinic records.

#### **1.7.5 Analysis of data**

The information that has been collected must be analyzed. This data has been analyzed by the use of computer and the analysis of data yielded the relevant information.

### **1.8 DEFINITION OF TERMS**

#### **1.8.1 Sampling**

Sampling is a process of systematically selecting cases for inclusion in a research project (Neuman, 1997:201).

Sampling is taking any portion of a population or universe as representative of that population or universe (Kerlinger, 1986:110). This definition does not say that the sample taken is representative but it says that taking a portion of the population and considering it to be representative.

### **1.8.2 Sample**

A sample is something less than all the cases of interests in the survey research, a subset of the population actually drawn from the sampling frame (Shaughness, 1997:49).

A sample is the relatively small subgroup of cases from the population (Huysamen, 1981:1). It means that it is not the whole population the researcher is going to work with only the subgroup of it.

A sample is a drawn that represents the population (Nachmias, 1992:172). It means it's a drawn element, which will represent the entire population.

### **1.8.3 Population**

Population may be defined as the entire collection of cases, which are potentially available for observation and which have the attribute in common to which our hypothesis refers (Huysamen, 1981:5). An example of such a population would be all white teenage boys in South Africa.

### **1.8.4 Sampling elements**

A sampling element is the unit of analysis or cases in a population. It can be a person, a group, an organization or written document that is being measured (Neuman, 1997:202).

### **1.8.5 Sampling frame**

A sampling frame is the specific list of all the elements in the population (Neuman, 1997:203).

### **1.8.6 Protein-energy-malnutrition (PEM)**

Protein-energy-malnutrition also called protein-k calorie (Whitney, Hamilton and Rolfes, 1997:151).

### **1.8.7 Malnutrition**

Malnutrition is a deficiency of both protein and energy; the world's most widespread malnutrition problem including kwashiorkor, marasmus, and states in which they overlap. (Whitney, Hamilton and Rolfes, 1997:151).

### **1.8.8 Acute PEM**

Acute protein-energy-malnutrition caused by recent severe food restriction and characterized in children by thinness for height. (Whitney, Hamilton and Rolfes, 1997:151).

### **1.8.9 Chronic PEM**



Chronic protein-malnutrition, caused by long term food deprivation, and characterized in children by short height for age. (Whitney, Hamilton and Rolfes, 1997:151).

#### **1.8.10 Kwashiorkor**

Kwashiorkor is the deficiency disease caused by inadequate protein in the presence of adequate food energy (k calories) (Whitney, Hamilton and Rolfes, 1997:151).

#### **1.8.11 Marasmus**

Marasmus is the disease of starvation, deficiency of both protein and food energy. (Whitney, Hamilton and Rolfes, 1997:151).

### **1.8.12 Mineralization**

Mineralization is the process in which calcium, phosphorous, and other minerals crystallize on the collagen matrix of a growing bone, hardening the bones (Whitney, Hamilton and Rolfe, 1997:151).

### **1.8.13 Over-nutrition**

Over-nutrition, calorie or nutrient over-consumption, which is severe enough to cause disease or increased risk of disease, a form of malnutrition (Maree, 1996:5).

## **1.9 VALUE OF THE RESEARCH STUDY**

The study will be useful in different departments, e.g. health. The department of health may also use this study for them to combat malnutrition in areas, Ngwavuma and Manguza. The study will help the community to become aware of how to combat malnutrition to their children by the use of balanced diet and what food it take should be consumed.

## **1.10 OUTLINE OF CHAPTERS**

This research report comprises five chapters, which are planned as follows:

## **Chapter 1: Introduction**

This chapter provides the orientation to the study

## **Chapter 2: Literature review of nutritional status of children**

This is a literature study chapter consulted with regard to on the nutritional status of children. It also looks at the relevance of the theoretical frame on the basis of the prevailing conditions in African schools. Furthermore, the focus is also placed on gender planning and social issues.

## **Chapter 3: Research design and methodology**

This chapter outlines the research approach and procedures adopted in collecting data that are relevant for this study.

## **Chapter 4: Data analysis and interpretation**

This chapter outlines the manner in which data collected in chapter three is analyzed and presented.

## **Chapter 5: Conclusions and recommendations**

This chapter is based on the researcher's interpretation of the findings of the study. It provides further suggestions on the topic for consideration by other researchers. This chapter also provides an evaluative summation of the investigation's findings.

### **1.11 SUMMARY**

The foregoing discussion highlights that the majority of children who were assessed are affected by malnutrition. Different researchers argue that inadequate knowledge or guidance services (such as the lack of adequate training) community workers to visit them at tell them to breast feed their children. The social factor is also a problem that causes malnutrition.

## CHAPTER 2

### LITERATURE REVIEW OF NUTRITIONAL STATUS

#### 2.1 INTRODUCTION

Malnutrition is mainly the result of a combination of inadequate dietary intake and infection. In children malnutrition is synonymous with growth failure – malnourished children are shorter and lighter than they should be at their age (Bengoa, 1998:15). To get a measure of malnutrition in a population, young children can be weighed and measured and the results compared to those of the ‘reference population’ known to have grown well. Measuring weight and height is the most common way of assessing malnutrition in populations (Tanner, 1996:105).

Although people still refer to growth failure as “protein-energy- malnutrition” (PEM) it is now recognized that poor growth in children results not only from a deficiency of protein and energy but also from an inadequate intake of vital minerals (such as iron, zinc, and iodine) and vitamins (such as vitamin A), and often essential fatty acid as well. These minerals are needed in tiny quantities, in the order of a few thousand of a gram or less each day (Rossouw, 1996:17). They are consequently called micronutrients. Micronutrients are needed for the production of enzymes, hormones and other substances that are required to

regulate biological processes leading to growth, activity, development and the functioning of the immune and reproductive systems (Rossouw, 1996:17).

All of the minerals that a body needs calcium, phosphorus, iron, zinc, iodine, sodium, potassium and magnesium, have to come either from the food eaten or from supplements. While the body manufactures many of the complex organic molecules it needs from simple dietary building blocks, a variety of vitamins are not synthesized. Vitamin D is exceptional in that it can be made in the skin, providing a person has sufficient exposure to direct sunlight (Hausen & Freesean, 1981:47).

The 1990 World Summit for Children singled out deficiencies of three micronutrients like for example iron, iodine and vitamin A as being particularly common and of special concern for children and women in developing countries. Recently, knowledge of the importance of zinc for the growth and development of children has underscored its value. A deficiency in zinc, but also vitamin D, is now recognised as a major problem in developing countries (Unicef, 1990:27-30).

A child who eats enough to satisfy immediate hunger can still be malnourished. According to World Health Organization (1998:78). half of South Asian children are malnourished. In Africa, one of every three children is underweight, and in several countries of the continent, the nutritional status of children is worsening (WHO, 1998:78).

Malnourished children are more likely to die as a result of a common childhood disease than those who are adequately nourished. Research indicates that there is a link between malnutrition in early life – including the period of foetal growth and the development later in life of chronic conditions like coronary heart disease, diabetes and high blood pressure, giving the countries in which malnutrition is already a major problem new cause for concern (Graham, 1996:240).

The most critically vulnerable groups are developing fetuses, children up to the age of five and women before and during pregnancy and while they are breast-feeding. Among children, malnutrition is especially prone to strike those who lack nutritionally adequate diets and are not protected from frequent illness and do not receive adequate care (FAO, 1999:106).

## **2.2. PROTEIN ENERGY MALNUTRITION (PEM)**

Protein energy malnutrition is a broad term that encompasses kwashiorkor and marasmus together with milder stages of these social diseases. According to studies conducted, millions of infants and young children are the victims of these diseases in Asia, Africa, Central America, the West Indies and South America. Many of the children who survive are unable to achieve their full physical growth and development (Margo, 1998:62-70).

Malnutrition is a social problem of staggering dimensions in South Africa particularly in KwaZulu-Natal (KZN). The majority of pre-school children who

live in the KZN province are malnourished. Protein energy malnutrition includes all kinds of malnutrition due to lack of food, and that resulting in diseases like kwashiorkor and marasmus (Margo, 1998:74).

Malnutrition is the main cause of the high death rate among African children (SA Medical Journal, 1999:79). Among the age group 1-4 years the death rate is estimated to be higher than for whites (Quass, 1992:92)

Widespread moderate malnutrition may not be obvious unless children are weighed and measured. Some severely malnourished children develop clinical signs that are easily observed, such severe wasting and the syndrome known as kwashiorkor, with skin and hair changes and swelling of arms and legs.

Despite years of research, the reasons why some children develop kwashiorkor while others develop marasmus remain a mystery. What is clear is that if left untreated, children with either condition are at high risk of dying from severe malnutrition. On the other hand and that insuring an adequate intake of nutritious food and freedom from repeated infections can prevent both kwashiorkor and marasmus. Less severe forms of malnutrition also cause death, mainly because they weaken children's resistance to illness.

### **2.3 THE AGE INCIDENCE**

Kwashiorkor may also appear among infants who are still breast-fed (Oomen, 1998:78-80), but such children have probably been receiving only a little breast milk in recent weeks.



Breast milk acts as nutritional source for infants less than one year of age. Choosing how and what to feed a baby is a personal decision that involves the socio-economical status of the mother.

Breast milk is the perfect source of nutrition for infants. Breast milk contains appropriate amount of carbohydrates, protein and fat. It also provides digestive enzymes, minerals, vitamins and hormones that all infants require (Oomen, 1998:82).

Kwashiorkor is a Ghanaian word, which means the illness that an older baby contracts when he is weaned as a result of the mother falling pregnant again. Williams (1992:21) a paediatrician who observed this syndrome in infants, and pre-school children introduced this term. Children who were weaned and fed on a diet high in carbohydrates, but low in protein typical of a diet of staple food, such as maize, were usually the victims of kwashiorkor (Davidson, 1990:57).

#### **2.4 THE SOCIAL BACKGROUND**

According to literature kwashiorkor is far more common among poor communities and the depressed social classes than among privileged people. No one has recorded a contrary view (Bengoa, 1998:85). Even those who have doubted whether kwashiorkor was a nutritional disease have not found cases in wealthy families, unless the feeding was exceptional poor.

In all rural areas the incidence of kwashiorkor depends mostly on the type of foods grown than on the amount of monetary income. The need to buy food is quite unknown or a comparatively recent requirement for many African people innovation and restricted to certain consummated meat and fish (Bender, 1998:86).

## **2.5 MALNUTRITION AND POVERTY**

At a micro-level, child malnutrition is related to poverty, but at the macro community level poverty does not appear to be strongly related to child malnutrition in many cases. Other factors are equally important. One of these is related to the intra-household use of resources such as the time management and knowledge of the main caregiver, who is usually the mother. For example, how much time is allocated to feeding, caring and ensuring a healthy environment for children?

## **2.6 VITAMIN A DEFICIENCY**

Infants and children under the age of five are the most vulnerable to vitamin A deficiency. Vitamin A is absorbed and stored mainly as a palmitate form in the liver.

Vitamin A deficiency has been known, for many centuries, as one of the underlying causes of xerophthalmia (Table 2.1). However, recognition of the clinical signs has obscured the fact that vitamin A deficiency is prevalent among large segments of society in many countries. Knowledge of this fact is critical

to the well-being of society, as a series of large intervention trials have shown that even mild to moderate vitamin A deficiency is recognized as a critical factor in child health and survival (Barker, 1998:70).

