THE NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN IN MALUKAZI

A study of nutritional status using anthropometric measurements and dietary intake, and selected ecological factors which may impinge on nutritional status, in 3-6 year old children in Malukazi

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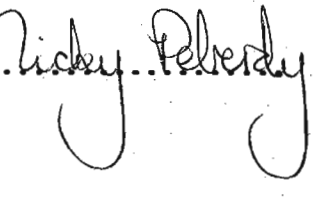
I Carol Nicola Peberdy (neé Ogilvie)
hereby declare this dissertation is
my own work and has not been
presented for any degree
of another university.

Signed 

In memory of

my parents,

and for my

husband, Alan

ABSTRACT

Nutrition education is recognised as being of value in the prevention of malnutrition. However, in order for it to be effective, an in-depth study of the community prior to the implementation of any nutrition education programme is essential. A study of the nutritional status of pre-school children in Malukazi (an informal, unplanned Black township in the greater Durban area) together with background information on the household and the childminder was therefore undertaken, so that recommendations for a nutrition education programme in the area could be made. The relationship between nutritional status and certain ecological variables was also studied in order to determine which of these, if any, was a significant factor in the development of malnutrition. Nutritional status was assessed by using anthropometric measures (height and weight) and dietary intake (24-hour recall and food frequency). Background information obtained included socio-economic status; food purchasing, preparation and storage patterns; intrafamilial pattern of eating; food taboos; clinic attendance; and the childminder's age, educational level, body size, nutritional knowledge and attitude towards nutrition education. Information was obtained by means of face-to-face interviews using a single, trained interviewer.

The incidence of low weight-for-age was relatively low and that of low height-for-age ("stunting") considerably higher (14,2% and 47,3% below the 3rd percentile respectively), indicating that chronic malnutrition is a serious problem in this community. Information on dietary intake showed that intakes of several nutrients notably energy, calcium, vitamin A, ascorbic acid and vitamin D were low for the study population. The percentage of total energy provided by the various macronutrients was however in line with recommendations, which tends to indicate that the greatest need is for an overall increase in food intake. Of the ecological variables studied, only two were found to be significantly associated with the incidence of malnutrition. These were the number of children cared for by the childminder ($p=0,04$) and whether or not the household grew their own vegetables ($p=0,02$). The degree of malnutrition found to exist in this community, together with the unsatisfactory level of nutritional knowledge of the childminders and their apparent willingness to learn more, revealed the desirability for further nutrition education in this area.

Recommendations regarding future nutrition education programmes for this community based on the findings of the study are submitted.

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1 INTRODUCTION

1.1 The Problem of Malnutrition

Malnutrition continues to be a worthy area of study due to its serious and, in some cases, permanent effects on health and quality of life. A recent editorial in "The Lancet" on the subject states that "in many countries ..... the combined effects of undernutrition ..... continue to be the major determinant of morbidity and mortality" **[1]**. In Sudan, chronic undernutrition has been described as the most common cause of death in young children **[2]** and a study in Bangladesh showed that severely malnourished children had a 3-fold higher risk of mortality than well-nourished children **[3]**.

The effects of malnutrition on physical growth and development are widely known and well-documented. These include wasting, stunting and increased risk of (and higher mortality from) infections **[4; 5; 6]**. However, the consequences of malnutrition extend beyond the physical to include mental retardation **[4]** **[7]** and the so-called attention deficit disorder which is manifested by shortened attention span, increased distractability, restlessness, impaired memory and disobedience **[8]**. The latter syndrome is said to be similar to that observed in children brought up in isolation without regular environmental stimulation **[8]**. Edozien concludes that the "disturbance of mental function and behaviour is perhaps the most serious danger of mild protein deficiency in the community" **[9]**.

Malnutrition in young children is of special significance in that they are acknowledged as being a vulnerable group from a nutritional point of view **[10-13]** and their nutritional status may give an indication of the nutritional status of the community as a whole **[9; 14; 15]**.

From a socio economic point of view, malnutrition can be seen as not only a result, but also a **cause** of underdevelopment, since poor health and decreased productivity arising from undernutrition may significantly retard economic development **[1]**.

The extent of malnutrition in a community is, therefore, far more than a reflection of health status - it is "an index of the social and economic well-being" and, therefore, requires attention as part of the overall plan for economic and social upliftment **[9]**.

1.2 Malnutrition in Southern Africa

Numerous studies have been carried out to determine the nutritional status of pre-school children in various parts of Southern Africa.

The second Carnegie Inquiry showed that almost one third of South African children were underweight and stunted for age **[16].** Richardson found the incidence of severe and mild / moderate undernutrition of Bantu non-nursery schoolchildren to be just under 5% and 75% respectively**[17].** In other studies, the incidence of low weight-for-age has been shown to vary from 13,7% - 20% **[10; 18; 19].** In marked contrast to these findings, Kustner found that only 5,3% of the children they measured (0-5 year old Black children near Durban) had a low weight-for-age **[20].**

As a result of lack of standardisation of criteria used it is difficult to summarise or draw meaningful comparisons between these findings. However, a consistent finding in the majority of these studies is that a greater percentage of children could be classified as "stunted" (low height for age) than underweight **[10; 18; 20; 21].** Since weight-for-age is an indicator of acute malnutrition and height-for-age an indicator of chronic malnutrition **[22; 23]** one conclusion that can be drawn from these studies is that whilst there may not be a "crisis in terms of acute protein energy malnutrition" **[20]** chronic malnutrition remains a problem in Southern Africa **[10; 19; 20].**

1.3 Malnutrition - possible solutions

Identification and treatment of severe malnutrition should form part of any health care programme. However, this fails to address the real problem, namely **prevention** of mild-to-moderate malnutrition. Not only will this alleviate suffering on a far wider scale, but in the long-term, prevention is more economical than cure **[24].**

The prevention of malnutrition requires an examination of the factors involved in its development. These are numerous and complex, but may include the following:

- socio-economic status
- cultural factors
- lack of knowledge

Whilst economic development accompanied by an improvement in living standards is probably the surest method of improving nutritional status, much can be done to achieve this through the implementation of appropriate programmes, relying on existing resources **[1].** Measures that can be taken include provision of food supplements to vulnerable groups, enrichment of basic foodstuffs and nutrition education **[11].** King et al state that "teaching is usually the best way of preventing malnutrition" **[4]** and nutrition education is recognised as one of the top priorities for community health workers **[25].**

1.4 Nutrition education - requirements for success

One of the reasons why so many nutrition education programmes have not been successful has been the failure to acquire sufficient knowledge regarding the community in question prior to the initiation of the programme. Making a superficial community diagnosis is not enough - an in-depth study how the people live is also necessary. Factors studied should include local customs and beliefs, availability and storage facilities for food, cooking methods, existing knowledge and attitude towards nutrition, media usage patterns, socio-economic status and any other factors that influence what the people eat **[4; 5; 25]**. With this knowledge, a nutrition education programme can be designed so as to meet the needs of that community.

It was therefore decided to carry out an indepth study of a particular community in order that recommendations could be made for an effective nutrition education programme in that community.

2 AIM (PURPOSE) AND OBJECTIVES

2.1 Aim (Purpose) of this study

The purpose of this study was to obtain detailed information regarding the factors which determine the eating behaviour and nutritional status of a community in a township outside a large city and to use this information to make recommendations regarding the development of a nutrition education programme in that area.

2.2 Objectives

The following specific objectives were identified as being relevant to the achievement of the above aim in respect of pre-school children in Malukazi:

a) To determine current nutritional status.

b) To determine the current dietary intake.

c) To investigate various socio-economic/cultural factors and determine which of these, if any, are associated with the nutritional status of the children.

d) To gather data with regard to the purchase, preparation and storage of food and the interests and lifestyle of the childminders so as to be able to make meaningful recommendations for a possible future nutrition education programme.

3 DEFINITION OF CRITERIA

For the purposes of this study, the following terms shall mean:

3.1 Pre-school child

A child not less than 36 months and not more than 72 months old.

3.2 Child-minder

The person responsible for caring for the child most of the time.

3.3 Nutritional status

A qualitative assessment of the child's nutritional well-being as determined by anthropometric measurements relative to those of reference populations.

3.4 Household

The child's permanent abode - the dwelling and its permanent inhabitants.

3.5 Head of household

The person ultimately responsible for the upkeep of that household.

4 LITERATURE REVIEW

4.1 Motivation for a Study of this Nature

"The need for effective programmes to improve nutrition and health throughout the world is becoming increasingly urgent." **[14]** This statement appeared in the Bulletin of the World Health Organisation as long ago as 1977, but it applies equally well to Southern Africa today. The emphasis, however, should fall on "effective."

Experience in several countries over many years has shown that effective nutrition education has as a prerequisite a detailed study of the community in question. **[5; 25; 26]** It is only with the information thus collected that the fundamental objective of nutrition education can be achieved namely "to help individuals to establish food habits and practices that are consistent with the nutritional needs of the body and adapted to the cultural pattern and food resources of the area in which they live" **[26]**. The information required for these purposes should include:

- patterns of growth in young children
- economic status
- availability of water and food
- educational levels
- food distribution within the family
- resource persons / materials
- beliefs about foods
- methods of food purchasing, preparation and storage
- other health practices
- role of women - use of time **[11; 27]**

As a result of the relationship between nutrition and infection, an assessment of general health status, particularly infectious conditions such as diarrhoea and measles, is also desirable **[4; 5; 6].**

A cross-sectional survey can be used for obtaining information of this nature. Guzman et al **[28]** state that cross-sectional surveys can be used "to evaluate the nutritional status of populations" as well as for the "investigation of factors related to growth." Caution is however advised in the interpretation of such data, in that it can "at best only inform about associations and not about cause-effect relationships."

4.2 Ethical Considerations

The ethics of research into protein-energy malnutrition in children has been questioned, since the causes and method of treatment for the condition are known. However, Moosa claims that "epidemiological surveys ..... and therapeutic research related to various intervention programmes of direct benefit to the patients can be justified provided the risks do not outweigh the benefits" **[29]**. The study in question, consisting of face-to-face interviews involving no invasive techniques can be considered very low risk.

Bailey describes several approaches for minimising risk to the subject in social research. Ideally animal studies or computer simulation can be used to replace research on human subjects. Where human subjects are used, risk can be reduced by researching only existing negative effects or by ensuring short-term, mild application of the cause. Informed consent, the use of samples and the maintenance of privacy could also minimise risk **[30]**.

The obtaining of informed consent, the use of survey technique, a sample, maintenance of privacy and researching only existing negative effects were characteristic of the present study.

Feedback to the community who participate in the study is also considered desirable. In this study, since the information collected was to be used in drawing up recommendations for a nutrition education programme, the results would be communicated both directly and indirectly (via the Clinic) to the community.

4.3 Choice of Pre-School Children as Subjects

The subgroup of the population selected for study falls into that defined as "older pre-school children" **[31]**. Whilst a considerable amount of research has been carried out on the younger pre-school child (1-3 years), less is known about the factors affecting nutritional status of 3-6 year old children.

It has been shown that whilst Black children in the Durban area up to the age of 2 conform to international standards regarding weight and height, older pre-school children fall progressively below these values **[18]**.

Children under 5 have traditionally been considered nutritionally vulnerable since this period is "notoriously fraught with risk" **[32]**. Reasons put forward for this include:

- this is a transitional period as regards diet - the young child has to adapt from an infant's (predominantly milk based) diet to that of an adult. **[11; 32; 33]**

- early childhood is a time when the individual is the subject of a variety of food taboos **[13; 33]**

- the child may be given purgatives regularly **[33]**

- this is a period of rapid growth with high nutritional requirements **[11; 32]**

- pre-school children are very prone to infections **[13]**

- children of this age-group frequently have the lowest priority in terms of food sharing **[11; 13; 33]**

- Frequently, infants are catered for in infant welfare clinics and schoolchildren by school health services, but no programme exists to cater for the needs of the pre-school child **[13]** - the pre-school child tends to be neglected in terms of most family health care activities **[34]** (A special "pre-school programme" was introduced in Sri Lanka to address this problem) **[35].**

- the special needs of a child of this age are frequently not met, notably the need to be fed several times a day and have his/her own bowl **[13; 32; 33]**

Several researchers have documented a high mortality rate in this age group **[13; 36; 37]**. Possibly the most important reason for selecting this group for study is that the nutritional status of pre-school children can be used as an indicator of the nutritional status of the entire community **[14; 15].**

4.4 Studies on Nutritional Status

4.4.1 Anthropometry

a) Southern Africa

The results of previous studies on the nutritional status of Black pre-school children in Southern Africa can be summarised as follows:

Table 1
Summary of Results of Anthropometric Studies on Black Pre-School Children in Southern Africa

Place of study	Year of study	Age of children (years)	Wt for age % <3rd percentile	Ht for age % < 3rd percentile	Wt for Ht % <3rd percentile
Soweto [12]	1975	2-6	23,0	-	-
Muldersdrift [38]	1976	1-5	27,6	22,8	-
Transkei [39]	1977	0-5	36,0	38,0	-
Umlazi/ Lamontville [18]	1977	3-5	15,0	38,0	-
Soweto [40]	1977	2-5	29,1	66,4	20,1
Gelukspan [41]	1980	0-5	51,0	-	33,0
Gelukspan [41]	1982	0-5	28,0	-	5,0
Lebowa [42]	1982	0-5	32,7	-	-
Eastern Cape [21]	1983	0-2	15,3	24,5	12,5
KwaZulu [43]	1983	0-5	36,0	-	-
Gelukspan [41]	1984	0-5	31,0	-	1,0
Natal/ KwaZulu [20]	1984	1-5	5,3	26,0	0,5
Gazankulu [44]	1984	0-5	28,2	-	-
Ciskei [45]	1984	2-4	21,0	-	3,0
Letaba [46]	1986	3-5	20,7	-	-
Rural SA [47]	1986	0-5	8,4	24,5	1,8
Khayelitsha [10]	1987	1-5	13,7	47,1	1,1
Bloemfontein [19]	1987	0,5-4	20,0*	15,5*	15,5*
Kalafong Hospital [48]	1987	0,5-5	51,0	-	-

* Below 5th percentile

NOTE TO TABLE 1

i) In most cases the above figures represent averages for both sexes.

ii) In the studies carried out before 1983, the Harvard standards were used whereas the NCHS standards were used in those studies carried out from 1983 onwards.

Bearing in mind that these studies are not all strictly comparable, the following overall conclusions can be drawn:

a) Using weight-for-age as a criterion, the majority of studies on nutritional status of pre-school children in Southern Africa indicate that between 20 and 36% of children under 5 years of age fall below the 3rd percentile of international standards. Not surprisingly, in children admitted to hospital, this percentage is reportedly much higher **[48]**.

   Exceptions to this are the study by Kustner **[20]**, and the First RHOSA (Regional Health Organisation of Southern Africa) Nutrition Survey **[47]**, which showed this percentage to be 5,3% and 8,4% respectively. The latter is the figure quoted by the Dept of National Health and Population Development in official reports.

b) In most cases the percentage of children falling below the 3rd percentile for height-for-age is appreciably larger. Chronic malnutrition is therefore more of a problem than acute malnutrition.

c) There are no appreciable differences between the percentages for rural and urban areas.

d) Of particular interest is the data from Gelukspan **[41]**, which shows a dramatic decrease in the incidence of malnutrition, by all three of the criteria listed in the table from 1980 to 1984. A comprehensive community health programme was instituted in the area over this period.

e) It is also of interest in the study by Coovadia et al that although an appreciable percentage of the 3 to 5 year old children fell below the 3rd percentile for both weight and height, the younger children they measured (i.e. up to 2 years of age) were either "equal to or greater than" international standards for weight and height.

b) International studies

The incidence of malnutrition in pre-school children in Israel and the USA is significantly lower than in Southern Africa according to the findings of Palti et al in Jerusalem **[49]** and Brown et al in the U.S.A. **[50]** However in India the incidence is much higher according to Rao et al **[51]** and Joshi et al **[52]** (refer to Table 1).

Table 2
Summary of Results of Selected International Studies on Malnutrition in Pre-School Children

Place of Study	% Stunted *	% Wasted **
Jerusalem [49]	1,5	1,5
USA [50] - white	5,3	1,5
- S E Asian	30,6	2,2
- Black	5,4	0,0
India [51] - slum	45,9	24,3
- village	60,0	14,7

* Low Height-For-Age
* Low Weight-For-Age

Joshi et al studied children of low and medium socio-economic status. Using weight-for-age, they found the incidence of mild malnutrition to be 26,2%, moderate malnutrition 59,5% and severe malnutrition 10,3% in the low socio-economic group; and 42,4%; 48,1% and 0,0% respectively in the medium socio-economic group. (These figures refer to groups not receiving food supplements and represent the average of 3 readings taken over a period of 7 months) **[52].**

It is interesting to note that studies in the USA indicate little difference between anthropometric data on Black and White children **[50; 53]** (if anything, Black children were somewhat taller and heavier than White children) whereas South African Black children are consistently shorter and lighter for their age than White children **[17; 54; 55]**.

4.4.2 Studies on nutritional status - Dietary Intake

a) Studies in Southern Africa

The number of studies in which the dietary intake of pre-school children in Southern Africa has been evaluated, is relatively small. For various reasons, including differences in age range selected, different diet survey methods and different dietary standards used, these studies are not strictly comparable. Some of the major findings are summarised in Table 3.

It is interesting to note that Richardson found mean energy intake to be low, whilst Richter et al found mean energy intake to be in line with WHO recommendations **[45; 56]**. Richter et al did however find that a high percentage of children (26%) had energy intakes below 75% of WHO standards. In his study on families in rural Transkei, Bembridge found that between 27% and 38% of families had "below minimum energy intakes" **[57]**.

Table 3

Summary of Major Findings of Surveys on Dietary Intake of Pre-School Children in Southern Africa

Place of Study	Year of Study	Age (Years)	Tot. Energy (kj)	Tot. Protein (g)	Tot. Fat (g)	Tot. CHO (g)	Ca (mg)	Fe (mg)	Vit A (iu)	Thia (mg)	Ribo (mg)	Nicot. (mg)	Asc A (mg)
Soweto – nursery schools [56]	1973	1-6	3515-5158	31-41	22-31	84-214	—	—	—	—	—	—	—
Soweto, non nursery schools [56]	1973	0-7	1793-4294	16-31	9-16	76-203	—	—	—	—	—	—	—
Rural Transvaal [56]	1973	0-7	924-3486	8-23	4-12	52-144	—	—	—	—	—	—	—
Ciskei (urban and rural) [45]	1984	2-3	6100	42	27	256	477	7,5	1654	0,97	0,96	5,0	26

In Richardson's study, protein and fat intake were low in the non nursery school group but adequate in the nursery school group whereas protein intake was relatively high, and fat intake low, in Richter's study. The latter also found intakes of calcium, iron, vitamin A, nicotinic acid, riboflavin and ascorbic acid to be "cause for concern."

Odendaal et al **[58]** examined the frequency with which various foods were eaten by rural and urban Venda children and their findings can be summarised as follows:

. both groups were breastfed
. maize meal porridge and butter/margarine and peanut butter were eaten every day
. other starchy foods such as potatoes, rice, sweet potatoes and samp were eaten from once a day to once a week
. protein-rich foods such as meat, fish, chicken, cheese, eggs, beans and insects were eaten once or twice a week
. fruit and vegetables were eaten at least 3 times a week
. tea was commonly drunk by the urban children, coffee by the rural children
. biscuits, sweets, sugar and jam were more frequently used by the urban children
. the urban children ate three meals a day, the rural children only two meals a day

Friedman **[59]** also examined the frequency with which foods were eaten - his study was carried out on families in a rural part of Natal, the Valley of a Thousand Hills. In his study, households were visited 6 times. Food frequencies are classified according to the number of days on which food was consumed out of a total of 6 visits.i.e.

Frequently consumed - 5 to 6 days
Commonly consumed - 3 to 4 days
Infrequently consumed - 1 to 2 days
Rarely consumed - 0 days

He found food frequencies as follows:

i) Frequently consumed:
Maize and maize products
Condensed milk
Sugar
Jam
Tea and Coffee

ii) Commonly consumed:
Potatoes
Vegetables
Meat
White Bread
Saturated fats

iii) Infrequently consumed

Fruit

Curry and chillies

Brown bread

iv) Rarely consumed

Fish

Rice

Eggs

Cows milk

Unsaturated fats

Butter and margarine

Friedman concluded that the diet was "poorly balanced".

b) **International Studies**

The major findings of selected studies on the dietary intake of pre-school children in the USA **[53]**, Jerusalem **[49]** and the U.K.**[60]** are summarised below.

Table 4

Major findings of selected international studies on dietary intake of pre-school children

	Energy (kJ)	Protein (g)	Ca (mg)	Fe (mg)	Vit A (IU)	Thia (mg)	Ribo (mg)	Asc A (mg)
USA* : 1968-1970								
i) receiving supplements/ Food Aid	5813	51,0	658	8,6	3700	1,7	2,4	110
ii) not receiving supplements/Food Aid	5600	53,0	647	9,5	4578	0,8	1,3	50
JERUSALEM: 1980 (middle & lower social class)	4763	45,8	-	6,1	-	-	-	-
(upper social class)	5670	53,9	-	6,8	-	-	-	-
UK: 1988 Caucasians	-	33,2	538	4,5	-	-	-	35
Asians	-	37,8	783	5,5	-	-	-	47
Ciskei ** : 1984 [45]	6100	42	477	7,5	1654	0,97	0,96	26

* Lowest socio-economic group, average calculated for age 3-6 years
** Data from the Ciskei are included in this table for purposes of comparison

In drawing comparisons between the local and international data, it can be seen that apart from energy and thiamine, intakes of most nutrients (protein, calcium, iron, vitamin A, riboflavin and ascorbic acid) of Ciskeian children are somewhat lower than those of children in the USA. By contrast, data from other local studies (see Table 3) indicate lower intakes of energy than in either the USA or Jerusalem.

