

**CAUSES OF MALNUTRITION AMONG CHILDREN 1–5
YEARS IN INFORMAL SETTLEMENTS,
WINDHOEK, NAMIBIA**

Submitted in fulfillment of the requirements for the degree of

**Masters of Public Health
of
the University of Namibia**

BY

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November 2007

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CHILDREN 1 – 5 YEARS IN INFORMAL
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PHILOMENA OCHURUS

NOVEMBER 2007

DECLARATION

I declare that “**Causes of Malnutrition among children 1–5 years in Informal Settlements in Windhoek, Namibia**” is my own work and that all the sources that I used were indicated and acknowledged by complete references.

P. Ochurus

November 2007

ABSTRACT

This study was conducted during the month of May 2006 in the informal settlements of Windhoek, Namibia. The aim of the study was to describe the prevalence of malnutrition among children between the ages of one and five years and to correlate possible causes, and other factors, with nutritional status.

A cross-sectional descriptive study design was chosen. The sample was comprised of 350 respondents, mothers or caregivers of children between one and five years, residing in the non-formal settlements of Windhoek. Both urban and rural settlements were included in the study.

Clusters coincided with the enumeration areas (EA) pre-determined for national census taking. The sample size was chosen to permit generalization of the results to the population under investigation.

Descriptive statistics were used to analyse and present the data using

SPSS and EPINUT databases. Data is presented in graphs and tables.

Three main indices were used to report the nutritional status of children: weight-for-height (WH), height-for-age (HA) and weight-for-age (WA). The WH index determines the wasting rate, which in this study was found to be 19.7%, and is classified as “high”. The second indicator, HA, identifies stunting; it is caused by chronic malnutrition. In this study the stunting rate, with an incidence of 28.8%, was rated “medium”. The third indicator, WA, indicates an underweight condition. This indicator is complex as it takes into account both stunting and wasting. The underweight rate in the non-formal settlements was 35.7%, which is considered very high.

Finally, recommendations were made based on the study’s findings.

KEYWORDS

Anthropometry

Food security

Informal settlement

Malnutrition

Nutritional status

Stunting

Underweight

Wasting

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May God Bless you.

DEDICATION

This work is dedicated to the Youth of Ebenezer Pentecostal Church, in particular the Junior Youth Group. Let this be a source of inspiration to them. With God all things are possible and one can excel both spiritually and academically.

ABBREVIATIONS

ACC	Administrative Committee on Coordination
BMI	Body Mass Index
CDC	Center for Disease Control
CSA	Central Statistics Authority
DHS	Demographic and Health Surveys
EA	Enumeration Area
EPINUT	Data Analysis Program for Anthropometrical Measurements
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
HA	Height for Age
HIV	Human Immunodeficiency Virus
HW	Height for Weight
MICS	Multiple Indicator Surveys from UNICEF
MoHSS	Ministry of Health and Social Services
NCHS	National Center for Health Statistics
NPC	National Planning Commission

<p style="text-align: center;">SADC Southern Africa</p> <p style="text-align: center;">Development Community</p>

SCN	Sub-Committee on Nutrition (of the United Nations)
SPSS	Data Analysis Software for the Social Sciences
VAD	Vitamin A Deficiency
WA	Weight for Age
WHO	World Health Organization

<i>TABLE of CONTENTS</i>	<i>PAGE</i>
DECLARATION	i
ABSTRACT	ii
KEYWORDS	iii
ACKNOWLEDGEMENTS	iv
DEDICATION	v
ABBREVIATIONS	vi
<i>Chapter 1</i>	
<i>ORIENTATION OF THE STUDY</i>	
1.1 INTRODUCTION	1
1.1.1 Background to the Problem	4
1.1.2 Problem Statement	7
1.1.3 Research Questions	7
1.2. AIM AND OBJECTIVES	8
1.2.1 Aim	8
1.2.2. Specific Objectives	8
1.3. JUSTIFICATION OF THE STUDY	8
1.4 OPERATIONAL DEFINITIONS	9
1.5 OUTLINE OF RESEACH REPORT	11
1.6 SUMMARY	11

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION 12

2.2 STUDIES CARRIED OUT IN OTHER COUNTRIES 12

2.3 STUDIES CARRIED OUT IN SUB-SAHARAN AFRICA AND NAMIBIA 14

2.4 SUMMARY 18

Chapter 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION 19

3.2 RESEARCH DESIGN 19

3.2.1 Quantitative Research 19

3.2.2 Descriptive Research 20

3.3. RESEACH METHODS 20

3.3.1 Study Population 20

3.3.1.1 Inclusion 21

3.3.1.2 Exclusion 21

3.3.2 Sampling 21

3.3.3. Sample Size	22
3.4 TRAINING OF RESEARCH ASSISTANTS AND PILOT STUDY	23
3.5 DATA COLLECTION	24
3.6 DATA ANALYSIS	24
3.7 ETHICAL CONSIDERATIONS	25
3.7.1 Permission	25
3.7.2 Right of Privacy and Participation	25
3.7.3 Anonymity	25
3.7.4 Confidentiality	26
3.7.5 Benefit	26
3.7.6 Reliability and Validity of Data	27
3.7.6.1 Validity	27
3.7.6.2 Reliability	27
3.8 SUMMARY	27
CHAPTER 4	
DATA ANALYSIS AND DISCUSSION OF RESEARCH FINDINGS	
4.1 INTRODUCTION	28
4.2 ANALYSIS AND DISCUSSION OF FINDINGS	28
4.2.1 General Information	28
4.2.2 Demographic Information	29
4.2.3 Household Morbidity and Elderly	32
4.2.4 Household Mortality	32
4.2.5 Food Consumption	33
4.2.6 Food Avoidances or Taboos	36
4.2.7 Food Distribution and Storage/Preservation in Household	37
4.2.8 Breastfeeding and Weaning	38
4.2.9 Household Food Security	40
4.2.10 Water and Sanitation	43
4.2.11 Nutritional Status and Anthropometrical Measurements	44
4.2.12 Childhood Morbidity during the Previous Two Weeks	47
4.3 SUMMARY	49

Chapter 5
CONCLUSIONS, LIMITATIONS AND
RECOMMENDATIONS

5.1 INTRODUCTION	51
5.2 CONCLUSION AND RECOMMENDATIONS ABOUT THE OBJECTIVES	51
5.3 LIMITATIONS	53
5.4 RECOMMENDATIONS	54
5.5 SUMMARY	55
6. REFERENCES	56
7. ANNEXURES	

LIST OF TABLES

Table 1.1 Trends of Nutritional Status of Children 0 – 5 Years in Philippines	4
Table 1.2 Comparison of Acute and Chronic Malnutrition	5
Table 1.3 Nutritional Status (Stunting Rates) by Region	6
Table 2.1 Dietary Energy Supplies in Namibia	17
Table 3.1 Population Distribution of Non-Formal Settlements	23
Table 4.1 Consumption of Carbohydrates	33
Table 4.2 Consumption of Protein	34
Table 4.3 Consumption of Fruits and Vegetables	35
Table 4.4 Consumption of Fats and Sugars	36
Table 4.5 Fluids Taken by the Child in the Last 24 Hours (n = 350)	39
Table 4.6 Solid Foods Taken by the Child in the Last 24 Hours (n = 350)	40
Table 4.7 Household Wealth/ Ownership of Livestock	43
Table 4.8 Sanitary Facilities	44
Table 4.9 Relative Prevalence of Low Anthropometric Values	45
Table 4.10 Nutritional Status by Location	46
Table 4.11 Childhood Morbidity during the Previous Two Weeks	47
Table 4.12 Health-Seeking Behaviour	48

LIST OF FIGURES

Figure 4.1 Sample Strata	28
Figure 4.2 Gender of the Head of Household	29
Figure 4.3 Age of the Head of Household	30
Figure 4.4 Marital Status of the Head of Household	30
Figure 4.5 Length of Stay at Present Residence	31
Figure 4.6 Family Size	31
Figure 4.7 Number of Chronically Ill in the Household	32
Figure 4.8 Fluids Introduced within 72 Hours	38
Figure 4.9 Duration of Breastfeeding	39
Figure 4.10 Main Source of Food Supplies	41
Figure 4.11 Main Source of Income	41
Figure 4.12 Monthly Income	42
Figure 4.13 Vitamin A Status	47

LIST OF ANNEXURES

Annexure A: Letters to Stakeholders

Annexure B: Responses from Stakeholders

Annexure C: Questionnaire

Annexure D: City Map

Annexure E: Arial Photographs

ABBREVIATIONS

ACC	-	Administrative Committee on Coordination,
AIDS	-	Acquired immunodeficiency syndrome
BMI	-	Body mass index
CDC	-	Center for Disease Control
ECSA	-	Ethopia Central Statistics Authority
DHS	-	Demographic and Health Surveys
EA	-	Enumeration Area
FAO	-	Food and Agriculture Organization of the United Nations
GDP	-	Gross Domestic Product
HIV	-	Human Immunodeficiency Virus

MoHSS - Ministry of Health and Social Services

- MICS - Multiple Indicator Surveys from UNICEF
NPC - National Planning Commission

SADC - Southern Africa Development Community

- SCN - Sub-Committee on Nutrition (of the United Nations)
VAD - Vitamin A deficiency
WHO - World Health Organization

CHAPTER 1

ORIENTATION OF THE STUDY

1.1 INTRODUCTION

Malnutrition is a universal problem that affects myriads of people, especially children. More than 150 million children of pre-school age in the world are underweight and 200 million have stunted growth. In addition, one out of four babies born in developing countries has intrauterine growth retardation and is at risk of mental impairment (Brown, 2000, p. 1). The Ministry of Foreign Affairs of the Netherlands states in its Sectoral and Theme Policy Document of Development Cooperation that “the contribution of malnutrition – even moderate malnutrition – to child mortality is

high: 56.0% of all deaths amongst children are associated with malnutrition”
(Randstad 1998, p. 7).

Sub-Saharan Africa is not excluded from the urgent public health problem of malnutrition and governments and private institutions need to act to ensure that the region is productive and self-reliant. The importance of addressing malnutrition was acknowledged by the South African Minister of Health, Dr. Manto Tshabalala-Msimang, in her opening and closing speeches at the Southern African Development Community (SADC) ministerial

consultative meeting on nutrition and HIV/AIDS. She reiterated the importance of addressing nutrition as one of the critical elements in health programmes and health interventions (Giraldo, 2003, p. 2). Dr. Tshabalala-Msimang also noted that a food and nutrition review of the Commonwealth revealed that about 40% of children under the age of five years were reported to be stunted and over 50% of the women in the reproductive age group suffer from iron deficiency in Eastern, Central and Southern Africa.

Malnutrition is a major impediment to socioeconomic development and contributes to a vicious cycle of underdevelopment, drastically affecting already underprivileged groups. It has long ranging effects on health, learning ability and productivity. Overall, one in six households in Namibia is 100 kilometres or more from a government hospital. The mean time required to reach these facilities is 76 minutes. People from two out of three households report that they must walk to the nearest

health facility. Because rural households are situated farther away from health facilities, it takes longer to reach them (MoHSS, 2003, p. 186).

Namibia is a vast country situated in south-western Africa. It is bordered by South Africa to the south, Botswana to the east and Angola and Zambia to the north. It covers approximately 824 269 square kilometers. The topographic regions of Namibia are the western coastal plain of the Namib Desert and the central plateau, which stretches from the northern to the southern border and covers almost half of the country.

Most of the country's climate is arid and semi-arid in the southern, central and coastal areas, changing to subtropical in the far north-east (Van Schalkwyk, 2004, p. 5). Only 8% of the land surface in Namibia receives between 501 and 700 millimetres of rain annually, while 22% of the land, mostly desert, receives less than 100 millimetres annually. Namibia has the driest climate in Sub-Saharan Africa with a mean rainfall of approximately 270 millimetres. There is a wide regional variation in annual rainfall, from less than 20 millimetres in the western Namib, to more than 700 millimetres at the east end of the Caprivi strip (Sweet, 1998, p. 70).

Food production in Namibia is influenced by natural rainfall, and national cereal production

fluctuates according to rainfall patterns. The cultivation of rain-fed crops is regionally concentrated and is mainly confined to the northern communal areas, though a small but significant area of commercial maize production is found in the so-called maize triangle, that is, Otavi, Tsumeb and Grootfontein area. The country depends mainly on imports to ensure food security for its inhabitants. Considering the country as a whole, food availability seems not to be a major problem. However, food security is

**problematic in a number of
households due to unemployment,
low farming outputs, and the impact
of HIV/AIDS (Sweet, 1998, p. 3).**

The Khomas region is the most centrally located and is also the region where the nation's capital is situated. It covers a total area of 37 007 square kilometres. According to the Population and Housing Census (NPC, 2003, p. 4), the total population of Namibia is approximately 1 830 330 with an annual growth rate of 3.1%. The sparsely distributed population is mainly rural (67.0%) while the rest (33.0%) resides in urban areas.

Khomas is the only region in the country with a rural population of less than 10%. The total population in Khomas is 250 262 with a total growth rate of 4.0%. It is the most densely populated region in the southern part of the country with a population density of 6.8 persons per square kilometer (NPC, 2003, p. 10). The annual growth rate poses a continuous challenge in providing necessary health, municipal and other services to the inhabitants.

The main sources of income, by which food is acquired, are wages from employment, old age pensions and trade activities. According to the 2001 population census report, the national unemployment rate is 31.0% (185 258), while the Khomas region reports a 29.4% (40 431) unemployment rate. About half of all Namibians are considered poor, of which 13.0% are considered extremely poor (Van Schalkwyk, 2004, p. 25).

Namibia's main sources of income are the agricultural and mining industries. The mining industry accounts for almost 25% of the gross domestic product (GDP) while beef production accounts for 85% of the gross agricultural income (MoHSS, 2003, p. 1). In the Khomas region, wages and salaries account for 74.0% of household income. Only 1.0% of households depend on farming and 11.0% on informal businesses, according to the 2001 Population Census data (NPC, 2003, p. 10).

Income distribution in Namibia is one of the most unequal in the world with 65.0% of the wealth concentrated among 10.0% of the population. The gross domestic product (GDP) per capita at current prices is indicated as N\$1 465 per month while the average GDP at constant prices per capita, per month is N\$2 676.33 (Van Schalkwyk, 2004, p. 4).

