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A GEOGRAPHICAL ANALYSIS OF NUTRITION IN THE EASTERN CAPE AND CISKEI

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PREFACE

The primary aim of the thesis is to make an anthropometric assessment of levels of nutrition of black pre-school children in selected communities of the Eastern Cape and Ciskei. The communities are those of black labourers and their families on white-owned commercial farms in the Dias Divisional Council area of the Eastern Cape; a rural community of an area of Ciskei known as the Amatola Basin; and Tsweletswele, a 'closer settlement' or resettlement area in Ciskei. A pilot survey of school entrants in the Albany magisterial district also sheds light on the nutrition of children in the small towns, such as Grahamstown, of the Eastern Cape. Through an analysis of nutritional conditions in these disparate communities, it should be possible to begin to establish the geographical variation of nutrition in the region. Black communities in the metropolitan area of Port Elizabeth are not considered in the thesis, but on-going surveillance in the city, by the author, will elucidate nutritional conditions there.

In achieving the primary aim of the thesis, attention will be focussed on inter-community rather than intra-community variation in nutrition. Nutrition may vary within communities (intra-community variation), for example, within different parts of the Dias Divisional Council area. While such variation is likely to be minimal, as will be discussed in the presentation of results in chapter 6, section A(1), it is in itself important, and present research endeavours within the surveillance programme are being geared to explore this dimension of nutritional variation more fully. Inter-community variation in nutrition provides, however, a more than sufficient focus for the thesis.

A secondary aim of the thesis is to explore the relationship between nutritional status and socio-economic conditions prevailing in the surveyed communities. The secondary aim makes it possible to obtain a better understanding of the processes which influence the geographical pattern of nutrition. A consideration of socio-economic conditions, both within the communities and within the Eastern Cape and Ciskei as a whole, also provides a context in which the nutrition results can be assessed.

The third aim of the thesis is to assess possible applications of the survey results to policy formulation, thereby providing an applied dimension to the work. The third aim is related, in part, to a specific

research programme which is referred to at this point, because it provided the initial impetus to the overall surveillance programme undertaken by the author.

A research programme was conducted by the Institute of Social and Economic Research (ISER) at Rhodes University, Grahamstown with the author as project director. The programme arose from a request by the Department of Health to ascertain conditions in the black Group Areas of Grahamstown and among black labourers on the surrounding white-owned commercial farms of the Albany magisterial district. National and international media reports of poor nutrition and high infant mortality among young black children suggested a totally unsatisfactory situation. It was claimed in the media that information from the Medical Officer of Health's (MOH) annual report for 1979, showed that one out of every four black babies born in Grahamstown died before the age of twelve months. More than half the deaths of black babies were attributed directly or indirectly to malnutrition (Hyman, 1979). The Department of Health, on the other hand, pointed out that the MOH's statistics were misleading. The suggested infant mortality rate (IMR) of 250/1 000 live births, was based on the 396 registered black births in Grahamstown. Since the offical black population was approximately 40 000 and the estimated black birth rate 40 per 1 000, the number of births must have been closer to 1 600, giving an IMR of 62 per 1 000 or one quarter of the IMR quoted in the news media. The Department maintained that there was insufficient information available for an accurate assessment of nutritional conditions and IMR's, since no community-based studies of these factors had been undertaken.

On receipt of a written request from the Regional Director of the Department of Health in the Eastern Cape, a pilot survey of nutrition of school entrants in both the urban and rural black schools of the Grahamstown area was undertaken in January 1980. It was envisaged that a survey of school entrants, a captive survey population, would also be indicative of conditions among pre-school children, a nutritionally high risk group, as much previous research has indicated (Maasdorp, 1976a; Ohuche and Otaala, 1981; Austin, 1981). The objective of the pilot study was to use a set of international anthropometric criteria to determine whether nutritionally at risk groups could be identified. If they could, then necessary corrective programmes (for example, nutritional education programmes) could be implemented immediately and more long term solutions contemplated, with a view to ameliorating problems where possible.

The design of the pilot survey will form part of chapter 5, which deals with the thesis research methodology. The pilot survey is considered here on two accounts. First, the results were instrumental in indicating that nutritional problems were possibly severe in certain communities, while less serious in others. The Department of Health therefore thought it prudent to establish a longer term surveillance programme, not only for the Albany area, but for the Eastern Cape as a whole. The instigation of cross-sectional community surveys, which could be repeated at intervals to assess whether or not conditions were improving, became a reality. One such survey, that of the Dias Divisional Council area is included in the thesis. It must be noted that the Dias Divisional Council survey reflects that part of the ISER's programme done in association with the Department of Health. The study of the Ciskeian communities, in the Amatola Basin and Tsweletswele, came about as a result of finance made available to the ISER from private business. These studies were unconnected with the Department of Health and are indicative of the resolve of the Institute to broaden its programme of nutritional assessment. Secondly, the pilot study results proved to be contentious, giving rise to a number of questions, including that of the appropriateness of the survey design. Questions which needed to be asked, included the following. Was the nutritional status of school entrants necessarily indicative of that of pre-school children? Were international anthropometric criteria such as the Boston standards or norms, used to assess nutritional status, suitable for the nutritional assessment of black children in South Africa? Since school entrants were unable to furnish information about their home backgrounds, was it not logical to look at the individual community household as the basic unit of future surveys?

As a result of the questions raised after the pilot survey, the author undertook research to:-

A. Design a survey instrument which could be used at the household level to solicit, directly, anthropometric data from pre-school children, as well as determine socio-economic conditions within surveyed households; and

B. Establish the suitability of using international anthropometric criteria, such as the Boston and the National Center for Health Statistics (NCHS) norms, for accessing nutritional status.

After the pilot study and the research outlined in A and B above, the author conducted, in collaboration with the Department of Health, the first major survey reported on in the thesis. The Dias Divisional Council survey was conducted in May 1981, followed by the Amatola Basin survey in November 1981 and the Tsweletswele survey in October 1982. The rationale for conducting these surveys is discussed in chapter 5, section C(1).

Before outlining the structure of the thesis and the order in which material will be presented, it is necessary to discuss two important issues. First, it is essential, at the outset, to note the problem-oriented nature of the thesis. The programme of surveillance, considered in the thesis, is very much in its infancy. The concern in the thesis is, therefore, with the exploration of the problems and prospects of using cross-sectional surveys to monitor community nutritional status. The study has an inherent geographical component, but the intention is not to vindicate the study as 'geography'. As a project undertaken by a geographer, the geographical perspective is important; however, it will only be stressed in as far as it promotes an understanding of the problem of analyzing nutritionally at risk communities. Furthermore, maintaining attention on nutritional assessment, underscores the interdisciplinary nature of the nutrition problem, and the complexity of resolving poor nutrition wherever it is encountered.

Secondly, the surveillance programme must be considered as a pioneer programme of its kind in the Eastern Cape, with all the attendant problems of instituting such a programme. Five of the many problems encountered in carrying out the study are considered, since they impinge upon the material and its presentation in the thesis.

A. Terminology

It is difficult at times to find words to describe a concept of process accurately. An example will serve to illustrate the point. The father is an important member of the household in all the communities surveyed. He is invariably the main breadwinner, whether he is at home or away from home as a migrant or commuter. Some fathers have also died so they are no longer present in the household, while others have deserted the household completely. In the latter instance, the father does not contribute financially or socially to the wellbeing of the household.

Some word or phrase has to be found to describe the various postures that the father (and mother) can assume in the home. The term used to denote the ways in which the father and mothers 'contribute' to the household is 'role'. The term 'role of parents in the household' is therefore used in the thesis when discussing aspects of family social organization or when tabulating data on the 'contribution' of parents to the household.

Most other terms used in the thesis should be self-explanatory. Where necessary, descriptions of certain terms are given, for example, malnutrition and oedema. The approach has been to use non-technical language wherever possible.

B. Sampling

The sampling procedure adopted in the community surveys is outlined in chapter 5, section C(2). Preliminary fieldwork suggested that the communities to be surveyed were all homogeneous groups of people, readily distinguishable from other groups within the same geographical area. On the basis of the assumption of homogeneity, two principles dictated the sampling design. The first was a desire to obtain an unbaised sample which would be representative of conditions within the community as a whole. The second principle or consideration was that money and time constraints would dictate the size of the sample to be taken in each community. The largely unknown characteristics of the communities also meant that samples were made as large as possible. As the surveillance programme is refined and the nature of the communities more fully understood, it may be that smaller samples will suffice to obtain sample statistics which will be indicative of the population parameters they represent. The method of selecting sampling is considered, at present, to be adequate to comment on nutritional and socio-economic conditions prevailing in surveyed communities.

C. Data and Data Analysis

It was envisaged that the assessment of nutrition and the factors which influence nutritional status would evolve around the analysis of 'hard' field data. That this was not possible in every instance is a reflection of the pilot nature of the work discussed in the thesis. Whereas, for example, the cash incomes of farm labourers can be ascertained, that of

income in kind is difficult to obtain without considerable time and effort. The cross-sectional nature of the surveys undertaken and the time required to find out all sources of food and goods received in lieu of cash (and to convert these to cash equivalents) precluded the collection of hard data on the cash equivalent of income in kind.

Similarly drought is a factor which may influence nutritional status in the Amatola Basin and for which hard data were not readily available. Even given ample time to conduct in-depth fieldwork, drought remains a difficult phenomenon to define and quantify. No attempt is therefore made to quantify the relationship between the many factors which culminate in drought (for example, rainfall and subsistence crop production) and nutritional status. The main point raised in the analysis of drought is that the Amatola Survey took place after a period of drought which may well have affected nutritional status. The 'drought' data, therefore, remain 'soft'. What the discussion highlights is the fact that any study faces numerous methodological and conceptual problems, and compromises are sometimes necessary between what one would like to collect in the way of data and what are available, given the very real constraints of time and limited numbers of fieldworkers.

D. The Analysis of Results within a Hypothesis - Testing Format

After considerable deliberation it was decided to use a deductive, hypothesis testing framework for the analysis of data. It was felt that such an approach would sharpen the focus of analysis and reinforce the problem orientated nature of the thesis. Can one discern a geographical pattern of nutrition in the Eastern Cape and Ciskei and can particular socio-economic factors explain that pattern?

An advantage of using a deductive, hypothesis-testing format is that it acts as an aid in the assemblage of data. For example, the hypotheses: 'Children in Tsweletswele will display unsatisfactory levels of nutrition because of the poor socio-economic conditions prevailing in the settlement' (Chapter 5, section D) immediately focuses attention on nutrition and the factors which may affect it. On the basis of the hypothesis a deduction is made about the factors which may affect nutrition and only data relevant to these factors are collected. Being a pilot study, such an approach is valuable in that it restricts the range of factors studied and on the basis of the survey findings indicates how

successful they have been in explaining nutritional conditions encountered. The study of the relationship between these factors and nutrition will invariably also indicate other possible, factors to consider in future studies.

A major pitfall to setting up hypotheses at the outset is that one may be constrained by them. The alternate approach is to use an inductive method of enquiry and to collect a great deal of data (which will no doubt yield valuable findings) and through 'analysis' come to a set of hypotheses for the conducting of future research. Whereas this approach has much merit the former has been adopted because of the pilot nature of the study and the desire to focus attention on a specific data set from the outset. It was envisaged that the hypotheses set out in the thesis will provide a logical format for the analysis of data and draw attention to some of the key issues pertinent to any field examination of nutritional status.

E. Uniformity in the Presentation of Material

The material presented in the thesis is taken from an on-going programme of nutritional surveillance. As such, material produced at an earlier period in the programme may have to be presented in different forms in the thesis. Figure 20 in chapter 4, section B(3) offers a case in point. The author constructed the figure on the basis of material supplied by the Ciskeian authorities, in which the settlement was referred to as Tswele Tswele. Later discussions with a Xhosa-speaking anthropologist indicated that the settlements name was a single word, Tsweletswele. All other references, other than Figure 20, therefore refer to the settlement of 'Tsweletswele'.

Many other problems, besides the three examples discussed here, arose in the course of the survey work, and the most important of these problems are discussed in chapter 5, which deals with research methodology. The remainder of the preface is given over to an outline of the structure of the thesis.

The material of the thesis is considered in three parts. Part I consists of three chapters that are theoretical in nature. They are concerned with a study of nutrition as a topic of geographical importance, while recognizing the interdisciplinary nature of community nutrition and

surveillance. Other issues which materialized as the research programme progressed are also scrutinized in these chapters. They include the problems and prospects of undertaking applied academic research and the contribution of geographers to nutritional studies (chapter 1); the role of malnutrition within the spectrum of diseases which can assail communities, and the anatomy of malnutrition and its assessment (chapter 2); and the discussion of the literature on malnutrition in South Africa (chapter 3).

