# A STUDY OF THE RELATIONSHIP BETWEEN MATERNAL OBESITY AND CHILD UNDER-NUTRITION IN AFRICAN WOMEN ATTENDING A CHILD HEALTH CLINIC IN KHAYELITSHA, CAPE TOWN

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**DECLARATION**

I, Ntombizodumo Mvo, hereby declare that the work on this dissertation is based on my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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## EXECUTIVE SUMMARY

**Background:** Malnutrition, manifesting as obesity in women and under-nutrition in children, is a major public health problem in South Africa. There is a multitude of epidemiological evidence reflecting the extent and health effects of these problems, specifically among the African communities. However, at a family level, there is a paucity of information regarding the relationship between obesity in mothers and under-nutrition in children. Studies set to explore this relationship and determinants of body size and nutrition from a cultural perspective are long overdue. Such studies would assist in identifying intervention strategies that are appropriate and effective for the population at risk.

**Objective:** This study, therefore, investigated the relationship between the child's nutritional status and that of the mother in a peri-urban African community. It further explored knowledge, attitudes and perceptions of body size as possible determinants of obesity and under-nutrition. This will make information available for further screening and planning of culturally sensitive nutrition interventions for the population under study.

**Methods:** The study was conducted in two phases. The first phase was an exploratory qualitative design used mainly to develop a questionnaire for the second phase. In-depth interviews were conducted with 10 obese African mothers, whose children were categorised on the 'Road-to-Health' card, as underweight. The interviews provided an understanding of the African womens'perceptions of their body sizes and nutrition regarding the child.

The second phase utilised a cross-sectional analytic study design to investigate the relationship between the mother's weight and the child's weight. It further investigated the knowledge, attitudes and perceptions found in the first phase in a larger sample using appropriate statistical techniques. A systematic sample of 365 mother-child pairs attending a child health clinic over a two-month period, starting from August 1997, was selected. The sample included women between the ages of 16 and 49 years old and their children between the ages of 2 and 5 years old attending a child health clinic in Khayelitsha, a peri-urban area outside Cape Town. Anthropometric measurements of children and mothers were taken and a structured questionnaire was administered to the mothers.

**Findings:** The qualitative study showed attitudes and perceptions of body size that were tolerant of a 'big' body image. There was a lack of knowledge regarding causes of obesity and effective ways of reducing weight, preventing chronic diseases of lifestyle and what constitutes 'good' nutrition for the child. All these findings were confirmed in the second phase of the study.

The main study showed that less than half (42%) of the mothers were able to estimate their body weights. These mothers underestimated their weights, on average, by 5 kg (p=0.0001 CI:3.5- 6.8). In the total sample, 37.3% of the mothers were obese ( BMI> 30kg/$m^2$ ) and 33.4 % were overweight ( 25 <BMI < 30 kg/$m^2$ ). Sixty-eight (18.6%) children were stunted in terms of the NCHS reference values (z-score<-2 height-for-age), 13.2% underweight (z-score<-2 weight-for-age) and 7.1% were wasted (z-score<-2 weight-for-height).Only a small proportion (6.3%) were obese, z-score >2 weight-for-height.

The main finding is that, overall, no relationship was found between the mother's weight and that of the child. The mother's BMI showed a weak positive correlation with the weight-for-age z-score. The relationship between BMI and height-for-age z-score or weight-for-height was not statistically significant. However, most importantly, subgroup analysis showed that mothers' perceptions of their own body size and that of the child were significantly related to BMI and weight-for-age z-scores. Furthermore, a higher proportion of obese mothers (47.1%) were unhappy about their body size than non-obese mothers (35.4%). Consequently, a lesser proportion of obese mothers (36%) chose an overweight body image as 'attractive' compared with non-obese mothers (40.2%).

**Conclusions:**

Although there was no relationship found between obesity in mothers and under-nutrition in children, this study confirmed the high prevalence of both problems in the study group. Furthermore, it provided new evidence on the relationship between nutritional status of mothers and the resultant attitudes and perceptions to body size. This crucial information could be used in planning appropriate intervention strategies for the study population. More studies of this nature are needed for specific target populations in order to direct effective interventions.

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## DEFINITION OF TERMS

| TERM | DEFINITION |
|---|---|
| Black, Coloured, Indian and White | These are "population groups" as defined in the Population Registration Act (1950) of South Africa. Within the Act, the meaning of such terms were legalistic constructions based on the conventional South African understanding of "race" and "ethnic group" and on the changing requirements of political control.[1]<br><br>Outside the act the terms have no logical meaning, but will be used in the thesis only as a measure of unequal provision of health care resources in the past and the consequent health outcomes. This will enhance the redressing of the previous imbalances. |
| Culture | The contemporary definition of culture as a resource will be alluded to in the entire thesis. By this it is meant that culture is the information which humans are not born with, but which they need in order to interact with each other in social life.[1] This information is learned through the process of education, socialisation, maturing and growing old. As with any other resource, culture is controlled by the environment, which places limits on what can and cannot be done. |
| Body mass index | This is computed from weight and height measurements and is defined as the body mass divided by the square of the height measurement:<br><br>$$BMI = \frac{\text{Weight (kg)}}{\text{Height m}^2}$$ |
| Obesity | A body mass index greater than $30kg/m^2$ ($BMI > 30kg/m^2$) classification of obesity will be used .[2] |

[Note: the terms BMI and obesity pertain to adults in the thesis]

| | |
|---|---|
| Under-nutrition | This refers to mild Protein Energy Malnutrition (PEM) as defined by low anthropometry, the three indices being height-for-age, weight-for-age and weight-for-height, and a value below -2 SD (z-score) is considered as under-nutrition |
| Z-score | A standard deviation (SD) score defined as the deviation of the value for an individual from the median value of the reference population.[3] |

$$\text{Formula} = \frac{\text{individual value- median value of reference population}}{\text{SD value of the reference population}}$$

[Note: the terms under-nutrition and z-score are applied to children in the thesis.]

| | |
|---|---|
| Malnutrition | This is an umbrella term for both under-and over-nutrition. In the thesis under-and over-nutrition will be used to make this distinction. These terms are used with reference to children and mothers, respectively, in the thesis. |

## LIST OF APPENDICES

# 1 INTRODUCTION

## 1.1 Background

South Africa is a country in transition with major health problems that need to be addressed. In assessing the basic health needs of the South African population, the Reconstruction and Development Programme (RDP) has identified nutrition as one of the major areas that needs immediate attention.[4] This agenda has been aimed mainly at improving the nutritional status of the younger children. However, it has been speculated that over-nutrition is increasingly becoming a problem in South Africa.[5]

The findings of the BRISK study highlighted the complexity of the nutrition problem in the study population. This study was designed to determine the cardiovascular disease risk factor patterns, the dietary patterns and nutritional status in the African population of the Cape Peninsula.[6] The problems of under-nutrition in children and obesity in mothers were reported in this community. However, the extent of this problem within the same family was not established.

The observation that under-nutrition in infants and over-nutrition in mothers might also co-exist in the same family was puzzling and it set the ground for the present study. Furthermore, it suggested that food scarcity or excess may not be the only factors involved. A major concern from a public health perspective is that both over-nutrition and under-nutrition are known to be related to increased health risks. Several chronic diseases such as hypertension, diabetes and cardiovascular diseases are associated with obesity.[7,8] Under-nutrition in children has been associated with high rates of child morbidity and mortality.

### 1.1.1 The context of health, nutrition and body size

The World Health Organization (WHO) defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.[9] In certain cultures, good health is merely the ability to function, freedom from pain or feeling fine.

Additionally, good health may be considered the result of supernatural intervention, as a gift or a form of punishment for displeasure or disapproval by God. Depending on the culture, either plumpness or thinness may be viewed as an indication of health. Some cultures might even consider malnutrition as normal if prevalent in the community. Understanding belief systems is essential to understanding food behaviour, because a person who holds these beliefs might fail to relate an adequate diet to good health. Instead, deficiency states or over-nutrition may be blamed on factors beyond their control rather than on incorrect consumption of nutrients in foods.

It is important to recognise that culture shapes peoples' food behaviour or habits. Moreover, culture is a dynamic process, some behaviours diminishing while others remain entrenched. Regarding obesity, the current anthropological view is that it is a recent phenomenon. In the South African historical context, there are few reports of obesity among the hunter- gather societies. Members of these egalitarian societies were forced to travel long distances to find food. Whatever food was found was usually shared among others in the community. This gradually changed with the introduction of subsistence agricultural economy. Later on, the changes brought about by industrialisation, a shift from an agricultural to industrial economy influenced people to migrate from rural areas into towns in search of work. Food patterns changed accordingly as the modernisation process led to a class structure of both affluence and poverty.

### 1.1.2 Research directions

Traditionally, public health interventions have been directed at high risk groups. In public health practice it is generally assumed that the households are relatively homogenous with respect to nutritional status, thereby implicating the notion of a 'high risk' household. However, the evidence of heterogeneity within households suggests that this approach should be questioned, the nutritional status of the mother does not necessarily reflect the nutritional status of her child. The information gathered in this study will assist in planning interventions that will be comprehensive and also integrate both mother and child health.

There is a paucity of information available regarding the cultural and economic shifts in South Africa as Africans migrate from rural to urban areas and live primarily in townships. These shifts most likely have an impact on food patterns, attitudes and self-perceptions. In order to develop appropriate interventions, it is necessary to understand how obese African women view obesity

and its origin. Furthermore, it is important to understand the relationship between belief systems and some of the socioeconomic factors that contribute to its maintenance.

The purpose of the study was, therefore, to determine the relationship between the child's weight and that of the mother in a peri-urban African community. This will make information available for further screening and planning of culturally sensitive nutrition interventions for the population under investigation.

### 1.1.3 The aims of the study

The aims of this study were, firstly, to determine if there is an association between the weight of the mother and the nutritional status of the child, using anthropometric indices, in Africans attending the Nolungile child health clinic in Khayelitsha. Secondly, it was designed to determine the knowledge, beliefs and attitudes of African women about acceptable body size of women and their children.

### 1.1.4 The objectives of the study

- To determine the socio-demography, urbanisation history and medical history of the mother and child.
- To measure the mother's height and weight and to calculate the body mass index.
- To measure the child's height and weight to determine anthropometric status.
- To describe the mother's perception of 'good' and 'bad' food and eating patterns for herself and her child.
- To describe the mother's perceptions of 'appropriate' body size for herself and the child.
- To describe the mother's perceptions of the causes of her body size and that of her child.

- To determine the role of gender in food decision making.

- To ascertain whether or not there is an association between the mother's weight and that of the child.

### 1.1.5 Overview of the dissertation

This dissertation comprises five chapters. The first chapter is an introductory chapter, which serves as a background to the study topic. Chapter 2 reviews the literature. The literature mainly highlights the worldwide problem of obesity in women. It also reflects the problem of under-nutrition in children from developing countries. These problems are further discussed in a South African context. The methodology is discussed in chapter 3. This is followed by chapter 4, which presents the study findings which are discussed in chapter 5. Finally, the references and appendices are attached.

# 2 LITERATURE REVIEW

Both obesity and under-nutrition have been identified as serious public health problems due to their association with medical and social effects. The high rates of child mortality in developing countries are associated with the high levels of under-nutrition. Under-nutrition in childhood further contributes to various other functional consequences, including impaired cognitive development.[10] Obesity, in adults, has been associated with a variety of chronic diseases including hypertension, heart disease, stroke and diabetes.[11-19]

The scope of this literature review will demonstrate the extent and determinants of obesity and under-nutrition. The first part of the review will deal with the problems of obesity in mothers. The second part will deal with those related to under-nutrition in children. Finally, both problems will be drawn together in order to show the complexity of the problems of nutrition in developing countries. It will also show the gaps in the existing literature.

## 2.1 DEFINITIONS AND MEASUREMENT OF OBESITY IN MOTHERS

Obesity is defined as a condition in which there is an excessive amount of body fat, or is understood as being present, when fat makes up a greater than normal fraction of total body weight.[20] These definitions imply that fat can be measured and quantified. However, most of the methods of measuring body fat are indirect and thus do not distinguish between overweight caused by excess fat from that due to excess muscle.

There are two indices, based on anthropometry that are used to measure the general degree of fatness. The first one is the relative weight and the second measure, originally known as the Quetelet index, is the body mass index (BMI).

### 2.1.1 Relative weight

Relative weight is a measure of body weight corrected for height, sex and sometimes body frame size.[21] This is expressed as a percentage of the weight of a normal or ideal subject of the same sex and height with or without correction for frame size. The standards of ideal weight were derived from insurance data collected by the Metropolitan Life Insurance Company of New York.[22] The

data were used to relate weight to mortality of the policy holders and subsequently, tables were derived to describe body sizes. In these tables three groups of frame size were distinguished by subjective assessment. The author emphasizes the need to consider incorporating some objective measures of frame size especially when dealing with people from different genetic make-ups, to overcome the problem of misclassifying some individuals.

### 2.1.2 Body mass index

Body mass index is defined as the weight divided by height squared [Wt (kg)/Ht $(m)^2$].[3] Obesity in women can thus be defined as BMI greater than 30, overweight as BMI between 25 and 30 and the normal limits being 19-24. However, the National Center for Health Statistics (US) defines overweight as a BMI of 27.8 or more in men and 27.3 or more in women. [23] Severe overweight is defined as BMI of 31.1 or more in men and of 32.3 in women. The lower and upper cut-offs correspond approximately to 20% and 40%, respectively, above desirable body weight in the 1983 Metropolitan Life Insurance tables.

A study done in Iran showed that the definition of obesity by BMI did not correspond with the centiles of weight and height.[24] It was suggested that if adult obesity is to be defined in terms of weight and height, as in BMI, the initial step is to have accurate population-based data. If such data were unavailable BMI may be seriously biased against short adults.

### 2.1.3 Other measurements

Other measures of fatness include laboratory methods and skinfold measurements. Mid upper-arm circumference has been identified as another appropriate indicator of women's nutritional status.[25] The latter is cost-effective and can be used as a rapid assessment of nutritional status.