The implication of such vitamin A deficiency, however, varies in the group at risk. In pre-school children vitamin A deficiency can lead to increased risk of morbidity or mortality and to blindness in pregnant and lactating women. It can also lead to night blindness and appears to have implications for material mortality and morbidity, while the immediate health consequences for schoolchildren and adolescents are not completely known, they are not probably less dramatic (West, 1997:97).

Deficiency of vitamin A leads to softening and ulceration of the cornea of the eye and sometimes to blindness. It usually affects young children and is often combined with kwashiorkor and marasmus. A more detailed summary of complex vitamins is given in Table 2.1 for review.

### **2.6.1 Night blindness (nyctalopia)**

This is a condition in which the individual is unable to see well in dim light and ends up having a problem of sight. But the intake of vegetables is being well encouraged the greens and yellows (see Table 2.1).

**Table 2.1**

<b>Vitamin</b>	<b>Functions</b>	<b>Results of Deficiency</b>	<b>Food Sources</b>
A (retinol); provitamin A (carotene)	Vision cycle - adaptation to light and dark; tissue growth, especially skin and mucous membranes; toxic in large amounts	Night blindness, xerophthalmia, susceptibility to epithelial infection, changes in skin and membranes	Retinol (animal foods); liver, egg yolk, cream, butter or fortified margarine, fortified milk; carotene (plant foods); green and yellow vegetables, fruits

**2.6.2 Epithelial changes (keratization)**

This is the shrinking, hardening, and progressive degeneration of the cells of the cornea

It increases the susceptibility to severe infections of the eye, the nasal passage, the sinus, middle ear, lungs and the genitourinary tract (Merhav, 1985:48, 12, 70).

**2.6.3 Skin changes (follicular hyperkeratosis)**

In this case the skin changes and becomes rough, dry and seamy (Ndlovu, 1985:74).

#### **2.6.4 Prevalence**

Vitamin A deficiency is one of the most frequent nutritional deficiency disorders in the world. WHO has estimated that over two million children worldwide have a deficiency in vitamin A stores (Ndlovu, 1985:105). The highest prevalence of vitamin A deficiency is found in pre-school children and in pregnant and lactating women, but sub-clinical vitamin A deficiency has also been shown to be not uncommon in school children and among adolescents in some settings.

The mean intake of vitamin A in the form of pro-Vitamin A and of preformed vitamin A differs considerably in various parts of the world. The average western diet provides about half of its vitamin A activity as carotenes from natural sources. The remainder of dietary vitamin A is obtained from preformed vitamin A from animal sources. Sources of the pro-vitamin A carotenoids include dark green leafy vegetables, deep yellow vegetables, and deep yellow fruit. Sources of preformed Vitamin A include fish liver oil extracts and egg yolks Schiemmer (1998:86).

#### **2.6.5 Sources of vitamin A supplies**

UNICEF has established a worldwide program of co-operation with the national governments for the elimination of vitamin A deficiency. This program is active in almost every country where vitamin A deficiency is a public health problem. In 1994 UNICEF supplied more than 180 million capsules to over 70 countries.

In addition, the provision of vitamin A supplements often to non-governmental organizations for the use in their own program, UNICEF program include support of projects for the elimination of vitamin A deficiency (WHO, 1997).

## **2.7 VITAMIN D**

A deficiency of vitamin D leads to inadequate absorption of calcium and phosphorus from the intestine tract and to faulty mineralization of bone and tooth structure (see Table 2.2). In South Africa rickets is commonly found among African infants under the age of one year (Davidson, 1995:125). Delayed dentition and dental caries may also be due to a deficiency of Vitamin D (Robinson, 1992:73).

**Table 2.2**

<b>Mineral</b>	<b>Metabolism</b>	<b>Physiologic Functions</b>	<b>Clinical Application</b>	<b>Requirements</b>	<b>Food Source</b>
Calcium (Ca)	Absorption according to body need, aided by vitamin D; hindered by binding agents (oxalates), or excessive fibre Parathyroid hormone controls absorption and mobilization	Bone formation Teeth Blood clotting Muscle contraction and relaxation Heart action Nerve transmission	Tetany - decrease in ionized serum calcium Rickets Osteoporosis	Infants: 400-600mg Children: 800-1200mg	Milk Cheese Whole grains Egg yolk Legumes, nuts Green leafy vegetables
Phosphorus (P)	Absorption with calcium aided by vitamin D; hindered by excess binding agents (aluminum)	Bone and tooth formation Overall metabolism Energy metabolism (enzymes) Acid-base balance	Bone loss Poor growth	Infants: 300-500mg Children: 800-1200mg	Milk Cheese Meat Egg yolk Whole grains Legumes, nuts

Vitamin D is different from all the other nutrients in that the body can synthesize it with the help of sunlight. Therefore, in a sense, vitamin D is not an essential nutrient. Given enough sun, you need not consume any vitamin D in all the food eaten. Rather it is like a hormone, a compound manufactured by one organ of the body that has effect on another. Its role is essential to bone mineralization (see Table 2.3).

**Table 2.3**

<b>Vitamin</b>	<b>Functions</b>	<b>Results of Deficiency</b>	<b>Food Sources</b>
D (cholecalciferol)	Absorption of calcium and phosphorus, calcification of bones; toxic in large amounts	Rickets, faulty bone growth	Fortified or irradiated milk, fish oils

**2.7.1 Vitamin D deficiency**

Both inadequate and excessive vitamin D intakes are found, in the United State and in Canada, even though the vitamin has been known for decades to be essential for growth and tonic in excess. Worldwide, vitamin D deficiency leads to rickets, which still afflicts large number of children.

The main symptoms of an inadequate intake of vitamin D are those of calcium deficiency. The bones fail to calcify normally and may be so weak that they



become bent when they have to support the body's weight (Griesel, 1996:65). A child with rickets, who is old enough to walk, characteristically develops bowed legs, often the most obvious sign of the disease (see Table 2.3).

### **2.7.2 Vitamin D from self synthesis**

The way to meet your vitamin D needs is to synthesize it yourself with the help of sunlight. Some foods contain the preformed vitamin, such as chiefly found in animal foods such as milk, fish, eggs and liver – but unless they are fortified, they are not likely to meet the RDA requirements. Children need to be taken out in the sun for a while each day around noon. They will receive enough light to generate a protective dose of vitamin D.

## **2.8 THIAMINE DEFICIENCY**

Prolonged thiamine deficiency can result in the disease beriberi, which was first observed in the Far East when the custom of polishing rice becomes widespread (see Table 2.4).

Beriberi was first believed to be caused by an infection agent. It is frequently associated with a low calorie intake and deficiency of other factors of vitamin B complex. In clinical practice, therefore, pure thiamine deficiency is not usually seen. Those who live only on cereals may take just enough thiamine to supply their minimum requirements. Any reduction in their intake, because of a change

in refined flour or due to loss during cooking, may precipitate a deficiency (WHO, 1997:28).

*A deficiency of thiamine is caused by:*

- *Low intake,*
- *Poor absorption, and*
- *Excessive demand (Gerald, 1992:70).*

### **2.8.1 Low intake**

Deficiency of thiamine occurs in areas where refined cereals are the major source of calories, either as polished rice, or as highly refined flour for baking bread. Alcoholics suffer from thiamine deficiency because their food intake is usually low and alcohol increases the metabolism and demand for the vitamin (Gerald, 1992:39).

### **2.8.2 Poor absorption**

Patients suffering from various diseases of the gastrointestinal tract have decreased thiamine absorption (Gerald, 1992:39).

### **2.8.3 Excessive demand:**

The demand for thiamine is increased during pregnancy and lactation, when the basic metabolic rate is high, as in hyperthyroidism or fever, and when large

amount of refined carbohydrates, like sugar, are taken. Severe deficiency of thiamine produces the disease beriberi (Gerald, 1992:40).

## **2.9 INFANTILE BERIBERI**

Infantile beriberi occurs if the first few months of life in the diet of the mother is deficient in thiamine. The infant is constipated and may even appear well nourished and plump due to water logging. The heart is enlarged and the heart-beat sounds muffled. Edema of the glottis manifests as a peculiar cry, and later, as loss of voice. Ultimately, there may be heart failure, twitching, coma and death.

The individual who daily receives less than the minimum amount of thiamine builds up an increasing deficiency that effect the gastro-intestinal, cardiovascular, and peripheral nervous system (Antia, 1997:18).

The early symptoms are non-specific for thiamine lack and include fatigue, lack of interest, fear and loss of appetite, weight and strength.

Thiamine deficiency in babies is called infantile beriberi. Convulsion and acute cardiac failure in the early months of life are suggestive of beriberi (see Table 2.4).

**Table 2.4**

<b>Vitamin</b>	<b>Functions</b>	<b>Results of Deficiency</b>	<b>Food Sources</b>
Thiamine	Normal growth; coenzyme in carbohydrate metabolism; normal function of heart, nerves, and muscle	Beriberi; GI: loss of appetite, gastric distress, indigestion, deficient hydrochloric acid; CNS: fatigue, nerve damage, paralysis; CV: heart failure, edema of legs especially	Port, beef, liver, whole or enriched grains, legumes

## **2.10 RIBOFLAVIN DEFICIENCY**

Riboflavin deficiency is associated with a broad range of symptoms. An early symptom of what is known as ariboflavinosis (lack of riboflavin) is a condition known as cheilosis in which cracks appear at the corners of the mouth and the lips become inflamed. Another common symptom is dermatitis around the nose and mouth and glossitis (inflammation of the tongue). For such symptoms to appear, intake of riboflavin must be low for several months. As with any vitamin deficiency, riboflavin deficiency can lead to growth retardation. In animal studies, riboflavin deficiency at a crucial stage of fetal development has been shown to lead to congenital malformation, such as cleft lip, cataracts and skeletal deformities. Such a relationship however, not been established in human pregnancy and humans and other animals certainly differ in their responses to riboflavin deficiency (see Table 2.5).

**Table 2.5**

<b>Vitamin</b>	<b>Functions</b>	<b>Results of Deficiency</b>	<b>Food Sources</b>
Riboflavin	Normal growth and vigour; coenzyme in protein and energy metabolism	Ariboflavinosis; wound aggravation, cracks at corners of mouth, swollen red tongue, eye irritation, skin eruptions	Milk, meats, enriched cereals, green vegetables

The riboflavin deficiency diseases prevails among African pre-school children and young children in South Africa. Angular stomatitis and chalices (lesions of the lips) are suggestive signs of riboflavin deficiency. During 1971 and 1972 a survey was conducted in the Transvaal where between 30% and 40% of chalices and angular stomatitis cases were reported to have occurred in African pre-school and school going children (Du Plessis, 1994:92).

Adequate dietary intake of meat, eggs, milk, and green leafy vegetables are essential in combating the onset of the disease.

## **2.11 NIACIN DEFICIENCY**

One of the prevalent nutritional disorders is pellagra, which result from niacin deficiency. It usually affects older children and adults (see Table 2.6).