Part II of the thesis outlines the nature of the study area (chapter 4) and details the methodology employed to carry out the empirical work (chapter 5). Part III consists of chapter 6, 7 and 8. Chapter 6 presents the results of the three major nutritional surveys undertaken in the Dias Divisional Council area, the Amatola Basin and Tsweletswele. Chapter 7 provides an assessment of the overall survey results and the nutritional surveillance programme. Chapter 8 concludes the thesis by reviewing the aims of the thesis as set out in this preface; by making an assessment of the findings of the nutritional surveillance programme; and by considering the policy implications of the work and how such policies may contribute to the resolution of nutritional problems encountered in the surveyed communities.

PART I

Part I of the thesis is comprised of three chapters. The chapters are theoretically orientated and provide the basis on which the surveillance programme, outlined later in the thesis, can be assessed. Chapter 1, the Introduction, analyzes key aspects of human and medical geography. A place for nutrition within medical geography is advocated. Chapter 2, The Assessment of Nutritional Status, expands upon the themes introduced in chapter 1. The initial concern is with a consideration of the nature of malnutrition and the conceptualization of the environment in which malnutrition occurs. Thereafter, the focus shifts to a contemplation of ways of measuring nutritional status and strategies for the resolution of unsatisfactory nutritional conditions. The final chapter of Part I, chapter 3, Patterns of Health and Nutrition in South Africa, draws together the themes introduced in chapters 1 and 2 by examining health and nutrition in South Africa. Malnutrition is shown to be associated with the diseases of poverty. The geographical variation in nutrition and the differentiation of nutritional status along predominantly racial lines are discussed.

CHAPTER 1

INTRODUCTION

A keynote of contemporary human geography is a concern with the analysis of socially relevant problems from a spatial point of view (Smith, 1977). Various philosophies and ideologies in geography have emerged, particularly since the early 1960's, to study societal issues. The philosophies include for example, those of positivism (Haggett, 1966; Harvey, 1969; Amedeo and Golledge, 1975) and phenomenology (Relph, 1970; King, 1976; Billinge, 1977), while the Marxist ideology has become an increasingly powerful force in recent years (Harvey, 1972, 1973; Blaut et al., 1975; Slater, 1977; Peet, 1978).

No matter what the philosophy or ideology employed, studies have ranged widely in human geography. In most cases researchers have crossed disciplinary boundaries with impunity, yet caution, as they have analyzed issues ranging from health in the urban areas of the United States to poverty in the underdeveloped economies of the world (Pyle and Rees, 1971; Learmonth, 1975; De Souza and Porter, 1974). In the majority of cases, while the specific focus varies, the preoccupation is with how man interacts with his environment from a spatial perspective. The concern with process and structure which gives rise to geographical distribution is also evident as the emphasis has moved from geography as a descriptive science to one much more concerned with explanation (Harvey, 1969) and prescription (Harrison and Larsen, 1977; Roepke, 1977; Pryde, 1978; Berry, 1980; Briggs, 1981).

The analysis of such seemingly disparate entities as health and development reflect increasing specialization within geography. Specialization underlines the need to narrow the focus of study as society and societal problems become more complex. Specialization in geography and the social sciences in general, also reflects the awareness that social problems are not discipline specific. Adopting an interdisciplinary perspective results in a set of divergent forces acting upon the researcher. On the one hand he must be aware of the wider system into which his particular work must slot (Huggett, 1980) and on the other hand he must, of necessity, develop specific techniques and expertise that may even lie outside his particular discipline but are essential to the analysis of the problem and to its resolution.

The present study in medical geography focuses attention on the identification of patterns of nutrition in selected black communities in the Eastern Cape, South Africa; the examination of factors which have given rise to the particular patterns; and some thought to prescription for the amelioration of perceived problems. The study reflects the interdisciplinary nature of the problem of nutrition and the need to develop suitable techniques to assess the level of nutrition of communities.

While the emphasis in the thesis will not be to vindicate the study as geographical, for reasons outlined in the preface, this chapter is given over initially to a brief study of the development of the field of medical geography. The need for an interdisciplinary perspective, the need to see the study as an example of applied geography, and the possible geographical concerns in nutritional issues are the other aspects considered. These issues provide the context in which the problems of research methodology and analysis of nutritional status, which forms a major part of the thesis, can be viewed.

A. The Development of the Field of Medical Geography

Work which focuses attention on the geographical patterns of health problems can be traced back to the early Greeks (Hunter, 1974; Meade, 1977; Learmonth, 1978; Pyle, 1979). Barrett (1980), reviewing the medical geographical writings on the eighteenth and nineteenth centuries, identifies a concern among the Western European medical fraternity with seeking the causes of human diseases in the environment. A common denominator of work done from the fifth through to the nineteenth centuries is that of a preoccupation with isolating the disease agents within man's environment. Barrett (1980, p.1) makes the point that these "earlier studies are historically interesting and superficially related to current work, (but) conceptually they are not part of geography, even though they focus on geographical relationships". A major reason for making the assertion is that the work was undertaken by physicians such as Finke, Schnurrer, Fuchs and Mühry who were looking to geography as a source of help in their attempts to understand disease distributions. Their prime goal was to understand disease per se rather than the spatial patterning of disease (Barrett, 1980). An important aspect of these works is a concern with environmental factors in disease etiology later to be found in the twentieth century writings of, for example, McKinley

and Rowntree (Pyle, 1979) and also an interest in areal or spatial patterns of disease, the hallmark of contemporary medical geography according to one of its leading proponents (Learmonth, 1978).

It is appropriate at this point to outline historical events which not only affected developments in medical geography in the nineteenth century but which still play a vital role in medical practice in South Africa and many nations of the world. In 1857 an innocuous sounding paper entitled 'Memoir on the application of lactic fermentation' was read in Paris. In this paper Louis Pasteur stated the principle of germ theory that totally revised the approach by medical professionals to the treatment of disease. Pasteur's revelation of bacteria shifted the focus of attention from a consideration of man's level of health as dependent on the interplay of disease agents, man and the environment, to a consideration of solely the disease agents of man (Hunter, 1974). Fleming's discovery of penicillin as a means of killing the disease agent, or infection, sharply curtailed the concern with finding the environmental causes of disease. Instead, medical research increasingly focused attention on the new science of microbiology. Given this new conceptual framework for the study of disease etiology, geographical perspectives which highlighted the relationships between man and his environment became passementerie, perhaps eloquently argued work but peripheral to the eradication of disease and the advancement of medical practice. A preoccupation with what has become known as curative medicine emerged. In essence the curative approach requires disease to have invaded the organ (man) before treatment can commence. The discovery of the wonder drugs of penicillin, Aureomycin and Terramycin made such an approach very attractive (Pyle, 1979) but it also gave rise to the perception of hospitals and other medical facilities as the essential constituents for promoting and maintaining health. Preventative medicine, based on an understanding of the environmental factors which promote disease in man and their curtailment before the disease agent invades man, is an ideal still far from being attained. The concepts of both curative and preventative medicine are relevant to the approach in the thesis and will be dealt with more fully in chapter 2.

Medical geography in the late nineteenth and early twentieth centuries, as a result of the advances in microbiology, went through what Hunter (1974) describes as the 'post-Pasteurian slump'. A number of scholars nevertheless forged ahead with medical geographical analysis, usually of

specific diseases. Almost deterministic in nature, these studies sought to evaluate the impact of the environment on human health. McKinley for example, working in the U.S.A, classified diseases in accordance with tropical and temperate climates (Pyle, 1979). Rowntree, working in the industrialised area of York, England in the first half of this century, made the connection between poverty and health. By comparing groups of school children and British army applicants from various areas of the city, he postulated that those from poor areas were shorter in stature than their counterparts from more affluent areas (Rowntree, 1902).

The key geographer to emerge from pre-modern medical geography, roughly the period prior to 1970, is undoubtedly the French-born Jacques May. He moved to the United States in 1950 to develop an atlas of disease for the American Geographical Society. From 1950 to 1955 a total of 17 sheets of the Atlas of Diseases were published in various issues of the Geographical Review, the mouthpiece of the American Geographical Society. They included the mapping of human starvation (May, 1953a) and the mapping of diet and deficiency diseases (May, 1953b). Besides the mapping of disease, May developed his concept of the epidemiological constraints of various diseases requiring the coincidence of two, three or four factors. In the study of nutrition for example (May, 1971, 1972, 1973, 1974), he tried to show that the level of nutrition was related to a series of geographical, cultural, economic and disease factors. Meade (1977), commenting on May's work, finds his emphasis to be on static description with an inability to develop theoretically sound generalizations. Consequently he fails to elucidate the processes at work. May however must be considered a major figure in the move to establish disease ecology as a theme in contemporary medical geographical studies.

The decade 1970-80 (which may loosely be defined as the modern or contemporary period in medical geography) has witnessed a significant resurgency of interest in the geography of health (Hunter, 1974; Pyle, 1976, 1979; Meade, 1977, 1980). Major reasons for the renewed interest are 'mismanagement of the environment' and 'ecological arrogance' (Meade, 1977, p.379). The work by inter alia, Hunter (1974), Howe (1976), Roundy (1976), Meade (1977), Learmonth (1978) and Pyle (1979) in medical geography and many others outside the field (Gish, 1975; Wilson, 1976; Ohuche and Otaala, 1981; Rowland and Cooper, 1983) demonstrates that the epidemic of the Western World's degenerative diseases and the endemic

parasitic and infectious diseases of the underdeveloped world, cannot be contained by health professionals pre-occupied with the germ theory of disease. There is a growing awareness that the containment of these diseases lies in once more focussing attention on the environment and the environmental factors which induce disease in man. Implied is a dynamic conceptualisation of health promotion based on the understanding of the interplay between pathogen or disease agent, host (man) and the environment; in short, the promotion of preventative medicine.

Many pathogens have become resistant to the biochemical controls used in curative medicine - new strains of antibiotics, each more potent than the preceeding one, are having to be developed in an effort to contain disease. Parallel to pathogen resistence has been the growing epidemic of Western diseases such as arteriosclerosis, cancer and ischaemic heart disease. In the underdeveloped world, cholera, T.B., venereal disease and malnutrition, to name a few, are also rampant (Hunter, 1974). Heart transplants, radiation therapy for cancer and the treatment of kwashiorkor cases in hospital are all examples of curative practices aimed at resuscitating the diseased host. The basic problem with these curative practices is that factors of the physical, biological and social environments are given insufficient credance in the eradication of diseases. Although curative medicine still predominates many national health services, renewed research in the man-environment tradition is slowly changing the trend. For example, in a review of local death records over a period of about 20 years, Allen-Price found a distribution of cancers in the Devonshire area, England, which seemed to be related to water supplies. He hypothesized that a cancer-provoking ingredient in the water supplies, which could be isolated by micro-chemical examination, was responsible for the cancers. Variation in the lead content of water was found to correlate with the incidence of cancer, so forging a link between cancer and an environmental factor (Howe, 1976). Allen-Price's study, and others, including McGlashan's studies into the oesophagael carcinoma problem in the Transkei, South Africa (McGlashan, 1977) and Guseynov's study into soil salinity and its relation to cancer of the oesophagus (Guseynov, 1979) once more bring health related issues into the ken of the geographer schooled in the man-land and spatial traditions of geography.

The preceeding discussion on the reasons for a renewed focus on medical geography is brief and selective. As Pyle (1976, 1979) and others have

noted, a number of concurrent approaches reflect an awareness of environmental factors in disease etiology, for example, the detailed mapping of disease patterns, so that associations with cultural or naturally-occuring phenomena can be established and understood. Yet other approaches in contemporary medical geography are probably more a product of development in geography per se during the last 20 years. The rise of positivistic geography with its scientific framework and concern with spatial analysis has fostered developments of the spatial study of the administration and provision of medical facilities (Bashshur et al., 1970; De Vise, 1971; Holmes et al., 1972; Shannon et al., 1973; Achabal, 1978; Joseph, 1979). Since the spatial study of administration and provision of medical facilities is peripheral to the subject matter of the present thesis it is not analysed in the discussion of developments in medical geography. Pyle (1979) provides an impressive review of contemporary trends in medical geography in the U.S.A., Britain, other areas of Europe and the Soviet Union and it is unnecessary to repeat his findings here.