In the Jerusalem study, food frequencies were also examined with the results as follows:

Table 5

Frequency with which selected food items are consumed: Jerusalem study

Food Item	At least once a day	More than once a week	Once a week	Less than once a week	Total
Milk	76	14	-	10	100
Milk Products	90	10	-	-	100
Meat	-	43	33	24	100
Poultry	3	73	3	20	100
Fish	3	43	20	33	100
Liver sausage	-	24	20	56	100
Eggs	57	37	-	6	100
Vegetables	94	6	-	-	100
Fruits	94	6	-	-	100
Beans	6	66	14	14	100
Cereals	94	6	-	-	100

4.5 Social, Cultural and Economic Variables and Malnutrition

4.5.1 The ecological approach

The role played by social, cultural and economic factors in the development and eventual outcome of malnutrition is well documented **[4; 6; 25; 27; 61; 62]** and the importance of thse factors in defining effective and appropriate interventive programmes is self-evident.

In addition to supplying information as to the possible cause of the malnutrition and facilitating more effective nutrition education, these factors may also give an indication of the general environment and overall health status **[63]**.

Sanjur states that factors including socio-economic data, food consumption patterns and cultural-anthropological data are needed for the overall assessment of nutritional status. She refers to this as the "ecological approach" to the implementation of a nutrition programme, where "food and nutrition problems are viewed as subcomponents of a larger ecosystem, all conditioned by a multiplicity of ecological factors."

This approach has been recommended in that it takes into consideration the complexity of problem's concerning food and nutrition and is more likely to result in permanent alteration of nutrition practices **[62]**.

Some of the factors that are considered to influence nutritional status are as follows:

a) **Economic**

- Occupation **[25; 32]**
- Income **[4; 5; 6; 16; 32; 33; 34; 61; 64; 65]**
- Material possessions **[32]**
- Food prices **[5; 32]**
- Home food production **[4; 5; 6; 65; 66]**

b) **Social**

- Educational level **[5; 16; 32; 65; 67]**
- Housing (including furniture) **[32]**
- Water supply **[5; 16; 25; 32; 64]**
- Food storage facilities **[5; 32; 64]**
- Power source **[4; 5; 32]**
- Family demographics **[4; 6; 16; 25; 32; 33; 34; 64; 65; 67]**
- Lack of nutritional knowledge **[4; 6; 16; 27]**

c) **Cultural**

. Food taboos **[5; 6; 25; 26; 33; 61]**

. Meal patterns **[6; 25; 27; 33; 64]**

. Food sharing **[4; 5; 6; 25; 27; 33; 34; 64]**

. Preference for male sex **[33; 61]**

. Infant feeding practices **[6; 16; 25; 27; 61; 64; 65]**

. Decision maker for health related practices - **[26; 27; 34]**

. Status attached to foods **[5; 26; 27; 68]**

. Home stimulation of children **[67]**

. Identity of guardian of child **[4; 25; 65]**

4.5.2 Studies using the ecological approach

Studies in Southern Africa where nutritional status of children has been investigated together with ecological variables are shown in Table 6.

Only in some of these studies was an attempt made to investigate the relationship between certain of these variables and nutritional status. Westcott and Stott found income, father's support, birth order, nutrition knowledge and possession of land to be significant influences on the incidence of malnutrition whereas the relationship between malnutrition and the identity of the childminder, clinic attendance, large number of sibling deaths and possession of a vegetable garden was not significant. Surprisingly, they found a larger proportion of undernourished children in educated mothers which they feel could be partly explained by the greater number of unmarried mothers in this group **[39]**.

Bac found the following to be significantly associated with acute malnutrition - total number of people and number of children under 6 years of age per household, school attendance of mother/childminder, age of child, possession of land/animals, housing, clinic attendance, immunisation status, water supply and diet.

Table 6
Summary of studies in Southern Africa of nutritional status of children and ecological variables

Area	Year	Subjects in whom nutritional status measured	Ecological variables studied
Soweto **[40]**	1977	2-16 years (Black)	. Income, presence of vegetable gardens . Educational levels, housing water supply, cooking and storage facilities, shopping habits, clinic attendance, household demographics, leisure activities. . Infant feeding practices
Transkei **[39]**	1977	0-5 years (Black)	. Income, presence of vegetable gardens . Educational levels, support by father, clinic attendance, family demographics . Nutrition knowledge, identity of childminder
Gelukspan **[65]**	1980	under 6 (Black)	. Land/animal possession, income, house construction occupation . Educational levels, clinic attendance, immunisation status, water source . Infant feeding practices, identity & age of childminder
Ciskei **[69]**	1981	0-5 years (Black)	. Income . Educational levels, whereabouts of father, family demographics . Identity of guardian

Table 6
Summary of studies in Southern Africa of nutritional status of children and ecological variables (cont)

Area	Year	Subjects in whom nutritional status measured	Ecological variables studied
Lebowa [42]	1982	0-5 years (Black)	. Home food production . Water supply
Tongaat [70]	1983	0-5 +years (Indian)	. Income, employment . Family demographics, clinic attendance, pregnancy & birth history, immunisation status.
Eastern Cape [21]	1983	0-2 +years (Black)	. Income, employment . Educational levels, household demographics, access to medical facilities. . Infant feeding practices
KwaZulu [43]	1983	0-5 years (Black)	. Income, employment, presence of vegetable gardens, possession of animals. . Educational levels, water supply, household demographics illness, immunisation status, clinic attendance. . Preference for health services
Tongaat [71]	1984	2-5 years (Indian)	. Income . Educational levels

Table 6
Summary of studies in Southern Africa of nutritional status of children and ecological variables (cont)

Area	Year	Subjects in whom nutritional status measured	Ecological variables studied
Tongaat x2 **[72]** **[73]**	1985	Pre-school (Indian)	. Birth history . Time spent with child, mothers' perception of childs' eating habits, frequency of meals, food purchasing, prenatal diet . Infant feeding practices
RSA **[74]**	1986	2-5 years (all race groups)	. Social class
Tshikundamalema Atteridgeville **[58]**	1988	1-4 years (Black)	. Frequency of meals . Infant feeding practices
Mamre **[75]**	1988	0-11 years (Coloured)	. Occupation . Educational levels, household demographics, water supply, sewage disposal, possession of animals, power source, clinic attendance, possession of clinic card, illness.
Ciskei **[76]**	1990	0-2 years (Black)	. Educational levels, child's place of birth, diarrhoea treatment, feeding practices, family planning, food supplementation, visits from village health workers, clinic card, immunisation.

The following were significantly associated with chronic malnutrition - age of child, marital status of mother, clinic attendance **[65]**. Thomas found that maternal education bore no relation to nutritional status but that identity of the childminder, stable family life, whether or not child is supported by the father and income were important in this respect. She concluded that "the main cause of low-weight-for-age in Ciskei is poverty, while the main cause of kwashiorkor is the disruption of family life" **[69]**. Jinabhai found a significant association with income **[70]** whereas the study by Lazarus and Bhana did not show this **[71]**.

They also found, as did Thomas, no significant association between nutritional status and maternal educational level, nor between birth history, time spent with children by fathers, prenatal nutrition, weaning age, duration of breast feeding, or food expenditure. They did, however find a significant relationship between the type of officer present at delivery, mothers' perceptions of children's eating habits, regularity of food intake, type of foods used for weaning and foods eaten at breakfast and lunch but not supper **[71; 72; 73]**. By contrast, Kuhn et al in their study in a rural village in Ciskei, found that nutritional status was associated with maternal education and the child's place of birth **[76]**.

The variations contained in these data confirm the complexity of food/nutrition problems and the difficulty of drawing firm conclusions as to the factors associated with malnutrition. Malnutrition is traditionally thought to be a result of ignorance and poverty, but it is clearly not that simple. Whilst income is undoubtedly important, studies both in Southern Africa and elsewhere have not shown there to be a direct relationship between this and nutritional status **[67; 71].**

In their study, Westcott and Stott concluded that "the two most important factors associated with weight below the third percentile were income ..... and the lack of sound dietary knowledge." This is of great relevance to this particular study, because it highlights the importance of nutrition education. Indeed, Westcott and Stott conclude that "dietary knowledge can go a long way towards protecting children from unfortunate family circumstances. They caution, however, that this is not infallible in preventing malnutrition, neither is raised income - "both factors are required for a healthy child population" **[39].** This only serves to underline the necessity for the investigation of several carefully selected ecological variables when undertaking a study of nutritional status.

4.6 Assessment of Nutritional Status

A general definition of the nutritional status of an individual is "the condition of health of the individual as influenced by the utilisation of the nutrients" **[77]**. It is therefore a measure of nutritional well-being. There are several methods for assessing nutritional status, including anthropometric measurements. According to Jelliffe however, "all the methods that can be used for the assessment of the nutritional status of a community are individually imperfect, inaccurate and subject to their own technical errors" and it is therefore recommended that various approaches be used simultaneously **[32]**.

Ideally, nutritional status should be assessed using a combination of dietary, clinical and biochemical procedures **[78]**. The feasibility of using these measures should however be considered and procedures selected that are in line with the objectives of the study. For the purpose of this study, nutritional status was evaluated using an assessment of dietary intake together with anthropometry.

4.6.1 Anthropometry

Of all the measurements used to assess the nutritional status of a community, the most widely used are the anthropometric measurements for assessing growth and development **[22]**. There are however a "confusing proliferation of nutrition status indices and recommendations for their use" **[79]**. It is necessary therefore to have knowledge and understanding of the various indicators in order to select those most appropriate for a particular study. Ideally, measurements should be easy to take and indices should provide an accurate assessment of the degree of malnutrition in the community. Since it is frequently difficult to obtain accurate ages, indices that are independent of age are particularly useful. **[3; 32]**.

4.6.1.1 Anthropometric measurements

Anthropometric measurements commonly used to assess nutritional status include weight, height and mid upper arm circumference. **[22; 32; 80]**.

a) Weight

Jelliffe describes weighing as "the key anthropometric measurement" **[32]**. Obtaining accurate weight measurements in large field studies does however pose problems as scales that have a high degree of accuracy are impractical for field use. Scales used in the field should be "sturdy, inexpensive, easily transportable and accurate to within the limits required." Spring scales are not recommended since they are liable to stretch. Beam balance scales are commonly used but, more recently, electronic digital display scales suitable for the purpose have been developed.

b) Height

Height is a measure of linear growth. The field measurement of height is relatively easy since it requires little equipment. The use of a measuring rod, headpiece and flat base will ensure a sufficiently accurate measurement **[32; 81]**.

c) Mid-upper arm circumference

Mid-upper arm circumference (MUAC) gained popularity as a result of its being quick and easy to measure. A three-coloured cord or "Shakir Strip" is particularly useful in this regard **[82]**. Most authorities agree that it correlates well with weight for height **[80; 83]** although there have been claims to the contrary **[84; 85]**. It is commonly used as a quick screening method for detecting protein-energy malnutrition in early childhood. Concern has however been expressed as to its lack of sensitivity **[86; 87]**. Although regarded as useful in emergency situations such as famine for detecting children with a high mortality risk **[80; 84; 88]** it is not considered necessary to measure MUAC in addition to weight and height since these provide essentially the same information, or, as stated by Waterlow "a thin child has a thin arm" **[80]**.

4.6.1.2 Indices based on anthropometric measurement

Indices commonly used for measuring nutritional status are weight-for-age, weight-for height and height-for-age. None of these is ideal on its own, but each has merit in reflecting different aspects of malnutrition.

a) Weight-for-Age

Weight for a given age gives an indication of both current and long-term undernutrition. By comparing weight-for-age for a given community with an accepted standard, an assessment of the nutritional status of both individual children and the community can be made. Because it is sensitive to small changes, it allows changes over a short period of time to be monitored. Since it is age dependent, it cannot be used where it is impossible to determine accurate ages of the children **[22]**.

b) Height-for-Age

Height-for-age gives an indication of chronic malnutrition or nutritional status over the long-term - a deficit implying undernutrition over a long period of time. Waterlow has described this as "stunting." Like weight-for-age, height-for-age has the disadvantage of being age dependent and genetic variations must be taken into account when making comparisons. Another disadvantage is the difficulty in measuring height accurately in very young children **[22; 23; 81]**.

c) Weight-for-Height

Weight-for-height is an indicator of short-term or current nutritional status. It can be used to assess the degree of acute malnutrition in an individual or to monitor the nutritional status of a community at a given time. An individual with low weight-for-height can be said to be "wasted" **[22; 23; 81]** In a survey comparing various nutritional indices, Anderson found weight-for-height to be "the best single anthropometric indicator of current nutritional status in preschool children more than one year old" **[79]**.

Using the three measures described above, it has been suggested [23] that children could be classified into four broad anthropometric categories:

- normal
- acute malnutrition (wasting)
- acute plus chronic malnutrition (wasting and stunting)
- nutritional dwarfism (stunting)

4.6.1.3 Classfication of nutritional status using anthropometric measures

To evaluate nutritional status of a community using anthropometric measures such as weight-for-age, height-for-age and weight-for-height, it is necessary to compare such information with an accepted standard. Percentages below pre-determined cut-off points can then be calculated, giving an indication as to the extent of malnutrition in that community. For meaningful comparisons at an international level, both the standards and classification criteria should be universally agreed upon. The debate concerning these issues has yet to be resolved, however.

a) Standards

The standards used as a basis for comparison for anthropometric measurements are compiled using the measurements obtained from a statistically adequate random sample of the sample from which they are drawn. As a result of the so-called "secular trend" towards heavier and taller populations in the last century it has been necessary to produce new standards from time to time **[32; 89]**. Whitehead and Paul have suggested that changes in infant feeding practices are associated with changes in growth patterns, possibly necessitating a review of current standards **[90]**. Standards used in the past include those compiled by Tanner in England and the Boston (Harvard) and Iowa standards from the United States of America.

The standards currently recommended for use are the NCHS standards, compiled by the National Center for Health and Statistics, USA **[22; 91; 92]**.

A major issue concerning standards is whether it is necessary to establish and use local standards for particular groups or whether comparison with a "universal" standard is acceptable. Jelliffe believes that it should be "the ultimate aim of nutritionists to prepare and use local standards for different ethnic groups" **[32],** since this would allow for differences in genetic potential for growth. He also states that local standards are difficult to compile and the lack thereof frequently necessitates the use of a general standard, even though this may be "genetically less appropriate" **[32].**

Habicht et al submit that general standards based on well-to-do children are acceptable for use in children from a lower socio-economic background, based on their finding that differences in growth are more likely to be influenced by environmental than by genetic factors. A study by Warrington and Storey supports this view since it revealed few significant differences between children of Indian origin and indigenous white children in the U.K **[60].**

Data from Egypt, Togo and Haiti also supports this view **[93; 94]**. Coovadia et al believe that the standards "established in the developed world can serve as guides to growth in the South African Negro child" based on their findings that the heights and weights of the younger children in their study are in line with international standards, since this would tend to indicate that Black children have the potential to reach the standards for height and weight established for white children. **[18]**. Miller et al refute the criticsm that a general standard is "inappropriate for comparison with children of other socio-economic and ethnic backgrounds"**[14]**. They believe that the reference population is not a "standard" but rather a baseline for comparison.It has also been suggested that a universal standard is suitable for pre-school children although the same may not apply to older children **[31]**.

A major concern regarding the compilation and use of local standards is that in the absence of sufficient properly-nourished local children the standards would be based on measurements of children suffering from varying degrees of malnutrition.

This could result in the truth being camouflaged **[95]**. Conversely, standards based on the measurement of over-nourished children could result in inappropriate information regarding optimal measurements being applied to developing communities **[96]**. With regard to South African standards, both Cameron and Richardson recommend the development of local standards provided these are compiled with care and take environmental and socio-economic factors into account **[17; 97]**. As yet no South African standards are available.

b) Classification criteria

Waterlow has stated the general requirements of a classification system for protein energy malnutrition to be one which is qualitative, quantitative and simple and which offers a guide to practical action **[80]**.

Various classification systems have been proposed. These include the Wellcome classification, the Gomez classification and those proposed by Waterlow and McLaren and Read **[98]**. Characteristics of these are summarised in Table 7.

TABLE 7 - SUMMARY OF SYSTEMS FOR CLASSIFYING NUTRITONAL STATUS

SYSTEM	INDEX	CLASSIFICATION CRITERIA	ADVANTAGES	DISADVANTAGES
Gomez [98]	Weight for Age	. First Degree (Mild) Malnutrition : 75-90% of standard . Second Degree (moderate) Malnutrition : 60-75% of standard . Severe Malnutrition : < 60% of standard	. Simple	. Age dependent . Does not distinguish between acute & chronic malnutrition . Underestimates no. of normal children
Jelliffe [32]	Weight for Age	Four grades of malnutrition I 80-90% of standard II 70-80% of standard III 60-70% of standard IV < 60% of standard	. Each degree of malnutrition one standard deviation from the mean	. Age dependent . Does not distinguish between acute & chronic malnutrition
Wellcome [81]	Weight for Age	. Kwashiorkor: 60-80% of standard, oedema present . Undernourished: 60-80% of standard, no oedema . Marasmic kwashiorkor: < 60% of standard, oedema present . Marasmus: < 60% of standard, no oedema	. Takes clinical signs into account . Widely used	. Age dependent . Does not distinguish between acute & chronic malnutrition . Disregards spectrum of severe PEM . Does not include duration as a criterion

TABLE 7 : SUMMARY OF SYSTEMS FOR CLASSIFYING NUTRITIONAL STATUS (cont)

SYSTEM	INDEX	CLASSIFICATION CRITERIA	ADVANTAGES	DISADVANTAGES
Waterlow [80]	Height for Age and Weight for Height	. Normal . Stunted (low height for age) Grade 0 : > 95% of standard Grade 1 : 90-95% of standard Grade 2 : 85-90% of standard Grade 3 : < 85% of standard . Wasted Grade 0 : > 90% of standard Grade 1 : 80-90% of standard Grade 2 : 70-80% of standard Grade 3 : < 70% of standard	. Independent of age	. Relatively complex
McLaren & Read [99]	Weight for Height	. Normal : 90-110% of standard . Mild malnutrition : 85-90% of standard . Moderate malnutrition : 75-85% of standard . Severe malnutrition : < 75% of standard	. Independent of age . Includes a category for overweight	Does not identify "stunted" children i.e. refers only to short-term malnutrition

Apart from these classification systems, a number of allometric relationships between weight and height have been proposed. These include:

- the Dugdale index (weight/height^{1,6})
- Ehrenbergs index (log weight - 1,6 height)
- the Quetelet index (weight/height^2)
- the K coefficient

  ($K=2\sqrt{([\text{weight (g)}]/\pi \times \text{Height (cm)}]}$

Once again these all have value in certain conditions but none is considered ideal **[23; 80; 81; 98; 100; 101].**

Standards are frequently presented in the form of percentile charts and in this case classification is recommended as follows:

- Measurements between the 25th and 75th percentiles are likely to represent normal growth.

- Measurements between the 10th and 25th, and 75th and 90th percentiles may or may not be normal, depending on various factors such as genetic potential and the environment.

- Measurements above the 90th and below the 10th may indicate the necessity for medical referral.

- Measurements above the 95th and below the 5th should be referred and followed up. **[102]**

- Measurements below the 3rd percentile have been described as "at risk both for morbidity and mortality" **[91]**.

4.6.2 Assessment of Dietary Intake

4.6.2.1 Diet Survey Methods

The accurate assessment of dietary intake is an integral part of many nutritional studies yet the methodology presents many challenges with regard to validity and reliability. There is as yet no single method that is considered acceptable as a means of assessing food intake of free-living individuals **[103]**. Several methods have been developed, each with its own particular advantages and limitations. The choice of method should "clearly be appropriate to the stated objectives of the study" **[104]**. Diet survey methods commonly used include the following:

a) Dietary History

This attempts to establish the "long-term history or pattern of usual intake ..... and requires an extensive interview by a trained nutritionist" **[105]**

b) Seven-day record of actual intake

This is believed to "give a reasonably accurate measurement of actual intake" **[105]** and is carried out by weighing or measuring of portion sizes of foods eaten over a seven day period. It is impractical for large surveys because of the high degree of co-operation required from the respondents.

c) 24 Hour recall

Respondents are required to recall food intake over the previous 24 hours. Since this is the method of choice in this study, it will be discussed more fully in this review of the literature.

d) 7 Day recall

Respondents are required to recall food intake over the previous 7 days. Reliance on memory for such a long period of time results in loss of accuracy **[105]**.

e) **Food Frequency**

This attempts to measure the frequency with which various foods are eaten. It is often used in combination with other methods **[62; 106; 107].**

4.6.2.2 Validation

The validation of diet survey methods is notoriously difficult because food intake is a constantly changing entity. For this reason, most attempts to validate the 24 hour recall have involved comparison of results obtained by this method with those obtained by the 7 day record of actual intake. The frequently quoted studies by Young, Gersovitz and Hankin indicated overall agreement in results achieved by the two methods **[108; 109; 110].** In another study, Madden compared nutrient values derived from weighed dietary intake (obtained by unobtrusive observation and subsequent weighing of plate waste) and 24 hour recall of the same lunch-time meal. No significant differences were found between any of the seven nutrients measured. The recall method did however tend to underestimate overall energy intake **[111].**

Eyberg compared the protein, calcium and phosphorus content of diets obtained by a 2 hour recall and laboratory analysis of duplicate diets, in a rural Black community. The correlation between the two methods was "excellent" **[112].**

In order to establish the validity of the 24 hour recall when administered to parents as a means of assessing food intake of young children, Klesges et al, Treiber et al and Eck et al have compared data obtained using a 24 hour recall with weighed food intake, food frequency and unobtrusive observations respectively. In all cases, good correlation was found between the two methods and it is concluded that 24 hour recall is a useful means of evaluating food intake of pre-schoolers **[113; 114; 115].**

It has also been proposed that the validity of the 24 hour recall is likely to be greater in less sophisticated communities where eating patterns are relatively simple, since this means there are fewer types of food to recall and recall is therefore easier **[81; 112].**

4.6.2.3 Limitations of the 24 hour recall

Reliance on memory

The inaccuracies found in data obtained using the 24 hour recall are largely the result of the reliance on memory. Recall may be incomplete, because "most people eat without devoting full attention to the type and amount of foods they are eating" **[116]**. Respondents may also elaborate on details, adding or omitting certain information. It has however been found that younger women recall information about food better than either older women or men **[103; 104; 117; 118]**.

Flat slope syndrome

The "flat slope syndrome" has been described in several studies testing the validity of the 24 hour recall. Also described as "talking a good diet" **[111]** this is the phenomenon whereby respondents tend to over report small intakes and under report large intakes **[108; 109; 111; 119]**. This has the effect of introducing "a downward bias in the number of subjects with extremely low and extremely high intakes" **[109]**.