**Table 2.6**

<b>Vitamin</b>	<b>Functions</b>	<b>Results of Deficiency</b>	<b>Food Sources</b>
Niacin (precursore: tryptophan)	Coenzyme in energy production; normal growth, health of skin, normal activity of stomach, intestines, and nervous system	Pellagra; weakness, lack of energy, and loss of appetite; skin: scaly dermatitis; CNS: neuritis, confusion	Meat, peanuts, legumes, enriched grains

Pellagra is still a public health problem in South Africa. Skin lesions of the neck, arms and legs, loss of appetite, general poor health, abnormally red lips and tongue, confusion, irritability and poor memory are the main signs of niacin deficiency (Williams, 1988:263).

## **2.12 ASCORBIC ACID DEFICIENCY**

A deficiency of ascorbic acid result in a disease called scurvy, which is characterized, by swelling and bleeding of the gums, poor wound healing and increased susceptibility to infection.

Scurvy is sometimes seen in adults and children whose diets are deficient in citrus fruits, guava, cabbage, pineapple and green vegetables such as spinach, which are good sources of ascorbic acid (Gerald, 1992:50).

### **2.13 IODINE DEFICIENCY**

Iodine deficiency disorders is a more precise term than “goitre” because the latter only refers to the size of the thyroid gland .The former on the other hand, also includes a condition associated with iodine deficiency. Among this are still births, abortions and congenital anomalies, endemic cretinism, characterized most commonly by mental deficiency deaf mutism and spastic diplegia .For a lesser degree of neurological defects related to fetal iodine deficiency, and impaired mental function in children and adults with goitre and decreased circulating thyroxine. Correcting iodine deficiency in the mother before pregnancy prevents iodine deficiency disorders in infants and children (Westcott, 1997:75).

The iodine deficiency disease, goiter, occurs in those areas where the iodine content is so low that insufficient iodine is obtained through food and water. Iodized water can thus prevent goiter in districts where this disease is common.

### **2.14 SUMMARY**

Of all population groups, pre-scholars are the most vulnerable to nutritional deficiencies. For children of developing countries, it is often difficult to obtain sufficient food energy and nutrients. Among children suffering from protein-energy malnutrition (PEM), essential fatty acid (EFA) deficiencies have been known to occur to non PEM children receiving an insufficient amount of food energy (Unicef, 1997:87).

Looking towards the implications of nutrition intervention in the province KZN. The main emphasis should be on assessing status of children. Attention should

also be given to the question as to how the government should intervene in helping the community and how should the government intervene in helping the community to combat the nutritional problems.

However if you have a rough skin, or cracks at the corner of your mouth or gums that bleed when you brush them, or pinpoint haemorrhages between hairs, do not assume that you are malnourished. Malnutrition is the term encompassing both under- and over nutrition, both of which conditions are of concern to the food and nutrition scientist.



## **CHAPTER 3**

### **RESEARCH DESIGN AND METHODOLOGY**

#### **3.1 INTRODUCTION**

This study focuses on the assessment of the nutritional the nutritional status of children, especially those who are under five years old. It is aimed at exploring problems that may be prevented, controlled or rectified with proper diets, and at finding out whether there is any relationship between poor nutritional status and marasmus and/or kwashiorkor.

Pilot and Hungler (1998:70), and Leedy (1997:79) explains the concept research design as the researchers overall systematic plan of action for gathering data that will answer the research question of his/her study and test the research hypothesis thereby informing the research problem. The research questions of this study served to crystallize the research problem as to how members perceived the effectiveness of the balanced diet for children in protein intake for their health. As a complete plan of action the research design according to Leedy, (1997:82) involves imagining and thinking some more on the strategies of how to handle the research problem so as to develop an accurate, objective

and systematically approach toward the solution of the question under controlled conditions and subject to quantifiable measurements. In this data the researcher will discuss the research design and methodology of the study.

### **3.2 RESEARCH DESIGN**

The nature of the research and the methodology adopted warranted the utilization of non-experimental research as a type of research design for this study. Non-experimental research as a type of research is based on the notion that the independent variables cannot be inherently manipulated or thus making the utilization of the research question in the study appropriate. (Pilot and Hungler, (1998:119) and Leedy (1997:90) also indicates that non-experimental research studies a specific situation as it is and does not attempt to manipulate the variables so as to numerically and statistically present the data for generalization to population. The questionnaires were distributed to the targeted population by the researcher's research assistants for them to complete in their own time and face-to-face interviews were conducted with those who could not read and write. Additional information was collected in the clinic using records, while other questionnaires were given to people who were visiting the clinic.

Mothers who had infants and children under the age of five with them at home or at the venues for interviews were eligible. Baby-sitters and relatives could not be interviewed unless they had been responsible for looking after the baby since birth.

### **3.3 RATIONALE FOR THE QUANTITATIVE APPROACH**

The research approach adopted in this quantitative approach, which sought explanations and predictions that aimed at investigating the hypothesis of the present research. Cresswell (1996:79) defines the quantitative study as “an inquiry into the social problem based on testing theory composed of variable, measured with numbers, and analyzed by statistical procedures, in order to determine whether the predictive generalizations of the theory hold true”.

Another distinguishing characteristic of the quantitative approach, which also informs its selection, is that data collected is based on what already exists and is measurable by means of a well-structured questionnaire that is reliable and valid to enhance generalization (Leedy, 1997:92).

### **3.4 RESEARCH METHODOLOGY**

Households which did not have any children under the age of five or whose occupants were not present and could not be contacted by the interviewer were substituted by the next occupied house having the next highest plot number.

### **3.5 SAMPLING**

A sample is defined as a selected subset of elements about which data are collected, representing the entire population (Polit & Hungler, 1998:72; Higgins, 1996:74). Leedy (1997:204) highlights the fact that through a carefully selected sample “the researcher is able to see all the characteristics of the total population in the same relationship that they would be seen were the researcher to inspect the total population”. A sample of children was drawn from each clinic from Maputaland community. The basic rule in selecting a sample is that it must be representative of the population and its size must be large enough to satisfy statistical procedures (Higgins, 1996:196).

The sampling procedure that was adopted in this study is probability sampling because the nature of the research design and population warrants representation of a segment of the population in the sample (Leedy, 1997:203). This implies that each entity that made up the large population legible to be was selected for inclusion in the sample.

The total population of the study of Mangaza and Ngwavuma come to 200, but it was not possible for the researcher to include the whole population in the investigation because of this large number. The researcher resorted to the process of randomization, which is defined by Leedy (1997:205) as “ the selection of a sample from the whole population in such a way that the characteristics of each unit of the sample approximate the characteristics of the total population”.

In short this means that each element in the population had an equal, but independent chance of being selected (Pilot & Hungler, 1998:80). Therefore, it was made possible through randomization that each respondent had an equal chance of being chosen. The selected elements therefore formed a random sample.

The sampling frame, established by the researcher was constituted from the official list of plots in Ngwavuma and Manguza. The sampling frame operation defines the population by providing the basis for sampling (Mouton, 1996:89). The Women with children under the age of five made up the sub-populations or strata of the total population. Hence there were mothers with their children who were attending clinic, hospital, Child Welfare, together with other interviewers at their homes taken from their house hold forming the sub-population or strata of the total population. Mouton (1996:90) defines a stratum as the inclusion of one population that is the sub-population in another. It is from this base that the sampling procedure was designed.

The inclusion of all the mothers who had children under the age of five provided the representativeness required by the researcher by concentrating on all segments of the institution and not only one. Mothers with their children were grouped together under the stratum (Pilot & Hungler, 1998:118). The procedure was made more complex because the strata in the study were of unequal size with regard to the total number of mothers who had children under five in their household.

According to Leedy (1997:117) a stratified random sampling is characterized by a random selection of subjects from two or more strata or sub-groups of a population, independently. This is when the population is subdivided into a number of homogenous sub-groups, which are randomly selected in order to achieve a greater degree of representativeness. In applying stratified random sampling the researcher grouped together the number of mothers and their children with the assistance of the research assistants. The desired numbers of participants in each clinic were then randomly selected (Leedy, 1997:120).

Twenty-two women were given a questionnaire while they were attending the clinic. A further thirty-four were given the same questionnaire while attending the hospital. The others were also given the same questionnaire while they were attending the welfare centre. The women from the households who were not able to read and write for themselves there were interviewed .Out of 100 households that were selected only 42 had children under the age of five, and some of the household mothers were not available. It was therefore very difficult to interview the grandmother or the babysitter. .

Observing that the sub-groups of the population were of unequal size (i.e. disproportionate sample) and would not ensure adequate representation of

respondents' perceptions, the researcher resolve to the ratios by increasing the sample size by twenty "so as to arrive at the best estimate of the overall population values" (Leedy, 1997:182). Polit and Hungler (1998:182) state that, when it is desirable to obtain reliable information about sub-populations whose membership is relatively small, stratification provides a means of including a sufficient number of cases in the sample by over sampling for that stratum" thus sharpening " precision and representativeness of the final sample" (Pilot & Hungler: 182). The increase in proportion by twenty in each stratum resulted in the number of elements (mother with their children) to be represented in each stratum sample.

### **3.5.1 Why stratified random sampling?**

In stratified random sampling, a researcher first divides the population into sub-population groups (strata) on the basis of supplementary information. After dividing the population into strata, the researcher draws a random sample from each sub-population. In general, stratified sampling produces samples that are representative of the population: that is, simple random sampling (SRS). The researcher used the stratified sampling method because stratum of interest was



small percentage of the population and random processes could miss the stratum by chance (Leedy, 1997:156).

### **3.6 DATA COLLECTION METHOD AND PROCEDURE**

Basically the issues or phenomena under investigation needed to be translated into measurable data because of the conclusion or generalizations based on the kinds of information collected. Data that is collected is informed by what the research needs to know and why (Bell, 1998:84). Since the nature of the researchers questions informed the kind of data to be collected, in selection the data collection method the researcher then took note of what characterized data collection methods.

### **3.7 RESEARCH INSTRUMENT**

The following research instrument has been used in this study.

#### **3.7.1 Why the questionnaire?**

A questionnaire is defined as a formally structured self-report document used for gathering data from variables of interest through respondents completing it in a paper and pencil format (Pilot & Hungler, 1998:120; Mtolo, 1996:185). Its composition is made up of question items, which the participant needs to read

and respond to in the manner required by the investigator. Leedy (1997:135) justifies the use of the questionnaires by stating that if a researcher wants to observe and collect data that is beyond physical reach, a questionnaire is an appropriate instrument. He further states that it is an impersonal probing instrument in which the researcher is remotely removed from the sources of data collected (Leedy, 1997:138). The researcher collected data from respondents, and he had no chance of knowing or even possibly meeting.

Furthermore, the basis for selecting the questionnaire in this research as a viable research instrument to use in collecting data, was governed by what Mtolo (1996:187) and Leedy (1997:141) cites as questionnaire assumptions there are as follows:

- *Clarity of language.* A standardized questionnaire, compiled in easily understood terms, has to be administered to all the respondents in order to obtain answers that would be relevant to the investigation.
  
- *Fulfilment of a specific research objective.* The questions asked were formulated on the basis of the aims of the study. It was from the respondents that the researcher was able to amass the information that was required to

solve the research problem. Therefore, the willingness, effort, favour and time afforded by the respondents to the researcher were important in obtaining honest answers.