An important fact to arise from a review of developments in medical geography is that most authors adopt a chronological approach to developments in the discipline. The idea of considering development in the discipline as a linear progression over time appears to have at least one serious pitfall. As Stoddart (1981, p.2) points out, to invoke an analysis of the development of ideas with the emphasis on chronology involves value judgement about "the past from the standpoint of what is clearly an evanescent present" and heroes and villians are created dependent on the vantage point adopted. He argues, along with Berdoulay (1981) that it is important to understand the context in which the development of ideas has occurred. Political, social, economic and other factors in the researchers mileau are crucial to an understanding of why the particular kind of research was or is undertaken. The present concentration by geographers on the delivery of health care in the U.S.A. is in part a reflection of the peculiarities of the free market type medical care system operating there (Pyle, 1979). Preoccupation with spatial attributes of health care delivery among U.S.A. geographers post-dates a concern among some of them with mapping patterns of disease as was the case with May's work. Yet in many contexts, especially the underdeveloped world, present concern with patterns of disease and disease etiology as undertaken by May is of more importance where health facilities are rudimentary in the extreme, than the analysis of the spatial facets of health care delivery.

Within the South African context, studies of the delivery of health care with a concentration on spatial patterns of patient usage of facilities, seems of less consequence, when compared with the major problems of hunger and malnourishment facing so many of the peoples within the country (Oettle, 1979; Braun, 1980; Thomas, 1981; van Rensburg and Mans, 1982). This thesis, because of the prevailing socio-economic and political conditions and the nature of the health problems within South Africa (to be discussed in Chapter 3) concentrates on nutrition and on elucidating patterns of nutrition, rather than on health care delivery, which is the main concern among North America and European medical geographers at present. Pyle (1979) shows from his analysis of various national trends in medical geography that a number of specific methodological statements can however be made on the nature of medical geography as an entirety. The major point he makes is that all medical geographical studies have at the core a concern for the spatial analysis of human health problems: "So long as there are geographic variations in time and space, where related to naturally occurring environment or artificial environments ... there is a definite need for geographic applications and communication of research findings" (Pyle, 1979, p.9).

B. The Need for an Interdisciplinary Perspective

Learmonth (1978, p.16) defined medical geography as "the study of areal distribution patterns of (human) disease, preferably viewed as dynamic rather than static patterns, and aiming at explanation. The causation of the disease must be viewed from the viewpoint of the physiologist or the pathologist looking at the individual patient, but as important in this context is a social or community approach". The definition isolates two key facets of medical geography. Most studies seek to depict a pattern of occurrence - areal distribution - as well as the causes or processes underlying that pattern. The core of geography per se, pattern and process, is therefore inherent in medical geography. However, processes underlying the pattern are not necessarily geographical. In his work on nutrition, May (1974) isolates economic, cultural and traditional factors in an attempt to understand the geography of nutrition. May's approach would be compatible with that of the social or community approach to understanding causality as stated by Learmonth.

Another facet of medical geography implied but not stressed in the above definition is that of the interplay between man and his environment. Man

as the host to a range of disease vectors, is subject to environmental factors which impinge upon his level of health, such as those of an economic and social nature. Meade (1977) points out that to understand these factors (and processes) as they affect man's health requires knowledge from a variety of disciplines. Medical anthropologists for example, have studied family size preference amongst various communities; practices concerning the nutrition of children, lactating and pregnant women; and extended kinship systems, and how these factors can affect levels of health. Medical sociologists have tackled the dimension of social organisation while ethnomedicants have analysed the role of the traditional practitioner in preserving mental health within their communities. Many other disciplinary contributions could be added to those presented here. What is relevant is that each contribution tackles some part of the wider system involved in the maintenance of human health. As such, one is confronted with a system at once too all-embracing for any one discipline to cover, but at the same time necessitating an awareness of the larger system one is working in, no matter what the specialization.

A major problem facing the interdisciplinary specialist is to find an overarching conceptualization of medical studies so that the particular research can be appreciated within the wider system. Meade (1977) comes closest to providing the clues of how such a conceptualization may be tackled when she suggests that the answer lies within the way health is appraised. Meade (1977), Pyle (1979) and Shoden and Griffin (1980) maintain that to think of health as the absence of disease is both negative and inadequate. Health and disease must be seen as dynamic processes and both a part of mans' environment at any one time. Health prevails when a measure of homeostasis is reached, a form of balance between multiple and diverse processes acting in the environment (Pyle, 1979). Disease occurs when the balance is disrupted. Man must continually adapt to changing environmental conditions, physical, social and biological, if he is to remain healthy. Maladaption reflects improper interaction between man, his environment and culture (Meade, 1977). As such the wider system in which the concerns of health may be viewed is constituted of man, his culture and the environment. Figure 1 depicts the system in which levels of health could be analyzed. Health within a population is dependent on such demographic features as sex and dependency ratios, while the environment is constituted of physical components such as availability of resources as well as non-physical

attributes including levels of education and income availability. Culture, or the learnt patterns of behaviour, will dictate how resources are used by the population, how the institutional structures are created for resource exploitation, as well as the attitudes to child raising, nutritional issues and familial organization.

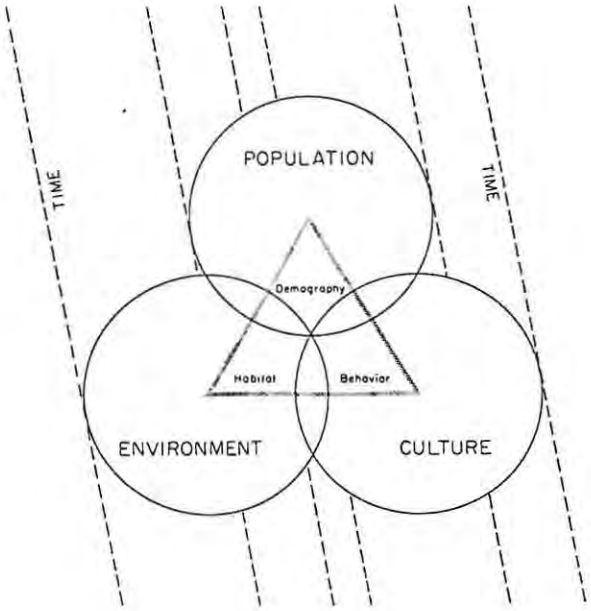

Figure 1 A System in which Health is Assessed

Source: Meade, 1977, Figure 1, p.383.

The interaction of man, his culture and the environment has a historical context. The analysis of the present state of the system is of little value without the historical (time) dimension which indicates how the system has evolved. Similarly forces exogenous to the system must be recognised. Just as Todaro (1977) and others have shown that national economies, as well as subnational ones are tied into a world economy, so the analysis of health and health care must take cognizance of the inter-related nature of regional, national and international systems of population, culture and environment. The degree of emphasis on the historical dimension or interdependence between systems will in large measure be dependent on the scale of analysis. Researchers working at the national or international scale and interested in the long term view of societal progress and health will tend to concentrate on the interdependencies between systems (and the overall weakness of the system), much more than those working for local improvement within their particular systems (Schofield, 1979). Whatever the scale of analysis,

the range of factors implicated in health require an interdisciplinary approach. Mohan (1981, p.292), commenting on the findings of a one day seminar in Medical Geography at Queen Mary College, says that "a purely geographical approach to these issues (topics discussed at the seminar) is somewhat limited; it is essential to consider broader social contexts and structures if our analyses are to have any meaning".

The work of some contemporary geographers shows a tendency to concentrate on structures to the extent that the geographical component in their work is hard to find (Peet, 1978). Much of this type of approach is found within the radical critique which concentrates not on the modification of existing societal structures, but on the replacement of what are regarded as inappropriate structures. Herbert (1979) points out that the radical critique has focused attention on some neglected areas pertinent to geographical analysis. Many of the problems which show themselves in medical geography - for example communities entangled in a web of poverty and associated diseases such as cholera and gastro-enteritis - are largely created by factors external to the group or community considered. Rather than concentrate on the cycle of poverty leading to tuberculosis for example, it can be argued that geographers can also concern themselves with the system which has brought about and maintains the community at risk to such infectious disease. As such the attention is on the antecedents of the disease problem.

While the present thesis does not work at the level of considering the antecedants of nutritional problems in detail, the issue is raised here for the following reason. The analysis of the geographical variation in nutritional status is inevitably limited to specific conditions within the communities analyzed, as well as factors extraneous to them. These extraneous factors may be structural in nature, for example, economic organization. While not geographical, an understanding of these factors is fundamental since they form part of the processes which are eventually given expression in particular geographic or landscape patterns.

In summary, an interdisciplinary perspective is important to a study such as the present one. Geography is concerned with patterns and the explanation of how patterns arise. Explanation often means that the geographer has to go beyond the disciplinary confines of his subject in an effort to understand the processes which give rise to particular

patterns. However, the disciplinary specialist requires a framework in which his or her work can be linked to that of other specialists. A system encompassing man, his environment and culture is postulated as a suitable framework. Depending on the objective of the analysis, it may be necessary to focus on specific problems within the system, for example to highlight issues which require attention within a community, such as the need for additional health facilities or more educational institutions. On the other hand it may be more beneficial to pay attention to the antecedents of the particular problem, thus exposing the social, economic or political forces which result in the lack of health and educational facilities being made available to the community.

C. Human and Medical Geography : the Need for an Applied Interface?

The following discussion considers the possibility of the academic utilizing the theoretical constructs at his disposal to create a geography which is not only positive (to explain) but also normative (to prescribe what ought to be). The debate about whether or not geography should become more pragmatic is a lengthy and complex one (Berry, 1980). Since the present thesis has an applied dimension the topic must be considered but only some of the more salient features of the debate are analyzed here.

Dunbar (1978) claims that the term, 'applied geography', can be traced back to John Scott Keltie who published a book titled, Applied Geography : A Preliminary Sketch, in 1890. Most other authors, however, claim that the present thrust of applied geography has its roots in the 1950's (Harrison and Larsen, 1977; Briggs, 1981) and that the father of applied geography can rightly be considered to be Dudley Stamp. In 1960 Stamp stated that applied geography had grown to be a vital part of the geographers equipment for the study of the future and as the guide to future developments (Stamp, 1960 in Briggs, 1981).

In spite of Stamp's declaration, applied geography did not develop in any large measure during the 1960's. The key reason was probably the rise of the misnamed 'Quantitative Revolution', which although not fully accepted by all, but rather 'accommodated', spawned a period of introversion, self-analysis and the desire to create a body of theory wholly geographical. The result of introversion within the discipline was that other scholars such as those in economics and ecology took over the role of geographers in many areas of public concern (Berry, 1980).

The heightened interest in applied geography (Harrison and Larsen, 1977; Foster and Jones, 1977; Dunbar, 1978; Frazier, 1978; Pryde, 1978; Roepke, 1977; Berry, 1980) has been accompanied by a call for geographers to be concerned with relevant and pressing social problems (Harvey, 1973; Smith, 1977; Peet, 1978; Berry, 1980). Social deprivation and inequality within Western economies, as well as unremitting poverty and associated problems such as ill health and insufficient housing in the underdeveloped world, are seen as some of the key areas in which geographical research can be of value. A further societal factor has also prompted more applied or pragmatic geographies. Harrison and Larsen (1977, p.142) remark that "professionalization of society is a lesson not lost on the incoming student, who is often abandoning all but the required liberal arts in favour of those fields directed specifically to employment markets". Furthermore they maintain that if "geography is to be viable in todays setting it must become marketable".

Many other scholars echo the sentiments of Harrison and Larsen. Berry (1980, p.453) states that: "Applied geography is not something to be contrasted with, and set beneath, an academic geography that is somehow 'pure'", and quotes Mao Zedong's aphorism that: 'If you want knowledge, you must take part in the practice of changing reality'. Berry (1980, p.454) goes on to portray the practitioner as one with vision about future states such that he is willing to "articulate aspirations in a manner that is sufficiently broad in scope to shape policy and inspire dedicated action".

Other scholars have been more reticent to endorse a move to applied studies. Truu (1982) feels that, in the South African context, the desire to create 'socially relevant' courses or those that claim to develop 'marketable skills' of students, leads to the decline of sound theory formulation and the general standard of university education. The problem arises out of the ambivalence of the role of the university in the community: should it be one of education (civilizing influence) or vocation? The role of the university geographer can be conceptualized in various ways. Berry (1972, p.78) states that if geographers "fail to perform in policy-relevant terms, we will cease to be called upon to perform at all". Olsson (1978, p.116) commenting on Berry's pronouncement, states that "the key verb here, however, is not 'to perform' but 'to be called on'. Perhaps the mistake was not performing,

but in listening too obediently to those timely sirens who did the calling. Perhaps our responsiblity as independent intellectuals is not to stand with hat in hand, but to be jesters, sometimes performing when called on and sometimes refusing altogether". Olsson's statement is thought provoking. While it is the contention in this thesis that application must be sought for geographical work, the researcher must also be able to assert his right to freedom of enquiry, unfettered by impossible constraints imposed by the agency or body for which the research may be undertaken. Such a position is untenable and unlikely to further standards of theoretic enquiry or the value of empiric findings. As such, the work undertaken in association with the Department of Health has been so construed that the author has maintained the right to assess the survey format and results in a manner independent of that of the Department of Health.