Variations in day-to-day intakes

The 24 hour recall has been criticised in that it represents only one day's intake which is not necessarily an accurate reflection of a usual pattern of intake. Heady and Hankin however found that despite large differences in individual intakes from day to day, mean intakes of the group were not significantly different **[110; 120]**.

4.6.2.4 Motivation for using the 24 hour recall

When evaluating the different methods for assessing dietary intake in order to select a method for a particular study, it is frequently "necessary to strike a balance between accuracy and validity on the one hand and practicability on the other" **[121]**.

Despite its recognised limitations, the studies quoted above and others, have resulted in the conclusion that the 24 hour recall method is an acceptable method of assessing food intake when used on groups of at least 50 respondents and where an error of 10% can be tolerated **[105; 108]**. It cannot be used to assess the nutrient intake of individuals, but is of value in obtaining "a good estimate of current food consumption by groups" **[103]**.

It requires a far smaller degree of co-operation from the study population and is less expensive than other diet survey methods, making it a suitable choice for large scale epidemiological studies. The likelihood of inaccuracies can be lessened by using a structured record sheet for interviews, food models and / or examples of commonly used household measures and thorough training of the interviewer(s) **[106; 122].**

4.6.2.5 Interpretation of dietary data

Data on food intake must be interpreted with caution. Interpretation involves the analysis of nutrient values of food consumed and the comparison of these values with an acceptable standard, in order to evaluate the nutritional adequacy of the diet. Meaningful results are therefore dependent on the quality of data on food composition and the dietary standard used.

a) **Data on food composition**

In relying on food composition tables to calculate nutrient intakes it must be accepted that such tables may contain certain weaknesses. These include possible errors resulting from inadequate sampling or errors in nutritional assays, failure to indicate missing values and failure to take into account differences in bioavailability **[78; 123].** Using different tables may compound such errors as a result of different methods being used in the compilation of the tables **[78].** The food composition tables used in this study (those compiled by the South African Research Institute for Nutritional Diseases) have the additional problem of the lack of local data and subsequent reliance on values obtained elsewhere **[124].**

b) **Dietary Standards**

When using dietary standards to assess adequacy of nutrient intake, it is important that the basis of the standard is clearly understood **[123].**

The standard most commonly used in nutrition studies is the "Recommended Dietary Allowance" or (RDA). This represents a "level of intake sufficient to meet the needs of essentially all healthy people" **[123]**. The RDA's have been formulated so as to allow a considerable "safety margin" both above and below the prescribed values. A nutrient intake in line with the RDA's does not necessarily ensure adequate nutritional status, neither does an intake less than the RDA's imply an inadequate intake. The further the intake falls below the RDA, however, the greater the risk of inadequacy amongst the population **[78; 123; 125]**. As far as excessive intakes are concerned, amounts as much as two or three times the RDA can, in most cases, be consumed without endangering health **[125]**.

Further limitations of the RDA's include the fact that they do not make provision for special nutritional requirements in different medical conditions and the absence of RDA's for certain nutrients **[125]**.

Despite these limitations, RDA's are considered an acceptable means of assessing the adequacy of the diet, provided they are applied to groups and not individuals and interpreted with caution **[78; 125]**.

4.7 Evaluation of nutrition knowledge and interest in nutrition

Studies designed to evaluate the nutrition knowledge of various groups in Southern Africa have been carried out by Wagstaff, Walker et al, Lubbe and Friedman **[59; 126; 127; 128].**

Wagstaff questioned a group of randomly selected adults as well as the mothers or childminders escorting children attending the Paediatric Outpatient Department at Baragwanath Hospital in Soweto. In those with an educational level below Std 8 who had received nutrition instruction, approximately 70% considered a mixed diet necessary for health and recognised protein as a body building food. In those with a similar level of education but who had not received nutrition instruction 57% considered a mixed diet necessary for health but only 30% recognised protein as a body building food. Wagstaff concluded that nutrition education was "well established in Soweto" and that the "vast majority have a reasonable basic knowledge of nutrition" **[126].**

Walker et al studied housewives of three different ethnic groups (White, Indian and Coloured) in Johannesburg, Springs and Durban. Questions were included concerning knowledge of nutrients and sources thereof and the function of various foods. The proportions of correct answers amongst Whites, Indians and Coloured were 50%, 41% and 43% respectively, which was considered "unsatisfactory." Interest in cooking was however high, as over 90% of all the housewives were either "very or quite interested" in food preparation **[127].**

Lubbe tested the nutrition knowledge of urban rural Zulus and South Sothos (men and women) in Natal, the Orange Free State and Transvaal. In this study it was found that amongst urban Zulus, between 50% and 80% indicated that they knew what was meant by a balanced diet. Amongst urban Sotho's this percentage was between 38% and 58% and in the rural areas it ranged from 14% to 23%. When asked which foods are necessary for a balanced diet, not one respondent included foods from all five basic food groups. The majority of respondents listed foods from two or three of the food groups and an appreciable number (between 45% and 100%) regarded sugar as being part of a balanced diet. Amongst the rural group, only 10-24% were in favour of breast feeding for babies under 6 months - this percentage rose to between 39 and 60% in the urban group. Between 67% and 97% of all respondents disagreed with the statement, "it does not matter what type of food a child eats as long as his stomach is full" although 8% of the urban and 23% of the rural respondents indicated that they either agreed or did not know. Similarly, 8% of the urban and 48% of the rural respondents either agreed with the following statement or did not know whether it was correct or incorrect: "Children are healthy if they eat only maize meal, samp and bread" Lubbe concluded that" gaps exist in the nutritional knowledge of rural and urban Zulus and South Sothos, particularly with regard to their perception of a balanced diet and baby and child feeding" **[128].**

In his study of families in the Valley of a Thousand Hills, Friedman asked: "What simple rules does one follow in planning a good diet?" The majority of respondents were able to give examples of foods from the protein-rich food group, the protective foods (fruit and vegetables) and the energy providing foods (starches and sugars) but the concept of a balanced diet was not "strongly appreciated." Nutrition education had been carried out in the area for several years prior to the survey but Friedman concluded that "there is still sufficient lack of understanding of nutrition requiring a continuation and even intensification of nutrition education" **[59].**

5. STUDY DESIGN AND RESEARCH METHODS

5.1 The Study Area

In the initial planning stages of this study, the area selected for study was Newtown C, a fast growing peri-urban area inhabited mainly by squatters (people living in densely populated, unplanned areas lacking basic facilities such as water, roads and sanitation) and forming part of the large township of Inanda, situated north west of Durban. However, shortly after fieldwork began, violence broke out in this area, making it impossible for fieldwork to continue. An alternative area, Malukazi, was therefore selected for study. Malukazi is an informal township situated approximately twenty kilometres south west of Durban (see Appendix i for map showing area). Part of the area falls under the independent homeland of KwaZulu and the remaining area was originally allocated to the Asian community. This area has however increasingly been inhabited by Black squatters with the result that it can now be classified as a Black squatter area. Many of the inhabitants can be regarded as temporary residents since they are refugees from other townships, forced to vacate their homes as a result of violence in those areas. The number of squatters moving into Malukazi has shown an appreciable increase in the past two years. Because Malukazi is not clearly demarcated it is difficult to estimate the area it covers, however this is assumed to be in the region of 50 acres. Similarly, as a result of the rapidly increasing population in the area, only a rough estimate of the total number of inhabitants can be given.

It is estimated that there are at least 1000 "squatter shacks" in Malukazi, each occupied by a minimum of 5-10 people, therefore it would appear that the population of the area is in the region of 5000-10 000.

Health services in Malukazi are almost exclusively provided by the Islamic Medical Association. Some ten years ago, the Isipingo Branch of the Muslim Youth Movement, who were carrying out missionary work in the area, recognised the need for health services there. This began on a temporary basis but as the population increased this proved insufficient and a full time Clinic, run by the Islamic Medical Association, has operated in the area for the past four years. The only other Clinic in the vicinity, run by the KwaZulu health authorities, is several kilometres away. Being an informal township, neither running water nor waterborne sewerage are available and the so-called "diseases of poverty" are common.

Malukazi was selected as the area for study for several reasons:

i) it is representative of the informal "squatter" areas bordering on formal townships outside large cities

ii) the Clinic operated by the Islamic Medical Association provided a suitable base for the interviewer and the Clinic sister was prepared to offer assistance with the study.

iii) it is relatively close to Durban making it easily accessible to researchers

5.2 Selection of the sample

Drawing of a random sample in the area proved to be difficult. In a more formal township where the area is systematically divided into sections each with numbered houses and proper access, the method of choice for sample selection would be for the sample to be selected from the total number of houses by computer. This was not possible for this particular study since Malukazi has not been formally planned.

An alternative system of drawing a random sample, similar to the "spinning the bottle" method approved by the WHO, which uses two throws of a dice (one to indicate direction and one to indicate the number of house in that direction to be selected) was attempted. This however proved impractical as the high density and haphazard arrangement of the shacks as well as the lack of proper access roads made it very difficult to locate and reach a particular house in a given direction.

It was therefore decided to draw a systematic sample from those people attending the Clinic. It was recognised that this would introduce an element of bias into the sample in that it would represent only that portion of the population attending the Clinic rather than the population as a whole, but discussions with the Clinic Sister indicated that as a result of the measles immunisation campaign, clinic attendance was exceptionally high.

Since the majority of people at the Clinic were there solely for immunisation purposes, the problem of a sample selected in this way reflecting only that sector of the population who are already ill, was greatly reduced. The sample was drawn with the aid of the Clinic Sister, who referred every tenth patient attending the Clinic to the interviewer for questioning, until a total number of 150 respondents had been selected. The average daily clinic attendance is approximately 130. Since the interviewing took place over a period of approximately 5 months, the total number of respondents interviewed represents a sample of approximately 1,0% of people attending the Clinic in that period.

In the final analysis of the data, however, only 148 questionnaires were used. In the remaining two, errors in the recording of the house identity number made it impossible to use this data.

5.3 Approval for the study

Approval for the study was obtained from the Islamic Medical Association and from the Sister in charge of the Clinic. As a result of the Sister's major leadership role in this particular community, approval by other community leaders was obtained with ease.

At the start of each interview, a brief description of the background and objectives of the study was given to each respondent before requesting their consent to continue with the interview. to ensure confidentiality, number codes were allocated to the questionnaires and only these were used once the questionnaires had been coded.

5.4 Collection of data

Information was collected by means of face-to-face interviews between a single interviewer and respondents. In each case, respondents included both the head of the household and the childminder. Part of the interview took place in the Clinic and part of it in the household. Children were weighed and measured at the Clinic.

5.4.1 Choice of data collection method

In a survey of the nature of this study, information could be obtained either by self-administered questionnaire, face-to-face interview or by direct observation. Direct observation has limited application in this case but was selected as the best means of obtaining information on the childminders' body size. Face-to-face interviews were selected as the method of choice for collection of the other data for the following reasons:

a) since the literacy of the study population was not known, it is possible that some of the respondents would not have been able to complete a self-administered questionnaire

b) the haphazard arrangement of the houses and lack of formal addresses would have made the mailing and return of self-administered questionnaires difficult

c) the relative lack of sophistication of the study population, together with their unfamiliarity with questionnaires, could result in problems which a trained interviewer could overcome. These include lack of interest, anxiety and a lack of understanding of certain questions **[129]**.

The face-to-face or personal interview is regarded as often "the most useful and powerful for survey research" **[130]**.

5.4.2 Choice of interviewer

When the study was originally planned, it was intended that respondents would be interviewed by community health workers working in the study area, as it is generally believed that quality of information collected from personal interviews is enhanced when the interviewer is from the same community as the respondents **[131]**.

Hoffman et al contend however that sensitive issues are more successfully handled by outsiders **[75]**. The latter aside, it was later realised that the use of community health workers as interviewers would prove impractical because of their relatively limited education.

It was therefore decided to select and train a single interviewer who would be reponsible for all the data collection. A staff nurse from a nearby area was selected for this purpose, on the basis that she was of the same ethnic group, spoke the same language and came from a more or less similar background to that of the respondents. The use of a single interviewer was also likely to improve the quality of the information collected by eliminating intra - interviewer variation.

5.4.3 Measurement of height and weight

a) Height

Height was measured by means of a wooden measuring stick specially constructed for the purpose. Designed to be easily carried, the stick was light, short (long enough to measure young children only) and could be folded in the middle.

The interviewer was provided with a thin, flat, rectangular plank to be used in the event of a horizontal floor not being available, and a right angled piece of hardboard for use as a "head-piece."

Subjects were required to stand either on the floor (if truly horizontal) or the plank with their heels up against the measuring stick which was held against a vertical surface. Height was then read off the measuring stick using the "head-piece" placed vertically on the crown.

b) Weight

Since weight is the "most important single anthropometric measurement that can be taken" **[11]** the choice of scale is very important. In this study, the scale had to be easy to transport therefore the highly accurate beam balance scale was not suitable. Bathroom scales although light and compact, are notoriously unreliable.

The use of a digital scale was therefore investigated. A battery operated Soehnle Gold Brand Digital bathroom scale, accurate to 25g, was selected. This scale later however proved inconsistent therefore a good quality Tanita bathroom scale was used in addition to the digital scale. Both scales were calibrated daily using a 20kg pack of fertiliser and weights adjusted accordingly. Weight was recorded with the subject wearing light clothing and without shoes.

In the initial stages of the study it was intended that in addition to height and weight, skinfold thickness and/or mid-upper arm circumference would be measured. This proposal was later rejected on the grounds that:

i) evidence of these measures supplying information over and above that obtained by height and weight was insubstantial **[80]**.

ii) the difficulty in obtaining accurate measurements of skinfold thickness detracts from their usefulness

iii) the calipers for measuring skinfold thickness are expensive and are perceived as threatening by young children

5.5 Questionnaire Design

The questionnaire or interview schedule used in the study was designed bearing the following points in mind:

- completion should necessitate the least possible amount of writing
- questions shold be simple, easily understood by the respondents and no unfamiliar terms should be used
- questions should give no indication of "right" answers
- questions should follow a logical sequence
- questions that could offend respondents should be avoided
- The questionnaire should be as short as possible

[129; 130; 131; 132]

In order to improve validity, questions were phrased so as to lessen the likelihood of respondents providing inaccurate answers or answers that were believed to be those sought by the interviewer. In addition, built-in checks and "trick" questions were included where possible. When completed, the questionaires were translated into Zulu, the language of the respondents.

Since the questionnaire was the key instrument in the study and was compiled over a lengthy period with input from a number of notable researchers who used a similar type of questionnaire in their own studies, a detailed explanation of the questionnaire design follows.

Information required included the following:

a) nutritional status of pre-school children using firstly anthropometric methods and secondly dietary intake

b) information on various factors which might influence nutritional status, e.g.

- socio-economic status of the household
- family structure
- identity, age and educational level of childminder
- childminder's knowledge of nutrition
- breast vs bottle feeding
- eating pattern of the child
- intrafamilial distribution of food
- childminder's body size
- identity of decision-maker concerning food purchasing and preparation
- presence of a growth card
- frequency of clinic visits
- number of children looked after by the childminder

c) background information necessary for the development of an effective nutrition education programme, e.g.

- . eating pattern
- . food taboos
- . food purchasing, preparation and storage
- . home production of food
- . presence and use of growth chart
- . identity, age and educational and literacy level of childminder
- . childminder's knowledge of nutrition
- . childminder's attitude towards nutrition education
- . social activities and media used by childminder
- . sources of highest credibility for dissemination of nutrition information

[4; 5; 11; 13; 25; 27; 33; 62; 81; 133; 134; 135]

With this in mind, the questionnaire was divided into four sections:

Section A : Background information on the household
- information obtained from the head of the household

Section B : Anthropometric measurements and general information on the child
- information to be obtained from childminder

Section C : Background information on the childminder
- information obtained from childminder

Section D : Food intake questionnaire

The questionnaire was discussed with the statistician responsible for the analysis of the data and the section for coding designed accordingly. Once completed and translated, the questionnaire was pre-tested on a small number of households in a different township some distance away from the study area. Minor changes were made and the questionnaire was then considered ready for use.

5.5.1 Notes on selected questions included in the questionnaire

Question 1

The household number was obtained so that the respondent could be contacted again if necessary.

Question 2

The information required was the number of children aged between 3 and 6 years present in the household. The question was phrased in this way because birthdates of children are known whereas ages frequently are not. The months given were altered according to the date of the interview. In addition, it was easier for respondents to list the names of the children rather than give the total number present. In order to eliminate further questioning of a household where no children of the required age group were present, the interviewer was instructed to cease the interview at this point if no children's names were provided.

Question 3

This question was designed so as to obtain information on socio-economic status. Question 3a) was intended to indicate the number of potential income earners present and together with 3 b) and c), a dependency ratio. Unfortunately the transient nature of the household made it impossible for the interviewer to obtain accurate answers to this question and it was therefore excluded from the analysis. Question 3b), adapted from a questionnaire developed by Friedman **[59]**, provided a rough indication of socio-economic status. Question 3c) was included to ensure that any supplemental income was not inadvertently omitted.

No direct question regarding income was included as this has been found to be unreliable as a means of obtaining this type of information **[136; Friedman - personal communication]**.

Question 4

For this and the majority of other questions included, the questionnaire was designed so as to provide for as many answers as possible, so that the interviewer was not required to write out the reply.

Questions 4-7 refer to food purchasing and preparation.

Question 8

This together with question 9 refer to intra-familial distribution of food.

Question 9

This question was included to ascertain whether or not the respondent felt there was sufficient food for the child(ren). The question was phrased so as to reduce sensitivity and thereby improve the likelihood of an accurate response.

Questions 29 and 47

These questions were included in order to obtain a rough estimate of the childminder's body size (Sr Jojo is a Nursing Sister who was closely involved with the study and who was considered to be of "average" body weight). The answer to these questions was obtained by observation on the part of the interviewer.

Question 31

As for question 2, this question was structured in this way because it was considered easier for the respondent to list the childrens' names than to give the total number.

Question 32

Again, birthdates are known whereas ages may not be.

Questions 36 and 46

Attitudes are particularly difficult to measure therefore these questions, referring to the childminder's attitude to nutrition education, were carefully designed. In question 36, various other home-making skills were included so as to shift the focus away from nutrition. This was intended as a check for question 46 where the question is asked directly.

Question 39

This question refers to food taboos.

Question 40, 41, 43, 44

The phrasing of these questions in the form of a "story" was an attempt to avoid having respondents supply answers in line with their perception of what the interviewer would like them to say. This method was considered effective in a similar study **[Friedman, personal communication]**

Question 42

This was a "trick" question in that the impression was almost given that bottle feeding is the accepted norm. Again, this was done so as to prevent respondents supplying what they believed to be the "right" answer in the eyes of the interviewer.

5.6 Measurement of Food Intake

It was decided to use the 24-hour recall method for measuring dietary intake as this is considered acceptable for use in ascertaining mean nutrient intakes of groups larger than 50. Validity was likely to be enhanced as a result of the lack of sophistication of the respondents and corresponding uncomplicated eating pattern **[81; 112]**, as well as the fact that the majority of the respondents were relatively young women **[103; 104; 117; 118].** Weekend days were excluded from the study in order to ensure a more accurate assessment of basic food intake.

A food frequency questionnaire was also included in an attempt to obtain further information on eating patterns and to provide back up information on the 24-hour recall.

5.7 Selection and Training of Interviewer

5.7.1 Selection of interviewer

The following are considered important in the selection of an interviewer.

- ability to speak the local language
- ability to establish rapport with respondents
- the interviewer should be of the same sex and of the same social class and ethnic group as the majority of respondents.
- women are considered better at obtaining information of a personal nature than men.
- the ideal age range for interviewers is 25 to 45 years although interviewers in the same age range as that of the respondents is also considered desirable. **[129; 131; 132; 136]**

The interviewer selected for the study, a Zulu female staff (enrolled auxiliary) nurse in her late twenties met most of the above criteria.

5.7.2 Training of Interviewer

Training of the interviewer took place over a period of several weeks and was greatly facilitated by the involvement of a Black Nursing Sister carrying out nutrition education in clinics throughout Natal.

Training included some of the basic skills necessary for successful interviewing such as the art of asking questions in a neutral manner and not registering agreement, disagreement or surprise.

The need for recording precise answers as supplied by the respondent was stressed, as was the need for strict standardisation **[129; 131].** Much of the training centred around the correct measurement of height and weight, the 24-hour recall of dietary intake, particularly the method of recording foods eaten accurately and in sufficient detail for subsequent coding. A practical training session was held in which commonly used foods and beverages were prepared, weighed and/or measured and standard portion sizes recorded using familiar household utensils. These included serving spoons, bowls and cups similar to those commonly used by the respondents. A set of these was then given to the interviewer to assist in obtaining accurate information from respondents regarding portion sizes. Care was taken to ensure that the researcher's and interviewer's perceptions of descriptions such as "large", "medium" or "small" and "thickly" or "thinly" (spread) coincided. The interviewer was also instructed as to the difference between milk powder and non-dairy creamers since these are frequently confused.

Ongoing support for the interviewer was provided by both the researcher and the Nursing Sister, who paid frequent visits to the study area and re-interviewed a limited number of the respondents in order to check reliability. Completed questionnaires were coded on an ongoing basis, thus providing a second check that they were being correctly completed.

5.8 Fieldwork

It was initially estimated that fieldwork would be completed in approximately three months, however the unforseen problems in the original study area resulted in a delay of several months before an alternative study area could be located. Consequently, field work took place somewhat later than planned, from July to November 1990.

Although the final study area was regarded as being relatively stable, fieldwork was hampered by the climate of socio-political tension in the area. This resulted in an atmosphere of general hostility and suspicion, making it extremely difficult for the interviewer to obtain the required information in certain cases. The assistance of the Sister-in-Charge of the Clinic in the area was invaluable in overcoming problems of this nature. In view of these difficulties, ongoing support and motivation of the interviewer was essential. The interviewer however displayed notable fortitude and commitment to the study in completing her task under these unfavourable conditions.

5.9 Coding of Data

All questionnaires were coded by the researcher. Coding was simplified by the design of the questionnaire, whereby the majority of questions were accompanied by a series of pre-coded possible answers. Codes were then inserted into blocks in a column on the right hand side of each page, included for this purpose.