- ***Consideration of questionnaire construction.*** The researcher took note of the following factors cited by Leedy (1997:140) when the questionnaire was constructed.

i) ***Courtesy.*** The researcher had full knowledge that the respondents were giving the researcher their time and offering him a favour by completing the questionnaires as a courteous gesture. Their kindness and willingness to participate in the investigation is acknowledged.

ii) ***Universality.*** Even though the research problem was based on the respondents' input on information about nutrition assessment, questions were general yet specific, to elicit their views on sensitive issues that could be easily be answered untruthfully. That is, the manner in which the questions were phrased minimally presented sensitive personal issue that would have led the respondents to answer untruthfully. The use of "you" in particular required their specific

views yet general experiences of nutritional assessment. Also, the biographical details ensured anonymity and sought for what would be generally relevant to the research problem. For example, the researcher did not include the participants' name, nationality, race, parents' names, child's name, etc. in the study. These would not have only been irrelevant but would have violated the right of anonymity. Mtolo (1996:42), argues that "if highly personal questions are asked, respondents may simply refuse to answer, give what they believe to be socially desirable responses, or even worse consign the questionnaire in the nearest waste basket!"

iii) *Simplicity*. The researcher made the questionnaire simple to read and answer so as to avoid taking much of the respondents' time and effort. The check-item questionnaire was preferred to the completion questionnaire because it was less time consuming and less mentally exhaustive for the respondents and the researcher. The researcher used a three-point scale measure to which the respondents had to insert a cross (X) in the box which best qualified their opinion and the minimal explanation required in some of the questions. The researcher hoped that this would prevent mothers thinking that they were writing

a long essay, thus causing them to answer untruthfully and / or to be less cooperative. The researcher also wrote the questions into sections in order to facilitate categorization and to make questions easier for the respondent to answer. The aforementioned questions in the questionnaire had a similar focus and content. This helped to focus the attention of the respondents on the essence of the questions. (Mtolo, 1996:44).

iv) *Briefness*. As mentioned earlier, Evans (in Mtolo, 1996:44) states that a long questionnaire is a daunting and time-consuming exercise that may end up being unanswered as opposed to a short one, which is attended to cheerfully and promptly. The use of the three point scale avoided delays in completing a long questionnaire. Furthermore, the researcher avoided wasting time of the respondents and lack of cooperation from them by confining the questions to the aims of the study so as to focus on the nature of the research questions and the data the researcher actually wanted to require. The limit to the content for inclusion in the questionnaire was achieved by grouping the questions asked under each relevant aim. Deciding on the exact

purpose of the study makes it possible for one to elicit the required information (Mtolo, 1996:45).

### **3.7.2 Nature and Structure of the Questionnaire Constructed**

The type of questionnaire constructed for this study was a structured questionnaire made up of predetermined questions, which were closed-ended questions and open-ended. Pilot and Hungler (1998:202) explain that a structured questionnaire is an instrument in which the respondents are “asked to respond to exactly the same questions in exactly the same order, and they are given the same set of options for their responses”.

### **3.7.3 Type of scale and scoring procedure of the questionnaire**

Pilot and Hungler (1998:208) define a scale as “a device designed to assign a numeric score to subjects to place them on a continuum with respect to attributes being measured”. The Likert scale is recommended because of its effectiveness in determining young peoples’ opinions towards career guidance (Jacobs, 1991:84). This view helped to reinforce the researcher’s idea of using the three point scale measure for the questionnaire. The researcher believed

that this assessment scale elicited similar results of a more perceptual nature than in the previous research, which did not significantly differ from the factual data obtained in the previous research. Hence, Pilot and Hungler (1993:128) state that the scale's purpose is to distinctly discriminate among people who hold different perceptions on specific points by having declarative items to which the respondents indicate their rating of the opinion expressed by the statement. A numerical score was allocated to each response and then the sum of scores of the individual responses was calculated to present the respondent's opinion on the topic (Jacobs, 1997:71; Pilot & Hungler, 1998:74).

#### **3.7.4 Reliability and Validity of the Instrument**

Cresswell (1996:121) states that if an investigator in a study plans to re-use, modify or combine instruments, reliability and validity have to be re-established or else the ... "original validity and reliability may be distorted..." Reliability refers to the degree to which an instrument is able to measure accurately and consistently the attributes or factors for which it was designed under the same constant conditions (Bell, 1998:124; Pilot & Hungler, 1998:195; leedy 1997:130).

The concept validity refers to the instrument's degree or effectiveness to which it measures or describes what it was supposed to measure or describe (Bell, 1993:127; Pilot & Hungler, 1993:107, Leedy, 1997:135). That is, to what extent does the instrument elicit the desired information? Bell, (1993:89), Pilot and Hungler, (1993:91); and Leedy, (1997:104) warn that it is not easy to establish the validity of an instrument because a reliable instrument does not necessarily ensure its validity.

### **3.8 SUMMARY**

In this chapter the actual plan of action that the researcher designed in collecting the required data. The research design consisted of the purpose and justification of the selected research approach.

The chapter further outline the research methodology and identified the types of instruments that were going to be used in collecting the data, the method of sampling used and why that type of sampling was selected.



The procedures required in collecting data were outlined so that a clear picture of how data was collected is provided. The researcher made use of open-ended and close-ended questions that were easy to answer and that avoided wastage of time on the part of the respondents. These were made to be easy for the respondent not to waste time trying to answer the questionnaires.

## **CHAPTER 4**

### **DATA ANALYSIS**

#### **4.1 INTRODUCTION**

This study is aimed at assessing the nutritional status of children under the age of five. Infant and child nutrition is normally considered in the context of the family. In nutrition, as in most other matters, the needs of mothers and children are so closely inter-related that it is difficult to separate them. Seventy-four percent of Ngwavuma and fourth-nine percent Ngwanase families share food on permanent basis. This makes the families to be classified as extended families.

This chapter reports on the findings and analysed data. Descriptive and inferential statistics were used in this study in order to summarise mothers' responses and to test for significant differences between the variables. The statistical procedures were both significant because data needed description before making generalisations on the data.

## **4.2 DATA ANALYSIS PROCEDURES**

In order for research questions to be answered, systematic ways or methods of looking separately at different variables in the data needed to be employed. This was in order to reveal certain trends, patterns or dynamic and potential factors that might lead to further investigation (Merton, 1996; Polite & Hungler, 1993; Leedy, 1997).

Quantitative methods require that data be statistically analysed on the basis of the characteristics of the kind, scale group, and variables of the data (Leedy, 1997). Statistical procedures are advantageous because they assist the researcher to “reduce, summarise, organise, evaluate, interpret and communicate numeric information” (Pilot & Hungler, 1993:272).

### **4.2.1 Descriptive statistics**

Descriptive statistics is defined as the organisation and summation of sampled data to be presented comprehensively in the form of averages (Mouton, 1993; Polit & Hungler, 1997).

Descriptive statistics describes how the data from the actual sample looks like and how they are related to each other in terms of an aspect of interest without testing the hypotheses and generalisations on the population parameter (Ngidi, 1995; Leedy, 1997). Pollit and Hungler (1993) point out that descriptive statistics helps to show the central point (central tendency) around which the data revolve.

#### **4.2.2 Inferential statistics**

Inferential statistics involve generalising about a sampled population with an intention of making predictions and conclusions about a wider population (Pollit & Hungler, 1993; Ngidi, 1995; Leedy, 1997). According to Leedy (1997) inferential statistics aims at looking at the distance and postulating what is unknown by examining the sample that is known. In other words, they draw general conclusions about a wider population on the basis of the data obtained from the sample population. This involves the testing of a hypothesis or hypotheses by making estimations and predictions about a wider population and determining whether the differences observed occurred by change factors or not (Ngidi, 1995).

### **4.3 DIETARY INTAKE**

Dietary intake was collected from 172 participants of the sample (N = 172).

There were mainly two reasons for this. Firstly some of the questionnaires were deliberately spoiled if the interviewers were satisfied with the reliability of the participants' answers. Secondly, in some instances the mothers of the young children were not available to assist with their recalls.

*The ten food items most frequently consumed by the family*

Order of appearance	Description of food items	Number of times food was consumed	Percentages (%)
1.	White, granulated sugar	75	21%
2.	White bread	25	07%
3.	<i>Hard margarine</i>	46	13%
4.	Whole milk	32	09%
5.	Brown bread	19	05%
6.	Goat meat	45	12%
7.	White rice	14	04%
8.	Jam	16	04%
9.	Hard, boiled sweets	26	07%
10.	Carbonated cold drink	35	10%
			92%

The total percentage, which is 92%, shows the poor food intake that was being taken in both areas in Ngwavuma and Ngwanase.

#### 4.4 BREAST FEEDING

Mothers were asked whether they liked to breast-feed and how long they breast-feed their babies. This question was an open-ended one, and it asked them to explain.

Mothers from Ngwavuma:

*"I love to breast feed, because there is no other food that I could give to my child. I have breastfed and I am still breastfeeding. My child now is 18 months."*

*"I don't have enough milk to breastfeed, even food to eat for me so that I can produce milk."*

Mothers from Ngwanase:

*"I really don't have time to breastfeed. I am working."*

*"I decided not to breastfeed but to use the bottle. I tried to breastfed for 3 moths and I fell pregnant again and the milk burned out."*

#### **4.4.1 Duration of breast-feeding**

The groups gave different responses in their replies, so the result shows the difference in both areas. In Ingwavuma area 62% of women breast-fed their babies up to 20 months, except the one who fell pregnant when the child was three months old. This lady was from Ngwanase. 37% from Ngwanase area cannot breast-feed. They decided to introduce bottle-feeding and some of them are affording. The greater number of women (41%) at Ngwanase weaned their babies from the breast at the age of 4 months, while 59% of the Ngwavuma respondents said they breast-fed their babies up to a maximum of 20 months.

In comparison with Ngwanase, Ngwavuma women spend most of their time with their children because most of them are unemployed. Other women fed their babies from both the breast and the bottle because they felt that their breast milk was weak and inadequate. Even from observation, it was clear that babies drank more milk from bottle than from their mothers. The majority of women from Ngwavuma stated that they prolonged the feeding duration due to financial constraints. Although breast-feeding for the maximum period, e.g. 24 months is recommended, it is very important to warn mothers that after 6 months, solid



food must be introduced. This is in order to supplement the required protein, which is lacking in breast milk and that milk becomes weak because of prolonged breast-feeding.

#### **4.4.2 Termination of breastfeeding**

In the course of the interview, 172 of the women in the sample were asked about timing with regard to termination of breast-feeding and introduction of the bottle, cup, spoons and solid food for their youngest child. The accuracy of their memories could not obviously be determined. However, the interview schedule was designed to check for internal consistency in each respondent's reply.

**Table 4.1. Termination of breast milk and the introduction of other food by age for the youngest children**

Event	Age (months)	No of children	Percentage
Termination of breast-feeding	03 months	63	37
Termination of bottle	08 months	35	20
Termination of cup or spoon	1 year	27	16
Termination of mashed solids	1.2 months	33	19
Termination of juices	2 months	14	8
		172	100

Thirty-two (32) children were not yet weaned from breast feeding at the time of the interview; 1 child was not breast-fed.

Four children were not yet weaned from the bottle at the time of the interview.

One child was not yet introduced to solids; 2 mothers could not recall this information.

In the Ngwanase area, the majority of the entire group of mothers in the study said that they began to leave their youngest babies at home regularly when they returned to work, especially among those who are full time employees. Many of these mothers did turn to bottle feeding for supplementary diet at that time.