The subject matter of applied geography is in line with the views expressed about human geography in the introduction to this chapter. The concern is with problems of societal importance such as health and nutritional status, and applied geography must be essentially problem orientated with a concentration on man-environment relationships within a spatial context. Fundamental to the man-environment interplay is the need to gauge how man uses the resources available to him. "The exploitation of scarce resources represents a dominating theme to human existence. It is from the pursuit of these resources and from the attempt to decide between alternative policies of exploitation, that not only environmental damage, but also the greater part of political, social and economic problems emerge; they can be seen as expressions of man's inability to organize himself and his world to his best, long-term advantage" (Briggs 1981, p.2). As stated previously, social, economic and political issues of which Briggs speaks must be considered with respect to nutrition. Furthermore, in the case of nutrition, attempts must be made to advocate policy measures to alleviate the various problems encountered.

To encapsulate the argument put forward in this section: the need for an applied interface in geography is a necessary and logical development of past practices within the discipline. The analysis of social problems requires the intellectual rigor associated with reviewing literature on

the subject and theorizing about possible problem resolution. It is both necessary and satisfying to make the additional step of prediction or policy formulation. In so doing theory is given application, which in turn must foster the development of improved theory formation.

D. The Geographical Study of Nutrition

In this section, attention is paid to the limited contributions of geographers to nutrition studies and the rationale for a stronger emphasis on nutrition within medical geographical studies. The section is followed by a chapter summary which draws the various sections of the chapter together.

The geographical contribution to the study of health and nutrition is very limited. Newman (1980, p.78) attributes the paucity of contribution in part to the fact that questions about food have been asked predominantly within the realm of cultural geography. "Here agricultural origins and dispersals, the evolution of food habits, including values and attitudes about food, and the production aspects of rural ecologies have been the focus, rather than the health implications of diet and nutrition". As a result, study has focussed on topics such as the use and rejection of specific foods by particular cultures and geophagy (Newman, 1980). These cultural geographers could have been instrumental in laying the foundations for the study of nutrition in medical geography. However, as Newman states, their antipathy to the positivistic trends which developed in medical geography in the 1960's and 1970's cut them off from informative material on the subject.

Another key reason for the failure of a substantive amount of nutritionally related studies to emerge in the geographical literature stems from the decline of American, and to a lesser extent, European academic participation in the problems of the underdeveloped world (Newman, 1980). The concern of these geographers appears to be increasingly ethnocentric. Progressively fewer top academics are conducting fieldwork in these underdeveloped areas thereby alienating themselves from the realities which exist there (Newman, 1980), namely the problems of malnutrition and infectious and parasitic diseases.

Three further factors seem to limit the development of a geography of nutrition. First, in the South African context, the number of

professional human geographers is comparatively limited and traditionally a concern by peers within the profession has been on broader issues such as urbanization (Beavon, 1982), demography (Smit, 1976, 1979) and development (Fair, 1976, 1982; Browett, 1977; Daniel, 1981). Geography departments therefore specialize in a limited number of issues and developments beyond these precincts must be made independently by anyone whose interests lie outside these areas of concern. Newman (1980) sees a similar problem in the United States but views the issue as 'more of an excuse than an answer' as to why developments in the area of nutrition have been limited.

Secondly, the evaluation of diets and nutritional status requires intimate personal knowledge from families. Empirical work at the household level is essential to obtain information regarding variety and quantity of food consumed, as well as the assessment of nutritional status of household occupants. A perusal of much medical geographical writings in the United States, as outlined in section (a) of this chapter, indicates a concentration on the spatial dimensions of medical care delivery. The kind of data required for these studies is much more impersonal, usually obtainable from, for example, hospital records and therefore presents less of a problem in collection. As Smith (1977) points out, the kinds of data collected for studies such as those of the sphere of influence of an urban clinic, give the researcher the opportunity to apply sophisticated spatial techniques to a data set. In many instances the technique has been more important than the subject matter and the studies as a result can be mechanistic and intrinsically of limited merit, in both a theoretic and empiric sense.

A final problem may lie in insufficient exploration of medical and nutritional literature by medical geographers. To attempt to construct patterns of nutritional status and to explore the processes underlying those patterns demands a thorough knowledge of terms and techniques used outside the medical geographical field. To develop the concepts of nutrition means a study of the nutritional and biological literature (Alleyne et al., 1977; Greene and Johnston, 1980; Shoden and Griffin, 1980). It is also rewarding to examine agency literature geared to understanding nutritional status from the point of view of assessing community nutritional levels: For example, the works of Condé et al. (1979) for the 'Development Centre of the Organisation for Economic Co-operation and Development; Austin (1980) for the World Bank; and

Brown and Brown (1979) for the 'Task Force on World Hunger' all define nutrition before attempting to ascertain community nutritional levels.

Nutritional status can be measured in a number of ways as will be discussed in the following chapter. Medical literature has been much more concerned with the measurement of nutrition than with nutrition per se. The variation in nutrition between and among various sections of communities requires a thorough knowledge of these measurements, how they are obtained and the literature from which they are derived. It is also important to be aware of in-house debates about the merits and demerits of such techniques, for example the merits of using international as opposed to local anthropometric norms to measure nutritional status. The use of particular techniques without a knowledge of their standing within the medical profession is dangerous and places research findings, based on less acceptable techniques, in disrepute.

The importance of the factors assessed above may vary according to circumstances. The conclusion one must draw, nevertheless, is that if multidisciplinary studies of nutritional issues are considered, geographical contributions are seldom present. For example, Learmonth (1978), on assessing the Tamil Nadu Nutritional Survey in India, found the survey to lend itself to geographic contributions, but unhappily had to acknowledge that no geographers served on the survey teams.

It is the contention of the thesis that the assessment of nutrition has a geographic component and that medical geographers have a role in such studies. The role may be to either fulfil some co-ordinating position because of the ability to integrate the various components of the system of health, or to independently isolate patterns of nutrition through developing the necessary analytical tools to measure nutritional status.

This thesis, concentrating on establishing patterns of nutrition in the Eastern Cape and the Ciskei, adds to the body of knowledge in medical geography and in particular attempts to contribute to the study of nutrition within medical geography. As such it must help redress the lack of participation by geographers in nutritional studies, a problem succinctly outlined by Newman (1980) and discussed above.

E. Chapter Summary

The thesis explores the geographical pattern of nutritional status of selected black communities in the Eastern Cape. In addition, factors associated with differing nutritional status are analyzed, in part to provide information for nutritional policy formulation in the area. The aims of the thesis reflect contemporary concern in both human and medical geography with societal problems and the need to ameliorate them.

Medical doctors have in the past used geography to help understand disease per se, rather than to depict particular geographical patterns of disease. Even such interest in the application of geographical perspectives to health issues waned in the nineteenth century with the discovery of penicillin and the ability to kill the disease agent once it had entered the host (man). The resultant curative approach to medicine required none of the expertise of the geographer versed in understanding the way man interacts with his environment, and it has only been in the last decade that a renewed interest has been shown in medical geography. The epidemic of western degenerative diseases and the continued presence of infections and parasitic illnesses in the Third World have exposed the weaknesses of a purely curative approach to disease eradication. A growing awareness of the need for preventative medicine, which requires a more thorough understanding of the many environmental factors which impinge upon health, has emerged.

Contemporary medical geography is in part concerned with pattern and process. Understanding factors which give rise to particular geographical configurations requires an interdisciplinary approach: economic, political and social factors are involved in explaining geographical patterns of health and disease. To provide a framework in which health can be conceptualized and which encompasses the issues involved in an interdisciplinary approach, the variables of population, environment and culture must be considered. In addition the historical perspective to the analysis of these three factors and how they interact is vitally important.

Another issue raised in this chapter is that geography should not only be positive but should also be normative - prescribe what ought to be as well as analyzing what is there. Such normative or applied geography

must not be viewed as something different from academic geography; rather, it is an extension of geographical skills into the area of policy formulation.

Finally the chapter focuses on geography and its concern with nutritional issues, the central point of the thesis. Geographers have made few contributions to nutritional studies. Various reasons can be given for such lack of participation, for example, the failure of cultural geographers in the 1960's to see the possibilities of becoming involved in the field of study. Whatever the reasons for the minimal contribution, this thesis purports to be an example of how the geographer's skills can be brought to bear on the subject of nutrition, and strategies which can be used to tackle problems considered in such a study.

CHAPTER 2

THE ASSESSMENT OF NUTRITIONAL STATUS

In this thesis, assessment of nutritional status is made for various 'communities'. The term 'community' is used with circumspection since the word has come to have strong emotional connotations and a more neutral term, such as 'population group' may seem more appropriate (Payne, 1983). However, the term 'community' has wide acceptability as referring to a group of people living in one place or specified area and having common interests or origins (Merriam-Webster, 1970; Irvine, 1977). Furthermore, community characteristics are such that the group can be identified within a larger society (Brown and Brown, 1979). It is in the above context that the term is used in the thesis to compare nutritional status of children. By comparing the nutritional status in these communities and isolating key factors which give rise to the particular levels of nutrition, it is envisaged that a better understanding of the pattern and underlying processes of nutrition of young blacks in the Eastern Cape as a whole will emerge. The understanding of the factors which give rise to malnutrition in the different communities should provide the base for assessing institutional steps taken to combat nutritional problems and for the formulation, where necessary, of additional measures. Criticism of existing policy and proposals for alternate strategies to ameliorate or eradicate nutritional problems takes the analysis into the realm of applied research, so fulfilling a futher major prerequisite of the thesis as outlined in section C, Chapter 1.

The present chapter covers five issues relevant to an understanding of the actual results from the nutritional assessment of the communities surveyed. They are:

A. The causes of morbidity and mortality within the spectrum of illnesses which can assail a community;

B. The definition of nutrition and the rationale for making an assessment of nutritional status;

C. A consideration of approaches to the assessment of nutritional status;

D. the analysis of demographic, cultural and environmental factors at the household level which foster or negate sound nutrition of children; and

E. the assessment of possible nutritional intervention strategies to improve poor nutritional conditions whenever they are encountered.

A. The Causes of Mortality and Morbidity

The medical profession places a great deal of emphasis on the need to stipulate the causal factor of human illness; understanding causality is the first step to prevention and in certain instances, eradication. The analysis of the causes or etiology of disease and death is therefore a central concern of the medical practitioner. The hospital superintendent, for example, is anxious to categorise the major causes of morbidity or mortality at his hospital to better understand the spectrum of illnesses most common in the communities served by the hospital. In so doing, the superintendent can tailor the hospital services more exactly to meet serious community needs, within the budgetary constraints of the hospital.

A number of factors are relevant to attempts to classify the causes of disease. First, there is a desire for conformity in the way diseases are classified. Secondly, mortality and morbidity are seldom caused by a single factor and the idea of multiple causality must be understood. Finally, an assessment of the etiology of disease suggests that two broad categories, infectious, parasitic and deficiency (malnutrition) diseases on the one hand, and degenerative and chronic diseases on the other, can be identified. The classification of disease etiology, the multiple causality of disease and the two broad categories of disease are considered in detail in this section because of the need to understand the context in which malnutrition occurs.

1. A Classification of Disease Etiology

Health bodies have continually striven to create a classification of disease causality that will have universal application (Pyle, 1979). Universal application facilitates the comparative analysis of disease patterns within countries as well as between countries and, in the long term, policies geared to the curtailment of disease. At present the

'International Classification of Diseases', in its ninth edition, and published by the World Health Organisation (WHO, 1975) fulfills the need for a major bench-mark publication of disease causality. In South Africa, the 'Statistical Classification of Diseases, Injuries and Causes of Death' (Republic of South Africa, 1979) used by medical practitioners, is based on the WHO publication.

In the South African publication the statistical classification of disease is broken into seventeen major classifying groups, each further subdivided. Examples of the groups would be:

I Infectious and parasitic diseases;

II Neoplasms;

III Endocrine, nutritional and metabolic diseases and immunity disorders; and

IV Diseases of blood and blood-forming organs.

The major groups are subdivided so that in Group I, covering diseases generally recognized as communicable or transmissible, fifteen subdivisions, in turn subdivided, cover the range of diseases in that category. For example, the first subdivision in Group I is 'Intestinal infectious diseases 001-004': 001 is designated as cholera; 002, typhoid and paratyphoid fevers; and 003, other salmonella infections.