### 2.1.4 Measuring obesity in mothers

The main aim of epidemiological studies on the relationship of obesity to disease incidence and mortality would be to construct a scale, which relates degree of obesity to risk.[25] The inadequacy of indices of fatness, and the dependence of obesity on the nature of index chosen for a particular study may further complicate the relationship of obesity to health risk. For instance, a study using

a probability sample of 3.8% of the population of black and white 35-year-old women was done in South Carolina.[22] The cohort included 738 white women and 452 black women. Anthropometric measurements and body girths at the chest, abdomen and mid-arm circumference were taken. Total adiposity was examined as a predictor of mortality and the effects of fat distribution were also estimated. It was found that BMI and body girths were associated with all cause and coronary heart disease mortality in white, but not in black women. This finding was consistent with the results of another cohort study conducted among 2453 and 2731 black American men and women respectively, where no overall positive association between BMI and mortality was found in either gender.[27]

Despite its shortcomings, BMI is by far the most recognised tool in both clinical and public health practice for assessing adult nutritional status.[28] This is due to its direct and continuous relationship with outcome, its strong correlation with levels of adiposity and its independence of height. It is also viewed as providing a basis for monitoring the achievement of several of the goals of the World Declaration on Nutrition, one of which was to identify and eliminate the widespread under- and over-nutrition, afflicting at least some adult populations in most countries.

## 2.2 PREVALENCE OF OBESITY IN WOMEN

International data consistently show obesity to be a critical public health problem for adult populations, due to the gradual increase in its prevalence and the associated health outcomes.[29,30] Overall rates indicate that 30% of US adults are obese or overweight. Using the criteria of the National Center for Health Statistics (NCHS),[31] about 34 million adult Americans were overweight between 1976 and 1980. Of this group, 15.4 million were men and 18.6 million were women. Of the total number, 12.4 million adults were severely overweight. The relative risk of hypertension and diabetes for the 20 to 75-year age group was threefold and that for hypercholesterolaemia was 1.5 times that for the non- overweight.

### 2.2.1 Gender and ethnic differences

Population-based studies conducted in the United States of America (USA) have also shown that there are marked gender and ethnic differences in obesity prevalence.[32-34] Men, in general, have a lower prevalence of obesity compared with women. When overweight was used as a proxy for obesity, black men were found to have similar rates of obesity to white men (30%), while black women (48%) had the highest prevalence in comparison with their white counterparts (25%) and men of either race. The apparent differences in female overweight caused great concern for further research into the problem of obesity. Additional research has been done in developed countries to determine the risk factors of obesity and explanations for the differences in its prevalence among different populations.

Kumanyika[35] pointed out that in epidemiological studies, bias and confounding could not explain the differences observed in female overweight in the United States. A number of studies that showed similar results were based on large representative samples. The ratio of overweight in black women was consistently shown to be in the order of 2:1 or more in almost all these studies, and it was clearly marked in their third decade of life. The author compared data from the National Health Examination Survey (NHES) and National Health and Nutrition Examination Survey (NHANES), which used estimates based on highly standardised direct measures of weight and height for a US probability sample, with data from the National Health Interview Survey (NHIS), which were also from a probability sample that used self-reported weights and heights. Similar trends were observed, although the prevalence varied according to the definition of obesity.

Some small scale studies among ethnic populations also found large proportions of obese individuals, with women specifically having the highest values.[36,37] Among northern Canadian Indians almost 90% of the women, aged between 45 and 54 years, had a BMI higher or equal to 26.[36] This study did not determine the degree of Indian ancestry in the study sample and had a 65% response rate of adults between the ages of 20 and 64 years from four communities that were invited to participate. A 15% random sample was selected from the larger communities. However, people not in the random sample were also included in the study. This resulted in 127 such volunteers, about 18% of the study sample. Therefore, such extreme results need to be interpreted with caution as there is a possibility of selection bias.

### 2.2.2 Age differences

In the United States, the prevalence of overweight has been shown to increase with age in both men and women, but more so in women.[38] Body weight measurements taken longitudinally at ten year intervals found that adults who were younger than 55 years tended to gain weight, while those above 55 years lost weight. The younger the persons, the more likely they were to gain weight. In this case women also showed a substantial variation in their 10-year weight change, which was skewed towards heavier body weight compared with men. Both men and women initially become obese in their early twenties and thirties. In men the peak prevalence (31%) is observed between the ages of 45 and 54 years, thereafter it decreases with increasing age. Contrarily, in women the prevalence of obesity continues to increase through the entire age range, reaching a peak prevalence (38.5%) between the ages of 65 and 74 years.

### 2.2.3 Is obesity a problem in developing countries?

In developing countries the problem of obesity is a recent phenomenon. History shows that traditionally living rural adults gained little or no weight with age.[39,40] The African continent was not an exception. Nowadays this is gradually changing with rising socioeconomic status and other changes resulting from urbanisation. Relatively few parts of Africa; mostly those who are still hunter-gatherers, are not experiencing high levels of obesity. However, no attempts have been made to compare the prevalence of obesity in different countries in Africa as was done in the United States. Some published studies are based on small sample sizes and are therefore not representative of the general population of the respective countries.

A random sample of 1509 urban and rural black adults was drawn from three provinces of Zimbabwe. Rural subjects were recruited at the main rural bus terminals, while urban subjects were sampled off the streets of the respective centres. This study found that obesity was not a problem for the black adults.[41] The ranges for BMI and weight-for-height ratio (WHR) were far below the lower limits of international values for obesity. However, women were generally more overweight (BMI 25-30 $kg/m^2$) compared with men. The results showed no statistical significance for the variables commonly associated with obesity, e.g. rural or urban dweller status, male female differences, and socioeconomic status. Though the authors deal with these issues in the discussion, no mention is made of the selection bias of study subjects. It is plausible to think of the severely

overweight adults as a group that might have been less likely to go to town and thus may not have been included either in the urban or rural groups because of their activity levels. Moreover, the pedestrians could have been a mixture of urban and rural adults and this might have underestimated the urban/ rural differences in adults' BMIs.

In South Africa, obesity has been shown to be a major public health problem for women and more so for the black ethnic groups.[42-45] The studies referred to, investigated gender, ethnic, rural and urban differences in obesity prevalence. The strength of the results lies with the fact that three of the studies were based on representative samples among the white, Indian, coloured and black populations. In the Western Cape province of South Africa, the proportion of obese black women (34.4%) was found to be almost double that of white women (18%), while coloured (25.9%) and Indian women (21.6%) tended to fall in the intermediate position. In men the prevalences were 7.9%, 14.7%, 6.1% and 3.2% respectively. White men had the highest prevalence of obesity (14.7), but was still far lower than that of women in either ethnic group.

Obesity levels also increased with increasing age in both men and women. [39] In comparison to international studies, there was more variability in womens' obesity levels among the different age groups. In the youngest age group (15 - 24 years) which is believed to be the age of onset of obesity, black women (12.9%) were already three times more likely to be obese than white women (4.6%). This was remarkable considering the fact that other studies showed that black children tended to be slightly underweight in comparison with white children. Contrarily, in the US population, black women were found to have BMIs > 30 kg/m$^2$ for the first time in their life in their third decade, than white women. For South African black women, the highest proportion of obesity (59.4%) was observed in the 45 - 54-year age group, while for white women the highest prevalence (31.7%) was in the 55 - 64-year age group.

## 2.3 DETERMINANTS OF OBESITY

The key to successful public health interventions is to determine the prevalence of modifiable risk factors in specific populations. The biological, physiological and psychological causes of obesity have been well researched and established. These include genetic susceptibility, physical activity and dietary factors. [40] Recent international literature has shown some associations between obesity and other socio-economic and cultural factors. Most of these studies were conducted in the United

States and very few were done in South Africa. Furthermore, intervention programmes, which focussed on weight control have shown that African-American women had particular difficulty with weight control compared to white women.[46-53] Cultural factors influencing weight control programs have been shown to contribute to this problem.

### 2.3.1 Socio-demographic factors

Socioeconomic status is said to be an important correlate of obesity levels in the US population.[54] A consistent inverse relationship between BMI and socioeconomic status has been shown in women but not in men. The socioeconomic indicators included poverty status, educational and income levels. This inverse relationship of increasing BMI with decreasing socioeconomic status has been shown to be typical of developed countries.[55,56]

The relationship between obesity and marital status is not well established because the results of different studies are inconsistent. Some studies have shown married people as more likely to be obese than unmarried ones, while other studies found this to be the case only with men.[57,58] It is further mentioned that some of the earlier investigations, which showed differences among marital groups, did not control for important confounding factors such as age. When these factors had been controlled for, marital status was not significantly associated with obesity.

### 2.3.2 Cultural factors

According to Brown (1991) human predispositions to fatness and obesity are best understood in the context of cultural and biological evolution.[59] Both genes and cultural traits that were adaptive in the context of past food scarcities have been found to play a role in the aetiology of adult obesity. The prevalence of obesity has changed throughout history and this has been associated with the changing cultural factors. Culture has also been found to play a role in the perception of health problems and patterns of health seeking behaviour by individuals.

Studies on the perceptions and attitudes to body size show obese black women to be more satisfied with their body size than obese white women.[60-65] Most of these studies were done in the United States, with the exception of one study that was conducted in South Africa.[64] One of the studies included adolescent girls, who were asked to select the ideal body size from a wide range of pictures as part of an investigation to explore norms and expectations of family and friends.[62] Black adolescents were found to be more likely to select a larger body size than their white counterparts. They also perceived that their parents considered them a little 'thin', while white adolescents thought their parents considered them a little 'heavy'. These findings were similar to those of a study conducted on American college students.[63] From these studies it became clear that families and communities play a significant role in influencing cultural norms of appropriate body size.

There is a paucity of information available regarding the cultural and economic shifts in South Africa, as Africans migrate from rural to urban areas and live primarily in townships. These shifts are most likely to have an impact on food patterns, attitudes and self-perceptions. One of the few South African studies investigated attitudes of rural and urban black, Indian and white adolescent girls on body image and eating behaviour.[64] A total sample of 1871 girls in the province previously known as the Eastern Transvaal responded to attitude questions answerable by 'yes' or 'no'. Subjects were further asked to volunteer information on amount of desired weight loss. The findings suggested attitudes that were unlikely to seriously prejudice health. Although black girls experienced more obesity than their peers, all these adolescents desired weight reduction. However, it was reported that weight reduction was seldom seriously attempted by black girls.

In order to develop appropriate interventions, it is necessary to understand how obese African women view obesity and its origins. Furthermore, it is important to understand the relationship between belief systems and some of the socioeconomic factors that contribute to its maintenance. Adolescence is a critical stage in terms of weight gain, but family support is also important in maintaining healthy attitudes. Therefore, it is still very crucial to understand mothers' attitudes to body image and explore whether 'big' is still viewed as 'beautiful' in the South African black communities.[65]

## 2.4 DEFINITIONS AND MEASUREMENT OF UNDER-NUTRITION IN CHILDREN

Under-nutrition is a global phenomenon, characteristic of developing countries. About 150 million children under the age of five years are underweight and more than 20 million suffer from severe under-nutrition. Recent information shows sub- Saharan regions of Africa to be the most affected. Mild-to-moderate under-nutrition (60-80% weight-for-age) is a common trend. [66-69]

Under-nutrition is defined as a pathological state resulting from an inadequate food intake over a long period of time.[66] A number of symptoms can be observed including loss of weight, decrease in the inflammatory and immune responses leading to repeated infections and further nutrient deficiencies. The whole cycle of under-nutrition is referred to as Protein Energy Malnutrition (PEM).

According to Kooshoo (1997) the accurate assessment of a child's nutritional status is a complex task due to ongoing growth, changing energy needs, varying body composition, and disease.[67] The importance of establishing an accurate nutritional intake is emphasized. In addition, being sensitive to and conversant with the effect of socio-cultural influences on dietary intake is mentioned.

As in adults, anthropometric measurements are also used to assess the child's nutritional status [67]. These are weight, height, body circumferences and skinfolds, but the indices used for interpreting these measurements are different and are expressed in terms of z-scores, percentiles or percent of the median. These indices are compared with a reference population to decide whether a group or an individual child is undernourished. Examples of commonly used indices in evaluating nutritional status follow:

### 2.4.1 Weight-for-age

Weight is the most sensitive indicator of nutritional status as it reflects acute and chronic changes. Weight-for-age is an indicator of whether a child's weight falls within the normal range or not. A low value of weight-for-age indicates underweight. If 20-40% of a population or group is underweight, the population is said to be moderately affected and severely so if more than 40% is under-weight. (WHO 1986)

### 2.4.2 Height-for-age

Height retardation occurs gradually and is not as easily observed as weight changes. A low height-for-age therefore indicates chronicity and is termed stunting. A population is regarded to be moderately affected if 25-50% of its children under the age of 5 years are stunted and severely affected if more than 50% are stunted. [70]

### 2.4.3 Weight-for-height

This indicator is useful when the child's age is unknown and can indicate whether a child is underweight or overweight. It is commonly used in surveys to determine acute nutritional stress and severe food shortages. A low weight-for-height reflects wasting. A prevalence of 5-10% wasting is moderate, while more than 10% is regarded as a severe problem. [70]

## 2.5 THE PREVALENCE OF UNDER-NUTRITION IN CHILDREN

Stunting and underweight are highly prevalent and thus reported as the most common forms of under-nutrition in developing countries. Longitudinal studies done in Egypt, Kenya and Mexico concurrently followed up biological parents (mainly focussing on mothers) and their children of different ages (from birth to 9 years old) for a period of one to two years.[69] The total sample included 250 households in each country. The results showed major deceleration of growth in children as early as the age of 3 to 4 months. Though not shown in these studies, the authors suggested that the first 12 to 18 months was probably marked by a continuous growth decline. From 18 months onwards, it was shown that the quantity and quality of diet and environmental factors did not permit catch-up to the normal or near to normal growth rate observed in the newborns. In all the three countries, growth beyond infancy continued to increase normally, but at a very low level.

In South Africa, a literature review integrating four national studies and a large number of small scale studies was conducted.[70] Its aim was to determine the nature and the extent of the problem of malnutrition and also to investigate which groups were mostly affected. The results showed that, on a national level 20% to 25% of preschoolers were stunted. However, there were wide variations

in the mean prevalence of stunting between the different population groups. The prevalence of wasting and underweight were found to be low. The authors concluded that the available data indicated that some areas had more serious problems of under-nutrition compared to others.

### 2.5.1 Dietary patterns of children

The children's feeding practices are partly determined by their carers, mostly their mothers in early infancy. As shown above, although the infant's nutritional status at birth up to 4 months is determined by circumstances around pregnancy and feeding practices, part of the child's growth, beyond 6 months, is determined by a combination of cultural, environmental and socio-economic factors. Furthermore, the nutritional status of children from 12 to 18 months and above seems to depend, partly on the child's nutritional status during infancy. As will be shown in the next few paragraphs, the feeding practices demonstrate this complex interaction of factors.