One mother arranged for breast-feeding sessions frequently through the day or had the child minder use a cup and spoon in their absence.

#### **4.4.3 Bottle feeding**

The results of bottle feeding show that 63% of, mothers in both areas had no money to buy milk from the store because the majority of mothers were not working, Children were at school and they were more or less of the similar age, so it was very difficult for them to buy milk. The purchasing of milk formulae could not even be considered. It was not exceptional to find family units with eight people. Such circumstances make it even more difficult for the breadwinner to promote nutritious food for infants.

#### **4.5 REASONS FOR EARLY WEANING**

The women that stopped breast-feeding before their babies were 5 months old gave reasons as shown in Table 4.2

Table 4.2. Reasons for not breast-feeding

Reasons for not breast feeding	Percentage of people			
	Ngwavuma		Ngwanase	
Mothers working	11	12 %	29	18 %
Mother dislikes breast feeding	29	32 %	17	10 %
Mother is ill	03	3 %	09	6 %
Milk is inadequate	02	2 %	25	15 %
Baby is ill	27	30 %	38	23%
Baby dislikes breast milk	19	21%	45	28 %
	91	100%	163	100%

Both areas are rural located in an environment and their false reasons given by members in both areas. From their responses it appear that it is because of the rural background and the beliefs held that makes them to be worried about milk. Even babies dislike breast milk but they are

forced to drink it, because mothers still regard breast milk as the best for nourishment.

#### **4.5.1 Weaning**

The onset of malnutrition mostly takes place during the period of weaning when a child really needs a balanced diet, of which the main component is milk. Since breast milk changes and has less protein at a later stage of breast-feeding, weaning does not mean stopping breast-feeding but accustoms the infant to food other than milk. This means that it is vital to continue breast-feeding while new foods are being introduced into the child's diet.

A few women weaned their children by leaving them at home when they went off to work.

#### **4.5.2 Solid food**

When a baby reaches 4 or 6 months of age, breast milk or some baby milk formulae are still important foods, but this does not satisfy all nutritional requirements. It is at this stage that a baby should be introduced to solid foods such as porridge, mashed vegetables like pumpkin and potatoes, eggs and fruit.

To the question “At what age did you start to introduce food?” The mothers responded as follows Table 4.3.

**Table: 4.3 Intake of solid food**

Solid food	Percentage of people	
	Ngwavuma (N=100)	Ngwanase (N=100)
Under 3 months	12	15
4 - 6 months	52	78
6 months and older	81	27

Ngwavuma respondents seem to delay the solid food introduction as 81% of them first gave porridge to their babies when they were over 6 months of age, compared to 27% of the Ngwanase mothers.

Mothers from Ngwavuma:

“ At first, I breastfed and gave my child soft porridge, 1-2 small spoonfuls twice a day .At the age of 6-9 months I gave porridge 3-4 times a day”.

#### **4.6 TYPES OF FOOD**

The type of food that a child has at a given stage is very important, as it is this type of food that builds up and nourishes the child. For us to assess good nutrition, this has to be based on the types of food that the child is being fed.

About 71% of the respondents were asked about the types of food they eat. The majority mentioned amasi, which is a nutritious source of calcium and protein. This was mentioned as a first choice by 40% of the respondent in at both Ngwavuma and Ngwanase. Fourty percent said that they obtained amasi from cows.

The women were also asked who told them about types of food to be given to children. The majority said that they had been informed at the clinic.



#### 4.7 ALLOCATION OF FOOD

Food allocation is very important because young children take their time when eating. Sharing food from the same container is not advisable, especially among children. Methods of feeding, making and distributing food needs as much attention as the type of food used. In many households, especially in rural areas, a child eats with other children from one container and no attempt is made by the mother to make him eat.

This practice is harmful, as a child may become malnourished. Each child should have a plate to himself / herself.

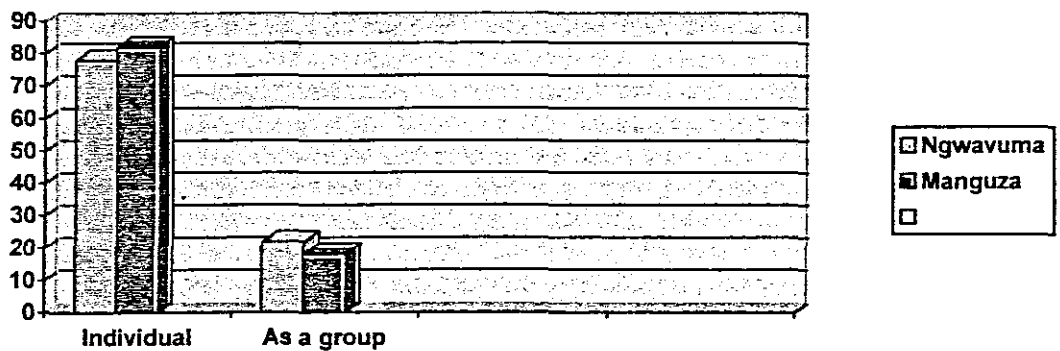


Fig: 4.1 Sharing foods

**Table 4.5 Feeding children eggs**

Children are being fed and eggs are the most available on the diet. Yet one of the culturally determined dietary practices is not to feed children eggs.

**Table: 4.5 feeding children eggs**

Do you feed children eggs?	Percentage of people	
	Ngwavuma (N=100)	Ngwanase (N=100)
Yes	82	94
No	18	06
	100	100

The majority of the respondents in both areas fed their children eggs. 82% and 94% of Ngwavuma and Ngwanase respondents respectively gave positive answers to the question.

#### **4.8 FOOD CONSUMPTION**

The consumption patterns of food differ in the two areas. A physical examination revealed that very little food, with a lot of starch is of a low level of balanced diet. There are physical signs that are visual and these occurred in both groups. Pale eye conjunctiva, showed a tendency towards a significant difference between the two groups.

#### **4.9 PROTEIN RICH FOOD**

Food that has a higher content of protein was taken in fewer contents. Protein-rich food like fish did not seem to be popular in either of the areas of the study. In Ngwavuma 36% ate fish while in Ngwanase, 22% preferred dried beans.

#### **4.10 FOOD BUYING**

On average respondents in both areas normally buy in bulk once a month, because of the distance from town. The breadwinner normally decides when or where food is to be bought. Such purchases are normally made at one grocery store. This is normally where the purchase would last for the whole month.

#### **4.10 CHOICE OF INDICATORS**

As indicated in the text protein energy malnutrition (PEM) is for all intention and purposes, the main type of malnutrition which food supplements are intended to correct or prevent. Two kinds of PEM can be considered:

- (a) Acute malnutrition (or emaciation).

- (b) Chronic malnutrition (or stunting).

The analysis should, therefore, include comparisons of the following three indicators to show the nutritional status:

- Weight for age.
- Height for age
- Weight for height.

#### **4.12 INTERPRETATION OF RESULTS**

In forming group indicators with age, weight and height, three relationships are considered:

- Weight for age.
- Height for age
- Weight for height.

For each of these three indicators there are several possibilities in the classification by comparison with a reference population, such as:

- Normal
- Above normal (or high)
- Below normal (or low)

In the case of high and low classifications, various cut – off points (or class limits) can be established; these may vary from one programme to the next, depending on such factors as the level of precision chosen for the statistical analysis, He also depends on the expected prevalence of protein – energy malnutrition (PEM) in the population and the frequency of severe malnutrition.

In general a “low” weight for age could be taken as one, which is more than 1 standard deviation below the median, weight for age of the reference population, however multiples of 1 standard deviation (e.g.; 1.5, -2 or -2.5) could also be selected as cut-off points. Conversely a “high” weight for age is in general more than 1 standard deviation above the median weight for age of the reference population. The same principle applies to the two other indicators: height for age and weight for height.

#### **4.13 IMPLICATION OF FINDINGS**

The measurement of the impact of a supplementary feeding programme on the nutritional status of the recipient population cannot be an end in itself. A positive finding, in addition to giving rise to satisfaction should

also serve as a bench – mark against which to measure a continuing or expanded programme.

A negative finding, showing no improvement of the nutritional status, rather than create frustration, should stimulate efforts to improve a programme by identifying the causes and initiating corrective action. The measurement of impact provides information, which should enable the programme management to adjust a project to its specific local conditions under which it operates.

It must be realized, however, that the measurement of nutritional status impact as described here. While it is able to assess whether or not the ultimate objective of a programme is being attained by itself, this will usually not allow also for the identification of the causes of success or failure. The impact of measurement may be important and even essential for the evaluation of a programme, but it must be seen as only one element of the much wider process of evaluation usually carried out. In supplementary feeding programmes in particular, however, it should be considered a crucial and indispensable part of evaluation.

Obstacles in reaching the objective of improving nutritional status, in so far they stem from the mode of operation of a project, are likely to be

identified and rectified by the usual process of project evaluation. It must be realized, however, that the lack of success in many cases may not be due to less than perfect management and logistics but rather to factors that were overlooked or unknown at the time of programme formulation.

Such factors might be: the unexpectedly low acceptance of particular foods, the failure of mothers – for a variety of reasons to feed the intended recipients with sufficient amounts; the partial or total replacement of the usual diet by the supplement; an environment causing recurrent febrile infections such as diarrhoea and thus chronic loss of appetite. This occurs especially in young preschool children; the inadequate accompanying nutrition education, etc. Such cases may call for special in-depth studies before the programme could be redesigned or properly adjusted to meet specific local conditions. The additional cost in time and resources of such fact-finding efforts should not be a deterrent if seen in the context of the total expenditures involved both for governments and for the assisting agency.



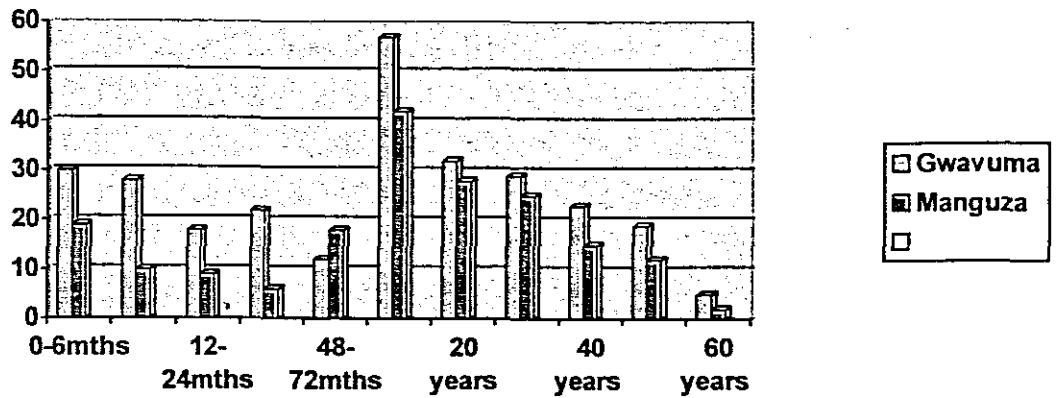


Fig: 4. 2 Numbers in the household

This histogram shows that between the ages of 10 –20 each and every household has the great number of teenagers. By its own this has a great impact on the buying of food and the consumption of food in the family before even taking care of the children. Teenagers consume a lot of food.