**According to Lutter (2003, p. 4),
productive years of life are impaired
and diminished by disabilities due to
inadequate nutrition and hunger.**

**Food insecurity has a severe
negative influence on individuals,
families and communities as well as
on the economy of Namibia.**

**Malnutrition especially affects
vulnerable and dependent
population groups. Infants and
children suffer cognitive deficits and
irreversible faltering in linear**

growth. These deficits have a negative consequential influence on their sufferers' contribution as adults to the economy. A vicious cycle results from poverty and malnutrition. Contributing to this problem is the high prevalence of HIV and AIDS. Poor countries in the SADC region indicate high HIV/AIDS rates: Botswana (38.8%), Lesotho (31.0%), Swaziland (33.4%) and Zimbabwe (33.7%) (Makinwa, 2003, p. 3).

1.1.1 Background to the Problem

Malnutrition is a major public health problem, especially in developing countries. Chronic food deficit affects about 792 million people in the world. The situation is particularly troubling in Sub-Saharan Africa where the number of malnourished children has increased by 70.0% (Smith & Haddad, 2000, p. 3). According to Smith and Haddad, this increase in Africa is occurring at a time when the rest of the world is showing a decline in malnutrition rates.

Protein-energy malnutrition is the most lethal form of malnutrition, which is mostly visible in children. Malnutrition is considered a “silent emergency”. It is the cause of at least half of the 10.9 million child deaths each year (WHO, 2003a, p. 2). According to the same report, Protein-energy malnutrition affects every fourth child worldwide, while 150 million (26.7%) are underweight, and 182 million (32.5%) are stunted. Geographically, about a quarter of those affected (26.0%) live in Africa (WHO, 2003b, p. 1). Mercado (2004, p. 4) did an analysis of nutritional statistics in the Philippines and reported that about four in ten children between the ages of five and ten years are suffering from stunted growth and 2.49 million are underweight. The following table (1.1) illustrates the findings of Mercado’s analysis.

Table 1.1: Trends of Nutritional Status of Children 0 – 5 Years in Phillipines

Nutritional status	1998	2003
Underweight	32.0%	27.6%
Stunted	34.0%	30.5%
Wasted	6.0%	5.5%

Source: Mercado 2004:8

A Nutritional Surveillance Project in Bangladesh (1999-2000) explored the quality and diversity of diet in rural Bangladesh, a country experiencing high rates of malnutrition. This study revealed that about 50% of the children under the age of five years had stunted growth, and 45.0% of mothers were underweight (Hafes, Torlesse, Moestue, Hall, Kless, & Bloem, 2003, p. 45). The Ethiopian Demographic Health Survey (2000) revealed that slightly more than half (51.0%) of children under five years of age were stunted, compared to 43.0% in Tanzania, 38.0% in Uganda, and 33.0% in Kenya (ECSA, 2000, p. 3). These statistics are comparable with the 47.0% stunting rate in the Khomas region of Namibia.

Table 1.2: Comparison of Acute and Chronic Malnutrition in Southern Africa

Country	Wasting	Stunting
Namibia – 1992	8.6%	28.0%
Namibia – 2000	9.0%	23.0%
Botswana – 2000	5.0%	23.0%
Zambia – 1999	4.0%	59.0%
Zimbabwe	6.0%	27.0%
Sub-Saharan Africa – 2000	10.0%	41.0%

Source: SADC 2003

Table 1.2 compares the prevalence of acute and chronic malnutrition between countries in the region and also the changes within Namibia between the 1992 Namibia Demographic and Health Survey (NDHS) and that of 2000. Overall, the prevalence of wasting in Namibia is higher than in neighbouring countries. However, the prevalence of stunting decreased between 1992 and 2000 and is comparable to that found in Botswana and Zimbabwe, though it is much lower than what occurs in Zambia and the Southern African region as a whole.

The problem of malnutrition in Namibia does not reveal itself differently than in most other developing countries. The available nutrition data in this study is only for children under five years of age, measured during the Namibia

Demographic and Health Survey (MoHSS, 2003, p. 153). This study revealed that a total of 31.4% of Namibian children under five years were stunted, referring to long-term malnutrition. Of these children, 7.8% were severely stunted and 23.0% moderately stunted. This shows slight improvement compared to the 1992 NDHS, which showed that 36.7% were stunted, 8.3% were severely stunted, and 28.4% were moderately stunted. Available figures are still cause for concern, particularly because of

emergent urban food insecurity among poorer households in Namibia. According to the 2000 NDHS report, the Khomas region has the highest (47.0%) stunting rate in the country (MoHSS, 2003, p. 152). Approximately one quarter (24.0%) of Namibian children under five years are considered to be underweight (low weight for age).

Table 1.3: Nutritional Status (Stunting Rates) by Region

Region	Total stunted	Severely stunted	Moderately Stunted
Khomas	47.0%	14.7%	32.3%
Kavango	42,5%	11.8%	30.7%
Ohangwena	36.2%	8.7%	27.5%
Omusati	34.5%	8.0%	26.5%
Omaheke	34.3%	8.7%	25.6%
Oshikoto	28.4%	5.2%	23.2%
Caprivi	26.6%	6.8%	19.8%

Hardap	25.1%	6.0%	19.1%
Kunene	25.1%	6.8%	18.3%
Oshana	23.9%	5.6%	18.3%
Otjozondjupa	22.0%	4.6%	17.4%
Karas	17.7%	2.7%	15.0%
Erongo	11.4%	2.7%	8.7%

Source: MoHSS, 2003, p. 152

Stunting, which is defined as the condition of being too short for one's age, has an immense impact on the productivity of individuals and occurs when children do not get adequate nutrients in quantity and/or quality during intra-uterine life, the first two years of life, or both (ECSA, 2000, p. 6).

Namibia is considered food secure at the national level due to a well-

developed commercial agriculture sector, and at the sub-national level due to the ability to import a sufficient amount of food to cover production deficits. However, the situation is far from satisfactory and many households are vulnerable to chronic or acute food insecurity — which could lead to malnutrition — due to low agricultural production, recurrent drought, and low incomes as well as limited off-farm employment opportunities. Barnett and Rugalema (2001, p. 1) state that morbidity and mortality caused by

HIV/AIDS reduces food security of households by reducing the ability to produce and/or buy food. Assets such as livestock and other possessions, which could be a source of income and nutrition, may be sold to generate cash for patient care and treatment due to HIV/AIDS and other chronic illnesses. This may lead to high levels of food insecurity and malnutrition, especially among orphans and vulnerable children.

1.1.2 Problem Statement

Malnutrition constitutes a global “silent emergency”, killing millions annually. Bekele reports (1998, p. 2) that nearly 12 million children under the age of five years (over four million of them in Sub-Saharan Africa) die annually and about 55% of these deaths are related to malnutrition. Namibia, as a part of Sub-Saharan Africa, also experiences the problem of malnutrition as reported in the NDHS (MoHSS, 2003, p. 152). A total of 31.4% of Namibian children

**under five years were stunted
(chronic malnutrition). Nationally,
the highest stunting rate (47.0%)
was recorded in the Khomas region.**

The conceptual framework for malnutrition in young children shows that the major factors associated with malnutrition are poor nutritional intake and illnesses related to lack of access to food, lack of health care, maternal care, and other services. According to the UNICEF conceptual framework for the causes of malnutrition (WHO, 2003a, p. 1) political ideology and national policies form the root of the problem of malnutrition.

This study will attempt to gather necessary information on the causes of malnutrition in informal settlements in Windhoek. This information will highlight some of the reasons why some children are well-fed while others are not. The study could potentially be utilised in health programmes to prevent malnutrition among children under five years and to promote the general health of this vulnerable group, ensuring that each individual reaches his or her full potential both physically and economically.

1.1.3 Research Questions

- What are the main causes of malnutrition in the informal settlements of Windhoek?
- What is the correlation between the nutritional status of children under the age of five years and factors that may contribute to malnutrition in the informal settlements of Windhoek?

1. 2 AIM AND OBJECTIVES

1.2.1 Aim

The aim of the study is to explore and describe the prevalence and causes of malnutrition amongst children under five years of age in informal settlements of Windhoek in order to provide information to stakeholders for designing a comprehensive project that will address the problem of malnutrition.

1.2.2 Specific Objectives

The specific objectives of the study are:

- To determine the prevalence and causes of malnutrition in selected communities in Windhoek;
- To correlate nutritional status (well nourished, malnourished children) and contributing factors for children under five years (weaning, knowledge);
- To describe factors associated with malnutrition in children between one and five years of age in the informal settlements of Windhoek.

1.3 JUSTIFICATION OF THE STUDY

While it is known that 47.0% of children suffer from malnutrition in the Khomas region (MoHSS, 2003, p. 152), this study will attempt to determine the prevalence and main causes of malnutrition for children under five years in the informal settlements of Windhoek. The study will correlate nutritional status (well fed or malnourished) with different factors that may contribute to malnutrition in the selected sample group. The study will attempt to gather necessary information on the causes of malnutrition in informal settlements in Windhoek. This information will reveal the nutritional status of children between one and five years of age.

Proper nutrition is essential for both mental and physical development as well as performance at school. It is essential for people to be able to achieve their full potential. It may be assumed that access to food is a basic human right. It is the

author's hope that this study will lead to the improvement of general health status through improved nutrition. The study will also contribute to public health research in Namibia, hopefully leading to the design and implementation of a comprehensive programme by stakeholders to improve the health of Namibian children.

1.4 OPERATIONAL DEFINITIONS

Anthropometry

Use of human body measurements to obtain information about nutritional status (WHO, 2004. p. 129).

Food insecurity

A situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life. It may be caused by the unavailability

of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level, which may be chronic, seasonal or transitory (WHO, 2004. p. 129).

Food security

A situation that exists when people have physical, social and economic access, at all times, to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active, healthy life (WHO, 2004. p. 129).

Malnutrition

A nutritional disorder or condition resulting from faulty or inadequate nutrition, or intakes of energy and/or nutrients below or in excess of needs for prolonged periods of time (WHO, 2004. p. 129).

Informal settlements

A collection of makeshift dwellings forming a community, especially on the outskirts of a town or city (researcher's definition).

Nutrition indicator

A measure used at the individual and population level to determine

**nutritional status (WHO, 2004. p.
129).**

Nutritional status

The physiological state of an individual that results from the relationship between nutrient intake and requirements and from the body's ability to digest, absorb and use these nutrients (WHO, 2004. p. 129).

Protein-Energy Malnutrition

A situation caused by an inadequate consumption of calories, resulting in a deficiency of proteins and

micronutrients (Berkow, Beers, & Bogin, 1999, p. 10).

Stunting

Refers to shortness (deficit of linear growth) in an individual who has failed to reach genetic potential as a result of poor diet and disease.

Stunting is defined as < -2 standard deviations (SD) of the height-for-age median value of the National Center for Health Statistics/World Health Organization (NCHS/WHO) international reference data. The height-for-age index is used to compare a child's height with the expected value of a child of the same

**age from a reference population
(WHO, 2004. p. 129).**

Undernourishment

**Food intake that is continuously
inadequate to meet dietary energy
requirements (WHO, 2004. p. 129).**

Undernutrition

**The result of undernourishment,
poor absorption or poor biological
use of nutrients consumed (WHO,
2004. p. 129).**

Underweight

**A low weight-for-age ratio and a
composite of stunting and wasting.
Underweight is defined as < -2 SD of
the weight-for-age median value of**

**the National Center for Health
Statistics/World Health
Organization (NCHS/WHO)
international reference data.**

**Weight-for-age Index is used to
compare a child's weight with the
expected value of a child of the same
age (WHO, 2004. p. 129).**

Wasting

**Describes a recent and severe
process that produces substantial
weight loss, usually as a
consequence of acute shortage of
food and/or disease. Wasting is
defined as < -2 SD of the weight-for-**

**height median value of the
NCHS/WHO international
reference data. Weight-for-height
Index is used to compare a child's
weight with the expected value of a
child of the same height (WHO,
2004. p. 129).**

1.5 OUTLINE OF RESEARCH REPORT

The report is organized into five chapters covering the following subjects:

Chapter 1 – Orientation to the study

Chapter 2 – Literature review

Chapter 3 – Research methodology

Chapter 4 – Data analysis and discussion of findings

Chapter 5 – Limitations, conclusions and recommendations

1.6 SUMMARY

Good nutrition is essential for mental and physical development, and for people to reach their full potential. The preceding orientation chapter presented an overview of the research process. Its central concern was to provide background information on malnutrition, and on the design and methodology to be used in the study. Included were a problem statement, justification of the study, and operational definitions.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter will present a review of existing literature on the subject. The literature review will link the purpose of the study to various theoretical perspectives and the current nature of variables related to the phenomenon.

Malnutrition is a universal problem, but affects the developing countries in Asia and Africa in particular. Less fortunate people are unable to secure food to provide them with necessary nutrients that enable

them to meet daily dietary needs. This inability severely affects their physical, social and economic status. There is a definite relationship between nutritional status and the prevalence of ill health and disabilities in individuals.

2.2 STUDIES CARRIED OUT IN OTHER COUNTRIES

Lutter (2003, p. 5) reports that the prevalence of stunting exceeds that of low weight-for-age. This is considered true for Latin America, where stunting is twice that of low weight-for-age. A study of malnutrition among children aged six months to two years from a

settlement colony in Delhi revealed a 60.7% prevalence rate of malnutrition. The undesirable practices of discarding colostrums, not exclusively breastfeeding a child up to four months, delayed weaning, and the use of bottle and nipple for feeding, were still widely prevalent in Delhi among children five years and under (Khokhar, Sigh, Talwar, Rasania, Badhan & Mehra, 2003, p. 1).

Mercando (2004, p. 8) reported that about four out of ten children between the ages of five and ten in Bangladesh are shorter (stunted growth) and 2.49 million are thinner than the growth reference curves developed by the National Center for Health statistics and the CDC, using data from the Fels Research Institute and US Health Examination Surveys (MoHSS, 2003, p.150). A study was conducted in Bangladesh from 1999 to 2000 by the Nutrition Surveillance Project of Bangladesh to explore the quality and diversity of diet in rural Bangladesh. This study revealed that about 50%

of children under the age of five years had stunted growth and 45% of the mothers were underweight (Mercando, 2004, p. 45).

The impact of HIV/AIDS on nutrition and nutritional status is phenomenal. Nutrition and HIV are closely linked, as HIV negatively impacts household food security and also reduces the production rate of food. The Nutrition Surveillance Project analysis revealed that HIV/AIDS is linked to poverty and, in particular, occurs in populations with endemic malnutrition and micronutrient deficiencies. The rate at which the disease progresses to full-blown AIDS could be affected

by the nutritional status of the host.

It is estimated that energy needs increase by 10% during the HIV stage and increase from 20 to 30% during the AIDS stage (Mercando, 2004, p. 9).

Engle, Menon and Haddad (1996, p. 28) describe “care” as the provision of time, attention and support to meet the physical, mental and social needs of a growing child both in the household and the community.