#### 2.5.1.1 Breastfeeding and weaning practices

Breastfeeding is generally accepted as providing adequate nutrition and supporting growth for the first 4 to 6 months of life.[71] After this period the weight curve flattens until supplementary foods are introduced. However, it has also been documented that the introduction of foods other than breastmilk can introduce the risk of contamination and infections, which may have negative effects on the nutritional status of the child and thus outweigh any benefit from the food.

Weaning has been found to be a critical period (between 4 and 18 months of age) for the development of PEM.[72-74] This is due to a number of constraining factors related to the whole process of weaning. A comparative study looked at the processes involved in infant weaning, which included both the introduction of supplementary foods and termination of breastfeeding in Ethiopia and Sudan.[73] One sample comprised 113 mother-infant pairs and the other 83 mothers. Both studies were nested in ongoing studies; a mixed longitudinal study of infant growth and a cross-sectional study of mortality among refugees respectively. The sample sizes were too small to be able to generalise the findings, but hypotheses on the important aspects of the weaning process were highlighted.

For instance, intra-population variation for initiating weaning was found to depend on, among other things, availability of appropriate weaning foods, infants' appetite and the emergence of primary teeth.

These were identified as infant-centred factors, which interact with one and another, because the willingness and ability of a child to eat the foods were found to be critical to the successful commencement of weaning. Other factors, identified as mother-centred were, pregnancy, breastmilk insufficiency and ill-health. The strength of this comparative study is that it gave an indication that the interaction of infant- and mother-centred factors determine the success of weaning and the two factors are very much influenced by the socio-cultural environment. These findings challenge the breastfeeding strategy and thus raise a question, subject to considerable debate, on the appropriate time for starting supplementation and weaning .

A South African study investigating breastfeeding and weaning practices of rural mothers also collected information on the dietary intakes of 118 rural preschoolers.[75] The prevalence of breastfeeding was found to be 90% and these mothers breastfed for the maximum recommended period of six months. The traditional breastfeeding period of eighteen months was on the decline as only 61% of the study sample practised it. However, the study showed an early introduction of supplementary foods (59% at 3 months of age) and less milk consumption after weaning (only 28%). Most importantly the mean heights and weights were found to be marginally lower in the groups that had been breastfed for longer periods. The reason for this relationship could not be explained by the same study, but it raises serious concerns for health education. However, further studies using representative samples need to be conducted to establish such a relationship.

#### 2.5.1.2 Preschoolers' (3-6 year old) eating patterns

Since under-nutrition is common in pre-school children, most South African studies have focussed on this age group.[76-79] One of the studies found that there were marked differences in the total consumption of various foodstuffs in the ethnic groups of South Africa. Urban white children tended to consume largest amounts of most food items compared to rural or urban blacks and urban Indians. The ranking of food items also differed between these groups. According to the authors, traditional habits played a part in the ranking of food items, though there was an indication of changing dietary intake from traditional to westernised diet.[76]

Looking at breakfast patterns of primary school pupils, one study showed that more white children (76.1%) reported eating breakfast compared to black children (57.6%).[77] Moreover, between 14.4 and 34.4% of these children reported being hungry when they went to school. These and other similar findings assisted in informing the development of the school feeding scheme.[78,79]

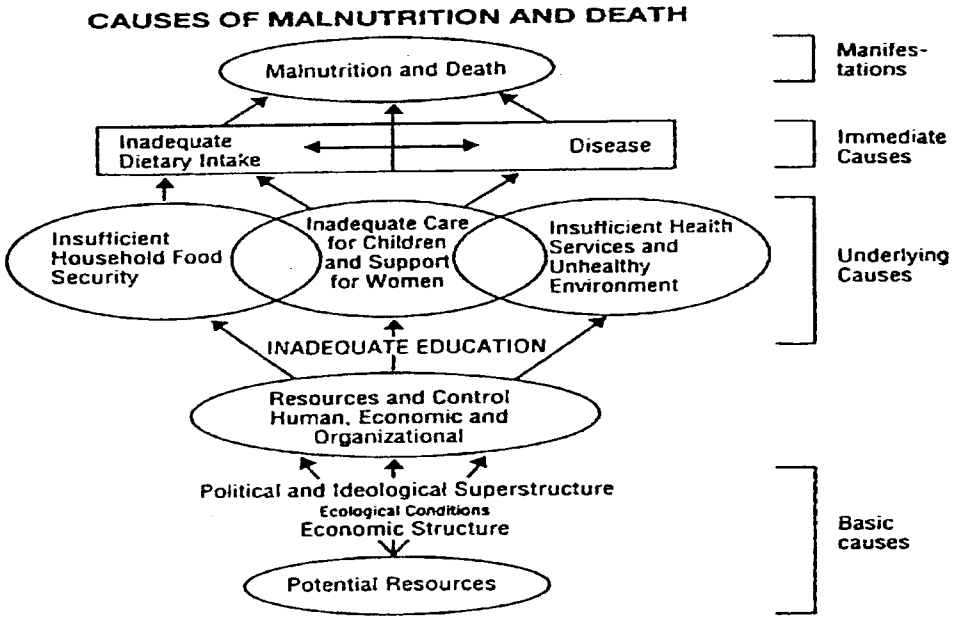
The situation is different in most developed countries. For instance, a meta-analysis of studies looking at nutritional status outcomes for American children revealed that more than 80% of all US children consume more than the recommended amount of total fat and saturated fat.[80] It also showed that children from lower socio-economic communities were at an increased risk of obesity. These problems could continue into adolescence and later predispose them to chronic diseases.

## 2.6 DETERMINANTS OF UNDER-NUTRITION

### 2.6.1 Socio-economic and other factors related to under-nutrition

Childhood under-nutrition has multiple causes that are mainly of a socio-economic nature. Although severe forms of under-nutrition are currently not common in South Africa, in such cases mothers' educational and marital status seem to play an important role.[81] Other causes commonly regarded as underlying causes, include insufficient household food security, inadequate maternal and child care, insufficient health services and an unhealthy environment. A conceptual model of the interrelationship of the different causes of under-nutrition is provided in Figure 1.[82]

**Figure 1:** **A conceptual framework (UNICEF) for considering causes of malnutrition in a community.**




## 2.7 THE COEXISTENCE OF OVER- AND UNDER-NUTRITION

International studies reflect the coexistence of the problems of under-nutrition and over-nutrition in economically underdeveloped countries.[83-85] Popkin et al,[86] in his discussion on the nutritional transition, states that a sequence of dietary and nutritional factors correlate with changing economic, social, demographic and health factors. In some developing nations, while still addressing poverty, problems related to food excess have begun to appear. For instance, the data from the 1989 China Health and Nutrition Survey provided an overview of the changes occurring in the diet and nutritional status of the Chinese. The analyses of these data were intended as a case study since the authors felt that identifying and addressing the problems of co-existing under- and over-nutrition is of international importance. This pattern is also one of the components of the epidemiological transition, where a decline in infectious diseases and an increase in chronic diseases is observed.

In public health practice it is common to assume that households in developing countries are relatively homogeneous with respect to nutritional status.[87] As a result nutritional assessments of mothers or individual children would sometimes be used as an effective screening mechanism for household level maternal-child nutritional risk. A study conducted in rural Guinea investigated the nature of within-household relationships of maternal and child nutritional status. The authors reviewed the extent to which anthropometric indicators for a particular household member (e.g. a child) can be used to make inferences about the nutritional status of other household members (e.g. the child's mother or siblings). The results of this study showed that childhood anthropometric indicators are inefficient screening tests for maternal malnutrition and vice versa. This was indicated by the low sensitivity of these anthropometric indices. For instance, the sensitivity of childhood nutritional status as a predictor of maternal nutritional status failed to even reach 50%. The use of maternal nutritional status as a screening tool for child under-nutrition had even lower sensitivity (<20% for all anthropometric indicators). However, these screening tests proved to be highly specific and this was attributed to the fact that factors that mitigate nutritional risk might be common for women and children staying in the same household, while factors associated with under-nutrition might not be fully shared or generate the same response by all household members. In other words it is possible to find an obese mother and an undernourished child within the same household.

In South Africa high under-nutrition rates in children and obesity in women have been identified at community level.[88-90] The BRISK study,[88] conducted in 1990 among urban Africans of the Cape Peninsula reported similar findings. The dietary intake of the study population met the requirements of the South African Diet Consensus Panel as far as macro-nutrients were concerned (60% energy from carbohydrate and 26% energy from fat). However, the diet represented a transitional phase between a 'traditional' diet and a 'western' diet. When comparing the results of this study with another one done in adults in 1940 a 14% reduction for carbohydrate as a proportion of energy and a 63% increase in fat intake were noted.[91] These changes are seen as dramatic when taking into consideration those observed in western countries undergoing rapid industrialisation over longer periods of time. This has important implications for interventions aimed at mothers and children, since South Africa is also experiencing rapid urbanisation. The coexistence of obesity and under-nutrition at community level has raised much concern regarding the possibility of an intra-household problem of over-and under-nutrition.

Very few studies have looked at the coexistence of over-and under-nutrition. One South African study found that the caretakers of underweight children were relatively overweight compared to those of normal weight children.[92] This was interpreted as an inadequate distribution of food in the household. This is in line with observations of Ross,[93] who found social interactions to be very fluid in one squatter camp outside Cape Town. She reported that members of the same household did not necessarily eat in the same household. It was common practice for children to eat at a neighbour's place depending on the availability of food in that particular household.

In summary, the reviewed literature clearly indicates that obesity is increasingly becoming a problem in all populations, developed and developing. However, in developing countries, the majority of the nutrition research agenda has been dedicated to solving problems of insufficient food intake with very little attention to the problems of excessive intake. Consequently there is limited information on the nature and extent of the problem of coexistence of obesity and under-nutrition.

# 3 METHODOLOGY

## 3.1 Research methods

The study was conducted in two phases. Phase I was a qualitative enquiry, which investigated the cultural factors around body size and nutrition in the study population. This contributed to the development of a highly structured questionnaire using culturally acceptable language. Phase II was a quantitative study, using the questionnaire developed based on information gathered in phase one.

### 3.1.1 Phase I

#### (i) Methods

This was an exploratory qualitative design where in-depth interviews were conducted with African women. The interviews provided an understanding of the African women's perceptions of their body sizes. The study further probed on questions about perceptions of nutrition regarding the child.

Ten mothers with underweight children were selected at the clinic. The children were described by clinic staff as underweight in their clinic cards. A purposive sample consisting of mothers with a 'large' body size were selected for the study. This was decided through the researcher's observations.

The in-depth interviews were conducted at the clinic in Xhosa and audio-taped by the researcher, who had experience in qualitative research methods. A general opening statement was presented to all the informants at the beginning of the interview. The interviews were unstructured using an interview schedule to guide the inquiry (appendix 3).

### (ii) Data analysis

Data were analysed separately by the researcher and a senior researcher, who was a supervisor in the study for content analysis and comparison. This process was followed by a focus group discussion to test the reliability of the findings. The audio-taped interviews were transcribed and translated from Xhosa into English. The transcripts and field notes were analysed using the grounded theory.[94, 95] WordPerfect 6.0, (word processing software) was used as a main software support.

## 3.1.2 Phase II

### (i) Study design

A cross-sectional analytic study design was used.

### (ii) Study Population

The study population was all the African women between the ages of 16- 49 years old and their children between the ages of 2 and 5 years old attending a child health clinic in Khayelitsha.

### (iii) Study setting

The Nolungile Child Health Clinic is situated in an informal settlement known as Site C in Khayelitsha, Cape Town. The number of shacks is reported to exceed the number of formal houses in the whole area. In 1996 the number of serviced shacks was estimated to be 30 703 and un-serviced shacks were in the order of 5 120 compared to 14 621 houses.[96]

The serviced shacks are provided with a flush toilet and a tap and there were reportedly eight such areas in Khayelitsha. Informal settlements on the other side have no immediate access to municipal services and this is characteristic of most shacks in the Site C squatter area.

**(iv) Sampling**

A systematic sample of 365 mother and child pairs attending a child health clinic over a two-month period starting from August 1997 was selected. The sample size was determined through a pilot study to ensure feasibility. Other factors that were considered were time and money available for data collection. The details of the pilot study are provided below.

The clinic operates between 07h30 and 13h00 Mondays to Fridays. Malnutrition clinics are run twice a week, on Tuesday and Thursday afternoons. Two children were randomly selected on an hourly basis between 08h00 in the morning and 13h00 in the afternoon. Most malnourished children only attended the clinic after lunch to collect their food parcels and get weighed. An effort was made to include this group by extending the selection process on these days until 15h00, which was usually the last hour for handing out food parcels.

The child- mother pairs, who met the inclusion/exclusion criteria, were included in the study sample after the mothers were approached. At the end of two months from the starting date, 365 mother and child pairs had been selected and this included 20 children from the malnutrition clinics. This sample size was sufficiently large to detect an expected prevalence of 12% underweight-for-age in the study population. A sample size of 162 was needed for this prevalence and to ensure a 95% confidence level that the sample estimate is similar to that of the population.

**(v) Inclusion and exclusion criteria**

Children between the ages of 2 and 5 years old were included. Only the children's biological mothers were included in the sample. The child health clinic serves children from 0 to 6 years. However, it was known that most children below the age of 18 months are usually on breast milk, and therefore, less likely to be underweight. Since it was important to have sufficient numbers of underweight children in order to address the study question, the age group that was deemed more likely to fit this category were children of 2 years and above, who would be completely weaned. Growth retardation is cumulative, so by ages 2-6 growth failure can be captured even more accurately than at earlier ages. Furthermore, it is generally known that capturing the

recumbent length in babies is problematic. Mothers who were pregnant, and women who were caretakers or child- minders were excluded. Finally, the mother and child pair was excluded if one or both of them were TB patients.

**(vi) Measurement**

A structured questionnaire, translated into Xhosa, was administered to the mothers (appendix 4). The questionnaire included information on socio-demographic factors, maternal and child anthropometry and information on maternal knowledge, attitudes and perceptions of body size.

The questionnaire was adapted using the information gathered in the first phase as well as in other standardised questionnaires such as the BRISK study.[6] All the questions relating to body size were formulated using the findings of phase one. Test photographs were also administered to mothers to further determine perceptions of ideal body size using a standardised method.[97] These photographs had been varied by an anamorphic lens to produce images that are both thinner and wider than the originals (appendix 5). Three experts had assessed them in terms of percentage deviation from the ideal body weight. Four questions relating to the photographs and body preferences had been developed.