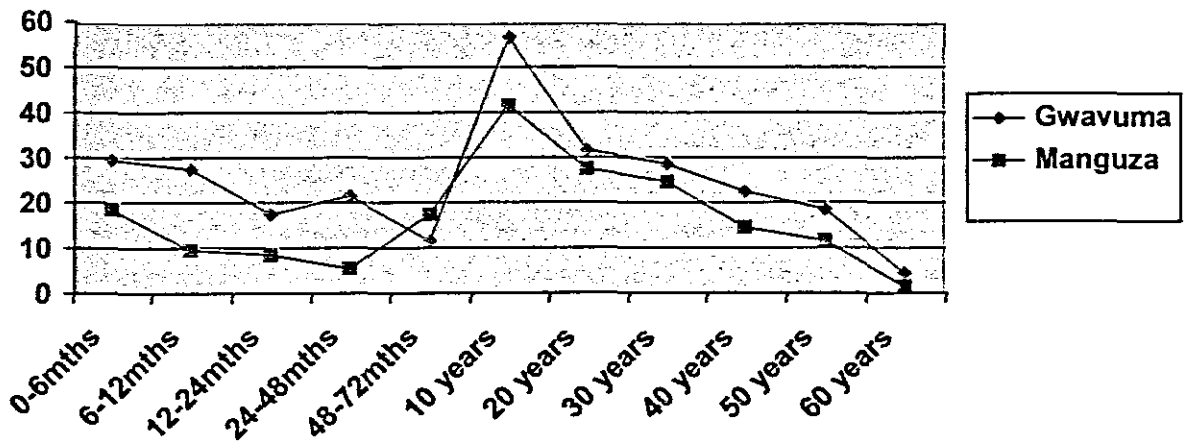


Fig: 4.3 Number of people in each household

The line table shows very clearly that from these two areas there are people with whom these children live with. In looking at the graph, it shows that these families have extended families. Ngwavuma area has a great impact of the extended families compared to Manguza area.

#### **4.14 DISCUSSION OF RESULTS**

The research findings show that malnutrition could to a great extent be attributed to the socio-economic problems in the Ngwavuma and Ngwanase areas. The two areas seem to be biased against unemployed mothers. Another essential factor that has a great influence on the findings is that Ngwavuma has projects like garden clubs. These women have more advantages with regard to looking after their babies because they grow vegetables that could make their babies better nourished compared to the others.

The nutritional status of Manguza children is much better than that of Ngwavuma children because of the number of mothers who are working as compared to Ngwavuma mothers. The results therefore indicate that even though people live in a disadvantaged area, they are not the same in terms of living standards, and ownership. The way they perceive things is far different.

The majority of the respondents appreciated the need for health supervision, as they are aware of some connection between food, health and nutrition. They are also keen to learn about cooking the right food in right way without losing the essential nutrients.

A further factor is that the respondents often have incorrect information about food, which stems from a culturally determined practice of information. An example is the taboo about eggs for child that needs to be addressed.

In general, the responses of Ngwavuma mothers indicate that they have been taught to take a positive attitude towards the feeding of their children. This could be seen especially among enlightened mothers, who are employed and are eager to implement the information at their disposal. It is important to encourage such people in order to achieve even better results.

The responses of Ngwanase respondents gave a clear picture of people who are victims of ignorance, poverty and generally from rural deprivation, since all resources are limited. Moreover, they receive less attention from the government. In addition, the influence of some African customs could be detrimental to the health of children. Such customs still

prevail, as can be seen in responses of Ngwanase mothers. This includes the views that they have about feeding children with eggs. Looking at both areas it would seem that they need to be recommended because in their minds, the majority of mothers still view breastfeeding as the best food for the baby as compared to bottle-feeding.

Surprisingly, large numbers of the respondents, due to ignorance, did not link illness and disease to lack of food and inadequate childcare. They were not fully aware that such factors could affect the lives of their babies as well as the community and that they were, in effect, promoting poverty whereas poverty should be combated.

#### **4.15 SUMMARY**

Chapter four has presented and discussed results of the data collected in chapter three in an attempt to show the relationship between the variables in the assessment of children with regard to nutritional status. The results revealed that most children have been affected by malnutrition because of the floods in both areas. The community was left with no food and their food in the gardens was being wiped away by the floods. The study, nonetheless, had to be undertaken to assess the nutritional status of children. However, it is very important for parents to take precautions.

## **CHAPTER 5**

### **CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 INTRODUCTION**

This chapter is the conclusion of the whole study and recommendations are made. This study has indicated that children in different ages have been affected by malnutrition. The results show that problems that contribute to the creation of the malnutrition in rural areas is as a result of social issues and the absence of the father as a bread winner, due to working conditions of a migrant nature. Poverty also plays a major role in malnutrition.

#### **5.2 MAIN FINDINGS**

The main findings will be discussed as they relate to the objectives of the research.

##### **5.2.1 Incidence of malnutrition at Ngwavuma and Manguza**

This study revealed the prevalence of undernutrition in a large proportion of Ngwavuma and Manguza area. On average, more than 50 % of the children (aged 0-5 years) had weight-for-age and height-for-age measurements below the 5th percentile of National Center for Health Statistics percentiles (NCHS).

The physical examination revealed a large evidence of malnutrition. Physical signs occurred in both groups. Pale eye conjunctiva, which showed a tendency towards a significant difference between the two groups, pale, nails, dry and dull hair and bowed legs, which was significantly lower in Ngwavuma area, were most prevalent. Considering reasons for undernutrition, the extremely low energy intake, particularly in Ngwavuma children, explain their poor anthropometric measurements.

### **5.2.2 Nutrient deficiencies in children diet**

These findings lead one to suspect that the problem is one of the chronic malnutrition caused by a diet comprising insufficient kilojoules over a long period of time. These findings are also supported by the low percentages of children with weight-for- height are much less than five percent and this figure can rise to 20% in areas of extreme poverty or famine.

The overall quality of the diet of children in this study was poor. Apart from the low energy in take many children also had undesirable intakes of essential vitamins and minerals. Interestingly enough, few children had a deficient protein intake although a low protein intake is frequently blamed for any malnutrition found in young children.

### **5.2.3 Relationship between poor nutrition status and marasmus**

The selected food frequencies are presented as ten food items most frequently consumed by the family. White sugar was the food item most frequently consumed by the families in both areas. This was generally consumed with either tea or coffee and a small amount of milk. Bread and margarine were the staple food consumed frequently during the day, with goat's meat and rice being the most popular items at the main meal. No fruit and/or vegetables were found to occur among the most frequently consumed food items.

Other sweet item such as jam, sweets and soft drinks were also popular. The total percentage, which is 92%, shows the poor food intake that was being taken in both areas in Ngwavuma and Manguza and that resulted to malnutrition to children.

## **5.3 FINDINGS OF THE STUDY**

The following conclusions are drawn on the basis of the findings on nutritional assessment of children under five years of age:

a)

Mothers were aware of, and viewed the importance of a balanced diet and breast feeding for their children. Although they perceived it to be important that their children should benefit from improved nutrition, they often felt helpless in the face of poverty.

b)

Malnutrition or under-nutrition is evident in both the Ngwavuma and Ngwanase area. The reason for malnutrition is that few mothers from Ngwavuma do not work and they do not have food to supplement their breast feeding during the time of weaning and the improper feeding practice, but the nutritional status of the children at Ngwavuma is more likely to improve than that of the children from Manguza area. However, this is only if they could get food to supplement their breast milk.

Most of the mothers in Ngwavuma are uneducated. Poverty caused by social and economic structures remains a fundamental cause of malnutrition. However, above a certain poverty level, most of the malnutrition associated with the weaning age results from improper feeding practices and not from the absolute lack of food in the home. Preventative measures would play a significant role in combating malnutrition in most cases.

#### **5.4 RECOMMENDATIONS**

After analyzing the findings the following recommendations are made:

- That child nutrition issues be made central to all planning and policy formulation if our society is to be concerned about the well-being of its future citizens,
- That mother should be encouraged to breast-feed for as long



as possible and they must also be warned about the risks of early weaning. Problems frequently arising from infection associated with poor hygiene, especially with respect to bottle preparation and from the lack of knowledge and money to prepare a nutritious meal for children, should be made aware to mothers and would – be mother as well.

- That nutrition rehabilitation centers in both areas be made an effective means for the promotion of good nutrition. Such centers like clinics and hospitals can educate mothers, especially those of malnourished children, about simple principles of childcare and feeding.
- That the introduction of vitamin-enriched staple foods like maize meal fortified with niacin and nicotinic acid which is essential in alleviating malnutrition be made available to mothers.
- That the promotion of the new protein-rich maize and Soya products, which are rich in protein, in improving the quality of diets be also made knowledgeable to breast feeding mothers.
- That home economics extension officers consist trained people in the simple methods of cooking food without losing nutrients that are necessary in the food.
- That an agricultural extension officer is to train people in simple methods of farming; composting and growing of

acceptable crops that contribute to a balanced diet.

- That mothers should be educated on the nutritional value of different types of foods. They should, for example, be made aware of the fact that, under normal circumstances, skimmed milk should not be used for the feeding of infants younger than 12 months. It should also be explained to them that it does not supply essential fatty acids and vitamins or enough energy for the infant.
- That pre-term formulae be recommended for low birth weight and pre-term infants. Indigent mothers should be assisted in obtaining such foods.
- That boiled fresh milk, evaporated milk and full-cream powder milk be made are more suitable for infants over 4 months. Vitamin and iron supplements should also be recommended.
- That there is need to consider what is best available with regard to foods at the clinics and the local supermarkets and the local shops.
- That soft drink, juice or any other food should not be given with a feeding bottle.

That participatory or action research be adopted so that those for whom action is to be planned always take part in the identification of their own nutritional needs and the definition of possible ways of satisfying them.

In conclusion therefore it was shown that a large percentage of children in Ngwavuma were found to be suffering from chronic and acute malnutrition. This was largely due to a diet, which was low in energy and protein and considerably below the RDA's for the most vitamins and Minerals.