Resources for care are defined as caregiver education, knowledge and beliefs, caregiver physical health

and nutritional status, caregiver mental health and self-confidence, autonomy and control of resources, workload and time availability, and family and community social support (Engle et al, 1996, p. 28).

Although research on the direct linkages between indicators of caregiver nutritional status and care-giving is limited, chronic energy deficiency, measured using body mass index, has been thought to have effects on productivity by modifying physical activity patterns. The nutritional status of the mother

is also expected to affect her ability to care for children. The blood iron status that determines whether an individual is anemic also affects the level of productivity of that individual (Engle et al, 1996, p. 28).

In the Gambia, it has been reported that children of mothers who have several children have poorer early growth and lower catch-up growth in height than children of mothers with few children. Short inter-pregnancy intervals are also associated with increased risk of pre-term low birth weight. According to Engle et al (1996, p. 29), the case for improving maternal health and nutritional status is stronger than ever before, based on existing evidence of the effects of maternal health on birth outcomes and emerging evidence of their effect on infant behaviour and care giving.

A study done by Girma and Genebo (2002, p. 23) on the nutritional status of women and children reports that more than 55% of children of malnourished mothers were underweight, while 44.9% of children of well-nourished mothers were underweight. A positive relationship between maternal and child nutritional status was observed.

Engle et al (1996, p. 33) further report that, in the United States of America, a large body of literature links maternal depression with poor care-giving and problematic outcomes for children. A UNICEF report on the slum improvement project in Bangladesh, referenced by Engle et al (1996, p. 33), suggested that the social isolation of women, coupled with lack of extended family networks in urban areas, has a negative effect on the mental health of women, which in turn is likely to reduce the quality of care, even when the mother is physically present. The most important social support for mothers is alternating child-care, which may be lacking when women are isolated.

A study done by Castle (cited by Engle et al) reports that some of the most malnourished children in Mali belonged to low-status women in high-income households. She suggested that it may not be the level of a household's wealth that determines the mother's resources for childcare, but the mother's access to these resources (Engle et al, 1996, p. 33).

2.3 STUDIES CARRIED OUT IN SUB-SAHARAN AFRICA AND NAMIBIA

After reviewing country trends in malnutrition for Sub-Saharan Africa, it became evident that in most countries the trend toward underweight children has shifted from an improving trend to a deteriorating or static trend. It is important to note that this deteriorating trend also coincides with increased food insecurity in Southern Africa and increasing numbers of people affected by HIV/AIDS (Mason, Rivers & Helwig. 2005, p. 94).

Feeding practices are important determinants of children's nutritional status. The 2000 Namibia Demographic and Health Survey indicates that infant feeding has an

impact on both the mother and the child (MoHSS, 2003, p. 143). Breastfeeding has an indirect effect on the post partum fecundity of mothers as more frequent breastfeeding is associated with longer periods of amenorrhoea, which leads to longer birth intervals. The 2000 Namibia Demographic and Health Survey (NDHS) further reveals that over 93% of infants were put on the breast within one day and 81.0% within one hour, which is a significant increase from the 1992 data of 80.0% and 52.0% respectively (MoHSS, 2003, p. 144). Some of the benefits of breast milk include, but are not limited to, the balanced composition of nutrients, the reduction of contamination, and the composition of passive immunity system for the baby. The time when other foods are introduced is as important as initiating breastfeeding. On the other hand, weaning foods might be contaminated and might also not contain required nutrients. The NDHS further reports that a mere 26.0% of Namibian children are exclusively breastfed up to the age of four months. Khomas and Erongo are the two regions with the lowest duration of breastfeeding, while Caprivi and Kavango have the longest duration, between 22 and 28 months (MoHSS, 2003, p. 145).

Feeding practices, with emphasis on the quality and quantity of food eaten, are important determinants of a child's nutritional status, which further determine the child's susceptibility to infection. Young children need more feedings (between five and six) than an adult in order to meet their daily nutritional requirements. The Namibia Demographic Health Survey has reported that between two and three meals are being fed to infants in Namibia (MoHSS, 2003, p. 147). About a quarter of Namibian children (24%) under the age of five are reported to be stunted. Stunting rates are highest in the Khomas (47.0%) and Kavango (42.0%) regions. In Namibia the underweight rate is at 24.0% while the severe underweight rate is at 5.0% (MoHSS, 2003, p. 153). The process of becoming stunted due to chronic under-nutrition begins before birth and continues during the first three years of life. The stunting that occurs during this time cannot be corrected later. Unfortunately, when energy intake is adequate, these stunted children are at higher risk of becoming obese. Childhood obesity is associated with chronic diseases in later life such as, hyperinsulinemia, hypertension, hyperlipidemia, type 2 diabetes mellitus and arteriosclerotic cardiovascular diseases. The burden of ill health will be double in developing countries due to poverty related infections such as malaria and tuberculosis, stunting and the related likelihood of being overweight (Julie, Van

Weissenbruch, Delemarre-van de Waal & Surjono, 2004, p. 354). Bloss, Wainaina and Bailey (2004, p. 267) suggest in their report that immunization gives protection against stunting. Children whose vaccinations were not up-to-date were more than twice likely to be stunted than children with current vaccinations. A study done by Verhoef, West, Veenemans, Beguin and Kok (2002, p. 4) in Kenya report that stunting peaks at the age of 24 months and stabilizes thereafter. They further report that nutritional inadequacies that cause stunting also impair host immunity, and thereby increase the degree to which malaria is associated with decreased concentration of hemoglobin, with increased inflammation and with increased iron required for erythroblasts. The report suggested that increased intake of micronutrients may not only reduce stunting and nutritional anemia, but malaria related anemia. The prevalence of stunted and wasted children among the study population was 39.0% and 5.0% respectively. The prevalence of anemia in the whole study group was 71.0% (Verhoef et al 2002, p. 4).

Insufficient food intake is one of the primary causes of malnutrition.

Poor child appetite plays a major role in adequate nutrient intake.

Factors that reduce a child's appetite may include a monotonous diet, lack of nutrients needed for appetite (e.g. zinc), and illnesses such as fever, diarrhoea, malaria,

measles, intestinal parasites, chronic malnutrition and sores in the mouth. A World Health Organization study on “Food Security and Caring Patterns of Vulnerable Young Children in South Africa” reported stunting to be the major nutritional problem in children under five years of age, especially in urban informal settlements and in rural areas. The study findings suggested that, in many cases, chronic malnutrition was related to inadequate resources, to monotonous, poor quality diets,

**and to poor appetites (WHO, 2002,
p. 23).**

Table 2.1: Suppliers of Dietary Energy in Namibia

Source	Percentage
Cereals	53.0%
Starchy roots	14.0%
Sweeteners	14.0%
Pulses, nuts and oil crops	4.0%
Fruits and vegetables	2.0%
Vegetable oils	3.0%
Animal fats	2.0%
Meat and offals	4.0%

Fish and seafood	1.0%
Milk and eggs	3.0%

(Source: Mittendorfer (2001, p. 5))

Mittendorfer (2001, p. 5) reports that 53.0% of dietary energy comes from cereals, while meat and milk are the main sources of protein in Namibia. This finding suggests that diet in Namibia is predominantly monotonous.

The latest Namibia Demographic Health Survey (NDHS) (MoHSS, 2003, p. 148) reports that Namibian children are introduced to supplementary feedings long before

the recommended age. Foote and Marriott (2003, p. 488), in their review of weaning of infants, state that early weaning has an immediate effect on the health of infants in economically developing countries due to factors such as the lack of availability of suitable alternatives to breast milk, microbial contamination of foods and fluids, replacement of breast milk by less nutritious alternatives, and the return of fertility with the cessation of lactation.

The NDHS further states that the frequency of feedings was on average between two and three meals per day for ten month old babies. This is below the recommended number of meals for children. Infection and poor health also play a major role in malnutrition. Household food insecurity, being one of the three underlying causes of malnutrition (WHO, 2003a, p. 1), could in fact determine the number of meals eaten, as well as the diversity of foods consumed by the family.

Employment for wages, old age pensions and trade activities are the most common sources of income by which food is accessed (Mittendorfer, 2001, p. 5).

In addition to protein energy malnutrition, insufficient food consumption leads to other problems that are of public health importance. Among these problems are deficiencies in iron, iodine and vitamin A, to list a few.

2.4 SUMMARY

In this chapter, possible factors that contribute to malnutrition in

informal settlements were discussed.

The main objective was to link the literature to the current nature of the variables related to malnutrition in the informal settlements of Windhoek.

Some of the factors discussed include feeding practices, immunization status, susceptibility to infections, household food security and the main source of income for purchasing food.

Household food security can be improved through poverty reduction programmes that improve the economic status, and thus the buying power, of households.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter provides an outline on how the research process was carried out to get answers to research questions. The research questions are: *What are the main causes of malnutrition in the informal settlements of Windhoek? What is the correlation between the nutritional status of children under the age of five years and factors that may contribute to malnutrition in the informal settlements of Windhoek?*

**Focus will be on the study
population, sampling techniques,
sample size, data collection methods
and the control measures taken to
ensure validity and reliability.**

3.2 RESEARCH DESIGN

This research is a cross-sectional descriptive study that describes the current prevalence and possible causes of malnutrition of children born from May 2001 to May 2005 (one to five years of age) residing in the informal settlements in Windhoek. In this study, the height and weight measurements of the children, taking age and sex into consideration, were converted into z-scores based on the National Center for Health Statistics reference populations recommended by the World Health Organization. Thus, those below a -2 standard deviation of the National Center for Health Statistics median reference for height-for-age, weight-for-age and weight-for-height were defined as stunted, underweight and wasted, respectively. In this study all three indicators were used to describe the levels of child malnutrition and the

relationships between nutritional status and contributing factors. The survey was limited to assessing protein-energy malnutrition without attempting to assess other deficiencies.

3.2.1 Quantitative Research

Quantitative research relies upon measurement to analyse different variables and uses various scales (Bless & Higson-Smith 1995, p. 38).

This is a formal, objective and systematic process, which aims to analyse, compare and describe different variables.

The quantitative research approach was considered to be suitable for measuring the nutritional status of children between one and five years and contributing factors in the informal settlements of Windhoek.

3.2.2 Descriptive Research

This study is descriptive. It was conducted to provide a description of the nutritional status in relation to different variables of the target population such as age, sex, educational level, and socio-economic status. The purpose of descriptive studies is to describe and document aspects of situations (Polit, Beck & Hungler 2001, p. 180). The researcher sought to describe and report on the nutritional status of children between one and five years of age with respect to various contributing factors.

3.3 RESEARCH METHODS

A survey study was considered the best method to gather information. This method is described as the collection of information on a wide range of cases, each case focusing only on the particular aspect under consideration (Bless & Higson-Smith, 1995, p. 41). The quantitative research approach is a method that often employs measuring instruments.

The researcher and research assistants used a structured questionnaire with both open-ended and closed-ended questions to collect data through face-for-face interviews. Anthropometric measurements of children were taken to determine factors of stunting, wasting and underweight.

3.3.1 Study Population

“Population” is a term that sets boundaries on the study units according to Strydom, Fouche and Delpont (2004, p. 198). It refers to individuals in the world that possess specific characteristics. The study area was the informal settlements in Windhoek. The population in this study included all mothers or caregivers of all children between

one and five years of age.

Households without children in this age group were excluded. Visitors were also excluded.

Sub-populations consisted of people living in the Windhoek district based on the following strata: 6 715 urban households and 628 rural households.

3.3.1.1 Inclusion

Households with children born between May 2001 and May 2005 were included in the study (children one to five years of age).

3.3.1.2 Exclusion

Households with children below one year of age, over five years of age and visitors were excluded.

3.3.2 Sampling

Bless and Higson-Smith (1995, p. 85) describe sampling as a process of selecting a smaller group of people from the research population as representative of that population. Sampling is less costly and time-consuming for a researcher than including an entire population.

A sample was drawn from the 49 informal settlements in Windhoek, which included seven major settlements, three of which (Havana, Okuryangava and Otjomuise) were urban, and four of which (Aris, Dordabis, Kappsfarm and Groot-Aub) were rural. First, the stratified random sampling method was employed to ensure fair representation of each section as the informal settlements are at different locations.

Secondly, cluster sampling was used. The identified clusters coincided with the enumeration areas (EA) pre-determined for national census. The EAs were grouped according to their geographic location and final clusters were selected randomly by drawing the EA numbers from a hat. The researcher visited the study area prior to the study and identified the enumeration areas on the ground as demarcated on an aerial photograph, with assistance from officials of the National Planning Commission. Even though houses were not numbered, street names existed which facilitated the identification of clusters.

Households in the study area were selected randomly. The first household was determined by locating the center of the cluster and spinning a bottle. The household indicated by the bottle was taken as the starting point. Once the starting point was determined, the next household selected was the adjacent one on the left side. This process was repeated until the desired number was reached.

3.3.3 Sample Size

The sample size is designed to permit generalization of the results to the population under investigation. As per population census records from the Central Bureau of Statistics, the population of the informal settlements is 25 475 individuals residing in

7 343 households. A study of the entire population would be time consuming and costly, therefore a sample of the population was studied. A confidence interval of 95.0% was taken and a sample of n households. The sample proportion P is 0.5 with a reliability of 5.0%.

The population is known, therefore the sample size is calculated as:

$$n = \frac{N}{1 + \frac{N(L/100)^2}{(1.96)^2 P(1-P)}}$$

$$n = \frac{7343}{1 + \frac{7343(5/100)^2}{(1.96)^2 0.5(1-0.5)}}$$

$$= 365$$

Notation

N_1 = population for urban Windhoek

N_2 = population for rural Windhoek

To calculate the sample for each stratum:

Urban Stratum

$$W_1 = N_1 \div N = 6715 \div 7343 = 0.914$$

$$n_1 = W_1 \times n = 0.914 \times 365 = 334$$

Rural Stratum

$$W_2 = N_2 \div N = 628 \div 7343 = 0.086$$

$$n_2 = W_2 \times n = 0.086 \times 365 = 31$$

Table 3.1: Population Distribution of Informal Settlements

Settlement	Population	Households	Percentage of population and sample	Number of respondents
Aris	175	88	1.1%	4
Dordabis	493	87	1.1%	4
Groot-Aub	1638	384	5.2%	19
Kappsfarm	293	69	0.82%	3
Havana	9278	2978	40.7%	148
Otjomuise	219	97	1.4%	5
Okuryangava	13 379	3640	49.7%	181
TOTAL POPULATION	25 475	7343	100%	364

3.4 TRAINING OF RESEARCH ASSISTANTS AND PILOT STUDY

The National Health Training Center made second-year students available during their two-week break to participate in the study as research assistants. Their selection was intended to provide an experiential learning opportunity for the students. The students had prior theoretical lessons on research methodologies. The researcher conducted training for the research assistants in preparation for the study a week before the actual fieldwork. The researcher built on students' existing knowledge and focused on the research design that was employed for the current study. The objective of the training was to provide necessary knowledge and skills in order to minimize mistakes. The research assistants were provided with the opportunity to practice in pairs and were given questionnaires to interview at least one household in Katutura. This was done in order to check the validity of the questionnaires, to ascertain whether the study tools employed would result in the expected responses, and to confirm that the questions were not ambiguous. Because research assistants could only participate in the data collection process during the two weeks scheduled for their practical training, no formal pilot study was conducted.