Height and weight measurements of both mother and child were taken on the day of the interview, using a metal measuring tape and a good quality balance scale (Seca). The height measurements were taken against an upright wall and on an even surface. Respondents were asked to remove their shoes and to stand on their feet with heels closely together, back and shoulders against the wall. Their heads were positioned to form a straight line from corner of eye to where the top of the ear joins the head, at right angles with the wall. The headboard would then be placed firmly against the wall and at right angles on top of the head. A horizontal point was marked against the wall. When the respondent moved away, the distance below the mark was measured using a metal tape in a straight line. The readings were taken to the nearest 0.1 cm opposite the mark.

The weights were measured by placing the balance scale on a firm, flat surface. Respondents had

to be barefoot and wore light clothing. They were asked to stand on the scale and the readings were taken to the nearest 0.5 kg.

**(vii) Validity and reliability**

The two field workers were trained by a professional research technician. They were taught interview techniques and how to take height and weight measurements. The investigator did daily quality checks of the questionnaires to ensure accurate data collection. Coding of questionnaires was also performed by the investigator to facilitate quality of data. Supervision was done for a full week during the starting period of the fieldwork to ensure proper sampling of subjects and to eliminate any logistical issues. Thereafter, the investigator visited the field site at any time, unknown to the field workers, at least 2 to 3 times a week to ensure that the field workers adhered to the protocol.

At the end of the fieldwork, the scale was validated by taking twenty weight measurements of the same child, just over 2 years of age, with a known body weight over a period of two days. The first two readings were 10.5 kg and all the successive readings were 11.0 kg. It was concluded that the scale was accurate to the nearest 0.5 kg and also reliable for both adults and children.

Test photographs, as already described above, have been devised as a quantitative method of assessing cultural ideals of body weight. This method can be used with persons of very limited education and in a wide variety of cultural settings. The Department of Human Nutrition of the University of Orange Free State has remodelled and standardised the test photographs for the black South African population.[98] This version was used in the present study as it was considered appropriate for the study population.

**(viii) Pilot study**

Two pilot studies were conducted. The first one was done during the questionnaire development stage, mainly to pretest the appropriateness of the questions. After the necessary changes were made, the questionnaire was translated into Xhosa and pretested for acceptance of the Xhosa

language and common understanding of the questions. A few changes were made in the phrasing of questions to accommodate teenage mothers who would be participating. The questionnaire was later finalised when no more changes could be anticipated.

The second pilot was undertaken before the initiating fieldwork to determine the sample size and the practical feasibility of the study. The information needed to decide on the sample size was not readily available at the clinic. Their statistical records only provided the total number of children attending the clinic on a monthly basis. The data was not broken down into age groups except for the 0-18-month age group. It was also not indicated which were repeat visits. A week's data were then collected at the clinic for all the age groups, from 0-6 years of age. When the childminder presented at the clinic, the road- to- health-card was checked for the child's age and she was also asked if she was a biological mother of the child. This was done to determine the proportion of children who would be eligible for the study.

The results of the pilot study showed that a total of 693 children attended the clinic during this one week, with almost half (49.4%) of them below one year of age. Of the total number, 36.6% were in the 0-9-month age group and 22.1% in 1-2-year age group. There were very few children in the older age groups, particularly between the 4-5-year age group (4.9%) and the 5-6-year age group (6.3%).

From these results it became clear that each week there would be fewer children to constitute the sample, since most of the children attending the clinic would not be part of the study sample. Therefore, it was decided that the study would have to continue for two months as the logistics at the clinic also allowed 10 mother and child pairs to be selected on a typical busy day. Each fieldworker would, therefore, interview 5 mothers over a 5-hour period and the interviews and anthropometric measurements of each pair would take between 30 and 45 minutes.

**(ix) Analysis**

Data were analysed using SAS version 6. Univariate analyses were performed to facilitate data cleaning. and to provide descriptive statistical information. There were no major errors in the data

set; the few coding and data punching errors were detected and necessary corrections were made to the data.

A simple linear regression was then performed on continuous variables to investigate the relationship between mothers' anthropometry and that of the child. A t-test was done to test the significance between mothers' perceived weight and their actual weight.

Further analysis explored the relationship between various categorical variables using a chi-square test. The variables of interest were mothers' Body Mass Index or children's weight-for-age and all the variables relating to mothers' knowledge, perceptions and attitudes to body size.

**(x) Ethical considerations**

The subjects were fully informed about the overall aim of the study. Mothers were approached individually, if they met the selection criteria, and all of them agreed to participate in the study. There were no invasive procedures during interviewing and all subjects were told to stop the interview at any time should they feel the need to do so.

The protocol was approved by the University of Cape Town Ethics Committee (appendix 1)

**(xi) Dissemination of findings**

As shown in Appendix 6, the results of this study have been widely disseminated. The findings of the first phase were presented at two scientific conferences and also published in an internal newsletter of the Medical Research Council that has a wide readership. As a result a local newspaper published these results. Interviews were also held with a National radio station (SAFM) and SABC1 TV station as other ways of information sharing.

The results of the second phase were presented at a scientific conference. Furthermore, it is planned to provide feedback to the Cape Metropolitan Council and Nolungile Child Health Clinic.

# 4 RESULTS

## 4.1 Phase I

### 4.1.1 Demographic data

All the participants interviewed in the study had moved to Cape Town from the Eastern Cape region of South Africa; nine of the ten informants came from the rural areas, whereas one came from the city of East London. The age range of the sample was from 18 to 36 years of age. All participants were mothers; most unmarried; and 9 out of the 10 participants unemployed. All participants lived in the informal settlements of Makhaza, Site B and Site C in the community of Khayelitsha with households of 4 to 10 other occupants.

One of the participants had left school after 6 years of schooling, while the rest of the group had received 9 or 10 years of formal education. Due to the high unemployment rate in this group of participants, food security was problematic, many of them relied on the generosity of their household owners who supplied the food. Most of the respondents received no financial support from the fathers of their children.

### 4.1.2 Mothers' perceptions of child's body size

Most of the mothers described their babies as being "*big at birth*", but early in infancy the baby ceased to gain sufficient weight, *"He is smaller now, he was fat before"*. This perception was reinforced by observations made by health providers at the primary health care clinics, *"Even the nurses said that"*.

The mothers gave a variety of reasons as to why their infants failed to thrive such as the child did not like the food. *"Really he does not like vegetables...you have to hold him and force him to eat"*.

Most mothers expressed a wish for the child to have a big body. One exception was a mother who associated plumpness with chest problems, "*When the child is too big she is troubled by chest wheezing*". The mothers who reported getting food (milk) for her child from a Malnutrition Centre complained that the milk is limited to two tins every fortnight. They described the long wait, "*You*

*stay there from the morning till late". "You have to wake up at six as if you are going to work so that you can get the porridge to feed your child with".* When asked if the children do get enough food from these centres, one mother replied, "*Yes, they get enough food although you have to struggle to get that food. It is said that it is the place to feed children but you see people having up to three dishes in front of them. One is for herself, the other one is for the child, and the last one is for herself again".*

### 4.1.3 Mothers' perceptions of their own body size

All the mothers described themselves as "fat". Many blamed their large body size on the contraceptive injection, Depo Provera. "*And I could see that with the Depo injection I am no longer having the body I used to have...".* Most of the women did not weigh themselves on a regular basis. They described themselves as fat because their clothes no longer fitted them, or because they heard other people comment about their large size.

Responses to the question on how the women felt about their body size varied. Some women felt that they were content with their shape as they associated being thin with times of stress and difficulty. *" I think I experienced a lot of problems at my husband's home. Then I lost and lost weight".* When asked if they were satisfied, they responded with replies such as, *"Yes, I like it".* They were content with their body size as they felt healthy and were not limited in their daily living activities. However, the majority of women expressed discontentment with their bodies, *"I wish I could lose weight, and not be like this....."*

The women who expressed their discontentment with their shape gave three main reasons for their unhappiness. Firstly, they found that they were unable to wear clothes that they had previously enjoyed wearing, or that had been donated to them. Secondly, they expressed difficulty moving around, *"No, it (the body) is heavy when you walk".* Others felt uncomfortably hot during the summer days, *"When it is hot I get a rash and I become very hot".*

The attempts to lose weight were limited. One woman described that she drank lemon juice with black tea, while another described her attempts to restrict her eating habits. These attempts soon failed when she was placed in a situation with abundant food, *"I sometimes try and not eat. My problem is that I can stay and not eat meat for some time, but when I eat it again, I eat it to make up for the times I was not eating it!"*

The response of people close to the women varied considerably. Many family members and friends appeared to acknowledge the participants' large size without any negative feelings. *"They say, "Wow, I wonder where do you get such a big body?"* or *"Yes, they do comment, but they do not criticise. They just talk about the fact that I have gained."* Others described positive comments about their large size. *"He (husband) praises me".* A few women gave incidences when they had received negative comments about their largeness. *"I work with coloured people, and they say I like food, that I am always eating, and that is why I am so fat".*

Others put on weight when they became worried and upset. This was sometimes associated with long periods of unemployment, *"Not working forces you to eat because you are not doing anything".* Others connected their large bodies to excessive eating, *"It is caused by food. I do not even want to lie. I like food very much". "I think maybe it is caused by eating too much".* Sometimes the increased access to food was caused by happy circumstances such as getting a job or living with a generous relative.

## 4.2 Phase II

### 4.2.1 Socio-demographic information

Socio-demographic information is shown in Table 1. The sample included 365 mother-child pairs. About 50% of the mothers were under the age of 30 years, 43.5% of them were single

Most mothers (91.2%) were born in rural areas and had also spent their first 10 years there.

About 38.3% mothers had fewer than seven years (Std 5) of education. More than half (58.1%) had between 6 and 9 years of education and a lesser proportion (26.8%), had 10- 12 years of formal education.

There were 1 to 6 adults per household with a median number of 2. There were also more female than male children. The number of children in the family, other than those in the study varied between 1 and 9, the median number being 2.

**Table 1: Socio-demography of the mothers and children, n= 365 mother-child pairs**

| **Variable** | **n= 365** | |
|---|---|---|
| **Mothers:** | | |
| 1. Age (years): | Median= 27<br>Range = 16- 49 | |
| | **Frequency** | **(%)** |
| 2. Marital status: | | |
| single | 133 | (36.4) |
| married/ living with partner | 206 | (56.4) |
| divorced/widowed | 26 | ( 7.1) |
| 3. Place of birth: | | |
| rural village/farm | 333 | (91.2) |
| small town/city | 32 | ( 8.8) |
| 4. Place where childhood was spent (up to 10yrs): | | |
| rural village/farm | 332 | (91.0) |
| small town/city | 33 | ( 9.0) |
| 5. Schooling | | |
| ever schooled | 358 | (98.1) |
| never schooled | 7 | ( 1.9) |
| <2 years | 8 | ( 2.2) |
| 3-5years | 44 | (12.3) |
| 6-9years | 208 | (58.1) |
| 10-12 years | 98 | (27.4) |
| **Children:** | | |
| 1.Age (years) | Median = 3.08<br>Range = 2- 5.6 | |
| | **Frequency** | **(%)** |
| 2.Sex | | |
| females | 203 | (55.6) |
| males | 162 | (44.4) |

### 4.2.2 Socio-economic status of the mothers

There was a high rate of reported unemployment (79.7%). More than half (57.5%) of the mothers had a total household income less than R1000 per month of which approximately 20% was spent on food, (Table 2). This ranged from R40 to R800 per month. Those who did not know their total household income were either students or mothers who had no regular source of income.

**Table 2: Mothers' socio-economic information**

| **Variable description** | **n=365** | |
|---|---|---|
| | **Frequency** | **(%)** |
| 1. Employment status: | | |
| unemployed | 291 | (79.7) |
| employed | 74 | (20.3) |
| 2. Total household income p/month: | | |
| 0- 199 | 16 | ( 5.2) |
| 200- 399 | 32 | ( 8.8) |
| 400- 599 | 53 | (14.3) |
| 600- 799 | 50 | (13.8) |
| 800-1000 | 56 | (15.5) |
| $1000^{+}$ | 73 | (20.2) |
| Don't know | 82 | (22.7) |
| 3. Amount spent on food p/month: | Median= R200<br>Range = R40- R800 | |

### 4.2.3 Medical history of the mothers

Mothers' health information is shown in Table 3. Out of 365 mothers, 52 (14.2%) reported having suffered from obesity related illnesses.

**Table 3: Mothers' health information, parity (excluding child in sample) and gravidity status**

| Variable description | n = 365 | |
|---|---|---|
| | Frequency | (%) |
| 1. Chronic diseases | | |
| no chronic illness | 313 | (85.8) |
| hypertension [hi -hi] | 45 | (12.3) |
| diabetes [swekile] | 4 | ( 1.1) |
| heart attack [intliziyo] | 3 | ( 0.8) |
| 2. Contraceptive use | | |
| current | 298 | (81.6) |
| non users | 67 | (18.4) |
| 3. Type of contraceptive | | |
| injection | 268 | (89.9) |
| other | 24 | ( 8.1) |
| pill | 6 | ( 2.0) |
| 4. Number of live children | | |
| no other child | 140 | (38.4) |
| 1- 3 others | 195 | (53.4) |
| 4 or more | 30 | ( 8.2) |
| 5. Number of pregnancies | | |
| one pregnancy | 130 | (35.6) |
| 2 to 4 | 189 | (51.8) |
| 5 or more | 46 | (12.6) |

Most of the mothers (81.6%) were currently on contraceptives. Of these mothers, 89.9% were using injectable contraceptives. A large proportion (64.4%) of them were multi-gravidas and had reported (61.6%) having more than 2 live children.