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**Table 2.1: B-Complex Vitamins**

Vitamin	Functions	Results of Deficiency	Food Sources
A (retinol); provitamin A (carotene)	Vision cycle - adaption to light and dark; tissue growth, especially skin and mucous membranes; toxic in large amounts	Night blindness, xerophthalmia, susceptibility to epithelial infection, changes in skin and membranes	Retinol (animal foods); liver, egg yolk, cream, butter or fortified margarine, fortified milk; carotene (plant foods); green and yellow vegetables, fruits
D (chole-calciferol)	Absorption of calcium and phosphorus, calcification of bones; toxic in large amounts	Rickets, faulty bone growth	Fortified or irradiated milk, fish oils
E (tocopherol)	Antioxidant - protection of materials that oxidize easily; normal growth	Breakdown of red blood cells, anaemia	Vegetable oils, vegetable greens, milk, eggs, meat, cereals
K (phylloquinone)	Normal blood clotting	Bleeding tendencies, haemorrhagic disease	Green leafy vegetables, milk and dairy products, meat, eggs, cereals, fruits, vegetables
Thiamin	Normal growth; coenzyme in carbohydrate metabolism; normal function of heart, nerves, and muscle	Beriberi; GI: loss of appetite, gastric distress, indigestion, deficient hydrochloric acid; CNS: fatigue, nerve damage, paralysis; CV: heart failure, edema of legs especially	Pork, beef, liver, whole or enriched grains, legumes
Riboflavin	Normal growth and vigour; coenzyme in protein and energy metabolism	Ariboflavinosis; wound aggravation, cracks at corners of mouth, swollen red tongue, eye irritation, skin eruptions	Milk, meats, enriched cereals, green vegetables
Niacin (precursor: tryptophan)	Coenzyme in energy production; normal growth, health of skin, normal activity of stomach, intestines, and nervous system	Pellagra; weakness, lack of energy, and loss of appetite; skin: scaly dermatitis; CNS: neuritis, confusion	Meat, peanuts, legumes, enriched grains
Pyridoxine	Coenzyme in amino acid metabolism: protein synthesis, heme formation, brain activity; carrier for amino acid absorption	Anaemia; CNS: hyper irritability, convulsions, neuritis	Grains, seeds, liver and kidney meats; milk, eggs, vegetables
Pantothenic acid	Coenzyme in formation of coenzyme A: fat, cholesterol, and heme formation and amino acid activation	Unlikely because of widespread occurrence	Meats, cereals, legumes; milk, vegetables, fruit
Biotin	Coenzyme A partner; synthesis of fatty acids, amino acids, purines	Natural deficiency unknown	Liver, egg yolk, soy flour, cereal (except bound form in wheat), tomatoes, yeast
Folic acid	Part of DNA, growth and development of red blood cells	Certain type of anaemia: megaloblastic (large, immature red blood cells)	Liver, green leafy vegetables, legumes, yeast
Cobalamin	Coenzyme in synthesis of heme for haemoglobin, normal	Pernicious anaemia (B <sub>12</sub> is necessary extrinsic factor)	Liver, kidney, lean meats, milk, eggs, cheese

red blood cell formation

that combines with intrinsic  
factor of gastric secretions  
for absorption)

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Table 2.2: A summary of Major Minerals

Mineral	Metabolism	Physiologic Functions	Clinical Application	Requirements	Food Source
Calcium (Ca)	Absorption according to body need, aided by vitamin D; hindered by binding agents (oxalates), or excessive fibre Parathyroid hormone controls absorption and mobilization	Bone formation Teeth Blood clotting Muscle contraction and relaxation Heart action Nerve transmission	Tetany - decrease in ionized serum calcium Rickets Osteoporosis	Infants: 400-600mg Children: 800-1200mg	Milk Cheese Whole grains Egg yolk Legumes, nuts Green leafy vegetables
Phosphorus (P)	Absorption with calcium aided by vitamin D; hindered by excess binding agents (aluminum)	Bone and tooth formation Overall metabolism Energy metabolism (enzymes) Acid-base balance	Bone loss Poor growth	Infants: 300-500mg Children: 800-1200mg	Milk Cheese Meat Egg yolk Whole grains Legumes, nuts
Sodium (Na)	Readily absorbed	Major extracellular fluid control Water balance Muscle action; transmission of nerve impulse and resulting contraction	Fluid shifts and control Buffer system Losses in gastrointestinal disorders Dehydration	Limit to 2.4g or less	Table salt (NaCl) Milk Meat Egg Baking soda Baking powder Carrots, beets, spinach, celery
Potassium (K)	Secreted and reabsorbed in digestive juices	Major intracellular fluid control Acid-base balance Regulates nerve impulse and muscle contraction Glycogen formation Protein synthesis Energy metabolism	Fluid shifts Heart action - low serum potassium (cardiac arrest) Insulin release Blood pressure factor	About 2000-3500mg Diet adequate in protein, calcium, and iron contains adequate potassium	Fruits Vegetables Meats Whole grains Legumes

Magnesium (Mg)	Absorption increased by parathyroid hormone	Aids thyroid hormone secretion, normal BMR Activator and coenzyme in carbohydrate and protein metabolism Muscle, nerve action	Tremor, spasm; low serum level following gastrointestinal losses or renal losses from alcoholism; convulsions	Deficiency in humans unlikely	Whole grains Nuts Legumes Green vegetables (chlorophyll)
Chlorine (Cl)	Absorbed readily	Acid-base balance - chloride shift Gastric hydrochloric acid - digestion	Hypochloremic alkalosis in prolonged vomiting, diarrhea, tube drainage	Parallel requirement of sodium	Table salt
Sulfur (S)	Absorbed as such and as constituent of sulfur-containing amino acid methionine	Essential constituent of cell protein <i>Hair, skin, nails</i> Vitamin structure Collagen structure High-energy sulfur bonds in energy metabolism	General protein malnutrition	Diet adequate in protein contains adequate sulfur	Meat Egg Cheese Milk Nuts, legumes

## Appendix 3

### INTERVIEW SCHEDULES

#### AN ASSESSMENT OF THE NUTRITIONAL STATUS OF CHILDREN UNDER THE AGE OF FIVE YEARS MAPUTALAND, KWAZULU-NATAL

I am conducting a study into the diet of infants and children of five years of age and under in this area. The information that I am collecting will help the community and clinics to find out whether children in this area are getting enough to eat and how sickness can be prevented by a proper diet. I would therefore like to ask you some questions about yourself and the children in the home. The information that you give me will be treated in confidence. I will not tell anyone about your answers. When I have seen all the people in this area, I will put all this information together and no one will see to whom the information belongs. All the families that I am visiting have been randomly selected and this family happens to be of them.

After I have finished asking you some questions, I would like to sell all children who are five years of age and under so that I can weigh them, measure their and arm circumference and examine their physical appearance. While I am here I am willing to advise you on how to prepare well-balanced and nutritious meals for all of your family members. May I now ask you some questions about your family and children of 5 years age and under?

**GENDER** :  
**MARITAL STATUS** :  
**AGE** :  
**RELIGION** :

**Section A**

1. How many people (including relatives and friends) who share food with the family are a permanent part of this family unit?

a) Adults, people over 18 years.

Male  Female

b) Children from the age of 6 to 16 years.

Male  Female

c) Children of five years of age and under

Name	Date of birth	Age
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- 1.
- 2.
- 3.
- 4.
- 5.

**Section B**

**Feeding practices with regard to babies**

1. What do you think of breastfeeding?
2. If the baby is / was not breastfed, what do/did you prepare it for a feed?
3. If the substitute is/was used, how do/did you prepare it for a feed?
4. What age do /did you start to feed your babies with solids?
5. Do you think there is a better food at weaning time?

Yes

No

### **Section C**

#### **Allocation of food**

1. Do you dish up an individual plate of food for each child or do all share food from one container?
2. How much is dished up for each child (eg dishing spoon)
3. How much poultry and fish are available, how do you share out the food?
4. Do you feed your children eggs?

Yes

No

### **Section D**

#### **Community organization**

1. Where do you get advise for your childcare?
2. Are there any women's group or associations in this area that are concerned about nutrition and the bringing of the children?
3. Are you a member of any of such group?