3.5 DATA COLLECTION

Data was collected through face-to-face interviews from May 8, 2006 to May 20, 2006, using a questionnaire. Structured closed- and open-ended questions were compiled (Polit et al, 2001, p. 154). A cluster sampling method was employed. All eligible subjects in specific clusters were interviewed and anthropometrical measurements were taken. All children in each household between the ages of one and five were included. Dates of birth were ascertained through birth certificates, Road-to-Health Cards, and parental recall.

The weight of the children was taken using an electronic UNICEF Secca scale. The children were weighed with little clothing (limited to a nappy and a vest). Weights were recorded to the nearest 100g.

The length of a child below the age of two was measured by having the child lie flat on his back on a UNICEF roller band, with his head touching the base. During measurement, it was ensured that the child would be looking straight ahead with his back straight and feet positioned flat against the cursor.

The height of a child more than two years old was measured standing with his feet flat on the base of a special L-shaped, metal height measure. Heels, buttocks and back were made to touch the backboard. The head was positioned so that the child was looking directly forward.

The data collection team was comprised of second-year student nurses from the National Health Training Center. The team conducted the interviews and took the anthropometrical measurements of all the children included in the study population.

DATA ANALYSIS

Data analysis entails categorizing, ordering, manipulating and summarizing the data and then describing them in meaningful terms (Brink, 2002, p. 178). In this study, data were analyzed using SPSS computer software, Microsoft Excel and EPI INFO 6 with the assistance of a statistician from the University of Namibia to obtain descriptive statistics. The calculations and analysis of the anthropometrical indicators were carried out using EPINUT. These data are presented in tables and graphs. Variables were all coded.

The anthropometrical calculations described in this report are based on the growth reference curves developed by the National Center for Health statistics and the CDC, using data from the Fels Research Institute and US Health Examination Surveys. The World Health Organization (WHO) recommends these growth curves for international use (MoHSS, 2003, p. 150). The use of this reference population is based on the findings that young children of all population groups have similar genetic potential for growth.

Three standard indices of physical growth that describe the nutritional status of children are presented.

- Height-for-age (stunting)
- Weight-for-height (wasting)
- Weight-for-age (underweight)

Each of these indices gives different information about growth and body composition that can be used to assess nutritional status (MoHSS, 2003, p. 151).

3.7 ETHICAL CONSIDERATIONS

3.7.1 Permission

First, permission was obtained from the University of Namibia's Post-graduate Studies Committee (Senate), where the research proposal was reviewed to ensure compliance with scientific research methodologies.

Secondly, community leaders were informed through the office of the Chief Executive Officer of the city of Windhoek. The purpose of the study was explained to community leaders and dates of the actual study were communicated to them so that they could inform the communities and thus avoid surprise and consequent anxiety which could otherwise be invoked by strangers seeking to examine their children.

Community leaders on the ground were also informed while the clusters were demarcated in the study area.

Thirdly, verbal consent was obtained from every interviewee (mother or caretaker) after the researcher had explained the purpose and procedures of the survey.

3.7.2 Right of Privacy and Participation

The right to privacy is an individual's right to decide when, where, to whom, and to what extent his or her attitudes, beliefs and behaviour will be revealed (Strydom et al 2004, p. 67). Mothers and caretakers who took part in the study did so voluntarily. Each studied participant was given a full explanation of the study and interviewed in private. Participation in the process was totally voluntary and without fear of

victimization. The participant had the right to withdraw from the study at any given point. The culture of the subject was respected at all times.

3.7.3 Anonymity

Anonymity means that no one, including the researcher, should be allowed to identify subjects afterwards (Strydom et al 2004, p. 63). Anonymity was adhered to throughout this study, as subjects were not identified either by name or residence. The results are also reported as averages and

percentages, and do not indicate any subject specifically.

3.7.4 Confidentiality

The interviewees remained anonymous, as each interviewee was assigned a unique number and personal information was kept confidential. No unauthorized person had access to the information. Privacy was maintained at all times.

3.7.5 Benefit

The benefits of the research were explained to the respondents. For example, it was explained to mothers how they could benefit from knowing the nutritional status of their children, which prompted them to provide honest information. They were also informed that the results would be shared with relevant authorities for consideration in planning purposes.

3.7.6 Reliability and Validity of Data

3.7.6.1 *Validity*

Validity refers to the extent to which a research design is scientifically sound or appropriately conducted. Validity has two subcategories: external and internal validity. External validity refers to the extent to which you can generalize the results of a study, while internal validity addresses the issue of confounding variables (Struwig & Stead, 2004, p. 136). A quasi-pilot study was used to determine the extent to which the study tool, the structured

questionnaire, would measure the intended variables and rule out ambiguity.

3.7.6.2 Reliability

According to Struwig and Stead (2004, p. 130), reliability is the extent to which test scores are accurate, consistent and stable. The researcher ensured reliability by selecting and training research assistants with prior knowledge in research and also by explaining the questions in simple words to these research assistants. These research assistants were trained health workers who were already familiar with the weighing and measuring techniques. Their knowledge was refreshed on the techniques to ensure reliability of the data. The weighing scales were checked for accuracy against established standards (such as packages of food) and faulty scales were replaced daily. The subjects were weighed wearing minimal clothing and barefoot. Questionnaires were compiled using simple language and explanations of questions were given to respondents.

3.8 SUMMARY

The preceding chapter presented an in-depth discussion of the research methodology. The aim was to outline how the researcher approached the methodology of data collection, sampling, and selection of the study population. Explanations were also given as to how validity and reliability were ensured and ethics observed.

CHAPTER 4

DATA ANALYSIS AND DISCUSSION OF RESEARCH FINDINGS

4.1 INTRODUCTION

This chapter will focus on the analysis, interpretation and main findings of the data acquired from the structured interviews and the anthropometrical measurements. The calculated sample size was 365, but the actual sample was 350 subjects. The calculations are based on the actual sample.

4.2. ANALYSIS AND DISCUSSION OF FINDINGS

4.2.1 General Information

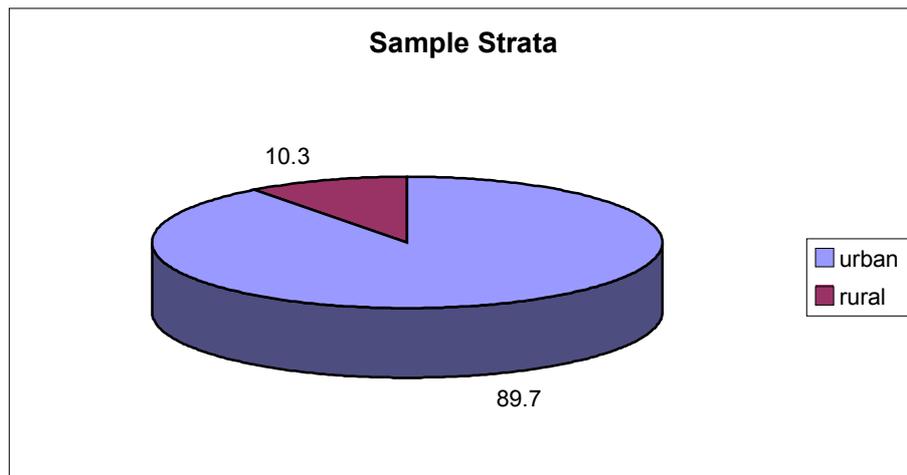


Figure 4.1: Sample Strata

The majority of the respondents (314 or 89.7%) were urban-based, while only 36 (10.3%) were rural-based. The proportion of urban population in the Khomas region was reported by the Population and Housing Census (NPC, 2003, p. 10) to be 93.0% while rural was only 7.0%. The second highest urban-

based population in Namibia is in the Erongo region (80.0%).

Of the respondents, 225 (64.3%) were parents of a child in the study. Of these parents, only 25 (11.0%) were fathers.

Of the respondents, 158 (45.0%) had an educational level of junior secondary (grade 8–10) while 119 (34.0%) completed lower primary (grade 1–7). Only 28 (8.0%) of the respondents had never attended school, 29 (8.2%) had completed senior secondary level (grade 11–12) and 16 (4.6%) did not respond. Data compares well with the 2001 Population and Housing Survey that reported 8.0% of the persons age six

and above never attended school (NPC 2003:25). An overwhelming majority of the respondents, (337 or 96.3%) had not reached the tertiary educational level while only one respondent (0.3%) had obtained a secretarial diploma, post grade 12. Educational status, especially of women, plays a key role in household food security and in caring for children on a day-to-day basis. The educational level of mothers as primary caregivers can be correlated to their income and higher purchasing power promotes

household food security. Education also serves to broaden their understanding of the importance of nutrition and influences household budgeting in a constructive manner.

More than two thirds of the respondents (248 or 70.8%), spoke “Oshiwambo” as their main language. The second most commonly spoken first language was Damara>Nama, with 62 respondents (or 17.7%), and the remaining 40 respondents (11.4%) were comprised of Otjiherero, Afrikaans, Rukwangali and Setswana speakers. Similarly, the 2001 Population and Housing Census reported that “Oshiwambo” is the language spoken by the majority of people in Namibia (37.0%), followed by Afrikaans (24.0%), and Damara>Nama (13.0%) (NPC, 2003, p. 39).

4.2.2 Demographic information

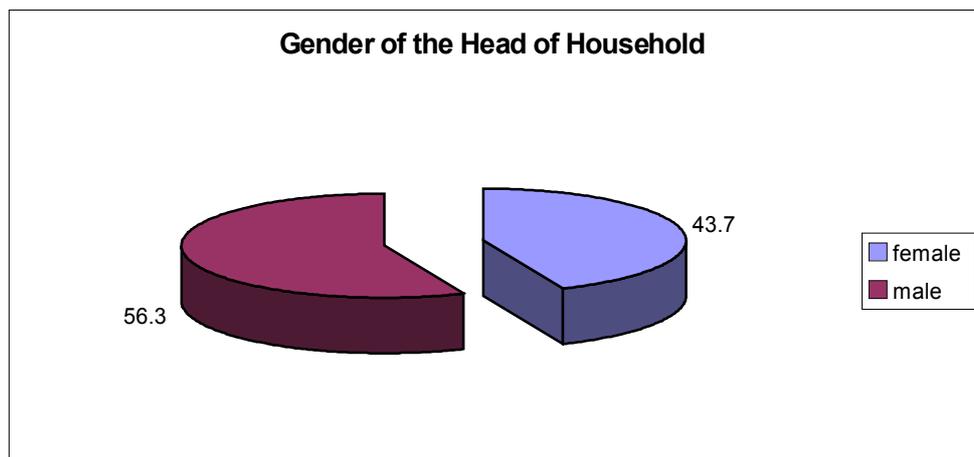


Figure 4.2: Gender of the Head of Household

Just over half of the households studied (197 or 56.3%), were headed by males, while 153 households (43.7%) were headed by females. Similarly, the Population and

Housing Census reports that 64.0% of all households in the Khomas region are male-headed (NPC, 2003, p. 10).

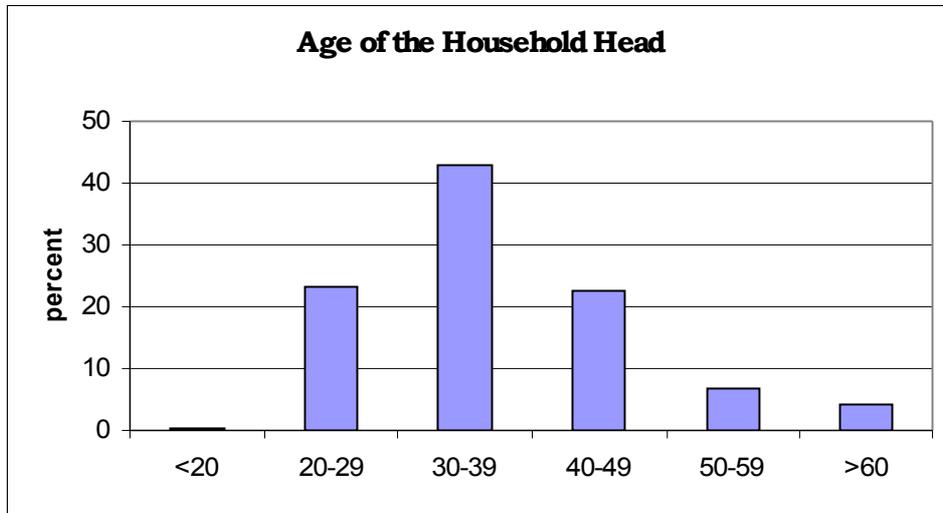
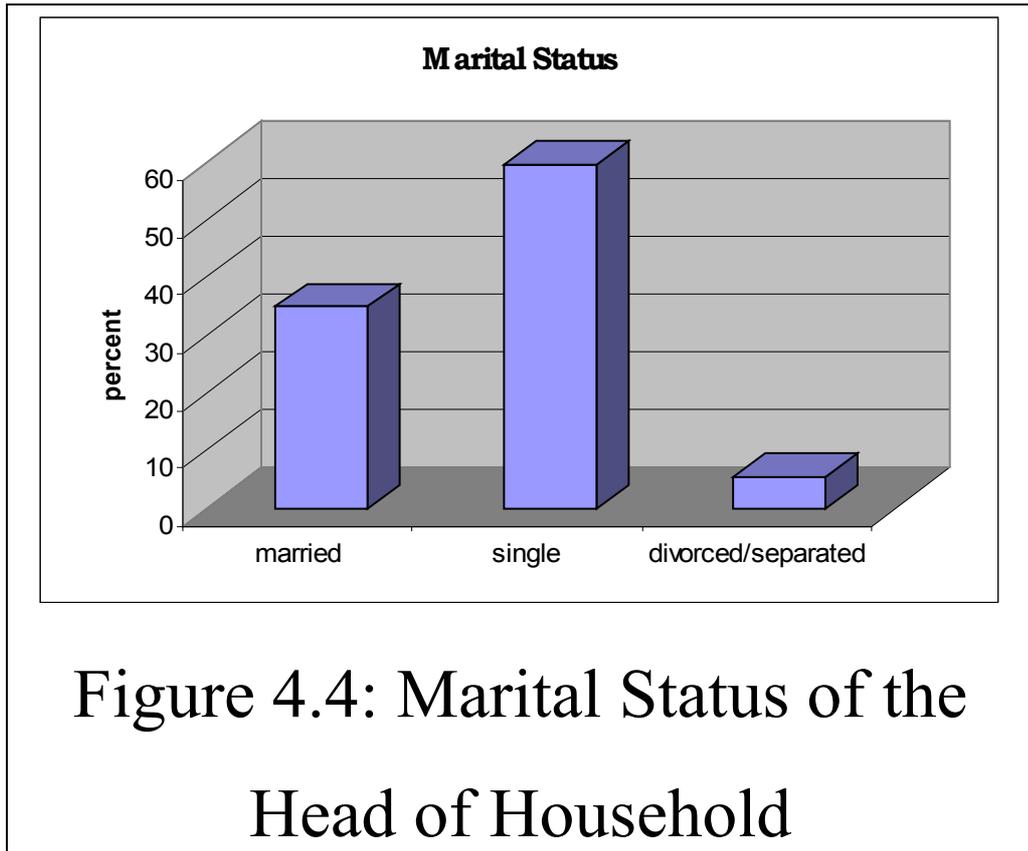


Figure 4.3: Age of the Head of Household

A majority of the heads of households (311 or 88.9%), were in the productive age group between 20 and 49 years, while only 38 (10.8%) were above the age of 50 and one (0.3%) was less than 20 years of age. In all cases adults headed the houses. Child-headed households were not identified in the study population.