### 4.2.4 Nutritional status of the mothers

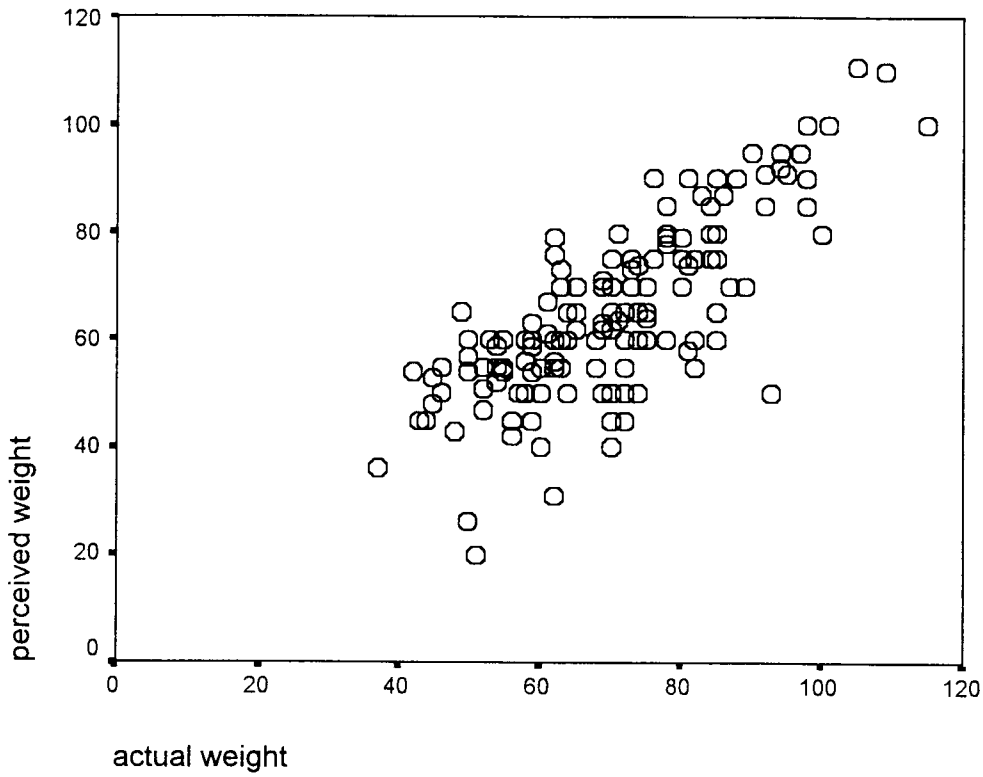
The median BMI was 28.2kg/m$^2$ indicating the presence of overweight. A high proportion of mothers were either obese (37.3%) or overweight (33.4%). A small proportion (2.7%) of mothers were underweight (Table 4)

Of the 365 mothers prompted, only 153 (42%) were able to estimate their body weight. There was a strong positive correlation between the perceived and the actual weight (r= 0.78, p= 0.01). The mean (SD) difference between actual and perceived weight was 5.13 (10.56) kg. The mothers significantly underestimated their true body weight( p=0.0001) (95% CI: 3.5 - 6.8kg). From figure 2, one can see that this underestimation was consistent over the whole weight range.

**Table 4: The nutritional status of the mothers, n=365**

| **Variable description** | **n= 365** |
|---|---|
| 1.Weight(estimate) (kg) | Mean = 65.5<br>SD = 6.4 |
| 2.Weight (actual) (kg) | Median = 70.0<br>Range = 37- 150 |
| 3.Height (m) | Mean = 1.58<br>SD = 0.06 |
| 4.Body Mass Index (BMI ) (kg/m$^2$) | Median = 28.2<br>Range = 16.0- 52.0 |
| | **Frequency (%)** |
| (i) BMI< 19kg/m$^2$ | 10 ( 2.7) |
| (ii) 19≤ BMI ≤ 24 | 97 (26.6) |
| (iii) 25≤ BMI ≤ 30 | 122 (33.4) |
| (iv) BMI> 30 | 136 (37.3) |

**Figure 2: A graph of the relationship between the mother's perceived weight and her actual weight. ( r = 0.78, p = 0.0001 )**




### 4.2.5 Nutritional status of the children

The children's birth weights were recorded from the clinic cards. Thirty six (9.9%) children had no records of birth weights. The means (SD) of weight-for-age, height- for-age and weight-for-height z-scores were -0.610 (1.249); -0.971 (1.315) and 0.049 (1.398) respectively indicating an overall problem of under-nutrition in the study sample.

Table 5 shows the proportion of children who were underweight, wasted and stunted according NCHS reference values (z-score <-2 SD for weight-for-age, weight-for-height and height-for-age). A high proportion (18.6%) of children were stunted than underweight (13.2%). A small proportion were wasted (7.1%) or obese (6.3%).

**Table 5: The nutritional status of the children**

| Variable | n = 365 |
|---|---|
| 1.Birth weight (kg) (n=328) | Mean= 3.15<br>SD = 0.58 |
| 2.Current weight (kg) | Mean=13.88<br>SD = 2.49 |
| 3.Height (m) | Mean= 0.92<br>SD = 0.07 |
| | **Frequency (%)** |
| 4. Weight-for-age | |
| z < -2sd | 48 (13.2) |
| -2sd ≤ z ≤ +2sd | 309 (84.6) |
| z> +2sd | 8 ( 2.2) |
| 5. Height-for-age | |
| z <-2 sd | 68 (18.6) |
| -2sd ≤ z ≤ +2sd | 291 (79.7) |
| z > +2sd | 6 ( 1.6) |
| 6. Weight-for-height | |
| z <-2sd | 26 ( 7.1) |
| -2sd ≤ z ≤ +2sd | 316 (86.6) |
| z >+2sd | 23 ( 6.3) |

### 4.2.6 Comparison of mother and child nutritional status

The mother's BMI showed a weak positive relationship with weight-for-age z-score (r= 0.105; p=0.05). The relationship between BMI and height-for-age or weight-for-height z-scores was not statistically significant (r= 0.08 and 0.07; p= 0.14 and 0.21 respectively).

As shown in figures 3, 4 and 5 there was no relationship between the mothers' and the childs' nutritional status. This was consistent over the whole BMI range.

**Figure 3: A graph of the relationship between the mother's body mass index and her child's weight-for-age z-score. ( r = 0.105, p = 0.05 )**

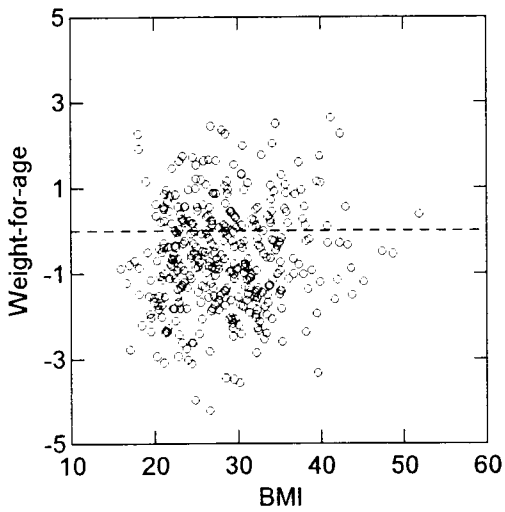



**Figure 4: A diagram of the relationship between the mother's body mass index and her child's weight-for-height z-score. ( r = 0.07, p = 0.21)**

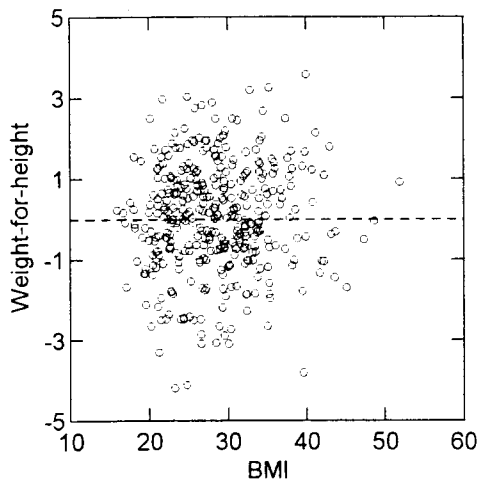
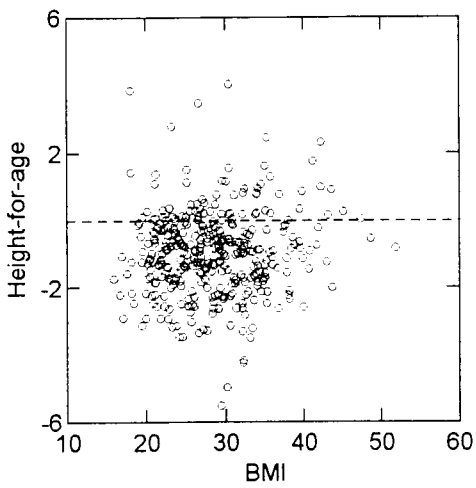


**Figure 5: A diagram of the relationship between the mother's body mass index and her child's height-for-age z-score. ( r = 0.08, p = 0.14)**




### 4.2.7 Mothers' perceptions of and attitudes to own body size

Information relating to mothers' attitudes and perceptions of body size is displayed in Table 6. More than half (58.9%) of the mothers described themselves as of 'medium' body size. A high proportion (60.3%) were satisfied with their body sizes. As a result very few mothers (3.3%) reported attempting losing and even fewer (1.4%) attempted gaining weight. The majority of the mothers (87.9%) thought a 'big' body could cause health problems.

**Table 6: Mothers perceptions of and attitudes to own body size**

| Variable description | n= 365 | |
|---|---|---|
| | **Frequency** | **(%)** |
| 1.Having a big body size: | | |
| causes health problems | 321 | (87.9) |
| is good for health | 34 | ( 9.3) |
| doesn't matter | 10 | ( 2.7) |
| 2.Description of own body size: | | |
| 'medium' | 215 | (58.9) |
| 'small' | 88 | (24.1) |
| 'big /fat' | 62 | (17.0) |
| 3.Satisfaction with own body size: | | |
| yes | 220 | (60.3) |
| no | 145 | (39.7) |
| 4.Ever attempted losing weight: | | |
| no | 353 | (96.7) |
| yes | 12 | ( 3.3) |
| 5.Ever attempted gaining weight: | | |
| no | 360 | (98.6) |
| yes | 5 | ( 1.4) |

Further analysis showed that mothers descriptions of their body size were related to their BMI measurements ($X^2 = 84.8$, p= 0.001) Table 7. Non-obese mothers (35.8%) were more likely to describe their bodies as 'small' than obese mothers (4.4%). Also, obese mothers (36.8%) were more likely to describe themselves as 'big' in comparison with non-obese mothers (5.2%).

**Table 7: Comparisons of non-obese and obese mothers with perceptions of their own body size. ( $X^2$ = 84. 8, p = 0.001)**

| Perceptions of own body size | Non- obese * freq (%) | Obese ** freq (%) | Total (%) |
|---|---|---|---|
| 'small' | 82 (35.8) | 6 ( 4.4) | 88 (24.1) |
| 'medium' | 135 (58.9) | 80 (58.8) | 215 (58.9) |
| 'big' | 12 ( 5.2) | 50 (36.8) | 62 (17.0) |
| **Total** | 229 (100) | 136 (100) | 365 (100) |

**(Cut-off point: * BMI< 30 kg/m$^2$ or ** BMI>30 kg/m$^2$)**

Comparisons with attitudes to body size showed most obese mothers (47.1%) were unhappy with their body sizes compared with non obese mothers (35.4%), Table 8. This difference in attitudes was statistically significant ( $X^2$ = 4.87, p = 0.03)

**Table 8: Attitudes of non- obese and obese mothers to their own body size**

| Attitudes to own body size | Non- obese mothers frequency (%) | Obese mothers frequency (%) |
|---|---|---|
| Satisfied with own body size | 148 (64.6) | 72 (52.9) |
| Dissatisfied with own size | 81 (35.4) | 64 (47.1) |
| **Total** | 229 (100) | 136 (100) |

### 4.2.8 Mothers' perceptions of and attitudes to child's body size

More than half of the children (56.2%) were described by their mothers as of 'medium' body size and 37.5% as 'smaller' than acceptable (Table 9). More than half of the mothers (51.5%) also expressed dissatisfaction with the child's body size.

**Table 9: Mothers' perceptions of and attitudes to child's body size**

| **Variable description** | **n= 365** | |
|---|---|---|
| | **Frequency** | **(%)** |
| 1. Describing child's body size as: | | |
| 'medium' | 205 | (56.2) |
| 'smaller' than should be | 137 | (37.5) |
| 'bigger' than should be | 23 | ( 6.3) |
| 2. satisfaction with child's body | | |
| no | 188 | (51.5) |
| yes | 177 | (48.5) |

As shown in Table 10, mothers' perceptions of the child's body size were significantly related to the child's nutritional status ( $X^2$= 28.8 p=0.001). Underweight children (53.9%) were more likely to be described as 'small' than normal weight children (27.2%). A higher proportion of normal weight children (63.8%) were described as of 'medium' body size compared to underweight children (43.9%).

**Table 10: Comparisons of underweight and normal weight children with mothers' perceptions of child's body size**

| Mothers' perception of child's body size | Underweight children * frequency | (%) | Normal weight children ** frequency | (%) |
|---|---|---|---|---|
| 'small' | 76 | (53.9) | 61 | (27.2) |
| 'medium' | 62 | (44.0) | 143 | (63.8) |
| 'big' | 3 | ( 2.1) | 20 | ( 9.0) |
| Total | 141 | (100) | 224 | (100) |

( * underweight = weight-for-age z-score > -2and < -1 ** normal weight = weight-for-age z-score > or = -1)

### 4.2.9 Mothers' perceptions of an 'ideal' body image

Perceptions of an ideal body image are shown in Table 11. The majority of mothers (61.9%) chose an obese body (body image 1) as most healthy. More than half of the mothers (58.4%) preferred to have an overweight body (body image 2). About 45.8% of them also thought that their partners would choose an overweight body as attractive. In contrast, only 38.6% of the mothers thought an overweight body was indeed attractive.

**Table 11: Mothers' perceptions of an 'ideal' body image: n=365**

***body Image 1= obese**
**body image 2= overweight**
**body image 3= normal weight**
**body image 4= underweight**

| Variable | *Image 1 freq (%) | Image 2 freq (%) | Image 3 freq (%) | Image 4 freq (%) |
|---|---|---|---|---|
| 1.'Preferred' image | 67 (18.4) | 213 (58.4) | 58 (15.9) | 27 ( 7.4) |
| 2.Most 'healthy' image | 226 (61.9) | 97 (26.6) | 27 ( 7.4) | 15 ( 4.1) |
| 3.More 'attractive' image | 62 (17.0) | 141 (38.6) | 91 (24.9) | 71 (19.5) |
| 4.Image partner would choose as 'attractive' | 59 (16.2) | 167 (45.8) | 87 (23.8) | 52 (14.2) |

Further analysis compared obese with non-obese mothers on the above perceptions, (Tables 12, 13, 14 and 15). The results showed no statistically significant differences, between these comparative groups, on choices of preferred, most healthy and partners' choice of an attractive body image. However, the two groups differed significantly on their own choices of an attractive image ($X^2 = 10.4$, $p = 0.02$). Non-obese mothers (40.2%) were more likely to choose an overweight image as attractive than obese mothers (36%).