Information obtained in the 24-hour recall of dietary intake was coded using the codes included in the NRIND Food Composition Tables (2nd edition) compiled by Gouws and Langenhoven **[124]**, on standard forms compiled by the Medical Research Council. Weight volume equivalents were calculated using the NRIND Food Quantities Manual **[137]**.

In two cases (maas, a sour milk product and "Tropika", a milk/fruit juice blend) foods eaten were not listed in the Food Composition Tables. Nutrient analyses for these products were obtained from the manufacturer and entered into the computer prior to the analysis.

An "identity number" was allocated to each household and to each child to facilitate cross-referencing of data. This system also ensured confidentiality from this stage onwards.

Where answers were unclear, this was discussed with the interviewer and in a limited number of cases, the questionnaire was returned and the question re-asked of the respondent. Three questions were however incorrectly completed on a large number of the questionnaires (Questions 3a, 29 and question 2 of Section D) and this information was therefore excluded from the analysis.

In the case of Questions 2, 3b and 31 the answer was coded so as to reflect the total number present. For questions 18 and 32, the ages of the child and childminder respectively were used for coding purposes. For question 43, a scoring system was devised based on one point for foods from each of the 5 Basic Food Groups listed. The total score was then used for coding.

5.10 Analysis of Data

Analysis of the data was done by the Institute for Biostatistics of the Medical Research Council in Pretoria.

An IBM 3270 computer and SAS (Statistical Analysis Systems) package were used to perform the following analyses:

i) Calculation of mean heights and weights; comparison of heights and weights with NCHS percentiles

ii) Nutrient analysis. When expressing mean daily nutrient intakes as a percentage of the RDA, it was decided to use both the RDA's determined by the U.S. National Academy of Sciences (N.A.S) and those of the World Health Organisation **[5]**. The former are somewhat higher than the WHO recommendations and a value of 67% of the N.A.S. RDA's is believed to compare well with the latter. This is considered to be the average requirement of half of a given population.

iii) Nutritional analysis with reference to Food Groups

Information regarded as having a possible influence on nutritional status was analysed to determine the level of significance, if any, between each factor and the degree of malnutrition.

The balance of the data was analysed so as to obtain percentages of the total number of respondents providing each particular answer.

6 LIMITATIONS

6.1 Interviewing

With regard to study design, an interview-based survey of this nature has a number of inherent limitations. The co-operation of the respondents is essential and the accuracy of the data collected can be seriously affected if the interviewer is regarded with suspicion or hostility. Lack of interest can further hamper the interview process. The assistance of the Clinic and its staff were therefore of critical importance to this study.

In any study using face-to-face interviews as the main method of data collection, limitations are imposed in that the quality of the data collected depends largely on the skill of the interviewer(s). Interviewer bias can be a problem and respondents frequently supply answers they believe will please the interviewer, particularly if they consider the interviewer to be "superior" in any way. Consequently, in this study, where the respondents were relatively unsophisticated, it was undesirable to use a highly skilled interviewer. Although every effort was made to provide adequate training for the interviewer, as well as ongoing support, the fact that certain questions were incorrectly completed indicates that interviewer training could have been improved.

It was originally intended that 10% of the respondents would be re-interviewed by a second interviewer (a trained nursing sister), in order to test the validity and reliability of the questionnaire. This proved to be impractical firstly because the haphazard arrangement of the houses made it extremely difficult to re-locate a particular respondent, secondly because the suspicion, hostility and general lack of co-operation on the part of the respondents made re-interviewing very difficult and thirdly because of the time constraints imposed by the necessity to change the study area when fieldwork was already underway. The failure to re-interview 10% of the respondents is therefore another limitation of this study. However, the use of a professional nurse as the "reference standard" against which the interviewer is assessed does itself have an inherent weakness due to the likelihood of different responses being given to a person of professional status.

6.2 Sampling

A major limitation of this study was the way in which the sample was drawn. Drawing a sample from that sector of the population attending the Clinic was by no means the method of choice for obtaining a truly representative sample, since it is likely that users of preventive health care are more aware of the importance of diet and other factors in maintaining health. However, since other superior methods of sample selection were attempted and proved impossible as a result of the lack of formal planning of the study area, this was regarded as the best practical method for this particular study.

6.3 Assessment of Nutritional Status and Dietary Intake

Further limitations exist in that no universally accepted method of assessing nutritional status has been devised and each of the established methods has its own particular limitations. The data obtained from this study would have been improved by the inclusion of biochemical data although this would not have been feasible for a variety of reasons.

Similarly, controversy continues to exist with regard to the best method of collecting dietary intake data. The seven day record is considered the most accurate method however there is general consensus that the 24 hour recall is acceptable for studies such as the present one.

In addition, there are limitations involved in using standards for comparison of both anthropometric data and nutrient intake, both from the point of view of which standards to use and the selection of cut-off points. Food composition tables used for nutritional analysis are also recognised as being less than perfect.

6.4 Questionnaire Design

The information obtained from two of the questions included in the questionnaire had limited use as a result of the way in which they were phrased. Question 25, concerning infant feeding practices, would have provided more useful information if it had been designed to determine the number of children who were exclusively breast fed for a minimum of 4 months.

Similarly, Question 27, referring to growth cards, should have been phrased so as to establish the number of children who have growth cards and were using them (growth cards are automatically issued to each child at birth therefore it would be expected that most children would have them.

6.5 Completeness of Data

With regard to the actual information collected, limitations exist in that it was not possible to obtain all relevant details. Exact information on respondents' income levels would have been desirable, as would data on weaning patterns of the children. As a result of the relationship between nutrition and infection, information on the overall health status of the children, particularly recent episodes of infections conditions such as diarrhoea and measles, would have been useful. Details of the childminders' food intake might have provided additional insights into the relationship between intra-familial distribution of food and the development of malnutrition. In addition, some of the questions included in the questionnaire, particularly those relating to knowledge and attitudes, may not have yielded accurate information in spite of the attempts to phrase these questions so as to overcome this problem.

Finally, there are limitations to be found in any information collected in a single survey. Repeated surveys using the same methods would improve the quality of data thus obtained **[130].**

7. RESULTS

7.1 Anthropometry

The breakdown of the sample according to age and sex which applies to the results given in Tables 9 to 15 is shown in Table 8.

Table 8
Breakdown of sample according to age and sex: Numbers and percentages (%)

Age in Years	Sex		Total
	Males	Females	
3	23 (15,5)	19 (12,8)	42 (28,4)
4	18 (12,2)	22 (14,9)	40 (27,0)
5	22 (14,9)	24 (16,2)	46 (31,1)
6	7 (4,7)	13 (8,8)	20 (13,5)
Total	70 (47,3)	78 (52,7)	148 (100,0)

7.1.1 Mean Heights and Weights

The mean heights and weights of the study population according to age and sex, are presented in Tables 9 and 10 respectively.

Table 9

Heights (cm) according to age and sex: Mean and (Standard Deviation)

Age in Years	Males	Females	Total
3	88,4 (10,0)	81,2 (11,2)	84,8 (11,0)
4	94,1 (8,9)	91,9 (10,8)	93,0 (10,0)
5	97,5 (9,3)	94,0 (12,1)	95,8 (10,9)
6	93,6 (13,2)	97,5 (11,4)	95,6 (11,9)

Table 10
Weights (kg) according to age and sex: Mean and (Standard Deviation)

Age in Years	Males	Females	Total
3	15,1 (1,3)	14,1 (1,4)	14,6 (1,4)
4	15,1 (1,0)	15,3 (1,1)	15,2 (1,1)
5	16,7 (2,7)	15,9 (1,8)	16,3 (2,3)
6	14,9 (1,8)	16,8 (2,3)	15,9 (2,3)

7.1.2 Assessment of nutritional status using height and weight

Although the choice of cut-off points for determining the percentage of malnourished children in a given population remains controversial, in the case of weight-for-age and weight-for-height, a cut-off point of 80% of the standard is widely used. For height-for-age, a cut-off point of 90% of the standard is used **[65]**. (These points are approximately the same as the third percentile **[91]**). In each case, the standard used is the 50th percentile of the NCHS standards. Both the 5th and 3rd percentiles are also frequently used as cut-off points.

The percentage of children falling below these various points for each category is presented in Table 11.

Table 11
Sample component falling below given cut-off points for weight-for-age; height-for-age and weight-for-height : Numbers and percentages (%)

Index	Below 90% of standard	Below 80% of standard	Below the 5th percentile	Below the 3rd percentile
Weight-for-age	-	23 (15,5)	29 (19,6)	21 (14,2)
Height-for-age	70 (47,3)	-	86 (58,1)	70 (47,3)
Weight-for-height	-	0 (0,0)	5 (3,4)	0 (0,0)

The percentages of the sample falling below the 5th and 3rd percentiles for weight-for-age, height-for-age and weight-for-height are shown according to age and sex in Tables 12, 13 and 14.

Table 12

Sample component falling below the 5th and 3rd percentiles for weight-for-age, according to age and sex: Numbers and Percentages (%)

Age in Years	< 5th			< 3rd		
	Males	Females	Total	Males	Females	Total
3	2 (8,7)	0 (0,0)	2 (4,8)	2 (8,7)	0 (0,0)	2 (4,8)
4	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)
5	11 (50,0)	3 (12,5)	14 (30,4)	7 (31,8)	0 (0,0)	7 (15,2)
6	7 (100,0)	6 (46,2)	13 (65,0)	7 (100,0)	5 (38,5)	12 (60)
Total	20 (28,6)	9 (11,5)	29 (19,6)	16 (22,9)	5 (6,4)	21 (14,2)

Table 13
Sample component falling below 5th and 3rd percentiles for height-for-age, according to age and sex: Numbers and Percentages (%)

Age in Years	< 5th			< 3rd		
	Males	Females	Total	Males	Females	Total
3	14 (60,9)	14 (73,7)	28 (66,7)	11 (47,8)	14 (73,7)	25 (59,5)
4	8 (44,4)	11 (50,0)	19 (47,5)	6 (33,3)	9 (40,9)	15 (37,5)
5	10 (45,5)	13 (54,2)	23 (50,0)	8 (36,4)	10 (41,7)	18 (39,1)
6	6 (85,7)	10 (76,9)	16 (80,0)	5 (71,4)	7 (53,9)	12 (60,0)
Total	38 (54,3)	48 (61,5)	86 (58,1)	30 (42,9)	40 (51,3)	70 (47,3)

Table 14
Sample component falling below 5th and 3rd percentiles for weight-for-height, according to sex: Numbers and Percentages (%)

Sex	< 5th	< 3rd
Males	3 (4,3)	0 (0,0)
Females	2 (2,6)	0 (0,0)
Total	5 (3,4)	0 (0,0)

Steyn et al **[55]** noted that the 5th percentile is more than 90% of the standard for height-for-age (the standard being the 50th percentile of NCHS standards) whereas for weight-for-age, the converse is true. This means that for height-for-age, more children fall below the 5th percentile than below 90% of the standard and for weight-for-age, more children fall below 80% of the standard.

In an attempt to determine the degree of malnutrition present in the study population, the data on height-for-age and weight-for-height were classified according to the classification system proposed by Waterlow **[80]**. (Although the Wellcome classification is widely used, it was decided to use the Waterlow classification for this particular study as it is independent of clinical signs.

Table 15
Classification of degree of malnutrition in pre-school children in Malukazi according to the Waterlow classification system: Numbers and Percentages (%)

Height-for-age			Weight-for-height		
Grade	% of Std*	Malukazi pre-school children	Grade	% of Std*	Malukazi pre-school children
0	> 95	45 (30,4)	0	> 90	131 (88,5)
1	90-95	33 (22,3)	1	80-90	17 (11,5)
2	85-90	18 (12,2)	2	70-80	0 (0,0)
3	< 85	52 (35,1)	3	< 70	0 (0,0)
Total		148 (100,0)	Total		148 (100,0)

* 50th percentile

7.2 Dietary Intake

7.2.1 Mean daily nutrient intakes - comparison with RDA's

Mean daily intakes of nutrients and percentages of RDA's (National Academy of Sciences, (N.A.S.) and World Health Organisation (WHO)) for all subjects **[5; 138]** are presented in Tables 16 and 17. Nutrient intakes falling below 67% of the (N.A.S.) RDA were energy, calcium, vitamin A, zinc, ascorbic acid, vitamin D and vitamin B6. Intakes of copper, pantothenic acid and biotin fell below 67% of the estimated safe and adequate daily dietary intake for these nutrients. Intakes of iron, phosphorus and riboflavin could be considered borderline since they were 73,0%; 72,0% and 72,7% of the RDA respectively. When expressing intakes as a percentage of the RDA's recommended by the WHO, nutrients with mean intakes falling below 75% of the RDA were energy, calcium, vitamin A, ascorbic acid, vitamin D and iron. Intakes of folic acid and riboflavin could be considered borderline.

The standard deviations are relatively large, indicating considerable variation in nutrient intakes within the sample. The percentage of energy provided by protein, carbohydrate and fat was 12%, 63% and 25% respectively (see Table 18).

Table 16
Daily intake of nutrients of Malukazi pre-school children and Recommended Daily Allowances (RDA)° : Mean (Standard Deviation) and percentage RDA

Nutrients	RDA°	Malukazi Pre-School Children	%RDA
Kilojoules	7560*	4815 (1117)	63,7
Protein (g)	24 (30)	34,0 (9)	141,7
Pl. prot (g)	-	25,4 (8)	-
An. prot (g)	-	8,5 (7)	-
Fat (g)	-	30,6 (12)	-
Sat. Fat (g)	-	8,8 (5)	-
Mu Fat (g)	-	8,2 (4)	-
Pu Fat (g)	-	8,5 (4)	-
Chol (g)	-	63,1 (55)	-
CHO (g)	-	177,2 (42)	-
Fibre (g)	-	16,3 (6)	-
Sugar (g)	-	12,6 (5)	-
Ca (mg)	800	278,5 (131)	34,8
Fe (mg)	10	7,3 (2)	73,0
Mg (mg)	120 (200)	191,9 (57)	159,9
Phos (mg)	800	575,8 (170)	72,0
K (mg)	1400**	1032,7 (287)	73,8
Na (mg)	300**	2086,2 (835)	695,3
Zn (mg)	10	5,2 (1)	52,0
Cu (mg)	1-1,5***	0,6 (0,3)	60,0
Vit A (IU)	-	972,2 (1263)	-
Vit A (RE)	500	186,0 (152)	37,2
Thia (mg)	0,9	1,0 (0,3)	111,1
Ribo (mg)	1,1 (1)	0,8 (0,3)	72,7
Nicot (mg)	12 (11)	10,0 (4)	83,3
B6 (mg)	1,1 (1,3)	0,3 (0,2)	27,3
Fol (ug)	75 (200)	80,9 (45)	107,9
B12 (ug)	1,0 (2,5)	1,9 (3)	190,0
Asc A. (mg)	45	8,0 (9)	17,8
Vit D (ug)	10	1,6 (2)	16,0
Vit E (mg)	7 (6)	7,0 (5)	100,0
Panto (mg)	3-4***	1,1 (0,5)	36,7
Biotin (ug)	25***	7,2 (4)	28,9

Note to Table 16

° RDA's of the Food and Nutrition Board National Academy of Sciences Revised 1989 for children aged 4-6 years.

Figures given in brackets after selected RDA values refer to the 1980 RDA's **[125]**, where these differ from the current (1989) RDA's **[138]**, for comparison with other studies.

* Recommended energy intake for child aged 4-6 years of height 112cm and weight 20kg.

** Estimated minimum requirements for sodium, chloride and potassium for healthy child aged 2-5 years.

*** Estimated safe and adequate daily dietary intake of copper, pantothenic acid and biotin for child aged 4-6 years.

Table 17
Comparison of mean daily intake of selected nutrients and Recommended Daily Allowances (WHO) for children of 3-5 years.

Nutrient	RDA	Mean Daily Intake	% RDA
Energy (kJ)	6552	4815	74
Protein (g)	25	34	136
Vitamin A (RE)	300	186	62
Vitamin D (ug)	10	1,6	16
Ascorbic acid (mg)	20	8,0	40
Thiamine (mg)	0,7	1,0	143
Riboflavin (mg)	0,9	0,8	89
Niacin (mg)	10,3	10,0	97
Folic acid (ug)	100	80,9	81
Vitamin B12 (ug)	1,2	1,9	158
Iron (mg)	10	7,3	73
Calcium (mg)	400-500	278,5	70

Table 18
Contribution by macronutrients to total energy intake in pre-school children in Malukazi and recommended contribution (FAO and WHO [140]) : Percentages

	Malukazi Pre-school children	Recommended
Protein	12	10 - 12
Carbohydrate	63	60 - 70
Fat	25	20 - 25

Mean daily nutrient intakes according to age and by sex are presented in Tables 19 and 20 respectively. It should be noted that when examined by age, the total number of respondents in each category is less than 50 therefore these figures may not be respresentative of the study population. It is however of interest to note that nutrient intakes did not necessarily increase with age. For most nutrients boys had either the same or higher mean nutrient intakes than girls however mean intakes of animal protein, saturated fat, cholesterol, sugar, sodium and vitamin A were slightly higher for girls.

Table 19
Daily intake of nutrients according to age (both sexes) : Mean and (Standard Deviation)

Nutrient	Age in Years				
	3 (n = 40)	4 (n = 39)	5 (n = 44)	6 (n = 18)	Total n = 141
	Mean Intake	Mean Intake	Mean Intake	Mean Intake	Mean Intake
Kilojoules	4773,9 (1074)	4851,3 (1347)	4846,3 (995)	4754,2 (1026)	4815 (1117)
Protein (g)	33,1 (9)	34,4 (11)	34,9 (9)	32,5 (8)	34,0 (9)
Pl. prot (g)	24,0 (8)	26,6 (10)	25,4 (6)	25,8 (7)	25,4 (8)
An. prot (g)	9,1 (7)	7,8 (6)	9,5 (7)	6,6 (5)	8,5 (7)
Fat (g)	31,0 (12)	31,6 (13)	30,1 (10)	28,9 (12)	30,6 (12)
Sat. Fat (g)	9,0 (6)	9,5 (6)	8,2 (4)	8,4 (5)	8,8 (5)
MU Fat (g)	8,6 (4)	8,1 (4)	8,1 (3)	7,6 (3)	8,2 (4)
PU Fat (g)	8,8 (5)	8,1 (5)	8,8 (4)	8,0 (4)	8,5 (4)
Chol (mg)	62,5 (58)	67,5 (64)	61,1 (47)	60,3 (52)	63,1 (55)
CHO (mg)	175,4 (42)	175,4 (48)	179,7 (40)	179,2 (31)	177,2 (42)
Fibre (g)	15,1 (6)	17,3 (7)	16,4 (4)	16,9 (5)	16,3 (6)
Sugar (g)	12,3 (6)	12,9 (5)	13,5 (6)	10,5 (3)	12,6 (5)
Ca (mg)	260,6 (134)	301,0 (134)	276,0 (129)	275,5 (127)	278,5 (131)
Fe (mg)	7,0 (2)	7,5 (3)	7,5 (2)	7,1 (2)	7,3 (2)
Mg (mg)	186,9 (60)	196,3 (70)	193,4 (46)	189,4 (46)	191,9 (57)
Phos (mg)	548,6 (180)	590,0 (196)	591,6 (151)	566,8 (134)	575,8 (170)
K (mg)	993,5 (301)	1056,5 (359)	1068,0 (226)	982,1 (205)	1032,7 (287)
Na (mg)	2193,9 (818)	1946,5 (679)	2044,6 (798)	2251,1 (1211)	2086,2 (835)
Zn (mg)	5,1 (1)	5,3 (2)	5,3 (1)	5,1 (1)	5,2 (1)
Cu (mg)	0,5 (0,2)	0,6 (0,4)	0,6 (0,2)	0,5 (0,2)	0,6 (0,3)
Vit A (IU)	1054,3 (1443)	990,6 (1196)	986,3 (1367)	715,9 (587)	972,2 (1263)
Vit A (RE)	194,9 (166)	196,9 (149)	177,0 (155)	164,3 (117)	186,0 (152)
Thia (mg)	1,0 (0,4)	1,0 (0,4)	1,0 (0,3)	0,96 (0,3)	1,0 (0,3)
Ribo (mg)	0,8 (0,3)	0,8 (0,2)	0,8 (0,3)	0,7 (0,2)	0,8 (0,3)
Nicot (mg)	9,7 (4)	9,9 (4)	10,6 (3)	9,4 (3)	10,0 (4)
B6 (mg)	0,3 (0,2)	0,3 (0,2)	0,3 (0,1)	0,3 (0,3)	0,3 (0,2)
Fol (ug)	77,1 (40)	91,7 (57)	78,4 (38)	72,1 (41)	80,9 (45)
B12 (ug)	1,7 (3)	1,7 (3)	2,3 (3)	1,7 (3)	1,9 (3)
Asc A (mg)	7,8 (7)	8,1 (9)	9,3 (12)	4,9 (3)	8,0 (9)
Vit D (ug)	1,5 (2)	1,6 (2)	1,6 (2)	1,5 (2)	1,6 (2)
Vit E (mg)	7,3 (5)	6,1 (5)	7,7 (5)	6,2 (5)	7,0 (5)
Panto (mg)	1,1 (0,5)	1,2 (0,5)	1,1 (0,5)	1,1 (0,5)	1,1 (0,5)
Biotin (ug)	6,7 (3)	8,2 (4)	6,9 (3)	6,9 (3)	7,2 (4)

Table 20
Daily intakes of nutrients by sex (all ages) : Mean and (Standard Deviation)

Nutrient	Sex		
	Male (n = 62)	Female (n = 77)	Total n = 139
	Mean Intake	Mean Intake	Mean Intake
Kilojoules	4952,0 (1194)	4694,9 (1041)	4815 (1117)
Protein (g)	35,4 (11)	32,7 (8)	34,0 (9)
Pl. prot (g)	27,1 (9)	24,0 (7)	25,4 (8)
An. prot (g)	8,2 (6)	8,6 (7)	8,5 (7)
Fat (g)	31,0 (11)	30,2 (12)	30,6 (12)
Sat. fat (g)	8,4 (5)	9,1 (6)	8,8 (5)
MU fat (g)	8,1 (3)	8,1 (4)	8,2 (4)
PU fat (g)	8,9 (5)	8,3 (4)	8,5 (4)
Chol (mg)	57,1 (51)	67,6 (58)	63,1 (55)
CHO (g)	182,8 (44)	172,7 (39)	177,2 (42)
Fibre (g)	17,6 (7)	15,4 (5)	16,3 (6)
Sugar (g)	12,2 (5)	12,9 (6)	12,6 (5)
Ca (mg)	285,1 (143)	268,6 (120)	278,5 (131)
Fe (mg)	7,9 (3)	6,9 (2)	7,3 (2)
Mg (mg)	201,8 (65)	183,7 (49)	191,9 (57)
Phos (mg)	606,9 (197)	549,3 (141)	575,8 (170)
K (mg)	1099,1 (327)	977,1 (236)	1032,7 (287)
Na (mg)	2048,4 (828)	2117,5 (853)	2086,2 (835)
Zn (mg)	5,4 (2)	5,0 (1)	5,2 (1)
Cu (mg)	0,6 (0,3)	0,5 (0,2)	0,6 (0,3)
Vit A (IU)	990,7 (1210)	961,6 (1325)	972,2 (1263)
Vit A (RE)	183,5 (146)	187,3 (157)	186,0 (152)
Thia (mg)	1,1 (0,4)	0,9 (0,3)	1,0 (0,3)
Ribo (mg)	0,8 (0,3)	0,8 (0,2)	0,8 (0,3)
Nicot (mg)	10,9 (4)	9,3 (3)	10,0 (4)
B6 (mg)	0,3 (0,2)	0,3 (0,2)	0,3 (0,2)
Fol (ug)	89,4 (54)	73,7 (35)	80,9 (45)
B12 (ug)	2,4 (4)	1,5 (2)	1,9 (3)
Asc A (mg)	9,6 (12)	6,7 (5)	8,0 (9)
Vit D (ug)	1,8 (2)	1,3 (2)	1,6 (2)
Vit E (mg)	7,7 (5)	6,5 (4)	7,0 (5)
Panto (mg)	1,1 (0,5)	1,1 (0,5)	1,1 (0,5)
Biotin (ug)	7,3 (4)	7,0 (3)	7,2 (4)

7.2.2 Mean daily nutrient intakes according to food groups

As one of the objectives of this study was to formulate recommendations for future nutrition education programmes in the area, it was decided to examine the data on food intake with reference to the basic food groups used in nutrition education. Information on the food groups and Exchanges (lists of foods and portion sizes with approximately the same nutritional value) used is included in Appendix iv.