Nutritionally related causes of death are found essentially in Group III, for example, Kwashiorkor (26) and Nutritional marasmus (261) and also in other groups such as XV: Certain conditions orginating in the perinatal period (in category 764, slow fetal growth and fetal malnutrition) and XVI, Symptoms, signs and ill-defined conditions (in category 783, symptoms concerning nutrition, metabolism and development).

The WHO and its derivative South African publication deal specifically with the causes of mortality, but there is an inherent association between mortality and morbidity in the classification. For example, in the case of affluent societies beset with chronic and degenerative diseases (discussed fully in subset 3 of this section) the morbidity pattern is one of declining infant illnesses and a greater proportion of ailments common in later life (van Rensburg and Mans, 1982).

2. Multiple Causality of Disease

A perusal of the disease classification booklet mentioned in section 1 above may suggest that death and disease are usually caused by a single

factor. Pyle (1979) notes that many diagnosticians still tend to arrive at single causes of death. In many cases multiple causality is more probable. For example, a child from a poverty stricken community may be classified on the death certificate as having died from measles (Group I, Category 055). A close scrutiny of his nutritional status prior to being infected with measles may suggest however that his poor nutritional status predisposed him to infection. The measles, once contracted, overtaxed the system and resulted in death. A full description of the cause of death may therefore require a multiple classification, straddling the various classificatory groups. The importance of multiple-causality is also important to an understanding of the role of malnutrition in a community: this point is considered in more detail in section (b) dealing with the definition of nutrition and malnutrition, but in short, malnutrition and infectious and parasitic diseases usually occur concurrently, reinforcing each other and so have a greater impact on the levels of community morbidity and mortality. While malnutrition may not always be given as the cause of mortality on a death certificate, it may well be a contributory factor.

3. Disease Patterns of Poor and Affluent Societies

The breakdown of disease causality in the classification discussed in the above sections reflects a growing awareness that the primary causes of either mortality or morbidity can be broadly identified. As stated in Chapter 1, a breakdown into infectious, parasitic and deficiency diseases on the one hand and degenerative and chronic diseases on the other has become widely accepted.

The infectious and parasitic diseases, Group I, of the Statistical Classification of Diseases. Injuries and Causes of Death (1979) are usually associated with traditional or poor agrarian based population groups of the underdeveloped world (Hunter, 1974; World Bank, 1979; Pyle, 1979). Deficiency diseases, such as Kwashiorkor, marasmus and iron deficiency anemia (Groups III & IV of the Classification) usually accompany those of an infectious or parasitic nature, for example cholera, tuberculosis and hepatitis. While these diseases can result in high death rates, especially among children and older people, continuous infection is more the case. Micro-organisms responsible for as much as two thirds of all human illness, adopt human hosts and multiply under the favourable conditions they provide. As stated by Burton & Smith: "For

the parasite to affect the host fatally is not usually the most successful result, as the infecting agent may perish with the host. Long continued association of parasite with a host population results in the evolution of a biological balance, satisfactory to the parasite and generally tolerable to the host" (Pyle, 1979, p.19). The result of the association between parasite and host is the prevalence of a range of endemic diseases which along with malnourishment and vitamin deficiencies give rise to lassitude, irritability and reduced productivity at work (Harrison, 1980). Disease morbidity is thus an important aspect of the health status of many communities and is, rather than mortality, the major concern of the present study.

Pyle (1979) describes cycles of disease patterns for agrarian and industrial or post-industrial societies. These cycles are depicted in Figure 2. The model of infectious disease shows the cyclical link between

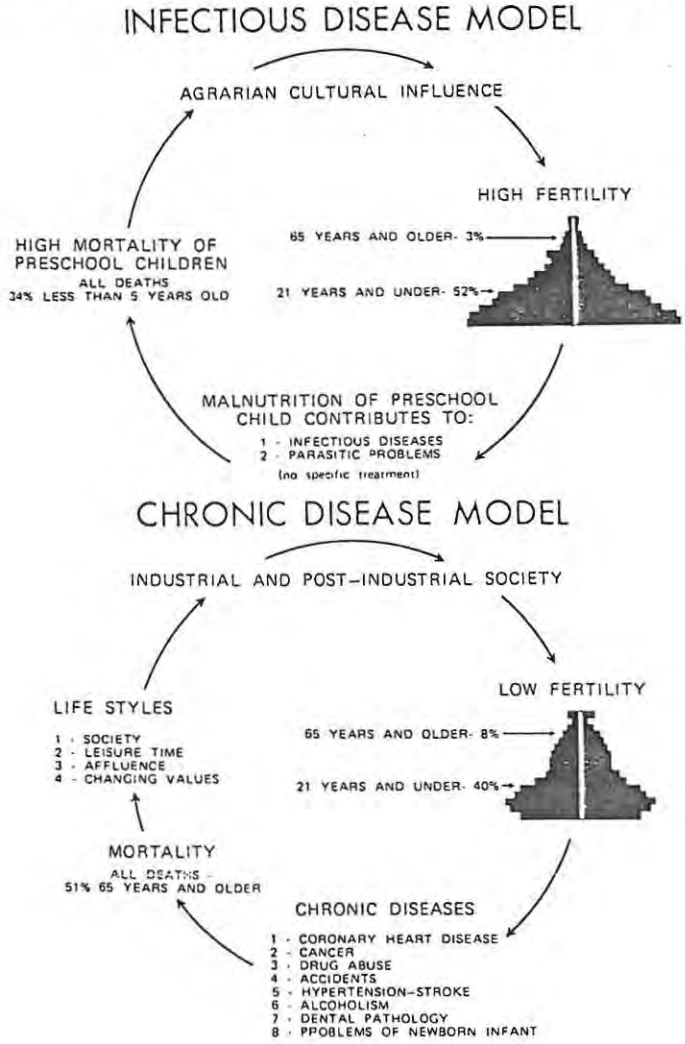

Figure 2 Cycle of Disease Patterns. Generalized Models Showing Infectious Disease Conditions in Agrarian Cultural Societies and the Relationship Between Chronic Diseases and Industrial and Post-Industrial Culture

Source: Pyle, 1979, Figure 4, p.20.

high fertility malnutrition and mortality rates which in turn reinforces a desire for large families. A pattern of high fertility can be ascribed to high infant mortality rates. A scrutiny of the infectious model of Figure 2 suggests that it may be applicable beyond the confines of agrarian societies to all communities living in environments of poverty. Figure 3 depicts the relationships within a more generalised infectious disease model.

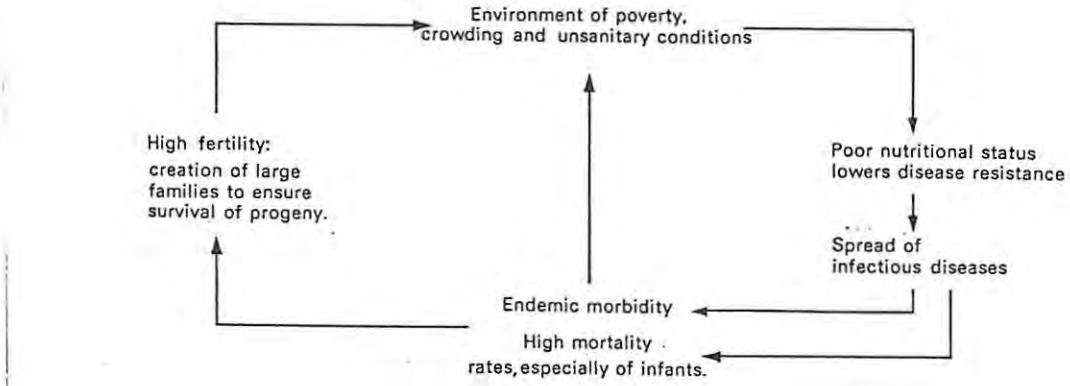

Figure 3 A Generalized Infectious Disease Model

The generalized infectious disease model has geographical expression in a generalized sense at the national level. As Morrill and Wohlenberg (1971), Pyle (1973), Wolch (1979) and many others have shown however, the characteristics of poverty and related diseases usually associated with underdeveloped countries are also found within particular locations of the United States, the epitome of the highly affluent market orientated economy. Within these poverty pockets the same cycle of poverty and associated infectious diseases occurs. Pyle (1973) for example, in a study of 1970-71 measles epidemic in Akron, Ohio, U.S.A., demonstrates a correlation between infectious disease and specific socio-economic and demographic factors, with the ghetto areas displaying the highest incidence of infection.

The cycle of chronic and degenerative diseases indicated in Figure 2 appears to be more applicable, at the national level, to the industrial, more wealthy nations of the world. Many of these diseases are associated with ageing, for example certain carcinomas or cancers and cardiovascular degeneration (i.e. degenerative diseases). Much evidence suggests that these are also the chronic diseases of affluence and the life styles of

highly industrialised societies. For example, Campbell (1973) and Cleave (1974) consider the rate of excess sugar intake and refined carbohydrates to be a critical factor in the high incidence of sugar diabetes among more affluent societies. Campbell furthermore demonstrates, from work done among the Zulu people and American Negro patients, how degenerative and chronic diseases can permeate a group who adopt western-styled eating habits. The following passage from Campbell's testimony to the 'U.S. Senate Sub-Committee on Nutrition and Human Needs' embodies some of his ideas which have had a marked impact in the medical world and which depict a significant association between diet and disease:-

> "My first interest in the relationship of diseases of people of identical ethnic stock who lived in different environments goes back exactly 20 years. When, having been a general medical practitioner in Durban in South Africa, it was my privilege to come over here to the University of Pennsylvania where I had the opportunity of examining, in Professor Fran Wood's medical clinic, large numbers of American Negro patients. I was absolutely staggered by the difference of disease spectrum as compared with the Zulu people in Natal. In our American Negro patients I saw, with total surprise, cases of diabetes, coronary thrombosis, hypertension, appendicitis, gall bladder disease, thyrotoxicosis, and a range of disorders that characterized the white people living in my hometown, Durban in Natal. When I went back to Durban, at the end of the 1950's, I was fortunate enough to get a post at the King Edward VIII Hospital where I noted at once a remarkable difference between the spectrum of disease in the urbanized Zulus as compared with their country cousins. Indeed this formed the subject of my first doctoral thesis which was devoted to a 10-year study of "Diabetes in the Zulu People".
>
> I found that, even after an absence of about 6 years, the urbanized Zulu had now started to get the type of diseases such as I saw in the Philadelphia Negroes - but not to the same extent. Now - some 16 years later - for all practical purposes, the disease spectrum between the Durban Zulu and the American Negro is almost the same. The Zulus have been a little slow in catching up in the matter of coronary thrombosis, but will not take long, I feel confident.

In Durban, we have a half million community of Indians, most of whom came from India in about 1860. To my great interest, these people, who have a much higher social status than the Durban Zulu, had the same disease spectrum as I saw in the American Negroes - and much similar to that seen in the whites in Durban. I was fortunate enough to be allowed to visit India twice, and found to my great surprise that in the primitive areas whence our Natal Indians had come, that there were to all intents and purposes none of the diseases characterizing the Durban Indians. That the rural Indians in their mother country suffered from the same range of disorders as that seen in the rural Zulus in Natal; namely, a predominance of infectious and sub-nutritive disorders.

Thus, to counter those who try slavishly to establish racial differences in regard to disease emergency, there appears to be a classical pattern or spectrum of disease which is common to all humans who have readily available supplies of refined carbohydrate foods - whether they are Negroes in Philadelphia; Zulus in Durban; Whites in U.S.A., England, or South Africa; or Indians in India, the West Indies, the Fiji Islands, or in Durban or Cape Town. That is a group of diseases that might be called the "diseases of advancement", but which Surgeon Captain Cleave and I have lumped together in our book as The Saccharine Disease - the connotation of the relationship of this group of diseases to the ingestion of sugar being stressed.

The longer the period of exposure of any group of people to these conditions of ready refined-carbohydrate availability, the greater becomes their implication in the classical spectrum of disease that characterizes those coming from, what we so often refer to as, the Have nations. By and large, this is a substitution of the degenerative diseases for the subnutritional and infective disorders. In the light of the reservations that I made earlier one may again claim that other factors may be equally at fault; but, in those many groups about whom we have collected information, the refined-carbohydrate story is always prominent. Especially where we have the opportunity of comparing carefully, as I have done, the diets of the rural and urbanized Zulu people - in the light of their remarkable discrepancy in diabetes frequency" (Campbell, 1973, p.210-211).

Other researchers advocate that the sedentary way of life and stress in industrialised societies is also responsible for many heart ailments and other chronic diseases (Hunter, 1974; Rowland and Cooper, 1983). They maintain that diet is not so much the problem in affluent societies as lack of physical fitness. Such a philosophy finds expression in the running and jogging 'explosion' which is radically altering the once sedentary lifestyle of many adherents to the new dogma. The relevance of the classification of disease etiology to the South African context is explored fully in Chapter 3.