Close to one third of the heads of households (122 or 34.9%), were married, whereas the majority (209 or 59.7%), were single. The rest, 19 (5.4%), were either separated or widowed. The 2001 Population and Housing Census also reported that 61.0% of the population 15 years or older was never married (NPC, 2003, p. 10).



Almost half of the respondents (179 or 51.1%) reported to have lived more than five years at their current residence while a quarter (25.1%) reported to have lived at their current residence for a period between three and five years.

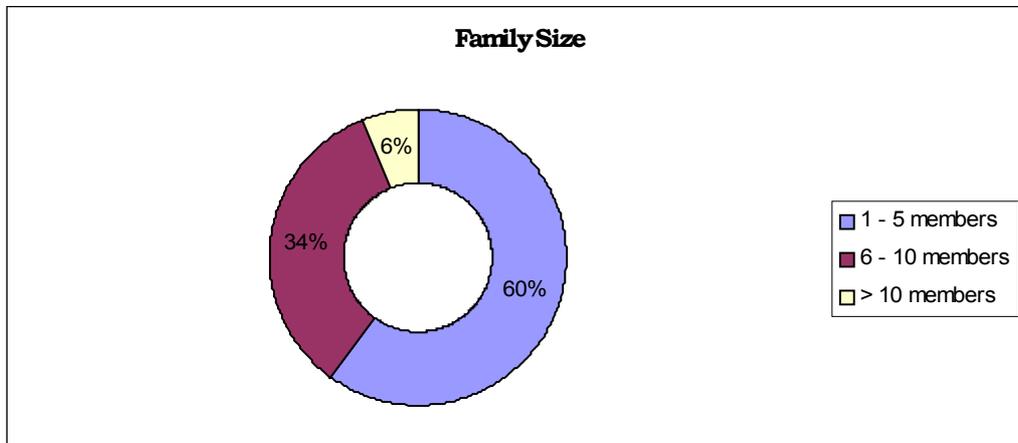
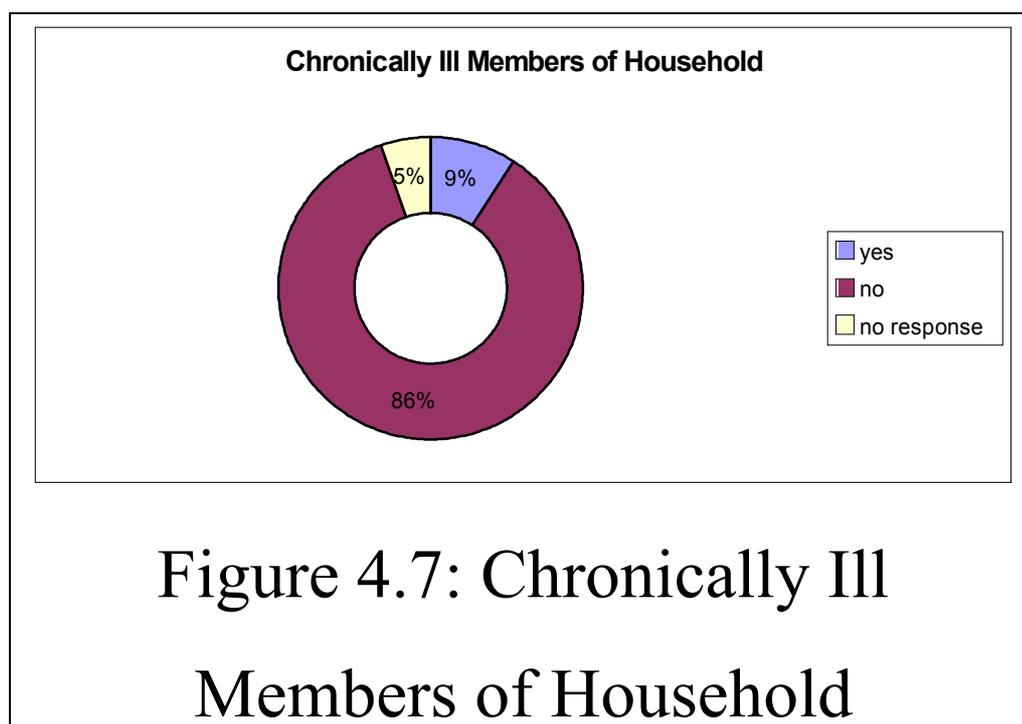


Figure 4.6: Family Size

The majority of the households (210 or 60.0%) had between one and five members and a third had between six and ten members. Only 21 households (6.0%) had more than ten members. The Population and Housing Census (NPC, 2003, p. 10) reported the average family size as 4.2 for the Khomas region, which is comparable with the study findings.

4.2.3 Household Morbidity and Elderly



Thirty-five (10.0%) of the respondents reported to having at least one chronically ill family member.

Only 44 (12.6%) of the respondents reported that they had elderly persons that were unable to work for an income, while 306 (87.4%) did not report elderly people as family members.

4.2.4 Household Mortality

Less than one tenth of families surveyed (26 or 7.4%), reported deaths in the past year. From the respondents that reported a death in the family, 18 (69.2%) reported that the death was due to long-term illness and only eight (30.8%) reported a case of sudden death. Of the deceased, 19 (73.1%) were male while seven (26.9%) were reported to be female. Evaluation of the ages of the deceased indicated that 14 (53.8%) died during their reproductive period, age 21 to 50 years. Death rates for age groups were: under five years, 2 (7.7%); 5-10 years, 2 (7.7%); 21-30 years, 5 (19.2%); 31-40 years, 6 (23.1%); 41-50 years, 3 (11.5%); and 50+ years, 8 (30.8%). Namibia ranks in the top ten countries most affected by the HIV/AIDS pandemic. It can also be assumed that a major cause of death in long-term illnesses is HIV/AIDS related.

4.2.5 Food Consumption

Table 4.1. Consumption of Carbohydrates

Food item	Once a day - more than twice a day (Percentage of 350)	Never - once a month (Percentage of 350)
Maize (stiff)	45.1%	17.5%
Maize (soft)	35.1%	18.0%
Mahangu	37.5%	34.6%
Oshikundu	36.0%	32.9%
Bread	48.9%	10.9%
Rice	28.5%	26.8%
Pasta	23.4%	32.2%
Breakfast cereal	10.0%	60.0%

Table 4.1 reveals that bread was eaten most frequently. That is, bread is eaten between once a day and more than twice a day by the majority (48.9%) of the subjects. Maize (stiff) ranked second with 45.1% of the subjects reporting that they consume Maize (stiff) between once and more than twice a day. Breakfast cereal ranked last with 10.0%. Cumulatively, maize (prepared either soft or stiff), mahangu, oshikundu, and bread comprised the staple for the sample population.

Table 4.2: Consumption of Protein

Food item	Once a day - more than twice a day (Percentage of 350)	Never - once a month (Percentage of 350)
Meat	38.9%	21.7%
Chicken	24.5%	33.7%
Fish	31.2%	26.3%
Beans	15.7%	54.0%
Peas	8.0%	66.0%
Nuts	5.2%	67.5%
Seeds	3.5%	72.3%
Soybeans	5.1%	69.7%
Milk	26.6%	32.8%
Eggs	17.7%	38.6%
Mopani worms	16.0%	50.0%
Other insects eaten	3.1%	39.1%

According to table 4.2, meat (38.9%), fish (31.2%), milk (26.6) and chicken (24.5%) were consumed from once to more than twice a day and served as the main

sources of protein for the sample population. Edible seeds and legumes were not mentioned frequently even though they are less costly than animal products. Less than half of the respondents consumed listed foods as a source of protein on a daily basis. Animals were mentioned frequently as a source of protein despite the price of meat being higher than that of legumes.

Table 4.3: Consumption of Fruits and Vegetables

Food item	Once a day – more than twice a day (Percentage of 350)	Never – once a month (Percentage of 350)
Pawpaw	4.3%	68.3%
Eembe	9.4%	60.2%
Oranges	21.1%	34.9%
Apples	22.8%	31.1%
Other fruits and berries	12.0%	28.3%
Pumpkin	13.7%	56.0%
Carrots	17.5%	52.0%
Spinach	19.5%	44.8%
Potatoes	28.9%	28.3%
Sweet potatoes	15.4%	56.3%
Other vegetables	13.1%	31.7%

Table 4.3 shows that 28.9% respondents consume potatoes at least once a day. Other types of vegetables were consumed less frequently. About a fifth (21.1% –

22.8%) reported consuming oranges and apples at least once a day.

Fruits and vegetables were lacking in the diet of the respondents, as less than a third (33.0%) mentioned consuming a fruit or vegetable on a regular basis. Based on this finding, the researcher assumes that the respondents could be deficient in important micronutrients (vitamins and mineral salts).

Table 4.4: Consumption of Fats and Sugars

Food item	One a day – more than twice a day (Percentage of 350)	Never – once a month (Percentage of 350)
Butter	30%	36.9%
Margarine	33.4%	37.1%
Cooking oil	54.2%	14.6%
Lard	12.3%	59.7%
Cream	8.9%	67.1%
Sugar	58.0%	12.6%
Honey	8.0%	72.6%
Jam	20.8%	54.3%
Syrup	4.3%	71.4%

Cumulatively, cooking oil (54.2%), margarine (33.4%), and butter (30.0%) were the most frequently mentioned fats and oils that are used on a daily basis. Sugar was mentioned by 58.0% of the respondents for daily use.

The four preceding tables suggest that the diet of the respondents mainly consists of cereals (carbohydrates), with few variations. This monotonous diet may not meet nutritional requirements.

4.2.6 Food Avoidances and Taboos

Most food avoidances reported by the respondents were based on issues concerning pregnancy or illness. Avoidance of alcohol during illness, based on the belief that it would interfere with an associated treatment, was mentioned frequently. Milk was believed to cause diarrhoea during illness.

Any food product with a linear shape, such as intestines and dried meat (in the form of biltong), was believed to cause foetal strangulation by the umbilical cord and was therefore avoided by pregnant women. Eating mopani worms was thought to cause salivating in babies. Eggs were believed to cause baldness. Some women believe that game meat should also be avoided during pregnancy, as the child would inherit the characteristics of the specific animal (i.e. a kudu jumps too much). Prolonged labour

and complications in childbirth were believed to be associated with eating tortoise meat during pregnancy. Oranges and chilli peppers were linked to jaundice if eaten during pregnancy. As most of the avoided foods mentioned are good sources of protein which would be beneficial for foetal development, such avoidances might result in monotonous diets which fail to meet the nutritional needs of a pregnant woman. Findings of a study done in South Africa by the World Health Organization (WHO, 2002, p. 23) suggested that chronic malnutrition was related to inadequate resources, monotonous, poor-quality diets, and poor appetites.

During the weaning period, sweets and sweet foods were believed to reduce appetite, pulses were believed to cause stomach distension and a bloated feeling, and wild spinach was believed to cause diarrhoea and should consequently be avoided during weaning.

4.2.7 Food Distribution, Storage and Preservation in Households

The majority of the respondents reported that females distribute food at mealtime - a mother, wife, grandmother or daughter, who is present. Occasionally a father, husband or boyfriend was mentioned. Slightly over half of the household heads (184 or 52.6%) stated that the family ate from the same plate or dish while the remaining respondents (166 or 47.4%) ate from their own plates.

A sizeable number of respondents (157 or 44.9%) reported that they experience an occasional reduction in the frequency of meals consumed. Reasons cited for the reduction were the lack of money, food or water. A reduction in the amount of food consumed each meal was reported by 166 (47.4%) respondents, and again the reasons given by 162 (46.3%) respondents were a lack of money, food or water.

Most of the respondents reported that they store uncooked food in cool dry places, such as cupboards, baskets or refrigerators, and a few mentioned that they dry meat. Cooked food was reported to be stored covered and in cool places, such as under the bed or refrigerator. Some reported cooking only enough food for a single mealtime with no leftovers kept. Some respondents even reported that left-over food was given to children or thrown away.

4.2.8 Breastfeeding and Weaning

An overwhelming number (311 or 88.9%) of the respondents reported that they breastfed their children. Only 39 (11.1%) reported that they did not breastfeed of

which 25 (7.1%) were males. Almost all Namibian children (95.0%) are breastfed for some period of time, regardless of the background characteristics of the mother or child (MoHSS, 2003, p. 143).

More than three quarters of the respondents (273 or 78.0%) reported that they did not introduce any other fluids within 72 hours after birth, while 70 (20.0%) reported introducing other fluids. The remaining seven respondents (2.0%) did not remember whether other fluids were introduced.