The mean number of Exchanges in each food group eaten over the 24-hour period and the corresponding amounts of protein, fat, carbohydrate and energy provided are given in Table 21.

Table 21
Daily intake of Exchanges : Dept of Health recommendations*, mean intake of Malukazi pre-school children and corresponding daily macronutrient intake**

Food Group	Recommended	Malukazi Pre-School Children	Protein (g)	Fat (g)	CHO (g)	Energy (kJ)
Milk (n=97)***	2	0,6	4,8	6,0	7,2	428,4
Meat (n=134)	At least 3	1,2	8,4	6,0	-	378,0
Cereals (n=141)	At least 4	9,8	19,6	-	147,0	2881,2
Vegetables (n=115)	At least 4	1,4	2,8	-	7,0	147,0
Fruit (n=2)	At least 4	0,9	-	-	9,0	151,2
Fat (n=134)	4-5	3,6	-	18,0	-	680,4
TOTAL			35,6	30,0	170,2	4666,2

Note to Table 21

* These refer to the number of Exchanges recommended for daily consumption for young children by the Dept of Health Services and Welfare **[141].**

** These are calculated for those subjects where the number of Exchanges eaten was greater than 0. They do not therefore necessarily reflect the mean intakes of the study population as a whole.

*** n refers to the number of subjects for whom the number of Exchanges consumed was greater than 0, where the total number of subjects was 141.

A comparison between the percentage contribution made by each food group to the total macronutrient intake for the present study and that of Richter et al **[45]**, is given in Table 22.

Table 22
Comparison between the contribution made by each food group to the total macronutrient intake for pre-school children in Malukazi and the Ciskei [45] : Percentages

Food Group	Protein		Fat		CHO		Energy	
	Malukazi	Ciskei	Malukazi	Ciskei	Malukazi	Ciskei	Malukazi	Ciskei
Milk	13,8	25,4	20,0	38,0	4,2		9,2	14,7
Meat	24,1	11,3	20,0	4,8	-	-	8,1	4,7
Cereals	56,3	58,2	-		86,4	69,9	61,8	66,6
Vegetables	7,9		-		4,1		3,2	3,6
Fruit	-		-		5,3		3,2	0,3
Fat	-		60,0	13,2	-		14,6	2,4
Sugar*	-	-	-	-			4,4	7,5

* Sugar is not one of the basic food groups but was included in this table for purposes of comparison.

7.2.3 Food Frequencies

Data on the frequency with which various foods were eaten is presented in table 23.

Table 23
Frequencies of consumption of various foods : Percentages

Food Item	Every Day	Several Times a week	Very Occasionally	Never	Total
A. Beverages					
Tea/Coffee	100,0	0,0	0,0	0,0	100
Cooldrink	0,0	25,7	74,3	0,0	100
Squash	0,0	64,9	33,1	2,0	100
Water	100,0	0,0	0,0	0,0	100
B. Protein-rich Foods					
Meat	10,8	87,2	2,0	0,0	100
Fish	0,7	38,5	60,8	0,0	100
Chicken	0,7	52,7	46,6	0,0	100
Eggs	4,1	57,4	38,5	0,0	100
Peanut Butter	2,0	11,5	68,2	18,2	100
Dry beans/lentils	1,4	98,6	0,0	0,0	100
Milk, Fresh	4,3	68,8	26,8	0,0	100
Maas (sour milk)	0,0	87,7	12,3	0,0	100
Milk, powdered	1,4	0,0	16,7	81,9	100
Non-dairy, creamer	97,8	0,0	0,0	2,2	100
Milk, tinned	0,0	0,0	13,2	86,8	100
C. Energy-Providing Foods					
Maize meal porridge, soft	81,2	18,8	0,0	0,0	100
Maize meal porridge, stiff	1,4	97,1	1,4	0,0	100
Rice	0,0	98,6	1,4	0,0	100
Brown bread	89,9	10,1	0,0	0,0	100
White bread	0,7	44,2	31,9	23,2	100
Potatoes	98,6	1,4	0,0	0,0	100
Maize rice/Samp	0,7	97,3	2,0	0,0	100
Margarine, yellow	93,2	6,8	0,0	0,0	100
Hard white cooking fat	1,4	45,3	44,6	8,8	100
Oil	93,2	6,1	0,7	0,0	100
White sugar	99,3	0,7	0,0	0,0	100
Brown sugar	0,0	0,0	0,0	100,0	100

Food Item	Every Day	Several Times a week	Very Occasionally	Never	Total
D. Protective Foods					
Fresh Fruit	3,4	56,8	39,2	0,7	100
Dried Fruit	0,0	0,0	7,4	92,6	100
Tinned Fruit	0,7	1,4	89,2	8,8	100
Tinned vegetables	0,0	5,4	74,3	20,3	100
E. Miscellaneous					
Jam/other spreads	98,0	2,0	0,0	0,0	100
Cakes	0,0	46,6	53,4	0,0	100
Biscuits	0,0	56,2	43,8	0,0	100
Sweets	2,0	51,4	46,6	0,0	100
Sauces	2,0	1,4	76,2	20,4	100
Salt	100,0	0,0	0,0	0,0	100
Stock cubes	1,4	36,5	62,2	0,0	100
Chips	0,0	14,9	84,5	0,7	100
Nuts	0,0	9,5	80,3	10,2	100

The foods most frequently consumed (i.e. consumed by over 80% of respondents on a daily basis) were (in descending order):

tea, water, salt, white sugar, potatoes, jam, non-dairy creamer, yellow margarine, oil, brown bread and soft maize meal porridge.

7.3 Background Information on the Household

7.3.1 Number of preschool children per household

Out of a total number of 148 households investigated, in 139 there was only one pre-school child present and in the remaining 9 households, 2 children of this age group.

7.3.2 Socio-economic status

Occupations of household members were given as follows:

Table 24

Occupational level of household members : Numbers and percentages (%)

Occupational level	Distribution	
I - Unemployed	95	(33,5)
II - Part-time worker	9	(3,2)
III - Student/undergoing training	2	(0,7)
IV - Self-employed	40	(14,1)
V - Lowest income fully employed eg gardener/ labourer/cleaner	20	(7,0)
VI - Low income eg messengers/shop assistants/waiters/ domestic workers	44	(15,5)
VII - Semi-skilled eg clerks/drivers/ painters	65	(22,9)
VIII - Skilled occupations eg teachers/nurses/ technicians	9	(3,2)
IX - Highest income eg doctors/lawyers/ headmasters	-	(0,0)
Total	284	(100,0)

No person other than those listed contributed to the household income. In the majority of households (68,1%) only one member of the household was employed, in 31,2% two members were employed and in 0,7% no member of the household was employed. In none of the households were more than two members employed.

7.3.3 House ownership

The percentage of respondents who owned the house they lived in was 44,5%. The remaining 55,5% did not own their own house.

7.3.4 Water Source

The vast majority of households (99,3%) obtained their water from a communal standpipe; the remaining 0,7% obtained water from their own standpipe.

7.3.5 Heat Source

A primus stove was the primary heat source of 99,3% of the households; the remaining 0,7% used a wood fire.

7.3.6 Food Storage

All households used cupboards and a cool place to store food, none used a refrigerator.

7.3.7 Food purchasing and preparation

i) **Decision maker regarding food purchases**

Information on the identity of the person responsible for food purchasing decisions is presented below:

Table 25

Decision-maker regarding food purchases : Numbers and Percentages (%)

Decision-maker	Distribution
Mother	109 (77,3)
Father	1 (0,7)
Grandmother	18 (12,8)
Other relative	13 (9,2)
Paid childminder	0 (0,0)
Other	0 (0,0)
Total	141 (100,0)

ii) **Person responsible for food preparation**

Similarly, information on the identity of the person responsible for food preparation is presented below:

Table 26

Person responsible for food preparation : Numbers and Percentages (%)

Person preparing food	Distribution
Mother	109 (77,3)
Grandmother	19 (13,5)
Sister (of child)	6 (4,3)
Sister-in-law (of mother)	0 (0,0)
Mother-in-law (of mother)	0 (0,0)
Paid childminder	1 (0,7)
Other	6 (4,3)
Total	141 (100,0)

iii) **Place of purchase of staple and perishable food**

The percentage of households purchasing staples and perishables at various outlets is presented below:

Table 27

Place of Purchase of Staple and Perishable Food: Numbers and Percentages (%)

Place of food purchase	Staples	Perishables
Supermarket	3 (2,1)	0 (0,0)
Local Store	131 (93,6)	137 (97,9)
Tuck shop	5 (3,6)	(-)
Vegetable store	(-)	3 (2,1)
Market	(-)	0 (0,0)
Other	1 (0,7)	0 (0,0)
Total	140 (100,0)	140 (100,0)

The majority (98,6%) of households did not obtain food from any source other than purchasing it; 1,4% of households did obtain food by other means.

iv) **Frequency of food purchases**

Information on the frequency with which respondents purchased various foods is presented below:

Table 28

Frequency of food purchases : Numbers and Percentages (%)

Frequency of Food purchases	Fruit & Veg	Milk/Maas	Bread
Daily	0 (0,0)	1 (0,7)	130 (92,9)
2-3 times per week	117 (83,6)	117 (83,6)	10 (7,1)
Once per week	22 (15,7)	20 (14,3)	0 (0,0)
Twice per month	0 (0,0)	1 (0,7)	0 (0,0)
Once per month	1 (0,7)	1 (0,7)	0 (0,0)
Total	140 (100,0)	140 (100,0)	140 (100,0)

v) **Food production**

Most of the households (88,5%) did not grow their own vegetables; 11,5% had vegetable gardens. The reason given by those who did not grow vegetables was that they had no space to do so.

Only a few (16,9%) households had fruit trees on or near their property; most (83,1%) did not.

7.3.8 Intra-familial distribution of food

i) In 98,6% of households, the child/ren ate with the rest of the family. In those that did not, the children ate before the other family members.

ii) In 7,1% of households, there was "often" food left over after everyone had eaten; in 83,6% there was "sometimes" food left over and in 9,3% there was never any food left over after meals.

7.4 Background Information on the Childminder

7.4.1 General Information

7.4.1.1 Identity of childminders

The majority (77%) of the children were looked after "most of the time" by their own mothers; 12,8% were looked after by a grandmother and 1,4% by either a child under 15 years of age or a paid childminder. The remainder were looked after by other relatives such as aunts or older sisters.

7.4.1.2 Dwelling place of childminders

The majority (97,3%) of the mothers lived in the same household as their children. Where the child/ren were looked after by someone other than the mother; 96,8% of these childminders lived in the same household.

7.4.1.3 Childminder's Body Size

Just under half (46%) of the childminders were regarded as being of average weight; 29,2% as fairly slim; 13,1% as somewhat overweight; 10,9% as slim and 0,7% as very overweight.

7.4.1.5 Age of childminders

The age distribution of the childminders is presented below:

Table 29

Age of Childminders : Numbers and Percentages (%)

Age (years)	Distribution
< 18	4 (3,0)
18 - 25	32 (23,7)
26 - 35	55 (40,7)
36 - 50	38 (28,2)
> 50	6 (4,4)
Total	135 (100,0)

7.4.1.6 Ability of childminders to read English and Zulu

The childminders' ability to read English and Zulu were rated as follows:

Table 30

Ability of childminders to read English and Zulu : Numbers and Percentages (%)

Language	Good	Fair	Poor	Total
English	25 (17,9)	103 (73,6)	12 (8,6)	140 (100,0)
Zulu	130 (93,5)	6 (4,3)	3 (2,2)	139 (100,0)

7.4.1.7 Education level of childminders

The percentage of the childminders who achieved various levels of education are presented below:

Table 31

Educational level of childminders :

Numbers and Percentages (%)

Highest standard passed at school	Distribution
< Standard 4	53 (37,9)
Standard 4 - 5	51 (36,4)
Standard 6-9	34 (24,3)
Standard 10+	2 (1,4)
Total	140 (100,0)

7.4.1.8 Attitude of childminders to nutrition Education

The attitude of the childminders towards nutrition education was investigated in two questions, Question 46 where the question was asked directly and Question 36 where it was asked indirectly. In question 46, the percentage replying that they would like to learn more about nutrition was 98,6% whereas only 62,6% gave this answer in Question 36. An appreciable number of respondents also expressed interest in learning more about knitting/sewing (86,3%), baking (20,1%) and [illegible]

7.4.1.9 Leisure activities of the childminders

The percentage of respondents who pursued leisure activities as listed below "often" (at least once a week) was as follows:

Table 32

Leisure activities that childminders pursue "often" : Numbers and Percentages (%)

Leisure activity	Distribution (n = 139)
Listen to radio	134 (96,4)
Watch television	5 (3,6)
Read magazines	17 (12,2)
Read newspapers	67 (48,2)
Attend meetings at church	23 (16,5)
Attend meetings of women's groups	2 (2,2)

7.4.1.10 Sources of high credibility for nutrition information

Answers to the question "If you wanted to learn more about nutrition, who would you ask?" were as follows:

Table 33

Sources of high credibility for nutrition information : Numbers and Percentages (%)

Person asked	Distribution (n = 140)
Friend	0 (0,0)
Mother	1 (0,7)
Grandmother	0 (0,0)
Mother-in-law	0 (0,0)
Church Minister	1 (0,7)
Clinic Sister	137 (97,9)
Teacher	3 (2,1)
Health Worker	110 (78,6)
Sangoma	4 (2,9)
Other	1 (0,7)

7.4.1.11 Food Taboos

The only food that an appreciable number of the childminders believed should "according to customs" not be given to children was pork and 38,8% of the respondents gave this answer.

7.4.1.12 Childminders' knowledge of nutrition and child care

i) Frequency of Clinic visits

Most (73,6%) of the respondents believed that children should only be taken to the Clinic when they are sick; 25% believed that children should be taken regularly and 1,4% were not sure. No respondents believed that children should not be taken to the Clinic at all.

ii) Variety of foods

The majority (92,9%) of the respondents believed that children should be given "many different kinds of food", none that "plenty of one food" was adequate and 7,1% were not sure.

iii) Breast vs Bottle Feeding

Only 13,6% of the respondents believed that ideally, bottle feeding should not be started at any age; 15,7% believed that bottle feeding should begin at a particular age (not specified) and 70,7% were not sure.

iv) Foods necessary for health

Respondents were asked to list the foods that a child should eat every day. Answers were then given a score out of a maximum possible 5, one point being given for each of the 5 basic food groups represented. Scores were as follows:

Table 34

Childminders' knowledge of foods necessary for health: Numbers and Percentages (%)

Score (out of 5)	Distribution
0	0 (0,0)
1	0 (0,0)
2	6 (4,3)
3	42 (30,2)
4	70 (50,4)
5	21 (15,1)
Total	139 (100,0)

v) Frequency of feeding

Just over half (53,6%) of the respondents believed that children should be fed three times a day; 45% believed children should be fed more than three times a day and 1,4% were not sure. No respondents believed that children should only be fed once or twice a day.

vi) Source of information on nutrition

Sources of nutrition were given as follows:

Table 35

Sources of nutrition information : Numbers and Percentages (%)

Source	Distribution (n=140)
Friend/Relative	0 (0,0)
Radio	2 (1,4)
Television	4 (2,9)
Magazine	1 (0,7)
Newspapers	0 (0,0)
Book	3 (2,1)
Lecture/Demonstration	0 (0,0)
Clinic	138 (98,6)
Employer	2 (1,4)
Teacher	0 (0,0)
Other	0 (0,0)
Just knew/Don't know	1 (0,7)

7.5 Background information pertaining to the child

7.5.1 Age of children

Within the 3-6 age grouping selected for study 28,4% of the children were three years old; 27,0% four years old; 31,1% five years old and 13,5% six years old.

7.5.2 Sex of children

Just under half (46,6%) of the children were male; 53,4% female.

7.5.3 Breast vs Bottle-Fed

The percentages of children fed by either breast or bottle or both are given below:

Table 36

Method of feeding (breast vs bottle) :

Numbers and Percentages (%)

Method of Feeding	Distribution
Breast Fed	37 (25,2)
Bottle Fed	25 (17,0)
Breast & Bottle Fed	80 (54,4)
Don't Know	5 (3,4)
Total	147 (100,0)

7.5.4 Identity of principle provider

The identity of the principle person responsible for the child's upkeep was as follows:

Table 37

Identity of principle provider : Numbers and Percentages (%)

Principle Provider	Distribution
Mother	17 (11,6)
Father	110 (74,8)
Aunt/Uncle	3 (2,0)
Grandparents	15 (10,2)
Other	2 (1,4)
Total	147 (100,0)

7.5.5 Presence of a Growth Card

Almost all (98,0%) of the children had growth cards; 0,7% did not have a growth card and in 1,4% the answer to this question was not known.

7.5.6 Frequency of Clinic Visits

The frequency with which the children were taken to the Clinic is given below:

Table 38

Frequency of Clinic Visits : Numbers and Percentages (%)

Frequency of Clinic Visits	Distribution
Regularly (4-6 x p.a.)	3 (2,1)
Seldom (1-3 x p.a.)	3 (2,1)
Only when sick	137 (95,8)
Never	0 (0,0)
Total	143 (100,0)

7.5.7 Dwelling place of parents

Nearly all (97,3%) of the mothers lived in the same household as their children whereas this percentage dropped to 69,4% in the case of the fathers.

7.5.8 Own bowl for each child

Almost all (98,6%) of the children had their own bowl from which to eat.

7.6 Relationship between Nutritional Status and Ecological Variables

Using both weight-for-age and height-for-age as indicators of nutritional status, the data were examined in order to determine the relationship, if any, between nutritional status and the following ecological variables:

- Number of children looked after by the childminder
- Age of childminder
- Intrafamilial order of eating
- Whether or not the child has its own bowl
- Whether or not the household grows its own vegetables
- Whether or not the house is owned by the head of the household
- Whether or not the father lives in the house
- Whether or not the mother lives in the house

For the purposes of this analysis, the 10th percentile was used as a cut-off point - those above the 10th percentile were considered to be "adequately nourished" and those below the 10th percentile, malnourished.

Where the results could be presented in a 2 x 2 table, Fisher's Exact Test was used to test significance - in all other instances, the Chi Square Test was used.

Of the ecological variables studied, only two were shown to be signficantly associated with nutritional status. These were the total number of children looked after by the childminder ($p = 0,04$) and whether or not the household grew their own vegetables ($p = 0,02$). In both cases, the relationship was shown to be significant only when height-for-age was used as an indicator of nutritional status.

8. DISCUSSION

8.1 Anthropometry

With regard to the mean heights as recorded in Table 9, it is interesting to note that the mean height of the 6 year-old boys is less than that of both the 4 and 5 year-old boys and less than that of the 5 and 6 year-old girls. This tends to indicate that the mean height of the 6 year-old boys is exceptionally low. Similarly, the mean weight of the 6 year-old boys is less than that of the 3, 4 and 5 year-old boys and the 4, 5 and 6 year-old girls. These anomalies could be explained by the small sample size of the 6 year-olds. It is however also possible that the nutritional status of children worsens when they begin going to school and are no longer able to eat all their meals at home (schoolchildren frequently miss breakfast and may not take anything with them to eat during the day, with the result that they eat only one meal a day, on their return home from school).

The percentage of the sample falling below the 3rd percentile for height-for-age (i.e. the percentage that are "stunted") is appreciably larger than that for either weight-for-age or weight-for-height, indicating that whilst the incidence of acute malnutrition in pre-school children in Malukazi may be relatively low, chronic malnutrition is a far greater problem. This finding is similar to those of other studies **[10; 18; 20; 21]**.