Yes

No

4. Do you attend meetings regularly?

Yes

No

### **Section E**

#### **Acquisition of food**

1. Where do you usually buy your groceries?

Tuck shop

Store

Town

2. How often do you buy groceries?

Daily

Weekly

Monthly

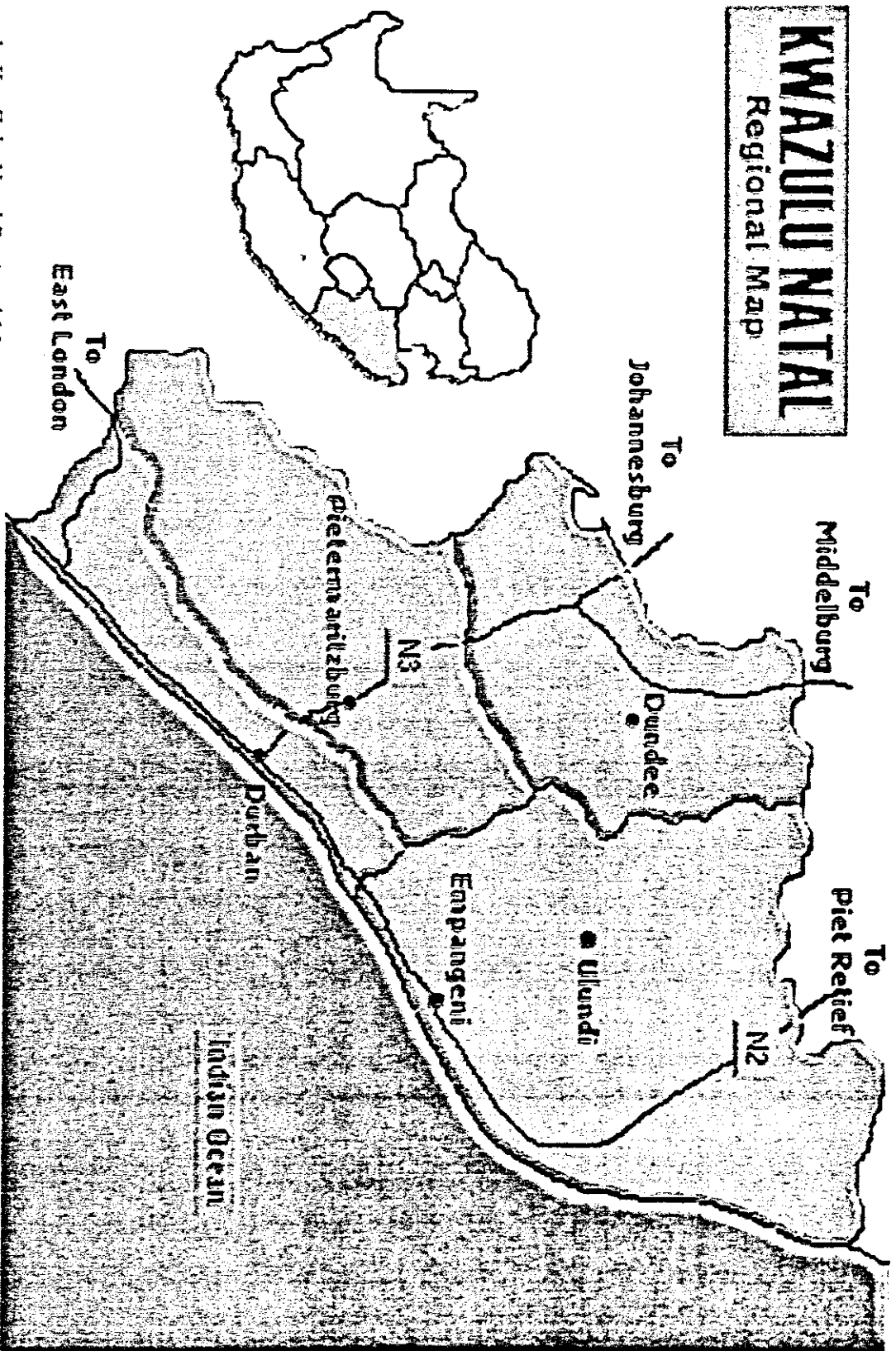


Figure 1: Kwazulu-Natal Regional Map



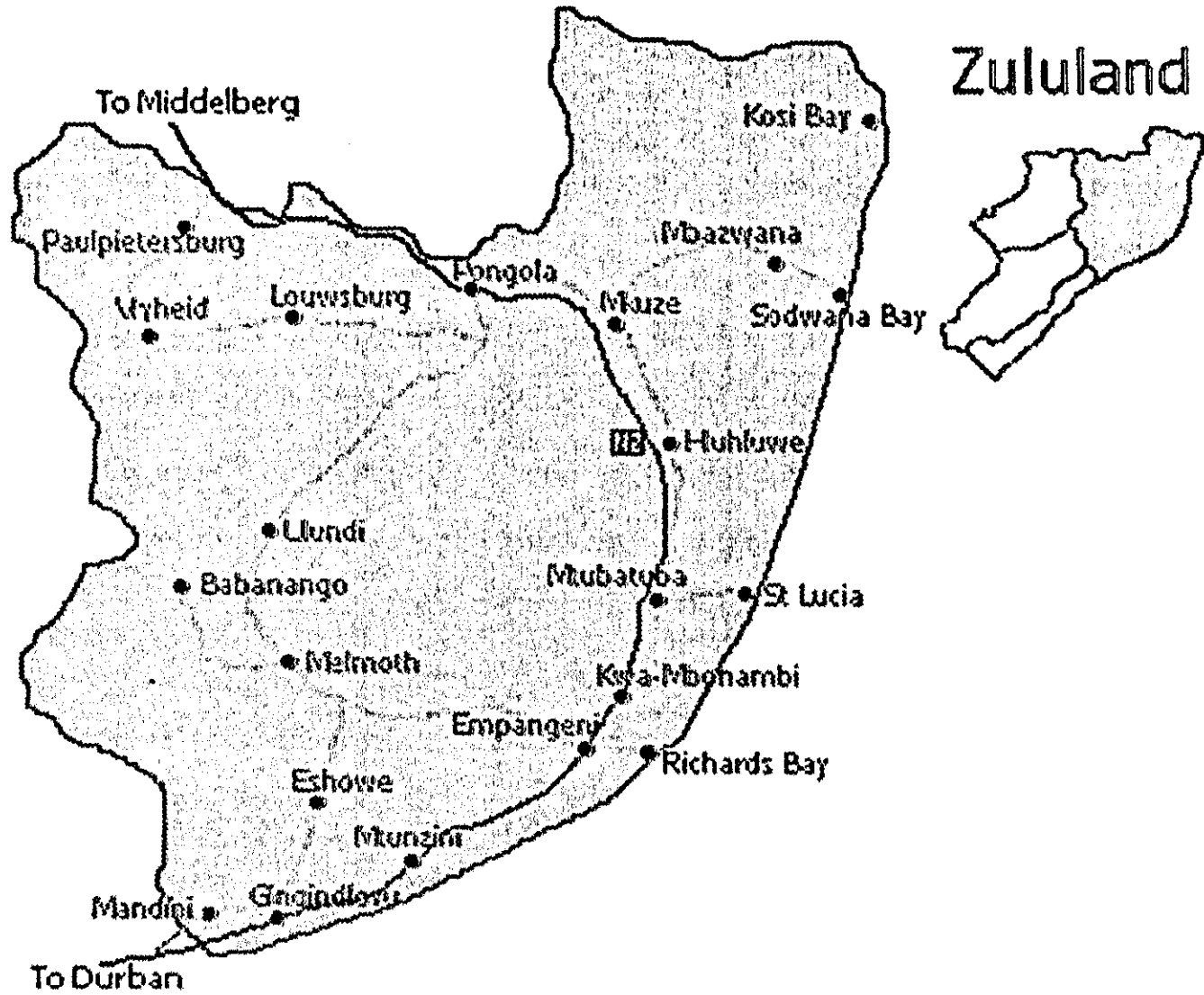


Figure 2: Map of Zululand

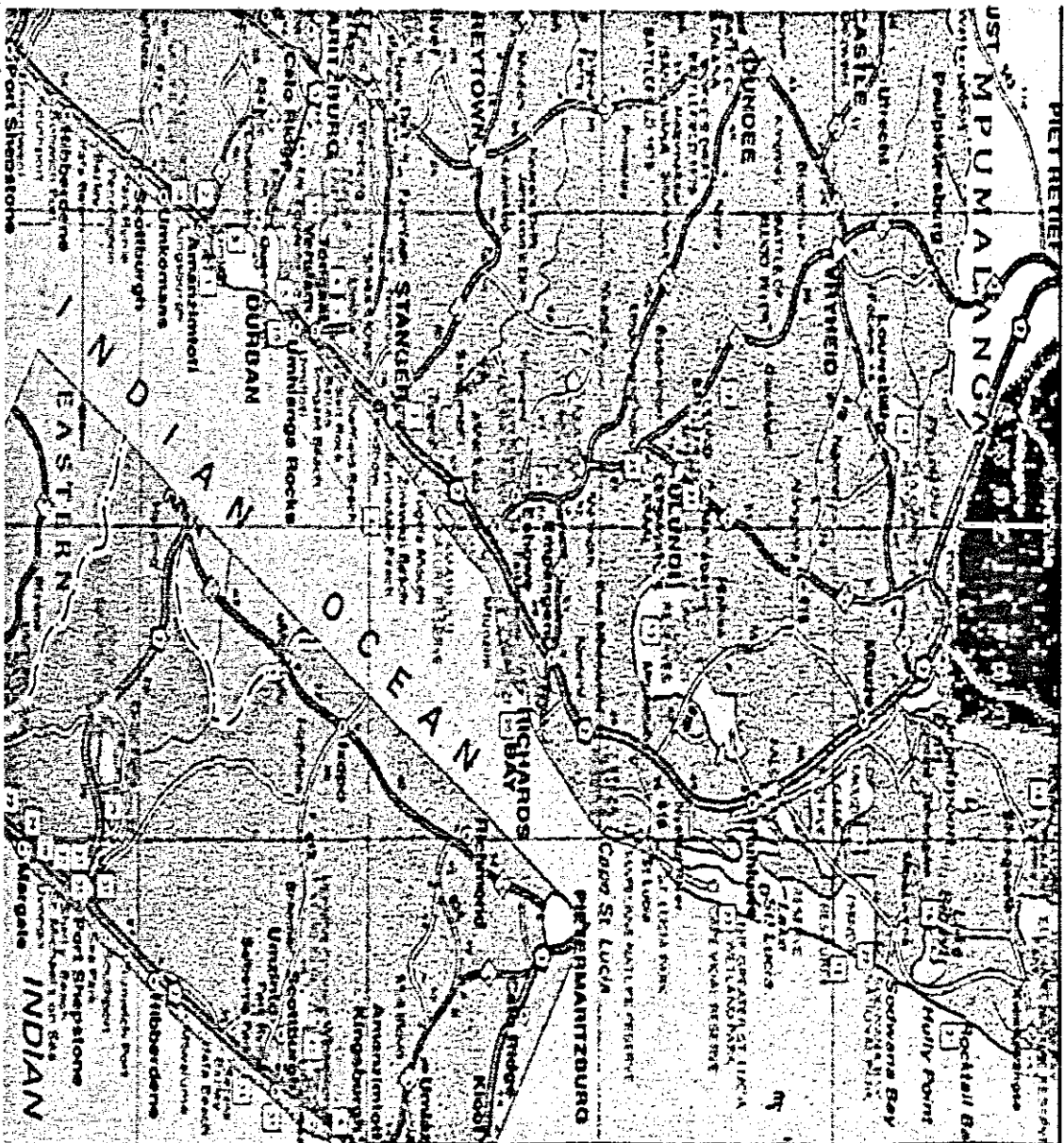


Figure 3: KwaZulu-Coastal

 **South Africa**

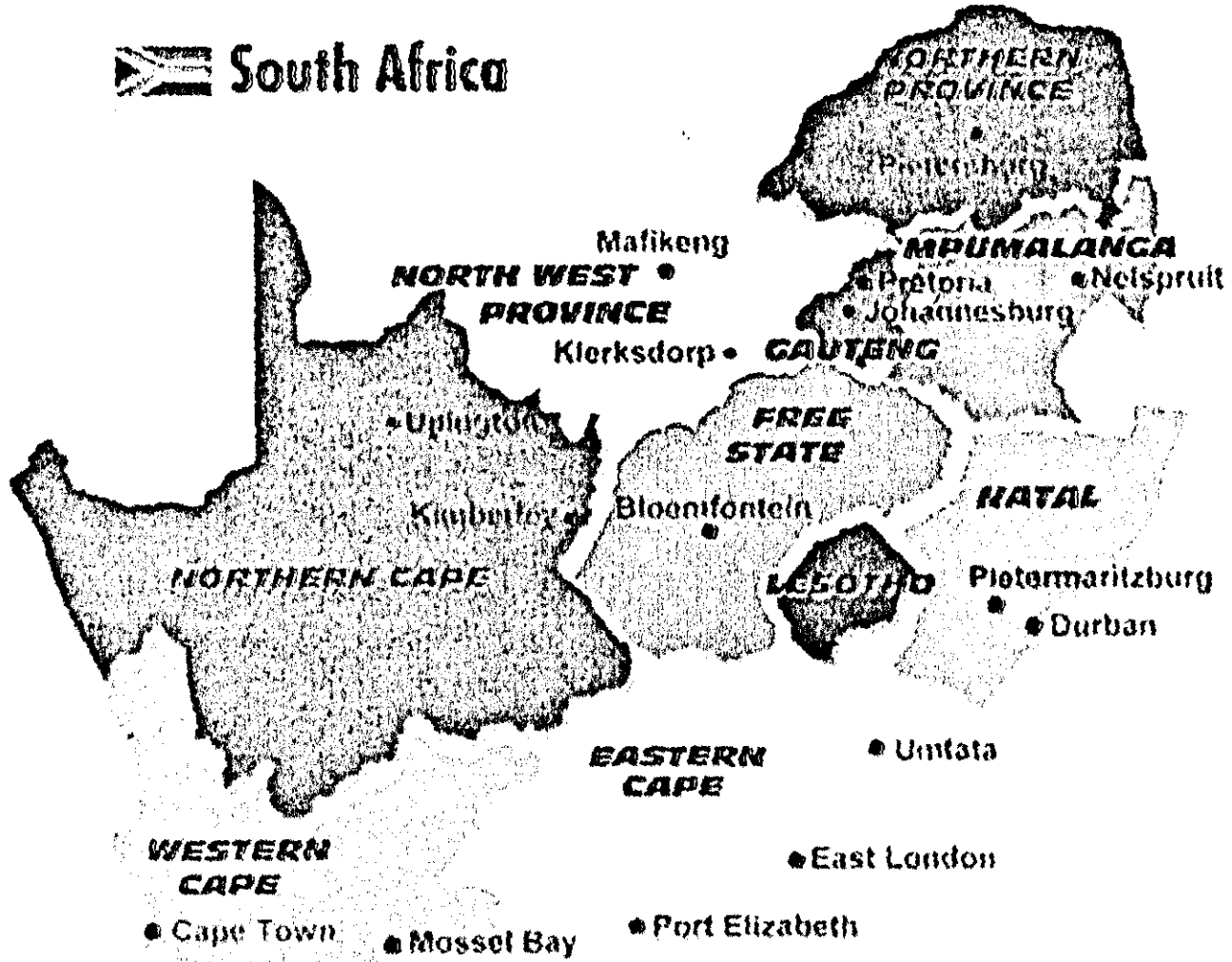


Figure 4: Map of South Africa