The literature review so far suggests that disease etiology must be understood within a societal context. While many diseases can be understood within the confines of medical terminology, the processes which have given rise to those diseases are in large measure a product of the socio-economic mileau in which they occur. The realization of the social, economic and other societal and environmental facets of disease vindicate once more an approach to health-related problems which encompasses not only man and the disease agent, but man within the total environmental context.

B. The Assessment of Nutritional Status

There are many dimensions to the definition of nutritional assessment and the reasons for making assessments of nutrition status. In this section attention is focussed initially on defining terms central to nutritional assessment including that of malnutrition itself. The discussion then moves on to briefly consider the social and humanitarian implications of poor nutrition within a community. While the selection of material is by no means an exhaustive list of issues pertinent to nutritional status assessment, it does indicate the concerns that nutritional assessment poses for the social scientist.

1. Definitions

In the context of the thesis the terms 'malnutrition' and 'at risk to being malnourished' need to be carefully defined. The issues encompassed by these terms are complex and no attempt is made to provide an exhaustive discussion of them; rather only that information considered necessary to assessing the survey results is presented.

Malnutrition occurs in most of the underdeveloped parts of the world through a deficiency of essential nutrients. Such nutrients are required for the maintenance of existing tissue, the growth and generation of new cells and metabolic support for the range of activities in which the individual participates. If nutrients are not in sufficient supply normal physiological function becomes impossible. It should be noted that in the developed industrialized nations malnutrition also occurs, but because of nutritional excess (Learmonth, 1978; Johnston, 1980) "which leads to impairment of health, increased morbidity and eventually to mortality" (Johnston, 1980, p.1).

Deficiencies can be a result of traditional dietary practices, for example, vitamin deficiencies leading to pellagra in corn-eating societies and beri-beri in rice-eating societies or mineral imbalances which result in such conditions as goitre or siderosis (Howe, 1976; Schiel and Wepfer, 1976). A more important general deficiency syndrome however is that of protein energy malnutrition (PEM) which in its most severe forms results in kwashiorkor, marasmus and marasmic kwashiorkor (Alleyne et al., 1977). PEM is most common in childhood and is responsible for the majority of paediatric hospital admissions throughout Africa; it is also a major contributor to high rates of infant mortality, whether directly or indirectly in association with concurrent infection (Gish, 1975; Maasdorp, 1976a; Newman, 1980). Kwashiorkor according to conventional wisdom, results from a lack of protein, the essential problem revolving around the deficiency of amino acids necessary for protein synthesis. Insufficient calorific intake is usually associated with protein deficiency. Waterlow and Payne (1975) find that the evidence does not substantiate the claim that the major restrictive nutrient is protein; rather energy is the major nutritional deficit. As Johnston (1980, p.5) notes, "In general children have adequate intakes of protein, or at least only marginally inadequate and certainly not to the extent of energy deficits". The debate on the relative importance of protein and energy in malnutrition is, however, likely to continue. Truswell (1981), for example, is of the opinion that much confusion exists about the relative merits of protein and energy in malnutrition and from his research in South Africa concludes that protein deficiency is more constant than energy deficiency in kwashiorkor. Casting the debate aside, the result of energy and protein deprivation is a failure of physical growth of individuals and possibly mental stunting, thereby having a lifelong effect on the person's ability to enjoy life

and contribute meaningfully to the society at large. Marasmus is a more severe condition, and is accompanied by muscle wasting and loss of subcutaneous fat. Excessive amounts of both proteins and calories are absent from the diet of children so afflicted.

The specific task of nutritional assessment in the thesis will be to indicate the numbers of children at risk to malnutrition. As Alleyne et al. (1977, p.1) suggest, prior to 1970 the criteria for distinguishing the three severe forms of malnutrition were based largely on clinical findings such that classification tended to be "qualitative and subjective". They cite the Wellcome classification developed in 1970 as an attempt at the simple quantitative assessment of malnutrition. The classification is based on the presence or absence of oedema and deficit in body weight; using this basis, the classification is able to distinguish between children with kwashiorkor, marasmus and marasmic kwashiorkor as well as those 'underweight'. Earlier quantitative assessments of nutritional status can be found, for example, those by Gomez et al. (1956) and Jelliffe (1966). What these classifications of nutritional status have in common and what is germane to the present discussion is the fact that classifications offer a way of not only isolating those children with severe nutritional problems, but also those with less severe, or subclinical levels of malnutrition. The ability to make such a distinction is important since it makes possible statements about the number of children 'at risk' to malnutrition. Many scholars see those children with severe malnutrition as only the 'tip of the iceberg' (Critical Health, 1981; Johnston, 1980; Moosa and Coovadia, 1981) with much greater numbers at risk to malnutrition and its long term effects. "Severe malnutrition, requiring hospitalization and rehabilitation is appallingly striking. However it accounts for but a small proportion of infants and children who are diagnosed as malnourished. Children with chronic mild-to-moderate malnutrition suffer as well, and the long term effects on their heath and mental function may be more significant for society than the increased mortality due to severe malnutrition" (Johnston, 1980, p.5). The critical cut off point to designate who is at risk is taken, for purposes of this study, to be those children falling under the third percentile of the NCHS norm of weight for age and height for age. The rationale for this cut off point is discussed in detail in section C of this chapter entitled 'The Assessment of Malnutrition'.

To summarize, malnutrition may be considered as a disturbed nutritional status and those children suffering from deficiency syndromes such as PEM, are the central concern of the thesis. If nutritional status is the "balance between nutrient intake and nutrient requirement" (Johnston, 1980, p.2) then malnutrition is the disruption of that balance with an insufficient nutrient intake its key feature. Those children with insufficient intakes are the concern of the nutritional surveillance programme so that the term 'at risk' refers to those at risk to mortality - the seriously malnourished - and those at risk to increased morbidity through being malnourished, a group which many experts believe to be a significant proportion of all young children in many Third World-type situations.

2. The Social Consequences of Malnutrition

Tanner (in Hansen 1979, p.1) states that "one of the best indications of how people of a country are faring; better than the gross domestic product, is the size of infants, of children and of adults". One of the issues raised by researchers concerned with nutritional assessment is the effect of malnourishment on physical growth. Another equally important consideration is the impact of malnutrition on mental and psychological growth. These two issues form the substance of this section.

Malnourishment, as will be discussed in detail in Section (C) of this chapter, precludes a child reaching the desirable weight and height dimensions he or she is capable of achieving. The result is nutritional dwarfism, an unsatisfactory state for those so afflicted. Hansen (1979) is of the opinion that even severely malnourished children can experience rapid physical growth and 'catch up' to normally nourished children. From research conducted he concludes that rapid growth takes place if children are moved into an environment of good nutrition and freedom from infectious disease. Such development must however take place before the epiphyses close. Yet other studies show that 'catch up' growth can occur in children aged fifteen and exhibiting the growth retarded coeliac syndrome. Placed on corrective diets, they have attained 'normal' growth even at that late age (Hansen, 1980).

In spite of the ability to rectify some aspects of physical growth retardation, studies of psychological or mental growth suggest that malnourishment in the early years may have a permanent long term negative

affect. The literature concerning the effects of malnutrition on mental and psychological development suggests that the issue is a complex one and the full implications of malnutrition on brain-development and therefore possible mental and psychological achievement is still not fully understood. Studies undertaken in the 1960's and 1970's suggest that malnutrition has a permanent negative effect on intellectual development if it occurs early in life (Cravioto and Robles, 1965; Hertzig et al., 1972; Grantham-McGregor, Stewart and Desai, 1978; McKay, et al., 1978). A study undertaken by Hoorweg in the mid-70's, matching teenage children previously malnourished with a control group, suggests that their general intellectural capabilities are impaired "with reasoning and spatial abilities most affected, memory and rote learning intermediately affected and language ability least, if at all, affected" (Hoorweg in Ohuche and Otaala, 1981, p.53). More recent studies challenge the notion that it is primarily malnutrition which results in intellectual impairment among at risk groups (Newman, 1980). The paucity of intellectual stimulation - stimulus deprivation - in poorly-endowed socio-economic groups may be the key factor in the inability of children to cope at school and in other community-orientated activities. The argument is that the socio-cultural environment has not been sufficiently acknowledged for its role in stifling intellectual development of community members. Perhaps a more fundamental approach to the problem is to regard the negative effects of malnutrition on brain development and stimulus derivation as interrelated factors of the environment, impinging on the childs' ability to cope with his social environment. Malnourishment and stimulus deprivation must not be seen as competing paradigms to explain the causes of poor psychological development of community members, but rather as part of the environmental and demographic components of the system which embraces health as outlined in Chapter 1.

Hansen (1980, p.83) aptly sums up the problem of trying to relate nutrition to intelligence and intellectual attainment when he says "The problem of nutrition and intelligence is a very complicated one. Our ignorance of the physical basis of higher mental functions is abysmal. We know very little about the association between central nervous system structure, biochemistry, behaviour and intelligence. Much of the work which has been done on animals cannot be applied to man and we must realize that in human beings, there is a tangle of interdependent environmental influences which come into play in shaping personality and

intellect. Thus it is really very difficult to distinguish malnutrition or any other single factor as a specific cause of an observed defect".

The difficulty of linking malnutrition, especially sub-clinical levels of malnutrition, to intellectual stunting suggests that there are problems in categorically stating that malnutrition, or the lack of nutrient intake, can jeopardize the later life chance of the child in dealing with his social environment and contributing meaningfully to his social group. The more severe forms of malnutrition such as kwashiorkor seem to be a more serious threat if not treated early in a child's life as Hansen's (1980) work suggests.

Finally, in concluding this section of the social consequences of malnutrition, it is worth noting that early detection and preventative treatment of children at risk is important. Thomas (1982, p.3) notes that a child with kwashiorkor "often stays in hospital for at least a month or even two or three. At the cost of R30/day/child it may easily cost the state R1 000 to treat ONE child, who has a high rate of relapse or even death after discharge because he is sent back into the same conditions which caused his illness in the first place. In contrast for R2/month/child with suitable foodstuffs distributed in a well supervised way it is possible to prevent malnutrition. We can thus have the crazy equation: 1 kwashiorkor treatment = 500 preventions". Not only is the cost of malnourishment high to those afflicted, it is also a grave penalty for the society and state as a whole.

3. The Humanitarian Dimension of Malnutrition

It is not the intention to elaborate on humanitarian aspects of the problem of malnutrition. Field experience is really needed to appreciate the impact of malnourishment on children. Listlessness, the inability to enjoy the fruits of living and in the most severe form, agony from lack of food, bring the plight of poor malnourished children to the researchers' attention.

Thomas (1982), who has worked among malnourished children in the Ciskei throughout much of her medical career, views the humanitarian dimension as important in any discussion concerning the eradication of the disease. "It is necessary to remember that malnutrition is the end point of a process of suffering and hunger", and by way of example states that

in homes where children are suffering "mothers may advise their children to lie on their stomachs to ease their hunger pangs (and) at a certain stage children with kwashiorkor stop crying and asking and just turn their faces to the wall in misery" (Thomas, 1982, p.3).

It is in the observation of children in obvious agony from malnutrition that the need to link theory and practice becomes apparent. To understand factors which give rise to malnourishment is one dimension of intellectual endeavour; to critically assess present methods of combatting the disease and where possible, making recommendations and promoting their implementation (Smith, 1977) is another important one. As postulated in chapter 1 section (C) on the need for an applied component to geographical research, policy formulation and implementation is a desirable and satisfying goal of research. Thomas's observations suggest that applied research into malnutrition must aim to alleviate the suffering of those who very often do not have the ability to voice the plight in which they find themselves.

C. The Anthropometric Assessment of Malnutrition

There are various ways of ascertaining levels of malnutrition within a community. Children may be examined by a doctor or teams of doctors. The problem with such an approach (i.e. to the clinical assessment of malnutrition) is that there is limited availability of medical practitioners to carry out widespread community evaluation of nutritional status. Instead a variety of more cost-effective methods are usually employed. Using some specified survey sampling design, an unbiased sample of the community at risk to malnutrition is taken and either a series of morphological or anthropometric measures are made. Morphological measures of nutritional status include hair and root shaft development as well as a variety of biochemical tests on urine and serum (McLaren et al., 1967; Newman, 1980). Morphological measurement procedures are still largely in the experimental stage and not suitable for use in situations where large samples of children are to be taken. Furthermore, biochemical tests require medical expertise and facilities not usually available for community surveys (Keller and Fillmore, 19-). Calorie intake analysis is another feasible method of analysis (Srinivasan, 1983) but the more complex measurement techniques required, for example, the careful weighing of all food intake by those surveyed over some stipulated time period, ruled it out for the present research programme.