In comparing the results of the present study with those listed in Table 1, it can be seen that in the case of weight-for-age, the percentage falling below the 3rd percentile is less than that recorded in several other South African studies on nutritional status, but similar to the percentage recorded in Lamontville **[18]**, the Eastern Cape **[21]** and Khayelitsha **[10]** and considerably greater than that recorded in Natal/KwaZulu **[20]** and rural South Africa **[47]**. In the case of height-for-age, the percentage recorded in the present study is greater than that for the majority of the other studies, the exceptions being the studies carried out in Soweto **[40]** and Khayelitsha **[10]**. The incidence of low weight-for-height recorded in the present study is very low, as was the case for the studies carried out in Gelukspan **[41]**, Natal/KwaZulu **[20]** and Khayelitsha **[10]**. The comparison between the results of the present study and the latter is of particular interest since they are similar with respect to all three indices.

The breakdown of the percentage of children below the third percentile for weight-for-age according to age and sex indicates that more males have a low weight-for-age than females. The incidence of low weight-for-age tends to increase with age - this trend was also observed by Coovadia et al **[18]**. In contrast to the above, in the case of height-for-age the percentage less than the 3rd percentile is greater for females than for males.

There does not appear to be a particular trend with the regard to low height-for-age and age, however the percentage below the 3rd percentile is greater for the 3 and 6 year-olds than those falling in between. With regard to the above, it must be borne in mind that the sample of 6 year-olds is small in comparison with the other age groups. The data on weight-for height show little difference in the numbers for males and females, however the incidence of low weight-for-height is too low for definite trends to emerge.

The classification of the degree of malnutrition in pre-school children in Malukazi according to the system proposed by Waterlow, using height-for-age, indicates a greater percentage of Grade 0 and Grade 3 malnutrition than for the grades in between. The fact that nearly 70% of the sample suffer from Grade 1, 2 and 3 stunting is cause for concern.

8.2 Dietary Intake

8.2.1 Mean daily nutrient intakes - comparison with RDA's

The similarity between results obtained using a cut-off point of either 67% of the N.A.S. RDA's or 75% of the WHO RDA's is of interest - both indicate that intakes of energy, calcium, vitamin A, ascorbic acid and vitamin D are low in the study population. The relatively low intakes of zinc, vitamin B6, copper, pantothenic acid, biotin, riboflavin, iron and folic acid may also require attention.

In comparing mean daily nutrient intakes obtained in this study with other similar studies on pre-school children in Southern Africa it is interesting to note that energy, protein and fat intakes were higher than those of non-nursery school children in Soweto and rural Transvaal, but fell into the same range as those of nursery school children in Soweto **[56]**. Energy and protein were lower than those reported by Richter et al in the Ciskei **[45]**, whereas fat was higher. Carbohydrate fell into the same range as that of the Soweto children, was higher than in the rural Transvaal and lower than in the Ciskei. Intakes of calcium, vitamin A, riboflavin and ascorbic acid were appreciably lower than those recorded in the Ciskei although intakes of iron, thiamine and nicotinic acid were either similar to or greater than those reported in the Ciskei.

Richter et al considered the low intakes of calcium, vitamin A and riboflavin in Ciskei children to be "cause for concern" and since the intakes of these nutrients in the present study are even lower, it is clear that they should receive considerable attention in any future nutrition education programmes. Such programmes should also emphasize the need to increase total energy intake as well as intakes of ascorbic acid, zinc, vitamin D and B6, copper, pantothenic acid and biotin.

With regard to the percentage of total energy provided by the various macronutrients, there is little need for change as these are in line with FAO/WHO recommendations **[140]**. Similarly, dietary fibre intake is in line with the recommendation of 8g fibre per 1000 calories of recommended energy intake. This tends to indicate that whilst certain nutrients clearly require special attention, the greatest need is to increase total food intake.

8.2.2 Mean daily nutrient intakes according to food groups

The analysis of the food intake data according to food groups provides additional insights into the composition of the diet of the study population. However, since the results refer only to those subjects where the number of Exchanges consumed daily was greater than 0, caution must be exercized when considering results where this number of subjects is relatively small, especially fruit.

The analysis highlights the need for emphasis to be placed on milk and milk products, meat and other protein-rich foods, fruit and vegetables, in any future nutrition education carried out in the study area. The relatively small number of subjects consuming fruit and milk daily further confirms the need for attention to be paid to these foods.

It is interesting to note that in comparison with the study by Richter et al **[45]** the children in the present study obtained approximately the same percentage of their macronutrient intake from cereals and vegetables, less from milk and sugar and more from the meat group and fat.

8.2.3 Food Frequencies

The food frequency questionnaire proved useful in that it provided additional information on food intake over and above that obtained using the 24-hour recall. Points that were highlighted included the following:

a) Non-dairy creamers are almost universally used on a daily basis. Since from a nutritional point of view there is no substitute for milk, replacement of non-dairy creamers by powdered milk could be suggested in any future nutrition education programme.

b) Peanut butter is only consumed "very occasionally" or "never" by the majority of the respondents and as a relatively inexpensive source of several nutrients notably protein and energy, the more frequent use of peanut butter could be beneficial.

c) Milk and/or maas (sour milk) are not consumed on a daily basis by the majority of the respondents - more frequent use thereof could help to provide additional calcium, protein and riboflavin.

d) Similarly, more frequent consumption of fruit could augment vitamin and mineral intake.

e) Although brown bread is the bread most commonly consumed, the fact that nearly half the respondents consume white bread "several times a week" suggests that emphasis should continue to be placed on the desirability of unrefined cereals in any future nutrition education programmes.

The food frequency questionnaire also drew attention to certain anomalies which became evident when the information is compared with the 24-hour recall data. According to the food frequency questionnaire, several foods (namely fruit squash, eggs, white bread, fruit, cakes and biscuits) were consumed "several times a week" by approximately half the respondents. These foods were not, however, reflected in the 24-hour recall data to an equivalent extent. There are several possible reasons for this. It could be that although eaten relatively frequently, these foods were not eaten on the day to which the 24-hour recall, referred. It is however unlikely that this applies in all cases.

Most of these foods are what could be classified as "undesirable" from a nutritional point of view therefore it is possible that respondents, wishing to provide information that was "correct" in the eyes of the interviewer, deliberately withheld details concerning their consumption. It is also possible that the respondents did not regard these items as "foods" and therefore did not mention them during the 24-hour recall interview.

Finally, it could be that respondents were inaccurate in their estimation of the frequency with which these foods were consumed. These anomalies should of course be borne in mind when considering mean intakes of various nutrients by the study population, since it is possible that intake of certain nutrients, notably energy, protein and ascorbic acid could in fact be higher than those recorded.

These results also highlight the desirability of using a food frequency questionnaire in addition to a 24-hour recall in studies such as this.

8.3 Background information on the household

It was interesting to note the small number of households with more than one child between the ages of 3 and 6 years. One explanation for this could be that other children of that particular mother were in the care of relatives in other areas.

The difficulty in obtaining accurate information on the socio-economic status of households of this type was emphasized in this study. It can however be assumed that the majority of households fell into the low income category when using the type of occupation of the householders as an indicator of socio-economic status.

Almost all of the households relied on a communal standpipe as their water source - this implies that water is a relatively scarce resource and information on food preparation and/or food hygiene included in any future nutrition education programme should be adapted accordingly. Similarly, information on food preparation and storage should take into account the fact that the vast majority of households use primus stoves as a heat source and do not own refrigerators.

The person responsible for the food purchasing decisions, as well as food preparation, was in most cases (77,3%) the mother of the child/ren. Since the mother was also the childminder for the majority of cases (77,0%) it is clear that it is the mothers at whom information on food, nutrition and health should be targeted.

The only other category of person who emerged in the role of childminder (or as being responsible for food purchasing and preparation) to any appreciable extent was the grandmother. The "local store" being the place where almost all food purchases were made could also be the target of future nutrition education programmes, or as a venue for dissemination of nutrition information. The relative frequency with which food purchases were made indicates that perishables such as fresh fruit and vegetables and dairy products could be consumed on a daily basis in spite of the lack of cold storage facilities.

Although 88,5% of respondents did not grow their own vegetables, the reason given for this was that there was no space. It is possible, therefore, that respondents could cultivate vegetables using the "door" method whereby a variety of vegetables can be grown in a bed the size of a door. Information on this method could also form part of a future nutrition education programme.

The custom whereby adults eat first and only when they have completed their meal are the children permitted to eat, is a possible contributory factor to malnutrition **[27; 33]**. This does not however appear to be a problem in this community since children eat either before or together with the adults. The fact that most of the respondents (83,6%) have food left over "sometimes" indicates that the food supply may vary from time to time.

8.4 Background information on the childminder

Since most of the childminders fell between the ages of 26 and 35 years, it is clear that any future nutrition education programmes should be targeted at this age group, bearing in mind that almost all the remaining childminders fell either between 18 and 25 years, or 36 and 50 years.

Similarly, any printed material included in future nutrition education programmes should be produced in Zulu since almost all the respondents could read Zulu "well." Because the highest educational level reached ranged from less than Standard 3 up to Standard 6-9, nutrition information targeted at this community would have to be designed to cover a wide range of educational backgrounds.

The difference in percentages of the total number of respondents who were in favour of further nutrition education obtained by asking the question directly and indirectly, was of interest, since it tends to indicate that respondents supply answers they believe to be "correct" in the eyes of the interviewer. However, although the percentage in favour of nutrition education was somewhat lower when the question was asked indirectly, it was still relatively high (62,6%) - this suggests that future nutrition education programmes for this community may be worthwhile. The high degree of interest expressed in learning more about other home-making skills, especially knitting/sewing, baking and gardening suggests that instruction on these could be used as a vehicle for nutrition education.

Radio and newspapers were the only media used at least once a week by an appreciable number of the respondents however neither of these was cited as a major source of nutrition information therefore their use as a vehicle for nutrition education would require investigation. It is interesting to note that in the case of television, approximately the same percentage of respondents used this medium and quoted it as a source of nutrition information. It is clear that the Clinic and the Clinic Sister were regarded as the most important source of nutrition information by this community. This result could however reflect a bias in that the sample was drawn from people attending the Clinic and much of the interviewing was done at the Clinic.

Food taboos in this community do not appear to be a problem from a nutritional point of view since pork was the only food regarded as unsuitable for children "according to customs" by an appreciable number of respondents. Jelliffe recommends that customs which are "of no significance one way or another to the health and nutrition of the child ..... should be left well alone" **[27]**. Since pork is not an essential part of the diet there seems little need to promote its consumption in this community.

The majority of childminders knew that a variety of foods are necessary for health. Only 15,1% were able to list foods from all five food groups, however and only 45,0% felt that children needed to be fed more than three times a day, indicating that further education may be necessary in these areas.

The fact that over 70% of the childminders were "not sure" of the answer to the question regarding breast vs bottle feeding may indicate that the desirability of breast feeding required emphasis - however the way in which the question was phrased may have led to confusion.

8.5 Background information pertaining to the child

The important role played by the Clinic in this community is indicated by the fact that 98,0% of the children had growth cards and the high credibility accorded the Clinic as a source of nutrition information. It is interesting to note however that 95,8% of the children were only taken to the Clinic when they were ill.

Since most of the children (77%) were looked after by their mothers and 97,3% of the mothers lived in the same home, a degree of continuity and stability could be said to exist in most households for those children living there. It must be remembered, however, that other children of that same family could well have been living elsewhere, in the care of other relatives. This, together with the fact that a lower percentage of fathers lived at home, indicates that the traditional nuclear family is not the norm in this community.

The failure to provide each child with its own bowl has been found to be a contributory factor towards malnutrition **[4]**. This would not appear to be a problem in this community, however, as 98,6% of the children had their own bowl.

8.6 Relationship between nutritional status and ecological variables

It is of interest to note that of the ecological variables studied, only two were shown to be significantly associated with nutritional status. It should however be borne in mind that as a result of the distribution of answers for several of the questions it was not possible to test the level of significance of the relationship between these particular variables and nutritional status.

It is also of interest that where the relationship was significant, this was found only when height-for-age was used as an indicator of nutritional status.

The fact that growing vegetables was found to be significantly associated with nutritional status provides further motivation for the promotion of home vegetable growing in this community.

9. RECOMMENDATIONS

9.1 The need for nutrition education

The degree of malnutrition that exists in this community (as shown by data on weight, height and nutrient intake) and the unsatisfactory level of nutrition knowledge amongst the childminders indicates the need for further nutrition education in this area. The fact that even when asked indirectly, over half the respondents expressed interest in learning more about nutrition provides further support for this.

9.2 Nature of future nutrition education programmes

Since the mothers are responsible for the care of the children and for the purchasing and preparation of the food in the majority of households, it is the mothers at whom future nutrition education should be targeted. Information provided should be adapted to the mothers' educational level and age. Local customs regarding food purchasing patterns, food preparation (including heat source and limited water supply) and storage should also be taken into account. Since most of the households fell into the low income category care should be taken that any recommendations made should be economically feasible.

The Clinic and Clinic staff, including Health Workers should be the primary vehicle for providing nutrition education but the possibility of using the local store as a venue/distribution point for information should be investigated.

The radio and newspapers have potential as a vehicle for nutrition education but their effectiveness and credibility as a source of this type of information should be investigated prior to their use. Television, although used by relatively few respondents, may be more effective in this regard. Its use should also therefore be investigated, possibly with a view to installing a television set in the Clinic where video material on nutrition could be used. Any literature distributed should be in Zulu.

In order to encourage participation in future nutrition education programmes, instruction in home-making skills such as knitting, sewing and baking could be included since respondents expressed considerable interest in these topics.

Finally, the community should be made aware of the role played by this particular study in the formulation of nutritional recommendations made.

9.3 Information to be included in future nutrition education programmes

The results of this study indicate that future nutrition education programmes in this area should emphasise the following points:

i) The need for regular Clinic visits (even when the child is not sick) in order that the childs' growth can be monitored.

ii) The promotion of breast feeding.

iii) The need to feed young children often (i.e. at least 4 times a day)

iv) The need to increase the children's total food intake and their intake of the following foods in particular:

- milk/milk products - the use of maas and fresh/powdered milk should be promoted and the use of non-dairy creamers discouraged

- protein-rich foods - pork should be excluded in discussions on protein-rich foods, and the use of peanut butter encouraged

- fruit and vegetables

- brown or wholewheat bread instead of white

- to increase total energy intake, the addition of oil and sugar to maize meal porridge should be encouraged

v) The method of growing vegetables using a bed the size of a door.

vi) The planting of fruit trees.

vii) The promotion of the haybox in order to conserve fuel **[5]**.

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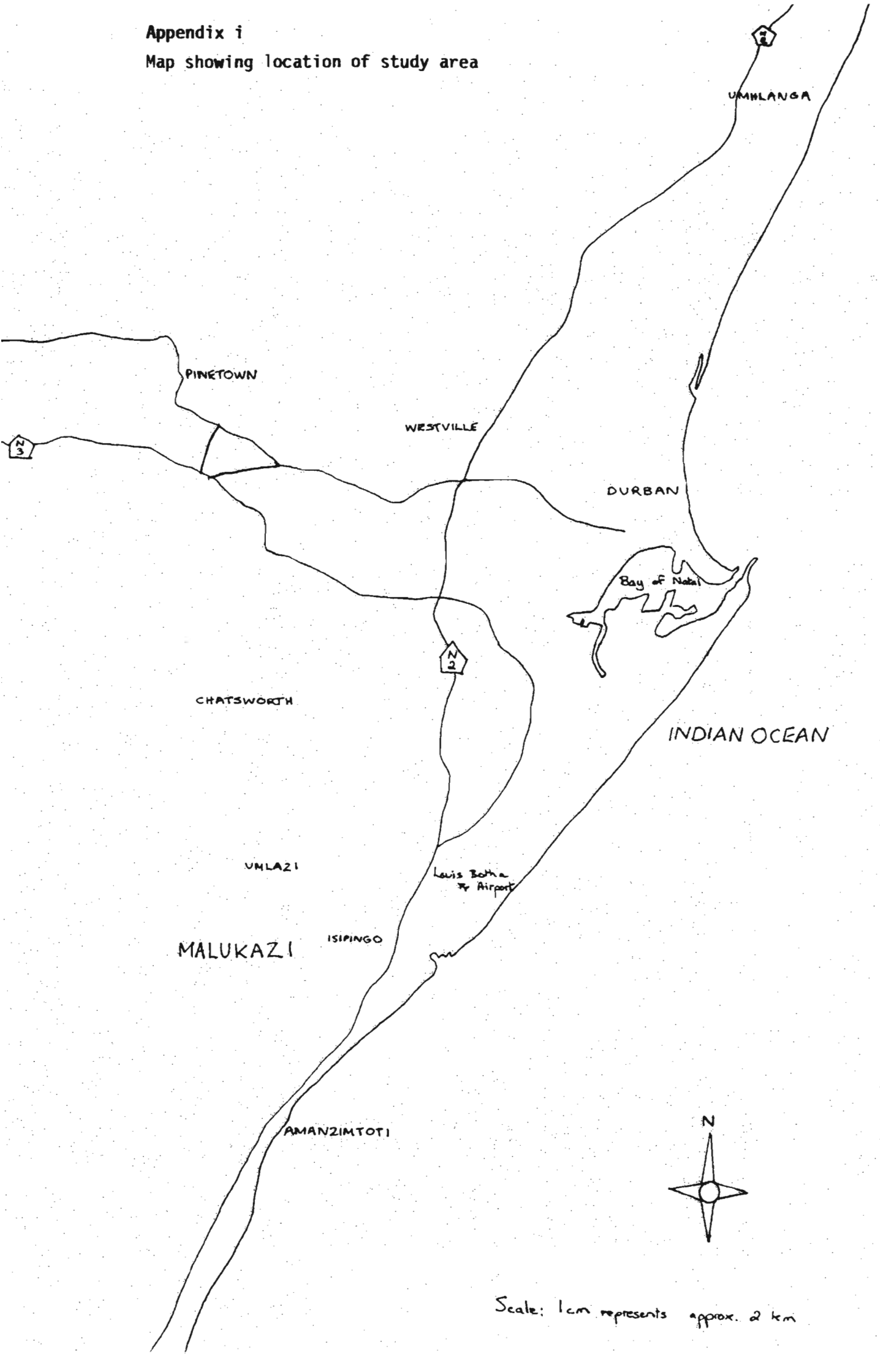
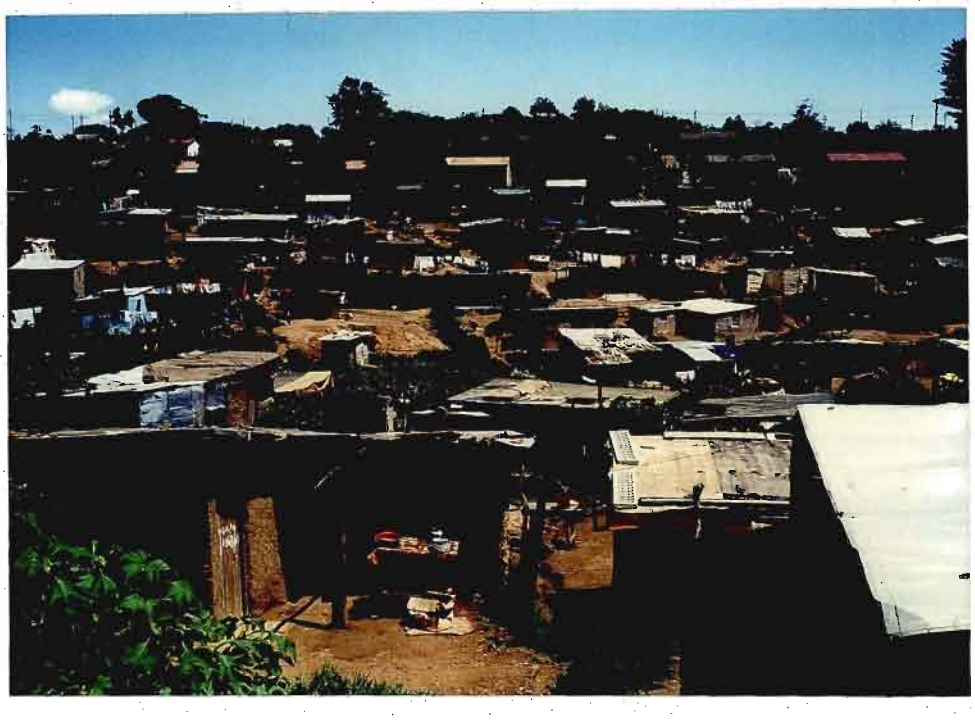
Appendix i