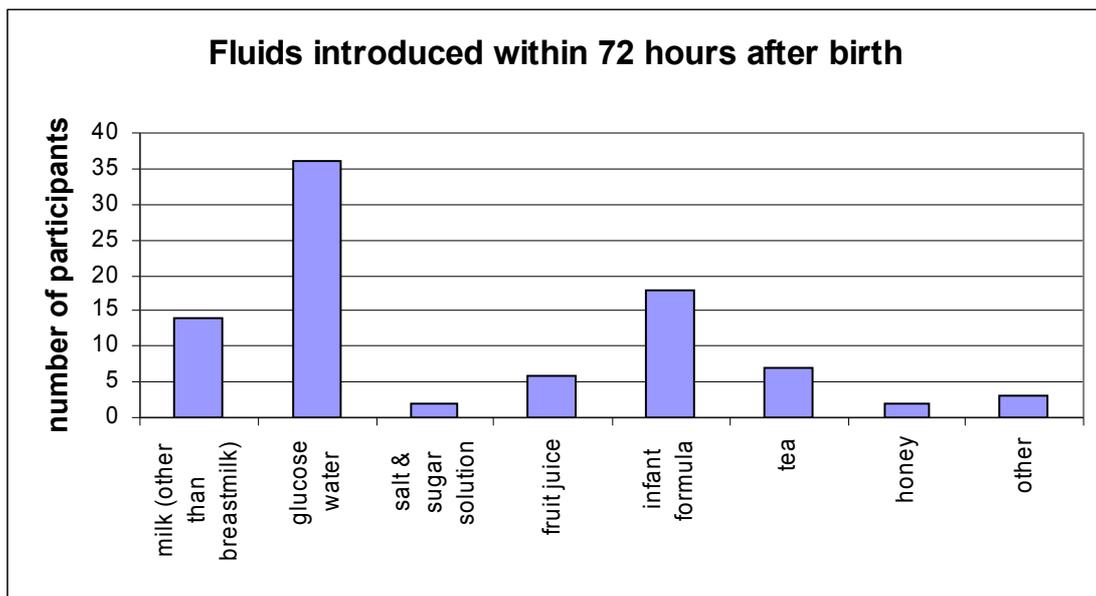


Figure 4.8: Fluids introduced within 72 hours after birth

Sugar water was most frequently mentioned by those who introduced fluids within the first 72 hours after delivery. Infant formula ranked second, and milk (other than breastmilk) was third.

About one third (108 or 30.9%) of the respondents reported that they were breastfeeding at the time of the interview, while the remaining 242 (69.1%) reported that they were not breastfeeding at the time.

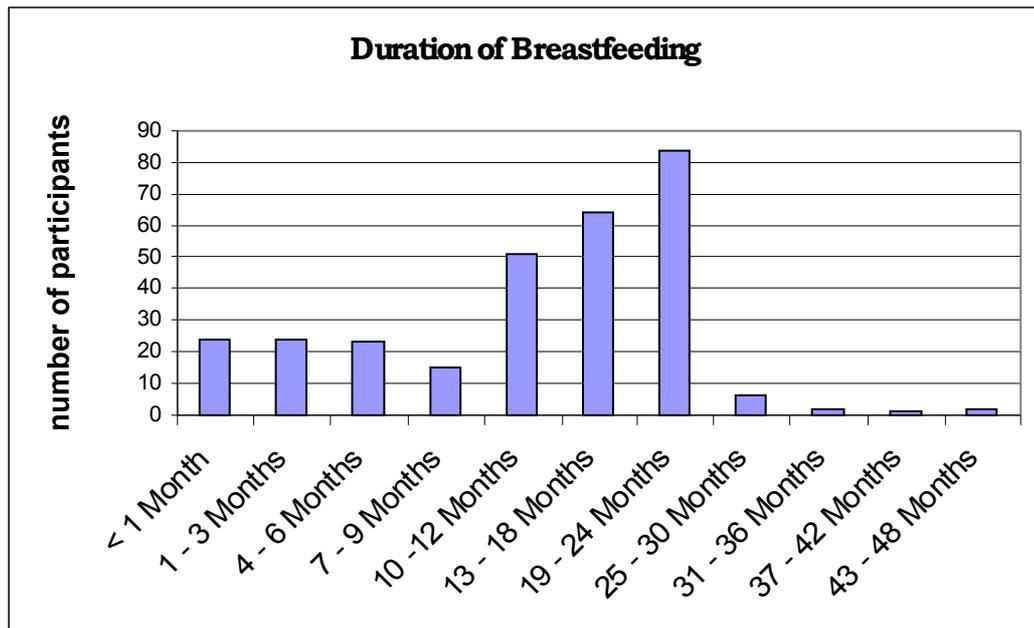


Figure 4.9: Duration of Breastfeeding

Fig 4.9 reveals that the majority of children were breastfed for about 24 months. Very few children were breastfed after 24 months of age.

The median duration for breastfeeding is 20 months for rural areas and 13 months for urban

areas (MoHSS, 2003, p. 146). This finding indicates that women in the informal settlements tend to breastfeed longer than the median for urban areas.

Table 4.5: Fluids Taken by the Child in the Last 24 Hours (n = 350)

Type of drink	Daytime		Night Time		Day and Night	
	Count	Percentage	Count	Percentage	Count	Percentage
Breastmilk	52	14.9%	7	2%	43	12.3%
Plain water	121	34.6%	13	3.7%	99	28.3%
Commercially produced infant formula	19	5.4%	7	2.0%	14	4.0%
Any other milk	27	7.7%	7	2.0%	14	4.0%
Fruit juice	34	9.7%	3	0.9%	18	5.1%
Any other liquid	88	25.1%	9	2.6%	38	10.9%

Cumulatively, 121 (34.6%) of the respondents reported to have given plain water to their children sometime during the previous 24 hours. Although water is important for maintaining health, it has no nutritional value. Water displaces nutritious substances, especially in the case of growing children, who require a substantial nutritional intake.

Table 4.6: Solid Foods Taken by the Child in the Last 24 Hours (n = 350)

Type of Food	Daytime		Night Time		Day and Night	
Millet	35	10.0%	9	2.6%	14	4.0%
Sorghum	22	6.3%	10	2.9%	20	5.7%
Maize porridge	125	35.7%	23	6.6%	121	34.6%
Rice	37	10.6%	16	4.5%	30	8.6%
Wheat	30	8.6%	11	3.1%	46	13.1%
Other local grains	26	7.4%	9	2.6%	17	4.9%

Of the respondents, 125 (35.7%) mentioned they gave maize porridge as a solid food to their child sometime during the previous 24 hours.

Just over half (182 or 52.0%) of the respondents reported that their children consumed three meals a day, while 107 (30.6%) reported only two meals a day. Only 10 (2.9%)

respondents stated that their children had five meals a day, while 15 (4.2%) reported only one meal a day. This information is in agreement with that reported in the Namibian Demographic Health Survey, that the majority of Namibian children 10 months of age or older were given solid foods two or three times a day (MoHSS, 2003, p. 157). In general, children were given protein-source foods only when available, and the source most mentioned was eggs.

4.2.9 Household Food security

The majority of the respondents (293 or 83.7%) reported to have staple food (maize meal) in their house at the time of the interview while 57 (16.3%) reported not to have any staple food remaining.

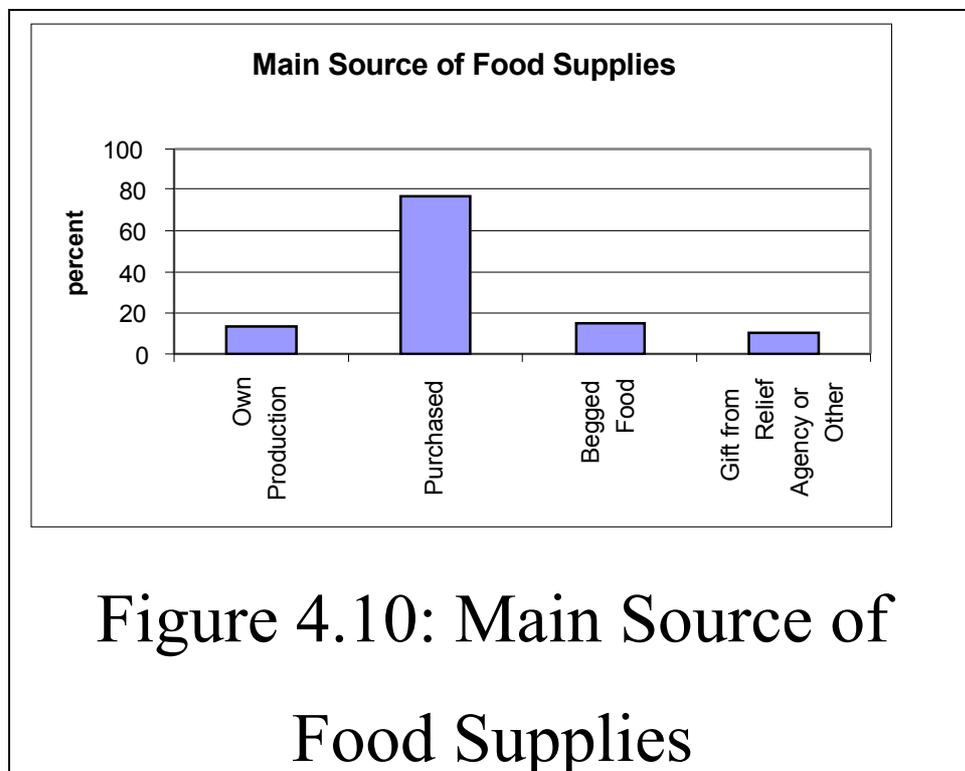


Fig. 4.10 reveals that the majority of the respondents purchased food. Only 46 (13.1%) depended on their

own production as the main source of food. The statistical analysis did not reveal an association between the main source of food supply and nutritional indicators, be they underweight, wasting or stunting. However, an association was reported between the phenomenon of begging for food and stunting $p < 0.05 = 0.0183$. From this finding it can be concluded that households who find it necessary to beg for food are more likely to have children who are stunted.

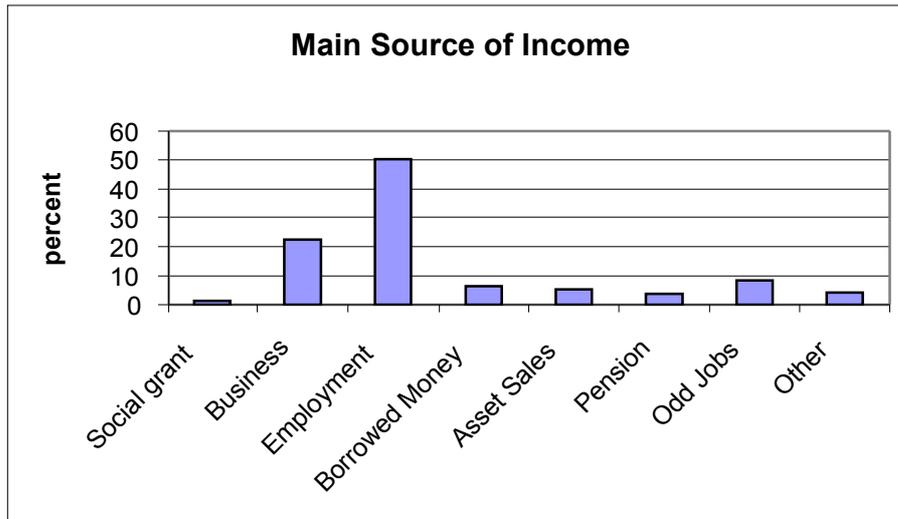


Figure 4.11: Main Source of Income

Employment for wages or salary is the main source of income for purchasing food items, as 175 (50.0%) respondents reported as such. The 2001 Population and Housing Census data reported that the main source of income, 75.0%, was wages and salaries (NPC 2003, p. 51). This support the current findings that respondents in urban settings primarily dependent on employment to purchase food items.

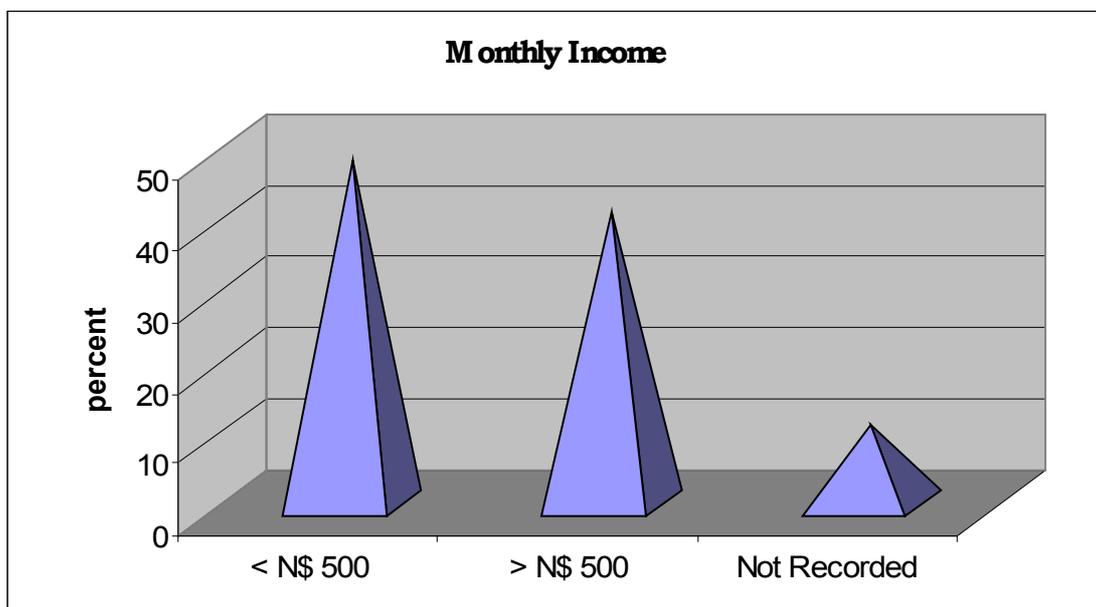


Figure 4.12: Monthly Income

Slightly less than half of the respondents (168 or 48.0%), reported a monthly income below N\$500.00 while 144 (41.1%) reported earning more than N\$500.00. The remaining 38 respondents (10.9%) did not report their earnings. The overwhelming majority, 276 or 78.9%, spent less than N\$500.00 per month on food while only 74 (21.1%) spent between N\$501 and N\$1500.

Only 73 respondents (20.9%) reported that they eat away from home while the majority (277 or 79.1%) reported eating at home.

**Table 4.7: Household Wealth/
Ownership of Livestock**

Livestock	Yes	No
Goats	11.3%	88.7%
Chicken	12.3%	87.7%
Other poultry	3.6%	96.4%
Pigs	2.9%	97.1%
Cattle	7.0%	93.0%
Other	7.3%	92.7%

Possession of livestock would indicate an additional source of income and food which could contribute greatly to household food security, a determinant of the nutritional status of household members.

The majority of the respondents reported they were not involved in any form of agricultural production.

4.2.10 Water and Sanitation

An overwhelming majority of the respondents (331 or 94.6%) reported that their main source of water was a tap. This finding compares favorably with the 2001 population and housing census data that reported that 98.0% of households in Khomas region had access to safe drinking water. Lack of access to water and a lack of sanitary facilities create an environment conducive to infectious diseases. Such conditions could be linked to the 2006 outbreak of polio in Namibia (NPC 2003, p. 49). From

the remaining respondents, only eight (2.3%) sourced water from a river or stream, six (1.7%) from unprotected wells and five (1.4%) from either a tanker or a borehole.