**Table 12: Comparisons of non-obese and obese mothers with 'preferred' body image ($X^2 = 4.27$, $p = 0.2$ )**

| 'Preferred' image | Non-obese mothers frequency | (%) | Obese mothers frequency | (%) |
|---|---|---|---|---|
| Obese image | 48 | (21.0) | 19 | (13.9) |
| Overweight image | 125 | (54.6) | 88 | (64.7) |
| Normal image | 39 | (17.0) | 19 | (14.0) |
| Underweight image | 17 | ( 7.4) | 10 | ( 7.4) |
| **Total** | 229 | (100) | 136 | (100) |

**Table 13: Comparisons of non-obese and obese mothers with 'healthy' body image ($X^2 = 6.45$ , $p = 0.09$ )**

| 'Healthy' image | Non-obese mothers frequency | (%) | Obese mothers frequency | (%) |
|---|---|---|---|---|
| Obese image | 145 | (63.3) | 81 | (59.6) |
| Overweight image | 60 | (26.2) | 37 | (27.2) |
| Normal image | 19 | ( 8.3) | 8 | ( 5.8) |
| Underweight image | 5 | ( 2.2) | 10 | ( 7.4) |
| **Total** | 229 | (100) | 136 | (100) |

**Table 14: Comparisons of Non-obese and Obese mothers with partners' choice of an 'attractive' body image ($X^2 = 0.44$ , $p = 0.9$)**

| Partners' choice of 'attractive' image | Non- obese mothers frequency | (%) | Obese mothers frequency | (%) |
|---|---|---|---|---|
| obese | 39 | (17.0) | 20 | (14.7) |
| overweight | 105 | (45.9) | 62 | (45.6) |
| normal | 53 | (23.1) | 34 | (25.0) |
| underweight | 32 | (14.0) | 20 | (14.7) |
| **Total** | 229 | (100) | 136 | (100) |

**Table 15: Comparisons of non-obese and obese mothers with their own choice of an 'attractive' body image . ($X^2 = 10.4$ , $p = 0.02$ )**

| 'Attractive' image | Non-obese mothers frequency | (%) | Obese mothers frequency | (%) |
|---|---|---|---|---|
| obese image | 48 | (21.0) | 14 | (10.2) |
| overweight image | 92 | (40.2) | 49 | (36.0) |
| normal | 49 | (21.4) | 42 | (31.0) |
| underweight | 40 | (17.5) | 31 | (22.8) |
| **Total** | 229 | (100) | 136 | (100) |

#### 4.2.9.1 Mothers' perceptions of causes of 'big' body size

Mothers were asked about what they thought were causes of 'big' body size. Their responses are shown in Table 16. Eating too much food (29.3%) was the most cited response, A similar proportion (28.8%) said 'happiness' led to weight gain. The 'bad' food category included 'fatty meat' or 'foods', 'too much oil', sugar and 'too much starch'.

**Table 16: Perceived causes of 'big' body size, n= 365**

| Perceived cause | frequency | (%) |
|---|---|---|
| 1. Eating too much food | 107 | (29.3) |
| 2. Happiness | 105 | (28.8) |
| 3. Eating bad food | 68 | (18.6) |
| 4. Genetic | 21 | ( 5.8) |
| 5. Family planning | 21 | ( 5.8) |
| 6. Ill health | 14 | ( 3.8) |
| 7. Eating good food | 8 | ( 2.2) |
| 8. No physical activity | 7 | ( 1.9) |
| 9. Meat | 6 | ( 1.6) |
| 10.Don't know | 5 | ( 1.4) |
| 11.Being healthy | 3 | ( 0.8) |

#### 4.2.9.2 Perceptions of 'good' eating patterns for mother and child

**(i) Mothers' eating patterns**

Mothers' eating patterns are shown in Table 17. Almost all the mothers (98%) thought eating at least 3 meals per day was a good eating pattern. In contrast, 70% of the mothers reported actually having the habit of eating 3 meals per day.

**Table 17: Mothers' perceptions of 'good' eating patterns for herself, n=365**

| Variable | frequency (%) |
|---|---|
| 1. Meals eaten per day | |
| 1meal | 5 ( 1.4 ) |
| 2meals | 61 (16.7) |
| 3 meals | 257 (70.4) |
| other | 42 (11.5) |
| 2. Meal to be eaten per day | |
| 2 meals | 1 ( 0.3 ) |
| 3meals | 358 (98.1 ) |
| 4meals | 1 ( 0.3) |
| don't know | 5 ( 1.3) |

**(ii) Childrens' breastfeeding history**

Breastfeeding information is presented in Table 18. The majority (95.3%) of the children at the time of the study were not on breast milk. Of these children, 95.7% were previously breastfed. About 50% of the children were breastfed for at least 18 months. However, a similar proportion of children, also started bottle feeding as early as 15 days of age.

**Table 18: Childrens' breastfeeding and weaning information**

| Variable description | n= 365 |
|---|---|
| | **frequency (%)** |
| 1. Breastfeeding (current) | |
| no | 348 (95.3) |
| yes | 17 ( 4.7) |
| 2. Breastfeeding (ever) | |
| yes | 333 (95.7) |
| no | 15 ( 4.3) |
| 3. Breastfeeding duration( yrs) | Median = 1.5<br>Range = 0- 3.5 |
| 4. Age at introducing 'spoon food' (months) | Median = 2.9<br>Range = 0- 24 |
| 5. Age at first bottle feed (days) | Median = 15<br>Range = 0- 19 mo |

### (iii) Perceptions of 'good' and 'bad' foods

Mothers were asked to name any three foods that they thought were 'good' for their health and another three they thought were 'bad'. The same questions were asked for the child. This information is displayed on Tables 19 and 20.

There was a range of responses to these questions but the variety of the foods was limited. There was no ranking attached to the different foods mentioned. The aim was to determine what was regarded as 'bad' or 'good' foods for mothers and whether these were different from what would be considered 'good' or 'bad' for the child. The data were analysed qualitatively.

**'Good' foods:** Of the 365 interviewed mothers, only 3 said they did not know what foods were 'good' for their health. Another 7 mothers could only name 2 'good' foods. About 291 ( 80% ) o f the mothers mentioned vegetables as one of the 'good' foods. These included beans, spinach, butternut or pumpkin, beetroot, cabbage, potatoes and carrots. Most mothers only mentioned 'veges' without specifying which one. Meat and eggs were also mentioned by most mothers, (63%). Meat, where specified, mostly referred to red meat though there were few mothers who mentioned chicken and fish. For instance only 12 mothers mentioned fish as 'good', 2 mothers mentioned liver and 1 thought chicken was 'good'.

The mothers' lists of 'good' foods for children was similar to their own lists. Vegetables (71.2%) and meat (42.2%) also came first on the list of food items that were reported by mothers. Phuthu (40.8%) and milk (38.4%) were also the most frequent items that mothers mentioned. Only one mother did not know what foods could be considered 'good' for the child.

**'Bad' foods:** The majority of mothers (72.3%) mentioned 'dry' foods as 'bad'. These included samp, rice and phuthu (stiff maize porridge) and were mostly regarded as 'dry' if these were eaten without vegetables, fat or meat. For example, a suffix or prefix would added to the food item as in 'dry samp' (samp with no beans) or 'pap only'. Most mothers (55.3%) could only think of 1 or 2 foods that were bad for their health.

Of the total sample, 81 mothers did not know what foods were 'bad' and another 29 thought there were no foods that could be considered 'bad' for them. Sixty mothers reported smoking and alcohol intake under 'bad' foods.

Some mothers also indicated a notion of quantity and variety as contributing factors in making some 'good' foods 'bad'. For instance, if a food item was eaten 'every day' or 'too much' it would become 'bad' as in eating 'porridge every day' or eating 'samp a lot'.

Regarding children, more than half (56.7%) of the mothers could not think of more than 2 bad 'foods' for the child. Samp (36.2%) and phuthu (34.2%) were most frequently mentioned as 'bad' foods for the children. The distinction that was made for mothers as to whether these could be 'good' if not 'dry' was not specified for children. Sweets (18.9%) and chips (10.7%) were other food items that were particularly mentioned as 'bad' for children. Cabbage was singled out as a vegetable that was 'bad' for children. Other 'bad' vegetables referred to were onions, tomatoes and potatoes. A lesser proportion of mothers (15.3%) reported not knowing foods that are 'bad' for children compared to those (22.2%) that did not know foods that are 'bad' for themselves.

**Table 19: Mothers' perceptions of 'good' and 'bad' foods for herself. n=365**

| **'Good' foods** | **frequency** | **(%)** |
|---|---|---|
| Vegetables | 291 | 79.7 |
| Meat/eggs | 236 | 64.8 |
| Milk/maas | 118 | 32.3 |
| Fruit | 101 | 27.7 |
| Bread | 68 | 18.6 |
| Samp with beans | 65 | 17.8 |
| Phuthu/pap | 62 | 16.9 |
| Rice | 58 | 15.9 |
| Beverages | 6 | 1.6 |
| **'Bad' foods** | **frequency** | **%** |
| 'Dry food' | 264 | 72.3 |
| Don't know | 81 | 22.2 |
| Alcohol & smoking | 60 | 16.4 |
| White bread | 45 | 12.3 |
| Meat | 41 | 11.2 |
| No foods are bad | 29 | 7.9 |
| Black tea/coffee | 16 | 4.4 |
| Cabbage/ potatoes | 13 | 3.6 |
| Sweets | 9 | 2.5 |

**Table 20: Mothers' perceptions of 'good' and 'bad' foods for the child n= 365**

| 'Good' foods | frequency | percentage (%) |
|---|---|---|
| Vegetables | 260 | 71.2 |
| Meat/eggs | 154 | 42.2 |
| Phuthu/Pap | 149 | 40.8 |
| Milk | 140 | 38.4 |
| Fruit | 101 | 27.7 |
| Rice | 66 | 18.1 |
| Cereals | 47 | 12.9 |
| Bread | 26 | 7.1 |
| Purity/yoghurt | 18 | 4.9 |
| Samp | 15 | 4.1 |
| Soup/tea/juice | 13 | 3.6 |
| Don't know | 1 | 0.3 |
| **'Bad' foods** | **frequency** | **percentage (%)** |
| Samp | 132 | 36.2 |
| Phuthu/ pap | 125 | 34.2 |
| Sweets/ ice cream | 69 | 18.9 |
| Don't know | 56 | 15.3 |
| Chips | 39 | 10.7 |
| Cabbage | 37 | 10.1 |
| None | 29 | 7.9 |
| Bread | 25 | 6.8 |
| Meat/fatty foods | 12 | 3.3 |
| Other veges | 10 | 2.7 |
| Tea | 10 | 2.7 |
| Alcohol | 3 | 0.8 |
| Maas | 2 | 0.5 |

### 4.2.10 Food decision making

Mothers (75.9%) played a major role in deciding what food items to buy for the household (Table 21). They (75.9%) also did most of the grocery shopping, cooking (85.5%) and serving (86.3%) of food. None of the respondents reported males to be involved either in cooking or food serving, though very few 7 (1.9%) helped with shopping and another small proportion 5 (1.4%) still decided on food items to be bought for the household.

**Table 21: gender roles in food decision making. n=365**

| Decision maker | who decides what to buy | | who shops for food | | who cooks | | who serves food | |
|---|---|---|---|---|---|---|---|---|
| | freq | (%) | freq | (%) | freq | (%) | freq | (%) |
| Respondent | 275 | (75.3) | 277 | (75.9) | 312 | (85.5) | 315 | (86.3) |
| Respondent and other female | 21 | ( 5.8) | 22 | ( 6.0) | 40 | (11.0) | 37 | (10.1) |
| Any adult female | 63 | (17.3) | 57 | (15.0) | 13 | (3.6) | 13 | ( 3.6) |
| Any adult male | 5 | ( 1.4) | 7 | ( 1.9) | - | | - | |
| Anyone | 1 | ( 0.5) | 2 | ( 0.5) | - | | - | |

# 5. DISCUSSION

## 5.1 OVERVIEW

There were high rates of obesity in mothers and moderate rates of under-nutrition in children. However, there was a weak positive relationship between the BMI of the mother and weight-for-age of the child. Other indicators of child's nutritional status were not related to mothers' nutritional status. This suggests that one cannot predict the nutritional status of 2-5 year old children given the mother's BMI. This finding is contrary to what has been previously reported [39,91,92] The findings of other studies suggested a complex problem of the co-existence of under- and over-nutrition in black communities.

The first phase of the study provided an understanding of how the interviewed mothers viewed obesity and under-nutrition. Overall there was a positive attitude towards a 'big' body size whilst a 'small' body size was associated with times of distress and hardships. Being 'big' was perceived to be an indication of 'good' mental and social well-being. These perceptions of and attitudes to body size may have been shaped by the lack of community pressure against 'big' body image.

The second phase yielded similar results to phase one regarding the perceptions of and attitudes to body size. The majority (60.3%) of mothers were satisfied with their body sizes despite the fact that the study found high levels of obesity. Regarding the child's body size, over half of the mothers were not satisfied with the child's body size and this was an anomaly considering that in the study there were low to moderate levels of under-nutrition in children. This could be related to the fact that most mothers desired their children to be 'plump'.

An important finding was that mothers' perceptions of and attitudes to the child's body size were shown to be significantly related to the weight-for-age z-score of the child. Mothers described underweight children as 'small' compared with 'normal' weight children. Normal weight children were in turn described as 'medium'. This shows the importance of understanding the terms used by mothers in assessing the body sizes of their children. A further challenge for public health would be to relate this understanding to nutritional status.

The following section will focus on these important findings in detail by looking at other factors that could explain the findings. This will be done by comparing results of phase I with phase II. Finally, conclusions will be drawn and recommendations given on the basis of all the evidence presented in this thesis.

### 5.1.1 The co-existence of over- and under-nutrition

The fact that no relationship was found between mothers' nutritional status and that of her child was still a puzzling finding which will motivate further studies into this relationship. A probability sample drawn from a community would be an ideal method to use. However, there is no reason to believe that the site bias might have had a major influence on the results. The sample size was adequate to show a relationship if there was one and the study methods utilised were objective indicators.

The emerging area of research is focussing on the relationship between stunting and obesity. [98-100] Evidence shows that obesity is more commonly associated with stunting than underweight or wasting in younger children and adolescents. This kind of research might shed light into the high levels of obesity observed in black women. This could suggest that some of the obese mothers were stunted as children and also failed to develop catch-up growth and thus increased in adiposity.[99]

### 5.1.2 Socio-demographic data

The majority of the mothers had rural origins. However, it was difficult to measure their urbanisation status as most mothers moved between their rural and urban homes at irregular intervals. The rate (79.9%) of reported unemployment was high compared with the estimated rate (67%) for this study population. [101, 102] This could be explained by the fact that some mothers did not regard informal sector jobs as employment. This was verified by asking if they had another source of income and it turned out that mothers who were selling food or clothing and sometimes those who worked as 'chars' (domestic workers) still considered themselves unemployed.