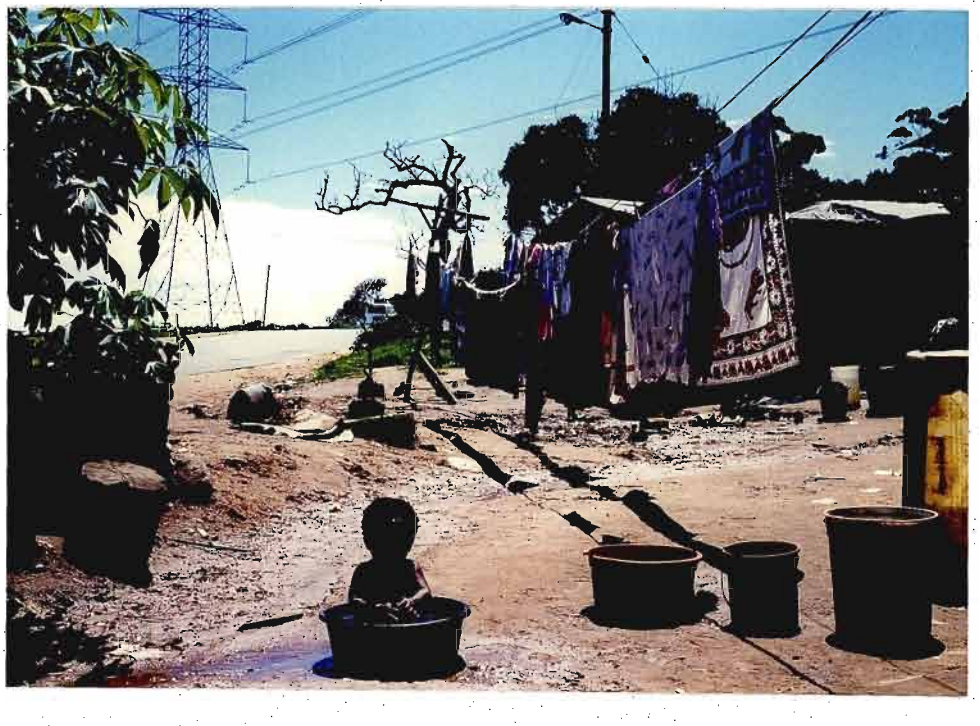
Map showing location of study area



Appendix ii - Photographs

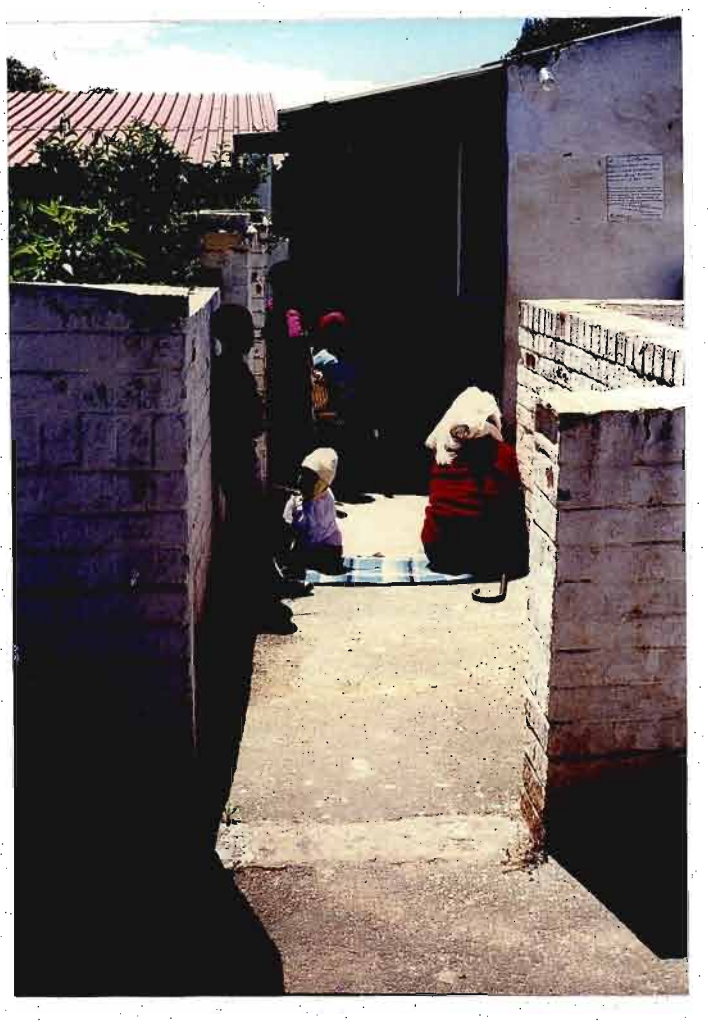
Photographs showing views of Malukazi





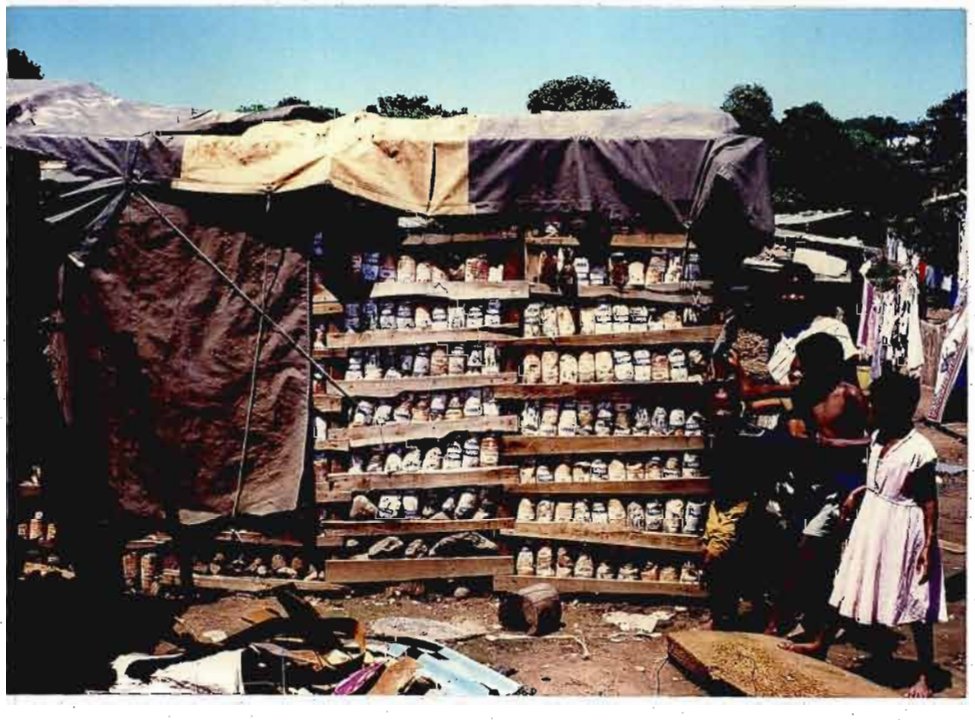
Appendix ii - Photographs (cont)

Photographs showing Malukazi Clinic



Appendix ii - Photographs (cont)

Photographs showing typical dwellings in Malukazi, constructed from beer cartons and road signs



Appendix iii

Example of questionnaires (English & Zulu)

C N OGILVIE - DEPARTMENT OF COMMUNITY HEALTH, UNIVERSITY OF NATAL

NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN IN INANDA

Introduction - to be used before the interview is begun.

Good morning

I am Sr _____ and I am working with Mrs _____, your Community Health Worker. We are trying to find out about how children eat in Newtown C so that we can help you all save money and make your children even more healthy.

Please would you help us to do this by answering some questions?

NAME/ RELATIONSHIP TO CHILD	UNEMPLOYED	PART-TIME WORKER	STUDENT/ UNDERGOING TRAINING	SELF-EMPLOYED	LOWEST INCOME FULLY EMPLOYED EG: GARDENER/ LABOURER CLEANER	LOW INCOME EG MESENGERS SHOP ASSISTANTS WAITERS DOMESTIC WORKERS	SEMI-SKILLED EG CLERKS DRIVERS PAINTERS	SKILLED OCCUPATIONS EG TEACHERS NURSES TECHNICIANS	HIGHEST INCOME EG DOCTORS LAWYERS HEADMASTER
	1	2	3	4	5	6	7	8	9
Total Number									

(c) Does anyone else contribute to the household income?

Yes	No	Don't Know
1	2	3

4) Who usually decides what food to buy for this child/children?

	Mother	Father	Grandmother	Other Relative	Paid childminder
Yes	1	1	1	1	1
No	2	2	2	2	2

	Other
Yes	1
No	2

IF OTHER, who _____ (relationship to child)

5) Who usually prepares the food?

	Mother	Grandmother	Sister	Sister-in-law	Mother-in-law	Paid childminder
Yes	1	1	1	1	1	1
No	2	2	2	2	2	2

	Other
Yes	1
No	2

IF OTHER, who _____ (relationship to child)

65

CARD NO. 2

HOUSEHOLD NO.

6) Where is the food usually bought?

a) Basic staples eg. Flour, Mealie meal, Sugar, Tea

	Supermarket	Local Store	Tuck Shop	Other
Yes	1	1	1	1
No	2	2	2	2

IF OTHER, where _____

b) Perishables eg. Fruit & Veg, Milk, Bread

	Supermarket	Local Store	Vegetable Stall	Market	Other
Yes	1	1	1	1	1
No	2	2	2	2	2

IF OTHER, where _____

c) Do you obtain food regularly from any other source i.e. apart from buying it?

Yes	No
1	2

If yes, give details _____

_____

7) How often are the following foodstuffs bought?

Fruit & Veg	Daily	2-3x/wk	1x/wk	2x/mth	1x/mth	Other
	1	2	3	4	5	6
Milk/Maas	Daily	2-3x/wk	1x/wk	2x/mth	1x/mth	Other
	1	2	3	4	5	6
Bread	Daily	2-3x/wk	1x/wk	2x/mth	1x/mth	Other
	1	2	3	4	5	6

8) Do the children eat with the rest of the family most of the time?

Yes	No	Don't Know
1	2	3

IF NO, do they eat before or after the adults?

Before	After	Don't Know
1	2	3

9) After everyone has eaten, is there any food left over for another meal?

Often	Sometimes	Never
1	2	3

10) Does each child have its own bowl?

Yes	No
1	2

11) a) Do you grow your own vegetables?

Yes	No
1	2

b) If no, why not?

No space	Yes	No
Soil not suitable	Yes	No
No Water	Yes	No
Can't afford it	Yes	No
No time	Yes	No
Not interested	Yes	No
Other	Yes	No
	1	2

IF OTHER, describe reasons: _____

_____

_____

c) Do you have fruit trees on or very near your property?

Yes	No
1	2

12) Do you own this house?

Yes	No
1	2

13) What type of water source is there?

Mains to house	Own standpipe	Communal standpipe	Rain Tank	Tanker
1	2	3	4	5

Kiosk	Spring or stream	Other
6	7	8

IF OTHER, specify _____

14) Which of these are used for storing food?

	Yes	No	
Cupboards	Yes	No	
Refrigerator	Yes	No	
Cool Place	Yes	No	
	1	2	

15) What heat source is used for cooking most of the time?

Paraffin Burner	Gas	Primus	Electric	Coal Fire	Wood Fire	Other	
1	2	3	4	5	6	7	

IF OTHER, specify _____

C N OGILVIE - DEPARTMENT OF COMMUNITY HEALTH, UNIVERSITY OF NATAL

NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN IN INANDA

Leave Blank

CARD NO. [3]

NAME OF INTERVIEWER _____ [ ]

HOUSEHOLD NO. [ ][ ][ ]

DATE _____

B. ANTHROPOMETRIC MEASURES & GENERAL INFORMATION ON CHILD

MUST BE COMPLETED FOR EACH CHILD

16) Address of Household _____

_____

_____

17) a) Name of Child _____ [ ][ ][ ][ ]

b) Sex of Child

Male	Female
1	2

[ ]

18) Date of Birth Month [ ] Year [ ][ ][ ][ ]

19) Height [ ][ ][ ],[ ] cm [ ][ ][ ],[ ]

20) Weight [ ][ ],[ ] kg [ ][ ],[ ]

ASK MOTHER (OR IF SHE IS NOT PRESENT, THE CHILDMINDER):-

21) Does the mother of the child live here?

Yes	No

[ ]

22) Does the father of the child live here?

Yes	No	Don't Know
1	2	3

23) Who looks after the child most of the time?

Mother	Grandmother	Child under 15 eg sister	Paid childminder	Other
1	2	3	4	5

IF OTHER, who? _____ (relationship to child)

24) If it is not the mother, does she live here?

Yes	No
1	2

25) Was this child

Breast-Fed	Bottle-Fed	Breast & Bottle Fed	Don't Know
1	2	3	4

?

26) Who mostly pays for the child's upkeep? i.e. clothes, food etc. Tick as many as necessary.

	Mother	Father	Aunt/Uncle	Child's Grand-parents	Other
Yes	1	1	1	1	1
No	2	2	2	2	2

IF OTHER, who? _____ (relationship to child)

27) Does the child have a growth card?

Yes	No	Don't Know
1	2	3

28) How often do you take the child to the clinic?

Regularly 4-6 x per year	Seldom 1-3 x per year	Only when it is sick	Never
1	2	3	4

29) How would you rate this child's mothers' body size?

Much thinner than Sr Jojo	Thinner than Sr Jojo	About the same as Sr Jojo
1	2	3

Fatter than Sr Jojo	Much fatter than Sr Jojo
4	5

C N OGILVIE - DEPARTMENT OF COMMUNITY HEALTH, UNIVERSITY OF NATAL

NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN IN INANDA

Leave Blank

CARD NO. 4

NAME OF INTERVIEWER _____

HOUSEHOLD NO.

C. BACKGROUND INFORMATION ON THE CHILD-MINDER

THIS SET OF QUESTIONS MUST BE COMPLETED FOR EACH CHILD-MINDER.

30) Name of child-minder _____

31) What are the names of the children you look after most of the time?

1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____
8 _____

Total

32) When were you born?

33) Can you read English?

Well	Not very well	Not at all
1	2	3

34) Can you read Zulu?

Well	Not very well	Not at all
1	2	3

35) What is the highest Standard you passed at school?

Up to Std 3	Std 4-5	Std 6-9	Matric
1	2	3	4

☐

36) If you could choose skills, which could help you run your own home better, would you like to learn more about?
(Prompt only if necessary)

Gardening	Yes	No	☐
How to dress well	Yes	No	☐
How to bake	Yes	No	☐
How best to feed your family	Yes	No	☐
How to knit/sew	Yes	No	☐
Other	Yes	No	☐
	1	2	

If other, describe _____

_____

37) Which of these do you do often (at least once a week)?

Listen to the radio	Yes	No	☐
Watch television	Yes	No	☐
Read magazines	Yes	No	☐
Read newspapers	Yes	No	☐
Attend meetings at church	Yes	No	☐
Attend meetings at womens' groups	Yes	No	☐
	1	2	

38) If you wanted to learn more about how to eat for good health, who would you ask?

Friend of yours	Yes	No	
Mother	Yes	No	
Your Grandmother	Yes	No	
Your Mother-in-Law	Yes	No	
Church Minister	Yes	No	
Clinic Sister	Yes	No	
School Teacher	Yes	No	
Health Worker	Yes	No	
Sangoma	Yes	No	
Other	Yes	No	
	1	2	66

IF OTHER, who? _____

CARD NO. | 5 |

HOUSEHOLD NO. | | | |

39) According to your customs, are there any foods that you feel children should never eat?

Liver	Yes	No	
Eggs	Yes	No	
Fish	Yes	No	
Meat/Chicken	Yes	No	
Milk	Yes	No	
Apples	Yes	No	
Peaches	Yes	No	
Amadumbe	Yes	No	
Vegetables	Yes	No	
Beans	Yes	No	
Other	Yes	No	
	1	2	

IF OTHER, which foods? _____

40) Sibongile, a lady who lives in an area similar to where you live, is expecting her first child. Everyone is giving her different advice about how to look after the baby. Some say she should only take the child to the Clinic when he/she is sick. Others say it is a waste of time to take a child to a Clinic. Still others say she should take the baby to the Clinic regularly.

Who do you think she should listen to - those who say the child should be taken to the Clinic

When it's sick	Not at all	Regularly	Not sure
1	2	3	4

41) Sibongile is still confused - this time people are advising her about feeding her child, who is now 3 years old. Some say it is important that she gives her child many different kinds of food. Others say that as long as she gives her child plenty of one food, like porridge or bread, the child will grow well.

Who do you feel is giving the best advice?
Those who say:

Many different kinds of food	Plenty of one food	Not sure
1	2	3

42) What age do you think is a good age for a normal healthy baby to start bottle-feeding?

Any Age	Never	Not sure
1	2	3

NOTE: "Any age" means any age the respondent gives eg. at birth, 1 month etc.

43) Sibongile wants to know what foods she should give her child every day. She comes to you for advice. Which foods would you tell her to give her child every day?

List foods as mentioned:

_____

_____

_____

_____

Don't Know

44) Now Sibongile wants to know how often she should feed her child?
Do you think she should feed it;

Once a day	2x/day	3x/day	More than 3x/day	Not sure
1	2	3	4	5

45) You have given me a lot of answers about types and amounts of foods for children. Where did you learn all this? (Tick as many as necessary)

Friend/Relative told you	Yes	No	
Heard it on the radio	Yes	No	
Saw it on television	Yes	No	
Read it in a magazine	Yes	No	
Read it in a newspaper	Yes	No	
Read it in a book	Yes	No	
Had a lecture/demonstration at a school/club/church	Yes	No	
Were told at the Clinic	Yes	No	
Were told by your employer	Yes	No	
Schoolteacher told you	Yes	No	
Other	Yes	No	
Just Knew/Don't Know	Yes	No	
	1	2	

IF OTHER describe _____

46) Would you like to learn more about the foods that are necessary for good health?

Yes	No	
1	2	

47) BY OBSERVATION ONLY:

How would you rate this childminder's body size?

Much Thinner than Sr Jojo	Thinner than Sr Jojo	About the same as Sr Jojo
1	2	3

Fatter than Sr Jojo	Much Fatter than Sr Jojo	
4	5	

C N OGILVIE - DEPARTMENT OF COMMUNITY HEALTH, UNIVERSITY OF NATAL

NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN IN INANDA

D FOOD INTAKE QUESTIONNAIRE

D.1 TWENTY-FOUR HOUR DIETARY RECALL

To be completed for each child in childminder's care.
BUT NOT ON A SUNDAY OR MONDAY.

Card No. [6] [ ]

Name of interviewer _____

Household No. [ ][ ][ ]

Name of child _____ [ ][ ][ ][ ]

Date _____ **Time of Day** _____

1) What has this child had to eat or drink since _____ yesterday?
(Fill in time depending on time of day)

TIME PERIOD	TYPE OF FOOD	METHOD OF PREPARATION	AMOUNT (HOUSEHOLD MEASURES)	LEAVE BLANK Weight in grams	Food Code

TIME PERIOD	TYPE OF FOOD	METHOD OF PREPARATION	AMOUNT (HOUSEHOLD MEASURES)	LEAVE BLANK	
				Weight in grams	Food Code

2) Does this child eat like this every day?

Yes	No	Don't Know
1	2	3

D 2 : Food Frequency

3 How often does this child eat the following foods?

FOOD	EVERY DAY	SEVERAL TIMES A WEEK	VERY OCCASIONALLY	NEVER	LEAVE BLANK
	1	2	3	4	
Drinks					
Tea/coffee with milk & sugar					☐
Cooldrink					☐
Fruit squash					☐
Water					☐
Other					☐
_____					☐
_____					☐
_____					
Body-building Foods					
Meat					☐
Fish					☐
Chicken					☐
Eggs					☐
Peanut Butter					☐

FOOD	EVERY DAY	SEVERAL TIMES A WEEK	VERY OCCASIONALLY	NEVER	LEAVE BLANK
	1	2	3	4	
Dry Beans / Lentils					☐
Fresh Milk					☐
Sour Milk					☐
Powdered Milk					☐
Creamer / Blend					☐
Tinned milk					☐
Other _____ _____ _____					☐ ☐ ☐
Energy Providing Foods					
Mielie meal porridge, soft					☐
Mielie meal porridge, stiff					☐
Rice					☐
Bread, brown					☐
Bread, white					☐

FOOD	EVERY DAY	SEVERAL TIMES A WEEK	VERY OCCASIONALLY	NEVER	LEAVE BLANK
	1	2	3	4	
Potatoes					☐
Mielie rice or samp					☐
Margarine, yellow					☐
Holsum					☐
Oil					☐
Sugar, white					☐
Sugar, brown					☐
Other _____ _____ _____					☐ ☐ ☐
Protective Foods					
Fresh fruit					☐
Dried fruit					☐
Tinned fruit					☐

FOOD	EVERY DAY	SEVERAL TIMES A WEEK	VERY OCCASIONALLY	NEVER	LEAVE BLANK
	1	2	3	4	
Tinned vegetables					☐
Other _____ _____ _____					☐ ☐ ☐
Extras Jam, syrup & marmite					☐
Cakes					☐
Biscuits					☐
Sweets					☐
Sauces (incl chutney, atjar etc)					☐
Salt					☐
Stock cubes					☐
Chips					☐
Nuts					☐
Other _____ _____					☐ ☐ ☐

C N OGILVIE - DEPARTMENT OF COMMUNITY HEALTH, UNIVERSITY OF NATAL

ISIMO SOKONDLEKA KWEZINGANE ZASENANDA - ESEZIZOQALA ISIKOLE (3 - 6 Yrs)

Ukuzethula - ngaphambi kokuba kuqalwe isivivinyo.

Sanibona

Ngingu _____ ngisebenza nabasemtholampilo, ngisebenzela uMphakathi. Sizama ukuthola ukuthi izingane zidla kanjani la eNewtown C ukuze sinisize nonke ngendlela yokonga imali futhi sinisize ngezingane zenu ukuthi ziphile kangcono.

Ningasisiza ke ukuthi sikwenze lokhu ngokuthi niphendule imibuzo ethize?

ISIMO SOKONDLEKA KWEZINGANE ZASENANDA - ESEZIZOQALA ISIKOLE (3 - 6 YEARS)

Shiya Kunjal

CARD NO. [1]

IGAMA LOVIVINYAYO _____ [ ]

INOMBOLO YENDLU _____ [ ][ ][ ]

A ISISEKELO SOLWAZI NGEKHAYA

BUZA UMNINIMUZI (uzime onamandla)

1) Ikheli: _____
_____
_____

2) Obani amagama ezingane ezazalwa ngemuva kuka October 1983, kodwa ngaphambi kuka October 1986 ezihlala lapha?

_____ [ ][ ][ ][ ]
_____ [ ][ ][ ][ ]
_____ [ ][ ][ ][ ]
_____ [ ][ ][ ][ ]
_____ [ ][ ][ ][ ]
_____ [ ][ ][ ][ ]
_____ [ ][ ][ ][ ]
_____ [ ][ ][ ][ ]
_____ [ ][ ][ ][ ]

Sebebonke [ ][ ]

UMA ZINGEKHO, GCINA UHLELO LWEMIBUZO LAPHA.

3) a) Bangakhi abantu abahlala kulendlu abazalwe:
i) Ngaphambi kuka 1929? _____ [ ]
ii) Ngemuva kuka 1929; kodwa ngaphambi kuka 1974? _____ [ ]
iii) Ngemuva kuka 1973? _____ [ ]

3(b) Yiwaphi amalungu alomuzi alekelela ngemali asebenza musebenzi muni? (Bala X endaweni eqondene)

IGAMA/ LOYISIHLOBO SENGANE	AWUQASHIWE	UMSEBENZI WESIKHASHANA	UNGUMFU NDI USAFUNDA	UYAZISE-BENZA	IHOLO EL-INCANE UQASHWE NGOKUGCWELE ISIBONELO ENGADINI ISISEBENZI-NJE UNGUMHLANZI	IHOLO EL-INCANE ISIBONELO: IZITHUNYWA ABASIZA ESITOLO UWETA IZISEBENZI ZASENDLINI	UNOLWAZI OLUNCANE ISIBONELO: UMABHALANE UMSHAYELI UMAPENDANE	EZOBUCHWE-PHESHE ISIBONELO: OOTHISHA AMANESI UMSEBENZI WOBUCHWE-PHESHE	IHOLO EL-IPHEZULU KAKHULU ISIBONELO: OODOKOTELA ABAMELI UTHISHA-OMKHULU
	1	2	3	4	5	6	7	8	9
Sebebonke									

c) Kukhona omunye olekelela ezimalini?