The distance to a water source, in terms of the time needed to reach it, was reported by the majority of subjects (325 or 92.9%) to be within 15 minutes, while 20 (5.7%) could reach their water source in 15 to 30 minutes. Only five subjects (1.4%) reported they required more than 30 minutes to reach their water source.

Table 4.8: Sanitary Facilities

Facility selected	Frequency out of 350	Percentage
Bush	148	42.3%
Uncovered latrine	16	4.6%
Covered latrine	26	7.4%
Flush toilet	160	45.7%

More than one third (42.3%) of the respondents reported that they make use of the nearby bush for sanitary facilities. Less than half of the respondents (45.7%) reported using flush toilets. The remaining 12.0% of respondents used both covered and uncovered latrines. Once again, this data concurs with census data which reported that 42.0% of households in the Khomas

**region were without toilet facilities
(NPC 2003, p. 51).**

**The majority of the respondents
(89.1%) could reach their sanitary
facilities within 15 minutes, 8.6%
required between 15 and 30
minutes, while only 2.3% used
sanitary facilities which were more
than 30 minutes away.**

4.2.11 Nutritional Status and Anthropometrical Measurements

More than three quarters of the respondents (280 or 80.0%) reported that their children had birth certificates, while only 70 (20.0%) reported that they did not. Slightly over half of the children covered by the survey (50.8%) were male; 49.2% were female.

**Oedema was observed in only 6.1%
of the children in the study. The**

**majority (93.9%) did not have any
oedema.**

Nutritional status is a major determinant of children’s susceptibility to disease. Anthropometry can be used to assess nutritional status at both the individual and community levels. Two preferred anthropometric indices for determining nutritional status are weight-for-height (WH) and height-for-age, as these discriminate between different physiological processes (Sullivan & Gorstein, (n.d.) p.3).

*Table 4.9: Relative Prevalence of
Low Anthropometric Values*

Index	Low	Medium	High	Very High
Low WH	<5.0%	5.0 – 9.9%	10.0 – 14.9%	≥15.0%
Low HA	<20.0%	20.0 – 29.9%	30.0 – 39.9%	≥40.0%
Low WA	<10.0%	10.0 19.9%	20.0 – 29.9%	≥30.0%

Source: (Sullivan and Gorstein, (n.d.) p.3)

Wasting

A low WH ratio is considered an indicator of wasting and is generally associated with a failure to gain weight or with a loss of weight (Sullivan & Gorstein, (n.d.) p.3). According to the table above, the prevalence rate (19.7%) for wasting in the informal settlements was found to be greater than 15.0% and is therefore classified as having a very high prevalence. Also, when compared to the Namibia Demographic Health Survey (NDHS) findings (9.0%), it is very high (MoHSS, 2003, p. 146).

Underweight

Weight-for-age (WA) is a composite index of weight-for-height and height-for-age and as such does not distinguish between acute malnutrition (wasting) and chronic malnutrition (stunting). A child may be underweight for his age because he is stunted, wasted or both. However, the weight-for-age index is a useful tool in clinical settings for continuous assessment of nutritional progress and growth (MoHSS, 2003, p. 151). This study found that 35.7% of children in informal settings were underweight. This finding is rated as very high (ie. above 30.0%) in the reference table. The NDHS revealed that 24.0% (a high rating) of children under five years of age are underweight.

Stunting

A low Height-for-Age index (HA) is considered an indicator of stunting which is associated with poor overall economic conditions and/or repeated exposure to adverse conditions (Sullivan & Gorstein, (n.d.) p.3). The stunting rate of children under five years of age residing in the informal settlements of Windhoek was found to be 28.8%, which is lower than the Khomas region stunting rate of 47.0%.

In this study, stunting was rated medium prevalence (28.8%), wasting was rated high (19.7%), and underweight very high (35.7%).

According to the statistical analysis, no association was discovered to exist between the nutritional status of the mother/caretaker and the child's nutritional status.

The number of children orphaned by their mother was only 3.3% percent. The mothers of the remaining 96.7% of children covered were still alive. Similarly, children orphaned by their fathers were only 5.7% of the sample. The fathers of the remaining 94.3% were still alive.

*Table 4.10 Nutritional Status by
Location*

Location	Wasting rate	Stunting rate	Underweight rate
Okuryangava	52.2%	55.8%	51.6%
Havana	34.8%	26.2%	33.0%
Otjomuise	4.3%	0.0%	6.6%
Windhoek rural	8.7%	18.0%	8.8%

From table 4.10, Okuryangava is shown to have the highest figure for each of the three indicators. There is an acute shortage of nutritious food in urban locations. This shortage can possibly be attributed to the unemployment rate and low income levels reported by households. On the other hand, Otjomuise seems to have relatively low indicators of malnutrition.

4.2.12 Childhood Morbidity during the Previous Two Weeks

Table 4.11: Childhood Morbidity during the Previous Two Weeks

Condition selected	Frequency out of 350	Percentage
Diarrhoea	84	24.0%
Fever/ Difficult breathing	49	14.0%
Fever/Chills	57	16.3%

Childhood morbidity was only reported by 190 (54.3%) respondents. Diarrhoea was the most frequently (24.0%) mentioned category of morbidity, followed by fever and chills (16.3%).

It was reported verbally that the majority of children 326 (93.1%) were up-to-date for immunization for their respective ages, only 24 (6.9%) did not report. Slightly more than three quarter 276 (78.9%) presented their health passports for verification of the immunization status.

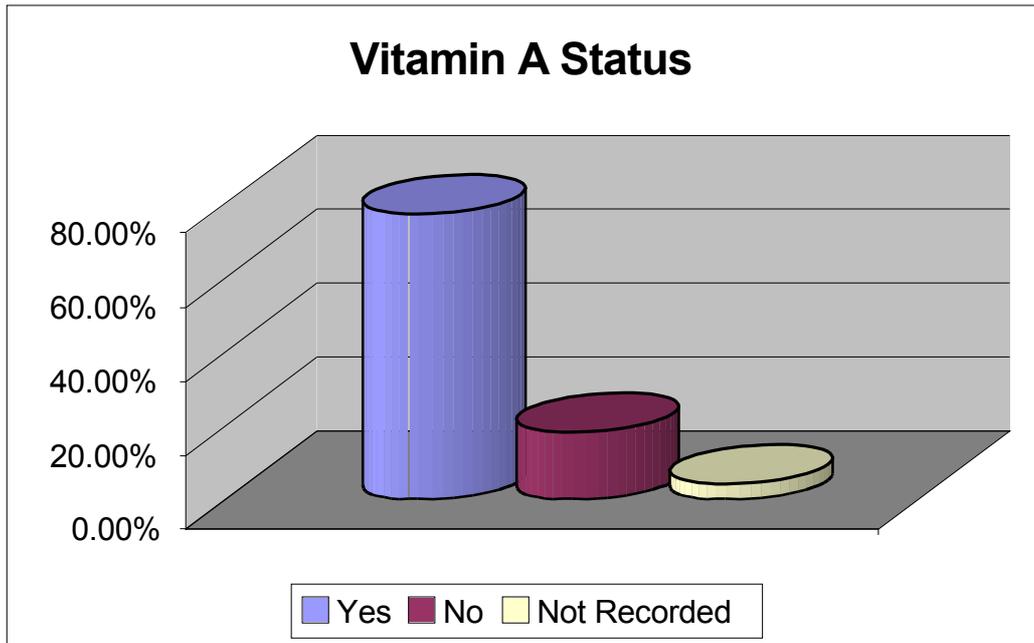


Figure 4.13: Vitamin A Status

The majority of the respondents (271 or 77.4%) reported that the children received Vitamin A supplements at six months while 64 (18.3%) reported that the children did not receive them. The remaining 15 (4.3%) were not recorded. The statistical analysis did find no association between Vitamin A status and stunting or wasting.

Of the respondents, 56 (16.0%) reported that their children experienced some difficulty seeing at night while 294 (84.0%) reported that they did not experience this problem. A study done by the Ministry of Health reported that for

12 out of 19 villages examined, vitamin A deficiency was observed as being a problem (MoHSS, 1993, p. 21).

Table 4.12: Health-Seeking Behaviour

Action selected	Frequency out of 350	Percentage
No treatment sought outside home	65	18.6%
Health Centre/clinic	218	62.3%
Self medication without consultation	17	4.9%
Traditional healer	15	4.3%
Private physician	7	2.0%
Outreach clinic	5	1.4%
Other	4	1.1%

Close to two thirds of the respondents (62.3%) visited the clinic when their child had been sick recently while a sizeable number

**(18.6%) did not seek treatment
outside the home.**

The distance to the nearest health facility (in walking time) ranged from 15 minutes to more than two hours. Rural communities experienced difficulties accessing transportation, and a distance of 30 kilometres could easily require two to three hours in transit, depending on the availability of transportation.

The distance to a health facility definitely influences the utilization of health services: the shorter the distance to a health centre, the more likely it will be used.

4.3 SUMMARY

The researcher was able to reach only 95.9% (350) of the households indicated for the study. Statistical analysis was done using the SPSS and EPI INFO 6 and with assistance from a statistician and a nutritionist. The majority of the respondents were in the age group of 20 to 59 years of age. Over half the households were male-headed; close to two thirds were headed by single parents. Both urban and rural informal settlements were included in the study and all subsections represented.

The majority of households had between one and five family members with only few elderly and sick people. Death in the family was not experienced frequently by respondents, with only 26 households (7.4%) reporting a death occurring within the past year. About two thirds of the family deaths were due to long illness. With consideration of the age group covered in the study (21 to 50 years) and the prevalence of HIV/AIDS in Namibia, there could be an association between HIV/AIDS and these deaths, but this eventuality was not explored.

In the informal settlements the main food consumed by the majority of respondents was maize; this majority maintained diets which may be classified as monotonous since only few consumed a combination of fruits, vegetables and meat. Sources of protein were influenced by cultural beliefs and some available sources were avoided during pregnancy, weaning or illness. For the most part, women were responsible for distributing food to family members.

Just below half of the respondents reported occasional reduction in meal frequency due to lack of resources such as money, food and/or water. Locally available resources were used to preserve and store both cooked and uncooked food supplies.

The overwhelming majority of children were breastfed initially and these feedings were provided on demand. Fluids such as sugar water were introduced quite early in a child's life (within 72 hours after birth).

While the majority of households had access to food supplies through purchasing, more than half earned less than N\$500.00 per month. These earnings were derived mainly from employment and businesses. The majority of the respondents were neither involved in agricultural production nor kept livestock.

The study revealed that the majority of respondents had a safe source of water that was within 15 minute's walk of their household. Only 5.4% did not have access to safe drinking water. On the other hand, accessible sanitary facilities were inadequate, with 42.3% of the respondents reporting that they used nearby bush. This situation presents a risk to public health because it could lead to an outbreak of disease, as was indicated in the 2006 polio outbreak, which mainly affected the informal settlements areas of Windhoek.

The malnutrition rates revealed by this study are: stunting rated medium prevalence with 28.8%, wasting rated high (19.7%) and underweight very high (35.7%).

The majority of the variables did not show an association with nutritional status. However, a link between begging for food and stunting was indicated.

Only a small percentage of children included in the study population were orphaned either by their mother and/or father. A sizeable number of respondents reported to have visited a health facility recently when their child was sick. The most frequently mentioned illness was diarrhoea. Immunization and Vitamin A coverage was reported to be more than 75.0%.

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

In this chapter, findings, conclusions and recommendations based on the findings of the study and its limitations will be presented. A study of this nature is important because good nutrition, which is indicated by nutritional status, is essential if an individual is to achieve his or her full potential both physically and economically.

Research Questions

- What are the main causes of malnutrition in the informal settlements of Windhoek?
- What is the correlation between the nutritional status of children under the age of five years and factors that may contribute to malnutrition in the informal settlements of Windhoek?

5.2 CONCLUSION AND RECOMMENDATIONS ABOUT THE OBJECTIVES

The findings of the study are concluded and recommendations made in relation to the study as follows:

Aim

The aim of the study is to explore and describe the prevalence and causes of malnutrition among children under five years of age in the informal settlements of Windhoek in order to provide information for stakeholders to assist them design a comprehensive project that will address the problem.

Objective 1

To determine the prevalence and causes of malnutrition in selected communities in Windhoek.

Conclusion (Objective 1)

The study results indicate that the prevalence of malnutrition ranges from medium to very high in the informal settlements. The stunting rate was 28.8%, the wasting rate was 19.7%, while the underweight rate was 35.7%. The nutritional indicators were explained in detail in the study. The majority of respondents earn a salary of less than N\$500.00 per month, and consequently could not afford food that is adequate in both quantity and quality. Diets were found to be monotonous. Very few respondents reached school grade 12, a factor which would limit employment opportunities on the level of working class, for which wages are also low.

Types of food avoided during pregnancy and weaning were predominantly sources of protein, a crucial nutrient for the normal growth of a baby or foetus. This could contribute to malnutrition in utero.

Objective 2

To correlate nutritional status (well nourished, malnourished children) and the contributing factors for children under the age of five years (weaning, knowledge).

Correlation is a statistical measure referring to the relationship between two or more variables. A correlation between two variables suggests some causal relationship between them (www.nzforex.co.nz).

Conclusion (Objective 2)

The study indicated that there was **no association** between:

- underweight, stunting, wasting and oedema.
- underweight, stunting, wasting and vaccination status
- underweight, stunting, wasting and mother/caretaker's body mass index
- underweight, stunting, wasting and difficult breathing or fever
- underweight, stunting, wasting and fever or chills
- underweight, stunting, wasting and the presence of staple food

There is an association between diarrhoea and underweight, $p < 0.05 = 0.0063$. Therefore, babies who are ill with diarrhoea are more likely to be underweight.

There is an association between begging for food and the stunting rate, $p < 0.05 = 0.0183$. It was concluded that households which begged for food are more likely to have children that are stunted.

Objective 3

To describe factors associated with malnutrition in children between one and five years of age in the informal settlements of Windhoek.

Conclusion (Objective 3)

Malnutrition prevents children, women and communities from achieving their full mental, physical and economic capacity, thereby creating dependence and hindering development of the nation.

The findings in several categories indicate that the root of malnutrition can be linked to poverty, which could be caused by unemployment, low educational levels or a combination of both.

5.3 LIMITATIONS

Insufficient Time

Time available to conduct the study was the main constraint, as the researcher had other commitments which encroached on that time. Research assistants were available for a total of only seven days and the data collection process had to be completed within that period.