The most important current method of measuring nutritional status relies on a series of anthropometric measures such as weight and height for age, weight for height and the measurements of skinfold thickness and head and upper arm circumference. It has been stated that "linear and weight growth are sensitive indicators of the health of the individual or collectively of populations" (Hansen, 1979, p.1). Anthropometric measures are designed to monitor such growth and in the case of infants and children, isolate cases where growth has been significantly retarded. In the following discussion some of the limitations and advantages of using anthropometric measures are highlighted before outlining the specific measures used in the study.

1. The Use of Anthropometry to Detect Children at Risk to Malnutrition

Various anthropometric measures can be employed in the attempt to identify malnourished children. Age dependent measures such as weight and height for age are employed as well as a number of age independent measures developed for situations where birth dates are problematical. These age independent measures include the measurement of the upper arm circumference and weight for height.

An initial problem the researcher encounters when considering the use of anthropometry to assess nutritional status arises in the choice of measures. The proportion of children at risk to malnutrition tends to vary according to the particular norm or set of norms used to establish nutritional status. Janes, Macfarlane and Moody (1979), for example, have shown that the Shakir and Morley method which employs upper-arm circumference measurement is a more conservative measure than that of the Gomez method which uses weight for age measurement. The dilemma is graphically illustrated in Figure 4 where significant differences in the frequency of malnutrition detected by the Shakir and Morley and Gomez methods along with two other measures are shown. The authors state that there "is clearly a need for careful reappraisal of the validity of anthropometric criteria used to assess nutritional status in childhood". Furthermore, misinformation "about the prevalence of malnutrition in a community could lead to serious errors or ommissions in national development or health plans, and international standardization is urgently needed" (Janes, Macfarlane and Moody, 1979, p.102).

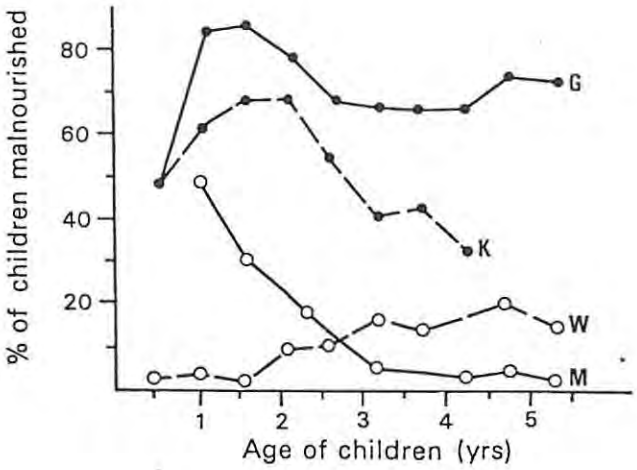

Figure 4 Frequency of Malnutrition Detected on Different Anthropometric Criteria

After Janes, Macfarlane and Moody, 1979, p.101.

G Gomez: 90% expected weight for age, Boston norm
K Kanawati and McLaren: (mid upper-arm circumference head circumference) 0,31 (3 months to 4 years only)
W Waterlow: 80% expected weight for height, Boston norm
M Shakir and Morley: mid upper-arm circumference 13,5cm (1 to 5 years only)

A further complication in the use of anthropometric measures follows from the need for international standardization. The Boston or Harvard norms developed in the U.S.A. in the 1940's have for long been regarded as the standard of reference against which to measure nutritional status in any community. The norms were developed by measuring a sample of American children from Boston and then using their weights and heights (as well as other anthropometric criteria such as head circumference) as the standard for assessing nutritional status. The fiftieth percentile of the weight for age norm, for example, would have been derived from measuring the children and establishing the median weight for age of the children. The Boston children therefore become the reference population against which other populations are assessed. The important point is that the researcher using the norms must accept that the Boston children, on whom the norms were based, are the ideal population to use for creating an international set of anthropometric criteria. Those children who fall below the third percentile on these norms, that is, attain less than 80 percent of the fiftieth percentile of weight for age, or 90 percent in the case of height for age, are assumed to be at risk.

A number of scholars and medical practitioners question the use of the third percentile of the Boston as the critical 'cut-off' point for designating infants and children at risk in under-developed countries. The call is for the development of local standards or empirically deduced 'cut-off' points on the Boston and similar international norms (Walker and Richardson, 1973; Walker, Walker and Richardson, 1976; Richardson, 1977; Waterlow et al., 1977; WHO, 1976). These 'cut-off' points or critical points at which children are then regarded as being at risk, are invariably well below the third percentile of the Boston norms.

In an article entitled 'Underweight, stunting and wasting in black and white South African school children: malnutrition or adaptation?' Richardson (1977) suggests that children may adapt to environmental conditions, be smaller in terms of weight or height for a certain age as postulated on the international norms, and be regarded as malnourished when in fact they are not. Walker, Walker and Richardson (1976) carried out studies on rural black school children in the Blyde River Canyon and Komatiepoort areas of the Eastern Transvaal. These children ranged in age from 10 to 15 years. According to the orthodox Boston standard, in the Blyde River Canyon sample, 38 percent of those studied fell below the third percentile of weight for age. The authors maintain however that the children did not go hungry, but rather that their simple diets of maize products, bread, beans, wild 'spinaches' and meat once or twice weekly, and their general outdoor lifestyles "evoked the anthropological picture we observed". Furthermore, "pupils below the third percentile - a large proportion of the total - displayed satisfactory performances in respect of school attendance, educational progress, ability to traverse long distances to and from school" (Walker, Walker and Richardson, 1976, p.404). The authors admit that some of the children were thin and that their optimal weight for age was at a percentile higher than the third but certainly lower than the fiftieth. They conclude by stating that their observations "while limited and far from exhaustive, underline how inadequate is our knowledge regarding nutrition, growth and their ramifications in future health. We need to know more of the range of weight for age during growth

(1) below which the enjoyment of good health is unequivocally impaired,
(2) above which no additional health benefit is conferred, and
(3) still further above which excessive weight constitutes a present and certainly a future handicap to health" (p.404).

The key argument which comes out of the 'school' advocating the development of local norms, is that conditions in underdeveloped countries are not likely to mimic those in the developed world in the foreseeable future; food and other resources being in much scarcer supply. More realistic local norms are likely to be less stringent than the international Boston norms, but should still isolate those most urgently in need of attention. Functional adaptation in environments of scarcity results in slow growth, but the adherents to this school question whether such growth constitutes a health hazard. The argument is that children can have more spartan diets, such as those of children in the Blyde River Canyon and Komatiepoort areas, perform unsatisfactorily on the Boston norms, but still be sufficiently nourished to enjoy life as measured by participation in societal activities such as school attendance.

The other 'school' studying nutrition in underdeveloped countries call for the retention of the Boston norms and the more recent National Centre for Health Statistics Percentiles (NCHS) for assessing the numbers of children at risk (Hansen, 1979; Thomas, 1980; United States Department of Health, 1980; Hamill et al., 1979; Moosa and Coovadia, 1981; Gopalan, 1983). It is worth noting that there is little measurable difference between the percentile ranks on the NCHS and Boston norms; for all practical purposes they can be regarded as detecting the same proportions of subjects falling above or below selected datum lines. Hansen (1979, p.2) shows how similar international standards are: "Garn from America has produced the Fells Institute Standards, with the length of a child at 2 years at 87,6cm. In the new National Child Health Survey chart (NCHS) it is 86,8cm at the 50th percentile, Tanner is 86,9 (an English set of standards) and the Boston figure is 87,5, so there is practically no difference between the English studies and the American studies done in 1948 and ..... in the 1970's". The advantage of the NCHS norms over the Boston, if any, is their more recent origin and the more rigid sampling and statistical procedures adopted in their creation.

Hamill et al. (1979) state that the NCHS norms were specifically developed using a broad spectrum of social groups in the U.S.A. and contend that they are applicable in underdeveloped countries as well as the U.S.A. to detect nutritionally at risk children. Hansen (1979) reports on studies of subjects in Nigeria, Hawaii and Japan which point to these diverse groups all approximating the NCHS norms. The United

States Department of Health (1980) notes a similar occurrence with Vietnamese refugee children now resident in the U.S.A. Under adequate diets these refugee children are demonstrating suitable growth according to the NCHS norms. Empirical work done by Thomas in the Ciskei on a group of black children under the age of 5 years has shown that 51 percent of those children with mild malnutrition who were not admitted to hospital after being examined in a community based study (i.e. those who fell below the third percentile of the Boston weight for age scale) had died within six weeks (Thomas, 1980), once again vindicating the international norms as sensitive indicators of those at risk. Thomas has also demonstrated that malnourished children falling under or approximating the third percentile of the Boston weight for age scale, will respond to treatment and when fully recovered fall at or near to the Boston 50 percentile (Figure 5a and b).

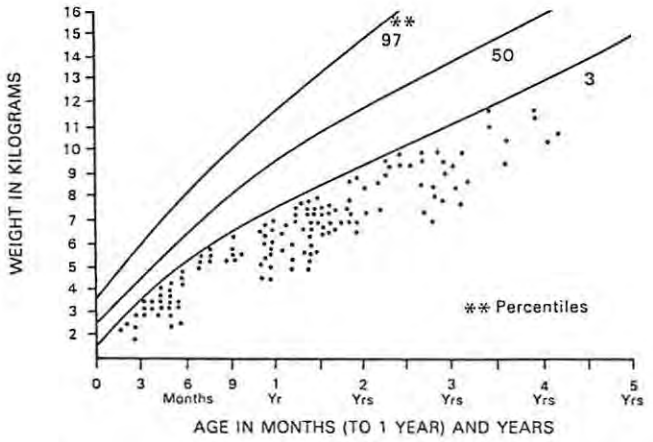

Figure 5a Weight of a Group of Children on Admission to an Outpatient Nutrition Clinic

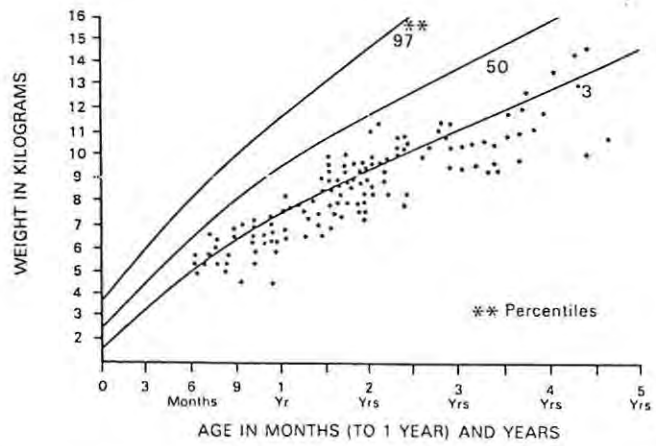

Figure 5b The Improvement of the Same Children Shown in Figure 5a, 3-21 (Average 11) Months Later

After Thomas 1980, p.40.

Under conditions of adequate nutrition the anthropometric dimensions of black children appear to be little different from those chosen to create the Boston norms. Clearly the question of which standards to use, internationally accepted standards such as the Boston or NCHS, or locally created norms, is a controversial one. In the present research the international Boston and NCHS norms have been used because:

a. Fox observed in South Africa during the 1930's that while it was desirable to recognise and assess nutritional status, "the difficulty of accomplishing this with any degree of accuracy may not be generally appreciated. To begin with, we have as yet no true standards of normality, with which to make our comparisons; thus our present standards of normality for growth should be considered as average under imperfect nutritional conditions rather than as optimum" (Fox, 1939, p.45) (author's emphasis, underlined). There is a danger in using local South African standards which turn out to be measuring average conditions under 'imperfect nutritional conditions'. The earlier statements made by Walker, Walker and Richardson (1976) that our knowledge is still so limited regarding nutritional assessment of many groups in Southern Africa, suggests just how little progress has been made since Fox wrote. Given the present state of knowledge about the suitability of anthropometric measures as proxy indicators of nutritional states, the rationale for using the third percentile of the NCHS norm as the cut off point for those at risk is appropriate. The third percentile may be regarded as a sensitive cut off point which does not grossly under- or overestimate the number of children at risk.

b. The use of an internationally accepted and stringently verified system of norms makes the comparison of results between the present surveys and others carried out in different parts of the country and elsewhere feasible. While it may be argued that the norms are too exacting for measuring those at risk in the underdeveloped world they provide both a sound assessment of numbers of children at risk as well as an indication of the nutritional status of the surveyed community relative to others.

c. Waterlow (1982) contends that there is a value judgement involved in selecting cut-off points. If one was to be sceptical of the use of the third percentile of the NCHS norms, then in Waterlow's terms it is still legitimate to use the third percentile as the cut-off point for defining those at risk: the third percentile, in terms of a 'value judgement' is a realistic target to set for all South Africans, since evidence to be presented in Chapter 3 suggests that those who live in socio-economically sound communities in South Africa have no problem in attaining, on average, scores on or above the third percentile. As Waterlow (1982, p.5) states it is legitimate to take the 80 percent of the reference median (the fiftieth percentile) as "a cut-off point below which children should be regarded as potentially in an unsatisfactory state". In another country it may be more appropriate to take 90 percent or 70 percent as the cut-off point. The cut-off points in his view "represent a perfectly legitimate value judgement in which a realistic target is set. It corresponds to the useful concept of 'attainable growth'" (p.5).