Yebo	Cha	Awunalwazi
1	2	3

☐

Shiya Kunjalo

4) Ubani ojwayele ukunquma ukuthi yikuphi ukudla angakuthengela ingane noma izingane?

	NguMama	NguBaba	uGogo	Omunye Isihlobo	Umbheki ngane oholelwayo	Omunye
Yebo	1	1	1	1	1	1
Cha	2	2	2	2	2	2

UMA KUNGOMUNYE, ngubani?_____ (Oyisihlobo sengane)

5) Ubani ojwayele ukulungisa ukudla?

	NguMama	uGogo	uDadewenu	Umakoti	Umamezala	Umbheki ngane oholelwayo
Yebo	1	1	1	1	1	1
Cha	2	2	2	2	2	2

	Omunye
Yebo	1
Cha	2

UMA KUNGOMUNYE, ngubani?_____ (Oyisihlobo sengane)

65

CARD NO. 2

INOMBOLO YENDLU

6) Nijwayele ukuthenga kuphi?

a) Izidlo eziyisisekelo isibonelo: ufulawa, impuphu, ushukela, itiye.

	Imakethe enkulu	Isitolo sendawo	Indawana yokuthengisa okudliwayo	Kwenye indawo
Yebo	1	1	1	1
Cha	2	2	2	2

Uma kungenye, kukuphi? _____

b) Izinto ezibolayo isibonelo: izithelo, imifino, ubisi, isinkwa.

	Imakethe enkulu	Isitolo sendawo	Indawana yokuthengisa imifino	Imakethe enendali	Kwenye indawo
Yebo	1	1	1	1	1
Cha	2	2	2	2	2

UMA KUNGENYE, kukuphi?_____

c) Nikuthola njalo yini ukudla kwenye indawo ngaphandle kokukuthenga?

Yebo	Cha
1	2

Uma kuyikho, nikeza imininingwane

_____

_____

7) Zivamise ukuthengwa kangakhi lezizinhlobo zokudla ezilandelayo?

Izithelo nemifino

nsuku zonke	kabili noma kathathu / ngeviki	kanye ngeviki	kabili ngenyanga
1	2	3	4

kanye ngenyanga	Okunye kangakhi
5	6

Ubisi/ noma amasi

nsuku zonke	kabili noma kathathu ngeviki	kanye ngeviki	kabili ngenyanga
1	2	3	4

Kanye ngenyanga	okunye kangakhi
5	6

Isinkwa

nsuku zonke	kabili noma kathathu ngeviki	kanye ngeviki
1	2	3

kabili ngenyanga	kanye ngenyanga	okunye kangakhi
4	5	6

Shiya Kunjalo

8) Kungabe izingane zidla kanye nomndeni izikhathi eziningi?

Yebo	Cha	Awunalwazi
1	2	3

UMA KUNGENJALO, zidla ngaphambi noma ngemuva kokuba se kudle abantu abadala?

Ngaphambili	Ngemuva	Awunalwazi
1	2	3

9) Uma abantu bonke se bedlile, kubakhona ukudla okusalela ukuthi kubuye kudliwe?

Kaningi	Ngesinye isikathi	Nakanci
1	2	3

10) Ingane ngayinye inesitsha sayo sokudlela?

Yebo	Cha
1	2

11) a) Unayo ingadi yemifino?

Yebo	Cha
1	2

b) Uma ungenayo yini?

Awunandawo	Yebo	Cha
Umhlabathi awulungile	Yebo	Cha
Akukho manzi	Yebo	Cha
Awunamandla okukwenza	Yebo	Cha
Awunasikhathi	Yebo	Cha
Awunaluthando	Yebo	Cha
Okunye	Yebo	Cha
	1	2

UMA KUKHONA OKUNYE chaza kabanzi izizathu: _____

_____

_____

c) Unazo izihlahla zezithelo noma eduze kwalapho wakhe khona?

Yebo	Cha
1	2

12) Yeyakho le ndlu?

Yebo	Cha
1	2

13) Yinhlobo enjani yomthombo wamanzi ekhona lapho?

Amaphayiphi aya endlini	Umpompi oqondene nawe	Umpompi oqondene nomphakathi	Amanzi emvula akhongozelwa ngamatangi
1	2	3	4

Alethwa uhlobo lwemoto esindayo	Kundlwanyana yokugcina izinto	Isiphethu noma umfudlana	okunye
5	6	7	8

UMA KUKHONA OKUNYE yisho _____

14) Yikuphi kulokhu okusetshenziswa ekulondolozeni ukudla?

	Yebo	Cha
Yikhabethe		
Umshini weqhwa wokulondoloza		
ukudla ukuze kungaboli	Yebo	Cha
Yindawo epholile	Yebo	Cha
	1	2

15) Luhlobo luni lwesifudumezi esisetshenziswa ekuphekeni izikhathi eziningi?

Isibane sephalafini	Ugesi	Isitofu sepalafini	Ugesi	Umlilo wamalahle
1	2	3	4	5

Umlilo wezinkumi	Okunye
6	7

UMA KUKHONA OKUNYE uhlobo yisho _____

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ISIMO SOKONDLEKA KWEZINGANE ZASENANDA - ESEZIZOQALA ISIKOLE (3 - 6 YEARS)

Shiya Kunjalo

CARD NO. [3]

IGAMA LOVIVINYAYO _____ [ ]

INOMBOLO YENDLU _____ [ ][ ][ ]

B. Uhlelo lokulinganisa ngamamitha nolwazi olugcwele ngengane, kufanele

LUGCWALISWE NGENGANE NGAYINYE

16) Ikheli likasokhaya _____

_____

_____

17) a) Igama lomntwana _____

b) Ubulili bengane [ ][ ][ ][ ]

Owesilisa	Owesifazane
1	2

[ ]

18) Usuku lokuzalwa [ ][ ] izinyanga [ ][ ][ ][ ] unyaka [ ][ ][ ][ ]

19) Ubude [ ][ ][ ],[ ] ngesilinganiso [ ][ ][ ],[ ]

20) Isisindo [ ][ ],[ ] ngesikalo [ ][ ],[ ]

BUZA UMAMA WENGANE (OKUNYE UMA ENGEKHO, KOBHEKA INGANE):-

21) Umama wengane uhlala lapha?

Yebo	Cha
1	2

[ ]

22) Ubaba wengane uhlala lapha?

Yebo	Cha	Awazi
1	2	3

[ ]

Shiya Kunjalo

23) Ubani obheka ingane isikhathi esiningi?

Umama	ugogo	Umamezala	Ingane engaphansi kweyishumi nesihlanu eg. udadewabo	Umbheki ngane oholelwayo	Omunye
1	2	3	4	5	6

UMA KUNGOMUNYE, ubani? _____ (Oyisihlobo sengane)

24) Uma kungesiye umama, ngabe uhlala lapha?

Yebo	Cha
1	2

25) Kungabe le ngane

Incele ibele	incele ibhodlela	incele ibele kanye nebhodlela	awazi
1	2	3	4

?

26) Ubani ovame ukukhokhela izindleko zengane nje ngokugqoka, ukudla njalonjalo? Qopha ngangokuba unakho.

	Umama	uBaba	Udade wobaba umalume	Okhulu bengane	Omunye
Yebo	1	1	1	1	1
Cha	2	2	2	2	2

Uma kungomunye, ubani? _____ (Oyisihlobo sengane)

27) Kungabe ingane inalo ikhadi elikhombisa ukuthi ikhula kanjani?

Yebo	Cha	Awazi
1	2	3

28) Uvame ukuyiyisa kangakhi ingane emtholampilo?

Njalo kane-kasithupha ngonyaka	Izikhathi eziyingcosana kanye-kathathu ngonyaka	Uma igula kuphela	Bonaze uyiyise
1	2	3	4

29) Ungasilinganisa kanjani isisindo somzimba kamama wengane?

Ungaphansi kakhulu kuno Sr Jojo	Ungaphansi kuno Sr Jojo	Ucishe alingane Sr Jojo	Ukhuluphele kuno Sr Jojo	Ukhulu phele kakhulu kuno Sr Jojo
1	2	3	4	5

ISIMO SOKONDLEKA KWEZINGANE ZASENANDA - ESEZIZOQALA ISIKOLE (3 - 6 YEARS)

Shiya Kunjal

CARD NO. [4]

IGAMA LOVIVINYAYO _____ [ ]

INOMBOLO YENDLU _____ [ ][ ][ ]

C. ISISEKELO NOLWAZI NGOBHEKA INGANE

LE MIBUZO KUFANELE IGCWALISWE NGAMUNYE UMBHEKI-NGANE

30) Igama lobheka ingane _____

31) Obani amagama ezingane ovame ukuzibheka? [ ][ ][ ][ ]

1 _____ [ ][ ][ ][ ]
2 _____ [ ][ ][ ][ ]
3 _____ [ ][ ][ ][ ]
4 _____ [ ][ ][ ][ ]
5 _____ [ ][ ][ ][ ]
6 _____ [ ][ ][ ][ ]
7 _____ [ ][ ][ ][ ]
8 _____ [ ][ ][ ][ ]

Sebebonke [ ][ ]

32) Wazalwa nini? [ ][ ]

33) Ungasifunda isiNgisi? [ ]

Kahle	Awusazi kahle	Awusazi nhlobo
1	2	3

Shiya Kunjalo

34) Ungasifunda isiZulu?

Kahle	Awusazi kahle	Awusazi nhlobo
1	2	3

35) Uphume kuliphi ibanga esikoleni?

Ku 3	Ku 4 noma 5	Ku 6 - 9	Ku 10
1	2	3	4

36) Uma ungakhetha, yikuphi kulokhu okulandelayo ongathanda ukufunda ngakho kakhulu?
(Lekelela lapho kunesidingo)

Ingadi	Yebo	Cha
Ukugqoka kahle	Yebo	Cha
Ukubhaka	Yebo	Cha
Ukondla kangcono umndeni wakho	Yebo	Cha
Ukunitha /noma ukuthunga	Yebo	Cha
Okunye	Yebo	Cha
Uma kukhona okunye chasisa _____	1	2

_____

37) Yikuphi kulokhu okwenza njalo (okungenani kanye ngesonto)?

Ukulalela iwayilense (irediyo)	Yebo	Cha
Ukubuka umabonakude (ithelevishini)	Yebo	Cha
Ukufunda iphepha-bhuku	Yebo	Cha
Ukufunda iphepha-ndaba	Yebo	Cha
Ukuhamba imihlangano esontweni	Yebo	Cha
Ukuhamba imihlangano yamakhosikazi	Yebo	Cha
	1	2

Shiya Kunjalo

38) Uma kade ufuna ukufunda kakhulu ngokuthi ungadlani ukuze uphile, ube uzobuza kubani?

Umngane	Yebo	Cha	
Umame	Yebo	Cha	
Ugogo	Yebo	Cha	
Umamezala	Yebo	Cha	
Umfundisi	Yebo	Cha	
Umhlengikazi wasemtholampilo	Yebo	Cha	
Uthisha wesikole	Yebo	Cha	
Owezempilo	Yebo	Cha	
Isangoma	Yebo	Cha	
Omunye	Yebo	Cha	
	1	2	

66

UMA KUNGOMUNYE, ubani? _____

CARD NO. 5

INOMBOLO YENDLU

39) Ngokwesiko lakini ucabanga ukuthi yikuphi ukudla okungafanele kudliwe yizingane?

Isibindi	Yebo	Cha	
Amaqanda	Yebo	Cha	
Inhlanzi	Yebo	Cha	
Inyama/inkukhu	Yebo	Cha	
Ubisi	Yebo	Cha	
Amahabula (ama-apula)	Yebo	Cha	
Amapentshisi	Yebo	Cha	
Amadumbe	Yebo	Cha	
Imfino	Yebo	Cha	
Ubhontshisi	Yebo	Cha	
Okunye	Yebo	Cha	
	1	2	

UMA KUNGOKUNYE, yikuphi ukudla? _____

Shiya Kunjalo

40) Sibongile, unkosikazi ohlala lapho uhlala ngakhona, ukhulelwe ingane yokuqala. Bonke abantu bameluleka ngezindlela ezahlukahlukene ngokuthi angayibheka kanjani ingane yakhe. Kukhona abathi kufanele ayiyise ingane emtholampilo uma igula kuphela. Abanye bathi ukudlala ngesikhathi ukuyisa ingane emtholampilo. Kanti abanye bathi kufanele ayiyise ingane emthola - mpilo njalo.

Ubani ocabanga ukuthi kufanele amlalele kulabo abathi makayiyise ingane emtholampilo

Uma igula	Angayiyisi nhlobo	Njalo	Awunaqiniso
1	2	3	4

☐

41) USibongile esasangene - manje abantu bamluleka ngendlela okufanele adlise ngayo ingane yakhe, eneminyaka emithathu ubudala manje. Abanye bathi kusemqoka ukuthi ingane ayinike izinhlobo nhlobo eziningi zokudla. Abanye bathi uma nje ingane yakhe eyinike uhlobo olulodwa lokudla kakhulu, nje ngephalishi noma isinkwa, ingane izokhula kahle.

Ubani ocabanga ukuthi umnikeza iseluleko esingcono?
Kulabo abathi:

Izinhlobo ezahlukahlukene zokudla	Uhlobo olulodwa lokudla kakhulu	Awuna qiniso
1	2	3

☐

42) Ingane ephile kahle ingaqala ingakanani ukuncela ibhodlela?

Noma inganani	Nhlobo	Awunaqiniso
1	2	3

☐

QAPHELA: "Noma yiwuphi unyaka" kusho ukuthi noma inesikhathi esingakanani ubudala isiboniso, izelwe, inenyanga eyodwa, njalo-njalo.

Shiya Kunjalo

43) USibongile ufuna ukwazi ukuthi yikuphi ukudla angakunika ingane yakhe zonke izinsuku. Uza kuwena ukuzothola iseluleko. Ungamtshela ukuthi ayinike kudla kuni zonke izinsuku.

Yenza uhla lokudla njengoba kushiwo

_____
_____
_____
_____
_____
_____
_____

Awunalwazi

44) Manje uSibongile ufuna ukwazi ukuthi angayidlisa kangakhi ingane yakhe?
Ucabanga ukuthi angayidlisa:

Kanye ngosuku	Kabili ngosuku	Kathathu ngosuku	Ngaphezulu kwesithathu	Awuna qiniso
1	2	3	4	5

Shiya Kunjal

45) Usunginike izimpendulo eziningi ngohlobo nezilinganiso zokudla okuqondene nezingane. Ukufunde phi konke lokhu?
(Qopha okufanele ngokudingekile)

Umngane/isihlobo esakutshela	Yebo	Cha
Wezwa ewayilensini	Yebo	Cha
Wabona kumabonakude	Yebo	Cha
Wakufunda ephepha-bhukwini	Yebo	Cha
Wakufunda ephepha-ndabeni	Yebo	Cha
Wakufunda encwadini	Yebo	Cha
Wathola izifundo/wakubona kwenziwa esikoleni/enhlanganweni/esontweni	Yebo	Cha
Watshelwa emtholampilo	Yebo	Cha
Watshelwa okuqashile	Yebo	Cha
Uthisha wesikole owakutshela	Yebo	Cha
Omunye	Yebo	Cha
Kusha-sha/Awunalwazi	Yebo	Cha
	1	2

UMA KUNGOKUNYE chaza _____

46) Ungathanda ukufunda kabanzi ngokudla okulungele impilo enhle?

Yebo	Cha
1	2

47) NGOKUBUKA NJE KUPHELAI

Ungalinganisa kangakanani isisindo somzimba sobheka ingane?

Ungaphansi kakhulu kuno Sr Jojo	Ungaphansi kuno Sr Jojo	Ucishe alingane kuno Sr Jojo
1	2	3

Ukhuluphele kuno Sr Jojo	Ukhulu phele kakhulu kuno Sr Jojo
4	5

C N OGILVIE - DEPARTMENT OF COMMUNITY HEALTH, UNIVERSITY OF NATAL

ISIMO SOKONDLEKA KWEZINGANE EZIQALA ISIKOLE ENDAWENI YASE-INANDA

D · UHLELO LWEMIBUZO NGENDLELA OKUDLIWA NGAYO

D.1 ISIKHUMBUZO NGOKUPHATHELENE NEMITHETHO YOKUDLA NGAMAHORA ANGAMASHUMI AMABILI NANE

Kugcwaliswe ngengane ngayinye obheka ingane.
KODWA KUNGABI NGESONTO NOMA NGOMSOMBULUKO.

Card No. [6]

Igama lovivinyayo _____ [ ]

Inombolo yendlu [ ][ ][ ]

Igama lengane _____ [ ][ ][ ][ ]

Usuku _____ Isikhathi sosuku _____

1) Lomntwana kade ezodlani noma aphuzeni ukusukela _____ izolo?
(Gcwalisa isikhathi kuye ngesikhathi sosuku)

ISIKHATHI	UHLOBO LOKUDLA	INDLELA OKULUNGISWE NGAYO	UBUNINGI IZILINGANISO ZEKHAYA	SHIYA KUNGENALUTHO	
				Isilinganiso esincanyana	Imithetho ehlelelwe ukudla

ISIKHATHI	UHLOBO LOKUDLA	INDLELA OKULUNGISWE NGAYO	UBUNINGI IZILINGANISO ZEKHAYA	SHIYA KUNGENALUTHO	
				Isilinganiso esincanyana	Imithetho ehlelelwe ukudla

2) Lengane idla kanje zonke izinsuku?

Yebo	Cha	Awunalwazi
1	2	3

D2 : Ukudla Ngobuningi

3 Ukudla kangakhi lokhukudla okulandelayo lo mntwana?

UKUDLA	ZONKE IZINSUKU	IZIKHATHI EZININGI NGESONTO	NGOKUTHI GQWABA	NHLOBO	SHIYA KUNGENALUTHO
	1	2	3	4	
Iziphuzo					
Itiye/Ikhofi elinobisi noshukela					☐
Isiphuzo esibandayo					☐
Isiphuzo sezithelo					☐
Amanzi					☐
Okunye _____ _____ _____					☐ ☐ ☐
Ukudla-okunezakha mzimba					
Inyama					☐
Inhlanzi					☐
Inkukhu					☐
Amaqanda					☐
Ibhotela lamantongo-mane					☐

UKUDLA	ZONKE IZINSUKU	IZIKHATHI EZININGI NGESONTO	NGOKUTHI GQWABA	NHLOBO	SIIYA KUNGENALUTHO
	1	2	3	4	
Imifino esethinini					☐
Okunye _____ _____ _____					☐ ☐ ☐
Izenezelo Ujamu, usulubha, Marmite					☐
Amakhekhe					☐
Amabiskuidi					☐
Amaswidi					☐
Usoso (faka ushatini, i-atsha					☐
Usawoti					☐
Isobho Lenkomo					☐
Amashipsi					☐
Amanto ngamane					☐
Okunye _____ _____ _____					☐ ☐ ☐

UKUDLA	ZONKE IZINSUKU	IZIKHATHI EZININGI NGESONTO	NGOKUTHI GQWABA	NIILOBO	SIIYA KUNGENALUTHO
	1	2	3	4	
Ubhontshisi/ owomile udali					☐
Ubisi olusha					☐
Amasi					☐
Ubisi oluyi-mpuphu					☐
Olunokhilimu/ Oluxutshiwe					☐
Ubisi olusethinini					☐
Okunye _____ _____ _____					☐ ☐ ☐
Ukudla okunikeza amandla Iphalishi lombila					☐
Uphuthu					☐
Ilayisi					☐
Isinkwa esinsundu					☐
Isinkwa esimhlophe					☐

UKUDLA	ZONKE IZINSUKU	IZIKHATHI EZININGI NGESONTO	NGOKUTHI GQWABA	NHLOBO	SHIYA KUNGENALUTHO
	1	2	3	4	
Amazambane					☐
Uhele-layisi noma isitambu					☐
Okusabhotela eliphuzi					☐
Amafutha aqinile (iHolsum)					☐
Uwoyela					☐
Ushukela omhlophe					☐
Ushukela onsundu					☐
Okunye _____ _____ _____					☐ ☐ ☐
Ukudla okuvikela umzimba Izithelo ezintsha					☐
Izithelo ezomisiwe					☐
Izithelo ezilondolo-zwe ethinini					☐

Appendix iv

Information on Food Groups and Exchange Lists

1. The particular system of food grouping used for this analysis was as follows:

Milk Group - all types of milk including fresh, sour, powdered and evaporated milk, yoghurt and cheese but excluding non-dairy creamers.

Meat Group - all protein-rich foods except milk and milk products i.e. meat, fish, chicken, eggs, nuts, legumes.

Cereals - all cereal products including bread, porridge, rice and samp.

Vegetables - all forms of all vegetables including potatoes and sweet potatoes.

Fruit - all fruits

Fat - all fats including butter, oil, margarine and hard cooking fat.

2. The Food Exchange Lists are a tool commonly used in nutritional analyses whereby foods of a similar nutritional value are grouped together. The macronutrient value of a standard portion of a basic foodstuff in each group is calculated, together with the amounts of the other foods in that particular Exchange List which will yield approximately the same values.

Portion sizes and macronutrient content of Exchanges

Food Group	1 Exchange expressed as portion of basic foodstuff	Protein (g)	Fat (g)	CHO (g)	Energy (kJ)
Milk	250ml milk	8	10	12	714
Meat	30g meat	7	5	-	315
Cereals	125ml porridge or 1 x 1cm slice bread	2	-	15	294
Vegetables	125ml vegetable	2	-	5	105
Fruit	1 small piece fruit	-	-	10	168
Fat	5ml margarine or oil	-	5	-	189

NOTE:

For the Milk, Cereal, Vegetable and Fat Groups, one Exchange is equivalent to a standard portion. For the Meat Group, one Exchange is equivalent to one portion for eggs, nuts and legumes but one portion of meat is made up of three meat Exchanges (90g). For the Fruit Group, one portion is made up of two Exchanges.