The levels (38.4%) of illiteracy were also higher than expected (22.7%) suggesting the gradual increase of urban in- migration. [103] Illiteracy was defined as less than seven years of formal

schooling ( or below STD 5 of education). [104]

The range of the amount of money spent on food was wide (Table 2) indicating that some subjects were worse-off than others. Furthermore the income levels of the study sample were low and this could have contributed to the small amounts spent on food. However these figures should be interpreted with caution as people are not always keen to disclose information about their income.

There was a slightly higher proportion of female children (55.6%) in the sample than would be expected. [104] This could partly be due to intra-household gender bias in child-care which might favour male children resulting in female children more likely to be perceived as sicker and thus attending child health clinics more frequently than boys.

### 5.1.3 Mothers' health information

There were low rates of reported chronic diseases as the study sample consisted of the younger age group.

Contraceptive use (81.6%) was high and the proportion of mothers using injectable contraception (89.9%) was similar to the rates (70- 80%) reported for black females in the general population. [101] During in-depth interviews, many mothers associated their weight gain with the use of Depo provera. Research has shown that injectable contraception may cause weight gain (average of 1-2kg per year).[105] It is argued that changes in diet can help control or prevent weight gain. As this group of women did not know any effective means of weight control, this could be one of the contributing factors to their weight gain, however this relationship was not established in the present study. Therefore, it was not clear whether or not this was the case.

### 5.1.4 Nutritional status of the mothers

The high prevalence of obesity (37.3%) found in the study population is similar to the rates quoted in the literature on black South African women. [16-19] This is also comparable with the results of studies conducted among black American women. [30-35]

Less than half of the mothers could estimate their body weights. The estimated weights were significantly less than their actual weights. As found in the qualitative study, women reported not weighing themselves routinely. As a result their perception of the body size was generated by comments from peers and the inability to fit into clothes that had been previously comfortable for them to wear.

### 5.1.5 Nutritional status of the children

The proportion of children that were stunted or underweight was lower than expected. National figures range between 20 to 25% and 20-40% respectively. [70] This could be explained by the fact that the present study was conducted at a clinic and clinic attenders may be different from community members and therefore not representative of the general population.

Other factors, including health-seeking practices and the existing nutrition interventions , such as the PEM scheme, could account for these low proportions of underweight children. It is however, difficult to judge whether or not these nutrition interventions have been effective unless a rigorous evaluation programme can be put in place. The role of public health in preventing nutrition problems also necessitates the availability of this information.

The qualitative enquiry has suggested that the food parcels that are directed to children (under five years) do not necessarily reach the children. One informant related this in her experiences in a malnutrition center :

"....*the milk is limited to two tins every fortnight. You stay there from the morning till late". "You have to wake up at six as if you are going to work so that you can get the porridge to feed your child with".*

When asked if the children do get enough food from these centres, one mother replied, "*Yes, they get enough food although you have to struggle to get that food. It is said that it is the place to feed children but you see people having up to three dishes in front of them. One is for herself, the other one is for the child, and the last one is for herself again".*

The problem of wasting (7.1%) which indicates acute nutritional stress and severe food shortages was evident in these children. As demonstrated above, household food insecurity was implicated in the in-depth interviews with mothers.

### 5.1.6 Knowledge, attitudes, beliefs and perceptions of body size

Although the findings of phase I showed attitudes and perceptions that were tolerant of a 'big' body image, a higher proportion of obese mothers (47.1%) were 'unhappy' about their body sizes than non-obese mothers (35.4%). This fact suggests that an intervention strategy to reduce body weight may be successful.

Comparisons of mothers' BMI with their own descriptions of body sizes for themselves showed that obese mothers were more likely to describe themselves as 'big' while non-obese mothers described themselves as 'small'. Furthermore, underweight children were more likely to be described as 'small' whilst normal weight children were described as 'medium'. Both findings were statistically significant (Tables 7 & 10 respectively). The ways in which mothers related to these terms during interviews, had an implication that a 'medium' body size was an 'ideal' body size. However, it is difficult to interpret these findings since they are subjective measures, yet they shed some light into how the study subjects conceptualised and visualised their body images.

Studies done in the USA have suggested that ethnicity is the main contributing factor to the differences in body size perceptions between black and white women.[52,61] A recent American study examined obesity of 9-10 year old black girls using a cultural pattern scale.[107] Familial variables and the body acceptance scale were found to be directly associated with BMI. The results also showed an inverse relationship between living in an extended family setting and obesity. Although there was no comparative group in the present study, the evidence gathered confirmed the fact that attitudes and perceptions are shaped by one's belief system. This supports the evidence of the strong influence that family, friends and community have on perceptions of body size.

Lack of knowledge regarding causes of obesity, effective ways of reducing weight, health implications of obesity and what constitutes 'good' and 'bad' foods was established in both phases of the study. The descriptions that participants gave as mechanisms to reduce their body mass indicated that they had little knowledge of an effective strategy to achieve their aim. Their attempts

to restrict their dietary intake were sporadic, and interspersed with periods of overeating. For instance, the use of black tea, without changing aspects of their diet, also indicated a poor understanding of the physiological basis of weight reduction.

Few could recognise the association of long periods of inactivity with overeating, especially when they were in situations where regular access to food was not assured. They communicated their association between food, pleasure and comfort. Thinness and loss of weight were associated with times of anxiety and emotional problems.

### 5.1.7 Mothers' perceptions of 'good' eating patterns

#### (i) Childrens' eating patterns

The breastfeeding information (Table 18) reveal that a high proportion of children were breastfed during infancy. However, traditional patterns of breastfeeding for extended periods of eighteen months was on the decline. About half of the mothers reported breastfeeding for this period. This proportion was lower than the national figure (61%) for rural areas. [75] 'Solids' and the 'bottle' were also introduced at a very early age.

In the qualitative study mothers had indicated some of the problems around breastfeeding. They reported that children were often difficult to feed and it appeared obvious that these mothers needed the continual support which they could obtain from professional health advisers.

It seemed that mothers had information on what they could feed their children. This information was, however, difficult to put into practice as mothers were faced with a challenge of securing food for the whole family. As a result it seemed that children were eating the same foods as adults (Table 19 and Table 20).

#### (ii) Mothers' eating patterns

Although the majority of the mothers perceived that three meals per day was a 'good' eating behaviour, this was not necessarily practised. The questionnaire did not have scope to probe what constituted a meal for this group. Consequently, no conclusive comments can be made regarding the nutritional value of their meals.

The mothers' perceptions of 'good' and 'bad' foods for herself and the child were difficult to analyse and interpret. This was partly due to the fact that a variety of food items were mentioned and these foods mostly overlapped in terms of nutritional value. This limited the ability to quantify the responses. Furthermore, the foods that mothers mentioned as 'good' or 'bad' could not be related to their current eating habits. However, the responses to this question gave an important indication of the mothers' level of understanding of what constitutes 'healthy' or 'unhealthy' foods.

Mothers as food decision-makers would need to be empowered with information to be able to make healthy food choices and also maintain a healthy body image. Until the whole community, and mothers in particular, can access this information, efforts to address the complex problems of nutrition will be ineffective. This study confirmed the finding that mothers are gatekeepers of food decision making. [108] As they are also key players in the well-being of their children, their role should not be overlooked. This seems to be the first step towards achieving a healthy lifestyle.

## 5.2 THE STRENGTHS OF THE STUDY

The strength of the present study is that it went beyond investigating obese African womens' perceptions of their own bodies. It looked at a cross-section of African women in order to get a broader understanding of perceptions of body size perceptions in African women as a cultural group located in a certain context of socio-economic status. It also attempted to establish whether similar body size perceptions hold for children. This was facilitated by the effective use of both qualitative and quantitative research methods in data collection.

The only study that has, so far, studied the relationship between mothers' nutritional status and their children used caretakers and not necessarily biological mothers. [92] Additionally, this study could not be regarded as conclusive because the sample size was inadequate, different selection criteria were used in selecting the underweight children, and the age group that was studied commenced from 6 months ranging to 5 years of age. Nevertheless, the authors also address this in their discussion.

This information is new and very valuable for intervention purposes in order to understand the stage at which body size consciousness begins in this group.

## 5.3 THE LIMITATIONS OF THE STUDY

The main limitation of the study is that it used clinic attenders to investigate the relationship between obesity in mothers and under-nutrition in children. In certain cases there may have been selection bias due to the fact that the 2-5 year age group had completed immunisations and thus did not have a reason to attend the clinic except for illness and the PEM scheme. The ideal design would be to conduct a community survey on a probability sample to establish this relationship. However, time and financial constraints did not permit this. As a result the findings cannot be extrapolated to the entire community of Khayelitsha although they are relevant to the study itself.

Furthermore, it has been demonstrated that perceptions of body size cannot be interpreted as cultural ideals of body size. This is due to the fact that, the study sample was a relatively homogenous group of mothers with similar socio-demographic circumstances. There was no comparative group from another cultural setting. The comparisons could only be made between obese and non- obese mothers in order to arrive at the present findings. It is more likely that a different finding, on perceptions of ideal body size, could be established if a different group of African women is studied. Therefore, the present findings cannot be generalised to all African women.

## 5.4 CONCLUSIONS

There was no relationship found between obesity in mothers and under-nutrition in children. However, this study showed that these two problems were prevalent in the study population. The wealth of the new information revealed by this study on the relationship between nutritional status of mothers and the resultant attitudes and perceptions to body size is crucial for devising appropriate intervention strategies for the study population.

It has been argued that in some African contexts, obesity is not viewed as a health problem but rather as a normal and attractive state. Instead, plumpness is associated with health and prosperity whilst being lean is associated with ill-health and poverty.

It has further been argued that in dealing with obesity in African women, health professionals need to decide on whether or not to treat obesity, bearing in mind that some overweight African women were found not to suffer from chronic diseases of lifestyle associated with obesity. [17] Information

on their perceptions of own body image and health has been seen as a key to some of these dilemmas. The problem of under-nutrition in children need not be overlooked because of the low levels shown by the present study.

The fact that the problems of over- and under-nutrition were found not necessarily to co-exist in the same household could be regarded as a motivation in addressing the nutrition problems at a community level. Even if this was the case, Scrimshaw has pointed out that it would not be necessary to have different sets of recommended nutrient allowances for the nutritional problems associated with poverty or affluence. [109] Instead, a key factor would be to set dietary guidelines that would be adapted to the food availability and preferences of various socio-economic groups within countries.

## 5.5 RECOMMENDATIONS

Like health, good nutrition is the outcome of many and multiple factors. [110,111] It is further argued that policies and activities of other sectors such as agriculture, finance, health, education, water and environmental affairs and welfare affect nutrition. An appropriate strategy in addressing problems of over- and under-nutrition would therefore ideally need to be comprehensive and integrated into the existing programmes.

The South African government has made nutrition a priority in order to address the country's health problems. Health workers, researchers and policy makers are therefore faced with a challenge of initiating and suggesting evidence-based strategies that can be translated to policies.

The problems of under-nutrition are being addressed at different levels as there is enough information to enable implementation of interventions. As a result, there are intervention programmes that are already in place such as the Primary School Nutrition Programme. Deworming and compulsory fortification of basic foodstuffs with critical micronutrients are other intervention programmes which have been shown to be effective and therefore need to be implemented. The role of health workers in general has to extend to advocacy work so as to facilitate the process of translating evidence into policy.

Over-nutrition is an emerging problem in the black communities, and therefore has not received considerable attention. The available evidence suggests that the time has come for developing and piloting interventions that are appropriate to the affected communities. There is a new initiative

with an objective of developing a simple and appropriate food guide that can be used by nutrition educators and consumers in KwaZulu Natal. [112] This can be used as a nutrition tool to assist in planning adequate and balanced diets that reflect current food consumption habits and are conducive to good health. This is an important initiative as it aims to revisit the food classification systems commonly used in South Africa (namely the 3 food groups, 5 food groups, USA pyramid, food square, and mixed meal guide) and test their appropriateness.

In the light of the new information provided by this study, especially, on the mothers' perceptions of ideal body size, there is optimism for health promotion strategies. The focus would have to be on the entire community as opposed to high risk individuals. The family and the community in which a person lives seems to set norms of acceptable body image.

In summary, the following recommendations are made:

- The encouragement of new mothers in initiating and maintaining breastfeeding in these informal settlements remains crucial.

- Education on the health implications of obesity need to be targeted to a wider audience than only to those already suffering from chronic diseases of lifestyle.

- The women who were unhappy about their 'big' body sizes gave practical reasons for their dissatisfaction, such as feeling uncomfortably hot or heavy, or not being able to wear the clothes that others had given them. None of the women identified potential health reasons as a motivation to lose weight. This suggests that the need for information is crucial.

- The mismatch between perceived causes of weight gain and the ways of losing weight is highlighted by this study. The focus on energy balance which current weight control programmes promote does not deal with the perceived causes of weight gain in this community. There is a great need to understand, demystify and inform mothers about the causes of weight gain.

- Mothers who present to child health clinics with their children can be given an all-encompassing talk on maintaining healthy lifestyles using available resources. The Food Based Dietary Guidelines, once piloted and tested for the KwaZulu Natal, could be an initial step in trying to solve the problems of over- and under-nutrition. However, there will be a need for modifying these to be appropriate for various population sub-groups.

- The challenge to public health is to encourage weight reduction when appropriate, without enforcing black women to have a negative self image and an extreme preoccupation with body weight.

- Further research is needed to evaluate the effectiveness of the existing nutrition interventions. There are logistical concerns that need constant evaluation to maximise the available resources. The Primary Nutrition Programme sets a good example for this. The community-based schemes also require tight controls and timeous evaluations.

- Further research on the co-existence of obesity and under-nutrition is already underway. This will investigate the relationship between obesity and under-nutrition at a family level using a community-based survey.[113]

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UNIVERSITY OF CAPE TOWN

**Appendix 1: Ethics approval letter**


Faculty of Medicine

Observatory, 7925
Tel: (021) 406-6911
Fax No: (021) 47-8955


Ms Z Mvo
Dept of Community Health

29 March 1996

Dear Ms Mvo

Re: **ERC No. 026/96**
**A STUDY OF DETERMINANTS OF MATERNAL OBESITY AND CHILD UNDERNUTRITION IN AFRICAN WOMEN ATTENDING A CHILD HEALTH CLINIC, KHAYELITSHA, CAPE TOWN**

I have pleasure in informing you that I have granted formal approval for the above study on behalf of the Research Ethics Committee. This study has been presented to the committee, for information, on the 29 March 1996.

Please find, included, a list of Research Ethics Committee Members. It would be greatly appreciated if you passed this information on to all requiring it.