Language Barrier

The main language of a majority of the respondents was “Oshiwambo”. Communicating with the respondents was challenging and the duration of interviews became lengthy, as translators were needed. In addition, information gathered through translation was often incomplete.

Limited Resources

Computers outfitted with appropriate data analysis programmes were not available at the resource center, a factor which caused delays in data analysis and interpretation. The costs involved in conducting a project of this nature are too great to be carried by

**a private individual, necessitating
the procurement of sponsorships
and recruitment of students who
would be willing to sponsor
themselves.**

Research Assistance

A pilot study was not conducted because MoHSS would not make anthropometrical equipment available. Due to this hindrance, preparation of the research assistants was also problematic.

5.4 RECOMMENDATIONS

**Among the serious developmental
problems facing Namibia,
malnutrition is one which could be
reduced significantly. It is possible
to design and implement cost-
effective programmes which could
address the problem in**

collaboration with all stakeholders.

**Some suggestions which could assist
in the achievement of viable
solutions are:**

- Improve the quality and quantity of diets by improving household food security through income-generating activities, micro-gardening, poultry farming, rabbit breeding, or fish-farming.
- Promote micro-gardening or homestead gardening, practices which facilitate an increased intake of additional nutrients, such as Vitamin A, through leafy green vegetables.
- Implement a programme for nutrition extension workers (nurses and other health practitioners who focus on this area of activity), or volunteers to create awareness and educate communities on the importance of nutrition and the dangers of malnutrition in the informal settlements.
- Establish or strengthen community-based growth monitoring activities in order to identify children who fail to thrive.
- Identify and involve stakeholders who could contribute to solutions to the nutrition crisis. These could include the community, the government of Namibia, non-governmental organizations, faith-based organizations, and the international community.
- Establish poverty reduction programmes which are linked to education for long-term solutions.
- As an interim measure, the World Food Program should be approached to provide food baskets to meet pressing needs. Malnutrition represents a serious crisis and needs to be treated as such.

Follow-up research needs to be conducted to identify development agencies already active in the informal settlements. Studies are needed as well, which would compare prevalence rates between formal and informal settlements.

5.5 SUMMARY

This chapter highlighted main conclusions drawn from the study findings, which indicated that malnutrition is a serious problem facing the inhabitants of the In-formal settlements in Windhoek. The government, civil society and the community at large need to joint efforts in addressing this problem. Language barrier, limited resources and insufficient time were considered as main study limitations.

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Annexure A: Letters to stakeholders

**P. O. Box 8795
B achbrecht
Windhoek
May7, 2006**

**The Office of CEO
City of Windhoek
Windhoek**

Re: Study on Causes of malnutrition among children 1-5 years in non-formal settlement in Windhoek, May 8— 12, 2006

I (Philomena Ochurus) am a Master in Public Health student with the University of Namibia. I am planning to do data collection on the aforementioned topic during the second week in May. The national Health Training Center availed 95 student nurses as research assistants and the National Planning Commission availed the anthropometrical equipment for the study.

Hereby I would like to humbly request your office to inform the all protocol (Political and Community Leaders) and the community to grant us permission and cooperation to do the data collection. The study will be done in Havana, Otjomuise, Okuryangava, Aris, Kappsfarm and Dordabis (Non-Formal Settlements) From May 8 — 12, 2006; a preliminary study will be done on Tuesday May 2, 2006 in Katutura and Khomasdal. The study results will be use in planning and implementation of services for these communities.

**If possible, during the second week of may could we have the presence of the City Police just to ensure the safety of the research assistants.
Should you have any questions, please do not hesitate to contact me at 0812217994.
Counting on your support and cooperation.**

Thanking you in advance.

Yours Faithfully

Philomena Ochurus

2 1

P.O. Box 8795
Bachbrecht
Windhoek
April 12 2006

The Permanent Secretary
National Planning Commission
Private Bag 13356
Windhoek

Attention Government Statistician

Re: Request for scales and measuring boards for a nutrition study

I (Philomena Ochurus) am currently enrolled for the Masters in public Health at the University of Namibia and will be writing my thesis this year. My area of my interest has always been nutrition and the high stunting rate in Khomas region triggered my curiosity to wanting to find out the reasons why, therefore the title of my study is Causes of Malnutrition amongst children 1 — 5 years in Non -Formal Settlement – In Windhoek

A preliminary study is planned for April 29, 2006 at the Five Rand Camp. a Non-formal Settlement just outside Okahandja whilst the actual study is planned from May 3 — 16. 2006. Second year students (95) have been granted as research assistant. To expose all students to the research process it was decided to divide them into 10 small groups and only 2 groups will be out in the field on a daily basis. Hereby, your office is humbly to provide us with 6 Salter scales, 6 bathroom scales, 6 measuring board to determine length of the babies and 6 measuring stands/tapes to measure the height of the caretakers and children. Use of standard equipment is crucial for this study.

Initially request was send to the Ministry of Health and Social Services and the response was that they also borrow from the National Planning when they do surveys.

I can be reached at telephone #061-226525 or 0812217994 for further clarifications or to set up a meeting with you.

Thanking you in advance for your usual cooperation and assistance, which is as always highly appreciated.

Yours Sincerely,

Philomena Ochurus, R.N
Master in Public Health Student
University of Namibia

U. S. Peace Corps
P.O. Box 6862
Ausspannplatz
Windhoek
February 21. 2006

The Permanent Secretary
Ministry of Health and Social Services
Private Bag 13198
Windhoek

Dear Dr. Shangula

Re: Request for the Students of the National Health Training Center as research assistants

I (Philomena Ochurus) am currently enrolled for the Masters in public Health at the University of Namibia and will be writing my thesis this year.

My area of my interest has always been nutrition and the high stunting rate in Khomas region triggered my curiosity to wanting to find out the reasons why, therefore the title of my study is Causes of Malnutrition amongst children 1 — 5 years in Non-Formal Settlement - In Windhoek.

I thought involving the student in my study will benefit both the students and myself in the sense that they will have a practical exposure of research and also help with accurate data collection as especially the anthropometrical measurements and interviewing the respondent that might be difficult for the a person from the street.

A preliminary study is planned for April 7, 2006 at the Five Rand Camp, a Non-formal Settlement just outside Okahandja v'hilst the actual study is planned from May 1 — 14, 2006. Depending on the number of available students data collection could be done in less than a week. In collaboration with The NHTC staff maximum learning could be ensured. The information gathered could be utilized in programme planning and implementation.

Hereby, you are kindly requested to avail the students to participate in this study. I can be reached at telephone #061-226525 or 0812217994 for further clarifications or to set up a meeting with you.

Thanking you in advance for your usual cooperation and assistance, which is as always highly appreciated.

Yours Sincerely,
Phulomena Ochurus, R.N.Peace Corps HI V/A IDS Technical coordinator

P.O. Box 8795
Bachbrecht
Windhoek
August 11,2005
The Permanent Secretary
Ministry of Health and Social Services
Private Bag 13198
Windhoek

Dear Dr. Shangula,

Re: Request for growth monitoring equipment for nutrition survey

As a requirement for the Masters in Public Health Degree a student has to do a thesis on the topic of his/her choice. I, Philomena Ochurus, am currently enrolled with the University of Namibia for the Masters of Public Health Program and am required to do a thesis/dissertation of the topic of my interest. Child Nutrition has always been a subject of my interest, therefore I decided to a study on the. "Prevalence and causes of malnutrition a mongst children under 5 years of age in n on-formal settlement Khomas Region" in August —September 2005.

- The objectives of the study is to determine the prevalence and causes of malnutrition in selected communities in Khomas region
- To correlate nutritional status (well nourished, malnourished children) and the contributing factors for children under five years (weaning, knowledge)
- To describe factors associated with malnutrition in the non-formal settlements of the Khomas region

Hereby your office is kindly requested to provide me with the following equipment in order to determine the nutritional status of the children, viz. 2 Salter scales & pants, 2 measuring boards, 2 bathroom scales, 4 IVFUAC tapes and 4 measuring tapes. This equipment will be returned to the Ministry on completion of the study.

Your assistance is as always highly appreciated. Thanking you in advance

Yours Sincerely,

Philoniena Ochurus, R.N.
Master in Public Health Student
University of Nainibia

P.O. Box 8795
Bachbrecht
Windhoek
June 2, 2005

Ms. Kafidi

Central Bureau of Statistics
National Planning Commission
Private bag 13356
Windhoek

Dear Ms. Kafidi

Re: Request for population statistics of the non-formal settlements in Khomas Region

I am a Public Health student at UNAM and required to do a study as part of the course. The chosen study area is the non-formal settlements in Khomas Region. Therefore your office is kindly requested to provide the aforementioned information for both urban and rural communities.

Information per settlement is required and if possible also breakdown in age groups such as under fives, males females.

It will be highly appreciated if information could be provided by June 3, 2005.

Contact me on Cell #0811246981 or 231640/226525. Fax 239676.

Thanking you in advance

Yours Sincerely,

Annexure B: Responses from stakeholders

03 MAY2006

TO WHOM IT MAY CONCERN

Ministry/Organization

Date Received

Return date

Person responsible

Name

Signature

Telephone/cell

Type of equipment/number/Please attach copy of request. A

The equipment appears above should be returned before/on the date of return to the NATIONAL PLANNING COMMISSION-CENTRAL BUREAU OF STATISTICS. Fr

Issuing officer, division and title DECTP.AT

Date.3 __.i

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WINDHOEK

NOTE: (NAMPOL) To the officer in charge please allow the said number of equipment to pass through to the said ministry/organization.

**REPUBLIC OF NAMIBIA
MINISTRY OF HEALTH AND SOCIAL SERVICES
NATIONAL HEALTH TRAINING CENTRE
Private Bag 13198
Mahatma Gandhi Street Tel: (061) 2032579
Windhoek
Windhoek Fax: (061) 232830
Namibia Email: nhtc@iafrica.com.na**

Enquiries: Ms J. Leboea Ref: 17/8 Date: 5th April 2006

**DIRECTORATE: POLICY, PLANNING & HRD NATIONAL HEALTH
TRAINING CENTRE**

Dear Ms P. Ochurus

RE: REQUEST FOR NHTC STUDENTS ASSISTANCE IN DATA COLLECTION

In response to your letter requesting assistance of NHTC students in data collection. I would like to inform you that the NHTC welcomed the idea and also saw it as a golden opportunity for our 2nd year students who are having Research as a subject to be exposed to reality.

The period indicated for data collection in your letter collides with the time when the students will be fulltime in the practical area and therefore can be utilized for that purpose. A number of ninety-five (95) students will be available to you thus presume that a week will be enough to complete the task.

You are therefore granted permission to make use of our students. All you need now will be to engage with Ms A. Kuutondokwa to arrange for this exercise. You can contact her at Tel no: 2032583 or 2032586

Thanks in advance for granting our students the opportunity of a lifetime.

Yours sincerely

MS J. LEBOEA

**ACTING: PRE-SERVICE HEAD
EDUCATION, TRAINING, COMPETENCE AND COMMITMENT FOR HEALTH
AND SOCIAL DEVELOPMENT**

**UNIVERSITY OF NAMIBIA
Private Bag 13301. 340 Mandume Ndemufayo Avenue, Pionierspark. Windhoek.
Namibia
FACULTY OF MEDICAL AND HEALTH SCIENCES**

Letter of permission:Post graduate students

**To:
From:
Post graduate students
Prof A van Dyk
Prof L Small
Date:
Dear Student:**

The post graduate studies committee has approved your research proposal.

**You may now proceed with your study and data collection.
It may be required that you need to apply for additional permission to utilize your
target population. If so, please submit this letter to the relevant organizations
involved. It is stressed that you should n proceed with data collection and
fieldwork before you have received this letter and got permission from the other
institutions to conduct the study. It may also be expected that these organizations
may require additional information from you.
Please contact your supervisors on a regular basis.**

Prof A van Dyk Prof L Small

Committee Chairperson of the Post Graduate

**UNIVERSITY OF NAMIBIA -
Private Bag 1330, 340 Mandume Ndemufayo Avenue, Pioneerspark, Windhoek,
Namibia**

**From: Acting Dean of Faculty (Dr. L Haoses) Faculty of Medical and Health
Sciences**

Date: 10 February 2004

To who it may concern (e.g. School principal, Church leader, Head of village etc)

Subject: Undertaking Public Health Project

**This is to confirm that Ms. v (Student number\$
is studying for Masters of Public Health at the University of Namibia, Faculty of
Medical and Health science and is in her/his 1st year of study.**

**As part of course work, this student has to do a Public health project in a form of
research project.**

**The Faculty hereby requests your permission to allow her/him to use your
facilities in order for her/him to complete her/his assignment.**

Your assistance in this regard is highly appreciated.

Thanking you in advance.

**L. Haoses Dr. S. N. Iginge
(Acting Dean of Faculty) (Head of Department)**

Annexure D: City map

**OFFICE OF THE PRESIDENT
NATIONAL PLANNING COMMISSION SECRETARIAT
CENSUS OFFICE**

Tel.: (061) 2834111 Private Bag 13356

Fax: (061) 2834502 WINDHOEK

Enquiries: E. Kahitu

Our Ref 13/6 Your Ref: 6 June 2005

Ms. P. Ochurus

UNAM

Windhoek

**RE: REQUEST FOR POPULATION STATISTICS - NON-FORMAL
SETTLEMENT IN KHOMAS**

Dear Madam.

With reference to your letter dated the 2nd June 2005, regarding the above. Please find attached the information as requested.

Please take note that for some settlements the information includes the whole settlement and not only the squatters.

We hope that the information conforms to your request.

Yours Sincerely,

L. N. Kafid4

Deputy Manager, Central Bureau of Statistics

REPUBLIC OF NAMIBIA

All official correspondence must be addressed to the Permanent Secretary

**OFFICE OF THE PRESIDENT
NATIONAL PLANNING COMMISSION SECRETARIAT
CENSUS OFFICE
Tel.: (061) 2834111 Private Bag 13356
Fax: (061) 2834502 WINDHOEK
Enquiries: E. Kahitu**

Our Ref 13/6 Your Ref: 6 June 2005

**Ms. P. Ochurus
UNAM
Windhoek**

**RE: REQUEST FOR POPULATION STATISTICS - NON-FORMAL
SETTLEMENT IN KHOMAS**

Dear Madam.

**With reference to your letter dated the 2nd June 2005, regarding the above. Please find attached the information as requested.
Please take note that for some settlements the information includes the whole settlement and not only the squatters.**

We hope that the information conforms to your request.

Yours Sincerely,

**L. N. Kafidi
Deputy Manager, Central Bureau of Statistics
REPUBLIC OF NAMIBIA
All official correspondence must be addressed to the Permanent Secretary**