Yours sincerely

Professor JP de V van Niekerk
Dean: Faculty of Medicine

**Appendix 2: Application letter for study access**

23 August 1995

The Regional Director
Cape Metropolitan Council
Libertas Hospital
GOODWOOD

Dear Sir

I hereby wish to apply for permission to conduct a Qualitative research project on perceptions about body weight and health seeking behaviour at Kwa Nolungile Clinic in Khayelitsha.

This project is a preliminary investigation on problems of overnutrition and undernutrition in urban African population. It will help me to develop a research hypothesis for a Masters degree project that I hope to do at the same clinic. I am also hoping that the results of this project will inform the policy makers in developing intervention programs that are culturally sensitive and appropriate for this population.

Please find included herein a copy of my draft protocol which I hope will give some background for the project. For a broader perspective, I have also provided an outline of my Master's project and the estimated time period that I will need to finish the whole project.

Thank you very much for your consideration.

Yours faithfully
Miss N. Mvo

## Appendix 3: An interview schedule for in-depth interviews of phase I

### Opening statement:

My name is..... I'm working at the Medical Research Council. I am talking to mothers about their experiences in raising a child, food nurturing in particular, from the age of 2 years until the age of at least 5 years. I am also interested in listening to the mothers' stories about their bodies.

Would you like to be part of this project?

### Topics to be covered:

- Socio-demography
- Women's knowledge about weight: their concept of normal body size?
- Perceptions of body size: Do they consider their body sizes as small, big or just right.
- Perceived causes of big body size and history of onset of obesity for the mother and causes of undernourishment in children.
- Attitudes about body size: Are they happy about their body sizes? what had been their experiences.
- Eating patterns: what do they consider as appropriate food for them and for children? What are their food preferences? how is food allocated within the household? What are the breast feeding practices?

**Appendix 4: A copy of the questionnaire for phase II**



## SECTION A: Demographic and Urbanisation Information

ID Number

Date of the interview

D d m m y y

1.In what year were you born? (Year 19.....)
(Don't know) [9]

2. How old are you now? (Age in completed number of years)

(To compare with the above and correct if inconsistent)

3.What is your marital status? Single [1]
(Include common law) Married: [2]
Divorced [3]
Widowed [4]
Live in partner[5]

4.Have you ever attended school Yes [1]

No [2] ( if no go to 7....)

5. If yes, what is the highest standard passed at school?

Sub A [1]
Sub B [2]
Std 1 [3]
Std 2 [4]
Std 3 [5]
Std 4 [6]
Std 5 [7]
Std 6 [8]
Std 7 [9]
Std 8 [10]
Std 9 [11]
Std 10 [12]

6. Do you have other training or educational qualification? 19

Yes [1] ( if yes go to 6.1...)
No [2] (if No go to 7..)

6.1. If yes, what is your highest qualification? ( can be coded later) 21

(Describe or specify) .....

.....

7.Where were you born? 22

Rural village [1]
A farm [2]
A small town [3]
A city [4]

8. Where did you spend most of your childhood (up to 10 years)? 23

In a rural village [1]
on a farm [2]
in a small town [3]
In a city [4]
Don't know [9]

9. When was the first time that you came to a big city ? 19 25

(if born in a city give year of birth)Year... 19 27

(If arrived this year give month of arrival in words) 29

.....

10. Have you spent any time periods away from the city, for at least a full year without a break, since you first arrived or since birth? 30

Yes [1]
No [2] (if No go to11...)

10.1.If yes , where did you go? (Place)..... .....

.....

(To be coded as in 7 & 8 above) 31

y y m m

10.2 How long were you there? (Number of Years) [35]
(Number of months)

.....

11 What is your home language? [36]

| | | |
|---|---|---|
| Xhosa | | [1] |
| Zulu | | [2] |
| Sotho | | [3] |
| Other | (specify) | [4] |

12. Are you employed ? [37]

| | | |
|---|---|---|
| Yes | [1] | (go to 12.1) |
| No | [2] | ( go to 12.2) |

12.1 (a)If yes, what are you working for? [38]

| | |
|---|---|
| Money | [1] |
| Goods | [2] |

(b) What is your other source of income? [39]

12.2 (a) If no, have you ever worked before? [40]

| | |
|---|---|
| Yes | [1] |
| No | [2] |

y y m m

(b) If no, for how long have you been unemployed? [44]

( number of years and months in words)

.....

(c) What is your source of income? [45]

12.2.1Are you looking for work? [46]

| | | |
|---|---|---|
| Yes | [1] | |
| No | [2] | (if No go to 12.2.2) |

12.2.2 If no, are you a: [47]

| | |
|---|---|
| A housewife | [1] |
| Student | [2] |
| Disabled (unfit for work) | [3] |
| Other (specify) | [4] |

13.1 How many adults live in your household? [49]

(a) how many males? [51]

(b) how many are females? [53]

13.2 How many children live in your household? [55]

## SECTION B: Mother's information

### 14. Chronic diseases

14.1 Has a doctor or nurse told you that you had or have:

Y=1 N=2 DK=9

| | | |
|---|---|---|
| high blood pressure ( "hi- hi") | | 56 |
| diabetes or sugar in the blood | | 57 |
| heart attack/ angina | | 58 |

14.2 Are you on family planning? 59

Yes [1] (if yes go to the next question)
No [2]

14.2.1 If yes, what do you use? 60-

Pills [1]
Injection/ Depo [2]
Other [3]

14.3 Some people say that having a big body size: 61

Doesn't matter [1]
Causes problems for your health [2]
Is good for your health [3]

**15. Perceptions of body size**

15.1 What is your estimate of your body weight? 64

Don't know [9] 65

15.2 How do you describe your present body size? 66

a small body size [1]
a "medium" body size [2]
a big body size/fat [3]

15.3 Are you happy with your body as it is now? 67

Yes [1]
No [2]
Unsure [3]

(give reasons for either response given in Question 15.3) 69

15.3.1 Did you ever attempt to lose some weight? 70

Yes [1]
No [2]

(If yes describe the method used) 72

ID Number

15.3.1 Did you ever attempt to gain weight?

Yes [1]
No [2]

**(If yes describe method used)**.....

.....

.....

15.4 How many meals do you eat per day?

1 meal [1]
2 meals [2]
3 meals [3]
other (specify #) [4]

15.5 How many meals do you think you should have per day?

15.5.1 Name three foods that are good for your health

1.....( To be coded later)

2.....

3.....

15.5.2 Name three foods that are not good for your health

1.....(To be coded later)

2.....

3.....

15.6 What is the total household income per month? [22]

(Amounts in Rands)

| | | |
|---|---|---|
| 0- | 199 | [1] |
| 200- | 399 | [2] |
| 400- | 599 | [3] |
| 600- | 799 | [4] |
| 800- | 1000 | [5] |
| 1000(+) | | [6] |
| Don't know | | [9] |

15.7 How much money is spent on food per month? (amount in Rands) [26]

Don't know [9] [27]

15.8 (a) Who does the grocery shopping? [28]

(b) Who decides what food items to buy? [29]

(c) Who does the cooking? [30]

(d) Who serves the food? [31]

15.9 What do you think causes some people to have a big body size? [33]

(To be coded later)

**SECTION C: Child's information**

16. Sex Male [1]
Female [2]

34

17. Birth date :

D d m m y y

40

18. (a) What is the number of children you have excluding this one?

42

(b) What is the position of child in the family
( eg first or second, etc)

44

19. How many pregnancies have you had?

46

20. Do you think the child's body size is:

47

smaller than it should be [1]
medium [2]
bigger than it should be [3]

21. Are you happy with the child's body size?

48

Yes [1]
No [2]
Unsure [3]

**(Give reasons for either response)**

50

.....

52

.....

54

.....

22. Is the child on breastmilk?

55

Yes [1]
No [2] (go to 22.1 & 2)

22.1. If no, was the child ever breastfed? 56

Yes [1]
No [2]

22.2.If yes for how long was the child on breastmilk?

(Specify number of days, months or years)

d d m m y y 62

23. How old was the child when spoon food was introduced (solids)?

(Specify number of days, months or years)

d d m m y y 68

24. How old was the child when you first gave the bottle?

(Specify number of days, months or years)

d d m m y y 74

ID Number

25. (a) Name 3 foods that you think are good for the growth/ health of the child

1.....( To be coded later)

2.....

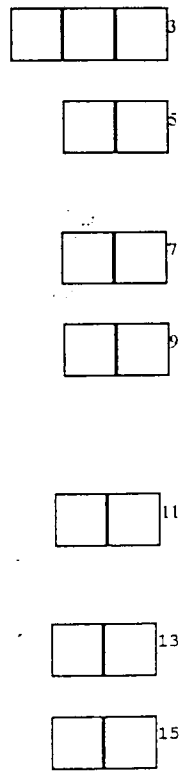
3.....

25. (b) Name 3 foods that you think are bad for the growth/ health of the child.

1.....(To be coded later)

2.....

3.....



## MEASUREMENTS

### Mother

Weight (kg) [ ][ ][ ] 18

Height ($m^2$) [ ][ ][ ][ ] 22

**Test photographs of persons who have been systematically varied by means of an anamorphic lens to produce images that are both thinner and thicker than the original ones ( with known BMI) will be administered to mothers and the following questions will be asked:**

1. Which body size would you prefer to have? [ ] 23

1 2 3 4

2. Which body size do you feel is most healthy? [ ] 24

1 2 3 4

3. Which body size do you feel is more attractive? [ ] 25

1 2 3 4

4. Which body size do you think your partner would choose as attractive? [ ] 26

1 2 3 4

### Child

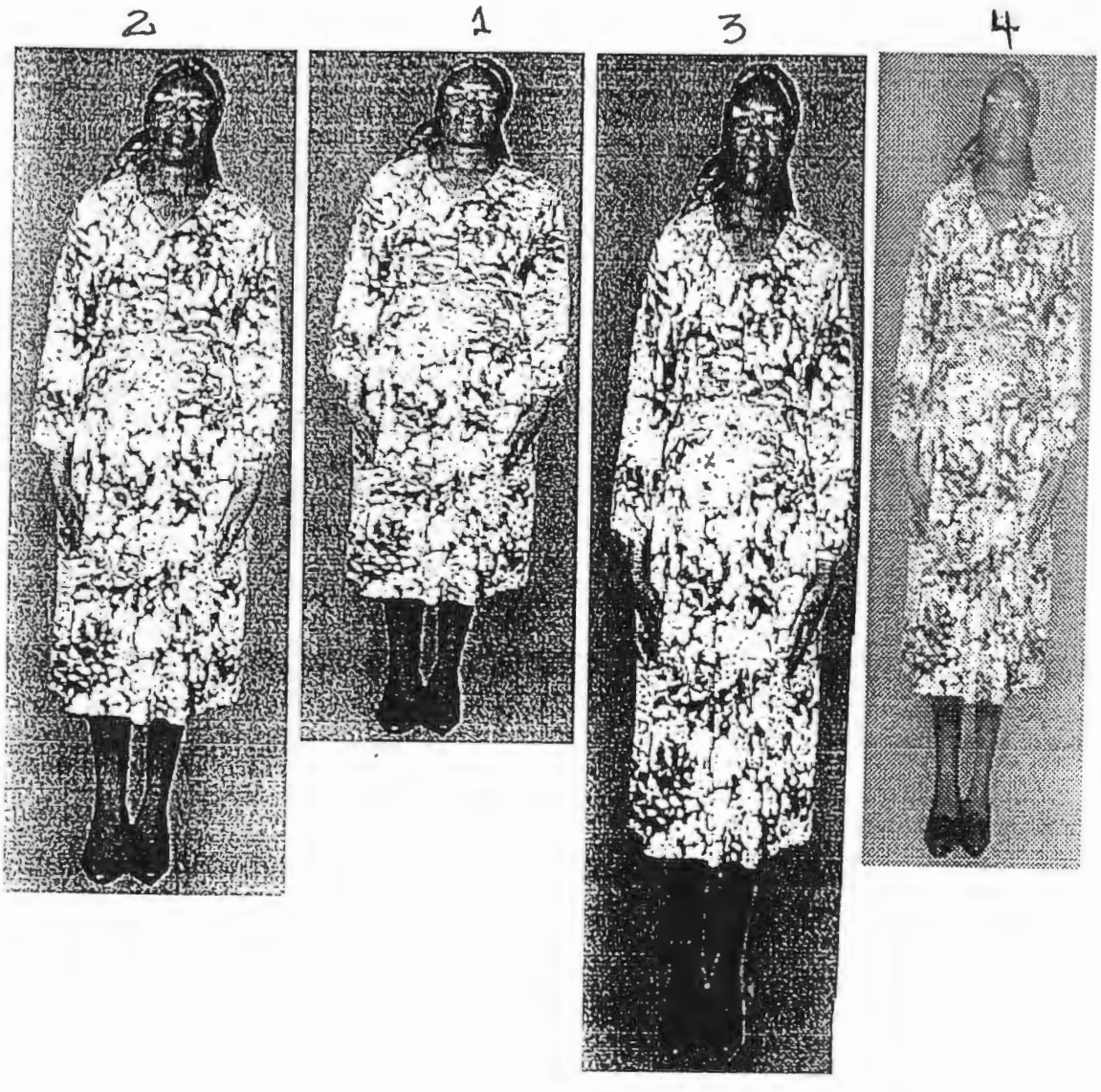
**(measurements to be taken by the researcher/ fieldworker)**

birth weight ( from the road to health card) [ ][ ][ ] 29

actual/ present weight(kg) [ ][ ][ ] 32

height ($m^{2)}$ [ ][ ][ ][ ] 36

**Appendix 5: Pictures of body images used to answer the last part of the questionnaire**



**Appendix 6. List of conference presentations and publications of parts of the study**

1. "hands on" Nutrition Congress of Southern Africa held in Stellenbosch University, Cape Town on the 2 April 1996.

   **Paper presented:** Knowledge, beliefs and attitudes of African women about acceptable body size of women and children

2. 18th African Health Sciences Congress in collaboration with the 15th Epidemiology Society of Southern Africa Conference held in Bellville Cape Town 14-17 April 1997.

   **Paper presented:** Knowledge, beliefs and attitudes of African women about acceptable body size of women and children

3. 16th Epidemiological Society of Southern Africa conference . Improving Health: Getting research into policy and practice held in Midrand Gauteng 26-27 October 1998.

   **Paper presented:** A study of the relationship between maternal obesity and child under-nutrition in African women attending a child health clinic in Cape Town

4. Mvo Z, Dick J, Steyn K. Perceptions of body size among African women in peri-urban Cape Town. Urbanisation and Health Newsletter, No 34, September 1997 p 31-33.