The preceeding discussion highlights some of the problems encountered when using anthropometry to assess nutritional status. The measurement of the nutrition of black children in South Africa, and the development of local norms based on such measurement, is questionable, since these children may well be reared in conditions of nutritional inadequacy. As a result of such reasoning, the Boston and NCHS norms were selected to assess the nutritional status of children in the surveys conducted in the Eastern Cape and Ciskei. The Boston norms were used in the pilot survey but the NCHS norms were used in all other surveys. The switch from the Boston to the NCHS norms was made after discussions with doctors at the Red Cross Memorial Hospital in Cape Town and in the light of the knowledge that the international norms were very similar to each other. An experiment to assess the nutritional status of a group of apparently well nourished black children is discussed in chapter 5, and points to a further attempt by the author to assess the appropriateness of using international norms for community-based surveys.

2. The Choice of Anthropometric Measures

The choice of measures for the surveys was made on the basis of an extensive review of literature (Tanner and Whitehouse, 1962; Tanner et al., 1966; Keet, Hansen and Truswell, 1970; Waterlow, 1972; Brookens, 1974; Shakir and Morley, 1974; Eveleth and Tanner, 1976; Martorell et al., 1976; WHO, 1976; Walker and Walker, 1977; Waterlow et al., 1977; Hamill et al., 1979; Hansen, 1979; Adhikari and Coovadia, 1981; WHO, 1981), consultation with various medical personnel and discussions with Dr J P Kotze, Head, Nutritional Services, Department of Health, and Dr J D Krynauw, Regional Director of Health Services in the Eastern Cape, both of whom were associated with the setting up of the Institute of Social and Economic Research (ISER) programme.

Tanner et al. (1966) have suggested that a battery of anthropometric measurements be taken to assess the growth of children. Such a battery would include the measurements of weight, height, triceps and subscapular skinfolds, arm, chest, head, trunk lengths and so on. For cross-sectional community surveys it is obviously not feasible to take all these measurements and careful selection of those measures which will provide the most accurate proxy indication of nutritional status is required. Weight for age, height for age, weight for weight, mid-upper arm circumference (MUAC) and birth weight are the measurements suggested by the World Health Organization (WHO, 1981). There are however, disadvantages in the use of some of these measures. Adhikari and Coovadia (1981), for example, suggest that the MUAC fails to detect at risk children as satisfactorily as weight and height for age measures. They conclude that "measurement of the MUAC is an insensitive index of growth retardation in Black children in Africa and should be used with caution in nutritional surveys" (p.32). Birth weight is also impossible to obtain in areas where health care facilities and workers are limited and for community survey purposes such measurements are not feasible.

In the present survey a series of age dependent as well as age independent measures have been utilized to assess the present and long term nutritional status of the children. These measures are weight for age, height for age, weight for height and subscapular and tricep skinfolds. The following sections outline the characteristics of each measure.

a. The Assessement of Present Nutritional Status

Weight for age, weight for height and skinfold measurements are used to measure the present nutritional states of subjects. These measurements give an indication of the present nutritional conditions being experienced by subjects. If food intake is insufficient children will perform poorly in terms of these measures. In severe cases wasting will take the form of kwashiorkor, marasmus or marasmic kwashiorkor. Weight for age is a measure dependent on knowing the exact age of the child or children while the weight for height and skinfolds are ostensibly age independent measures. As Jelliffe and Jelliffe in Waterlow (1972, p.567) state, there are no strictly age-independent measures since such measures "do not need a knowledge of exact age to the month or week, but do require approximate age categorisation". Waterlow (1972, p.567) elaborates by stating that there can be no age-independent estimate of retardation or failure to grow, "because by definition retardation refers to the relation between a given value and age".

i) Weight for Age

Weight for age is the most often used nutrition indicator to classify malnutrition and determine its prevalence (Keller and Fillmore, 19-). In this study it is used to indicate the present nutritional status or wasting of subjects, distinguishing those who are at risk from that part of the population which can be regarded as exhibiting normal growth. Weight for age has been used to distinguish between severe forms of malnutrition such as kwashiorkor and marasmus (Alleyne et al., 1977) but De Maeyer (1976), for example, feels that such distinctions are more suited for clinical purposes than field surveys, especially since the number of cases of kwashiorkor and marasmus are usually small when compared to the total number of malnourised children. As stated previously, the third percentile on the NCHS norms is taken as the cut-off point to separate those at risk from the rest of the population. Figure 6 shows the NCHS weight for age chart used to measure the nutritional status of girls aged birth to 36 months. A similar chart is also available for measuring the nutritional condition of boys. The fiftieth percentile is indicative of the median condition of the population while those who are above the ninety seventh percentile may be regarded, in all probability, as being overweight for their ages.

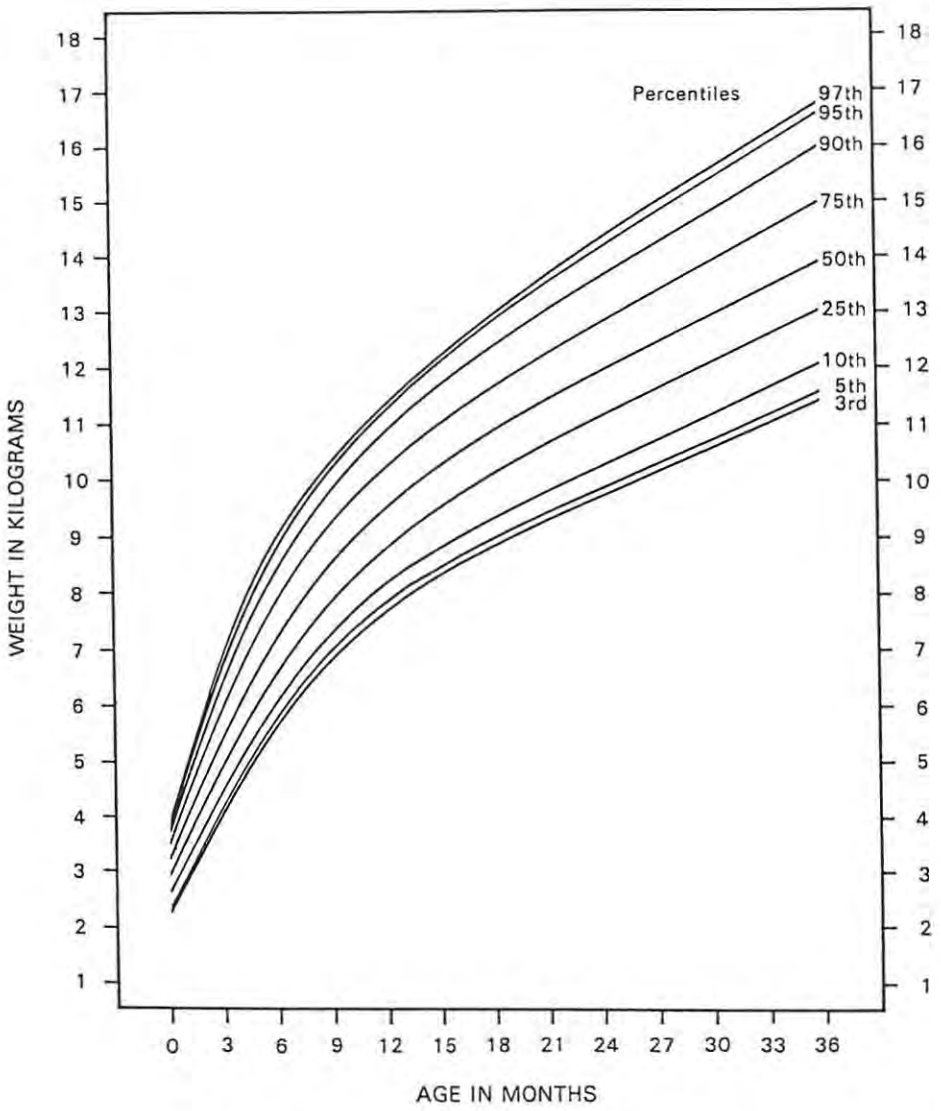

Figure 6 Weight for Age Percentile for Girls Aged Birth to 36 Months[1]

After United Stated Department of Health, 1977, Figure 3, p.54.

1 The Third and Ninety Seventh Percentiles are based on data supplied by Dr M Mann, Red Cross Memorial Hospital for Children, Cape Town.

There is at least one limitation to the full acceptance of weight for age as the ideal measure of present nutritional status. In many communities the ages of children are not known with any degree of accuracy (Waterlow, 1972). It is necessary to see either birth certificates, baptismal certificates or clinic record cards to verify age in many black communities since the guardians of the children do not know the exact age of children. The NCHS norms require the age of the child to at least the nearest month.

ii) Weight for Height and Skinfold Thickness Measurements

Age may not always be easy to obtain for children in black communities, as suggested in the previous subsection. As a check on the age-dependent measures, weight for height and skinfold measures appear most suitable. Other measures such as the measurement of head circumference while useful in a full scale epidemiological study, were not considered for the present study. Such additional measures would increase knowledge of the anthropometric dimensions of the surveyed group but it was felt that the time constraints precluded them and that the chosen measurements were more than adequate.

Weight for height, as with weight for age, measures present nutritional status. It has the advantage of being nearly independent of age between one and ten years and is also relatively independent of ethnic group (Waterlow et al., 1977). Thomas (1980) discussing the weight for height measure feels it is a conservative one as a 'normal' reading, that is, of a 'child above the third percentile of weight for height may conceal an undernourished child. The child's height may be in proportion to its weight but both may be unsatisfactory in terms of that chronological age of the child.

Triceps and subscapular skinfold measures can be used to indicate suboptimal nutrition and early PEM in group surveys (Keet, Hansen and Truswell, 1970). Skinfold measurements indicate the level of subcutaneous body fat. If an individual is wasting, that is the present nutritional status is unsatisfactory, it should be reflected in the lack of subcutaneous fat. Skinfold measures are made with calipers and cannot be successfully performed on children under the age of about one year. However for children between the ages of one and five years the standard values of the triceps and subscapular skinfolds vary less than 2mm (Keet, Hansen and Truswell, 1970). Exact age is therefore less important and the measures provide additional insight into the present nutritional status of surveyed individuals, those falling below the third percentile being regarded once more as at risk.

b. The Assessment of Long Term Nutritional Status : Height for Age

The measurement of past nutritional status is valuable in community surveys since it provides an insight into the long term nutritional and

environmental conditions in which individuals have grown up. If a child is brought up over an extended period of time (say the first five years of life) in an environment of food scarcity, he or she is likely to exhibit retarded growth. Such growth retardation or past malnutrition is reflected in the length or stature of the child. Measurement of height is therefore central to ascertaining the long term nutritional condition of the child. There are no age independent measures of long term nutritional status, so that height for age remains the single criterion on which such assessment can be made. Those children who fall below the third percentile of height for age - 90 percent of expected height for their ages - are regarded as being in all probability stunted. While stunted children have a past history of malnutrition, there appears to be debate in the literature as to whether these children should be regarded as currently malnourished (Hansen, 1971). If children have survived the first five years of life in environments of food scarcity they may well have adapted to those environments and be short for their age but not at nutritional risk.

Anthropometry provides a suitable means of establishing the present and long term nutritional conditions of children. In the preceeding discussion age-dependent and age-independent measures of present nutrition are put forward. For the assessment of long term nutrition, only the height for age measurement is appropriate and its usefulness is considered as an indicator of the environmental conditions under which children have lived.

D. Malnutrition and Socio-Economic Conditions

The establishment of levels of nutrition in a community may appear to be directed simply at the health aspects of that community. Nutritional conditions cannot however be divorced from the broader social and economic conditions that prevail. "When we examine the prevalence of manifest malnutrition in relation to social and economic variables we find that people in poorer families, by whatever definition, have higher prevalence rates than those in richer ones" (Dowler et al., 1982, p.100). While the authors acknowledge that not all vulnerable individuals - constituting 'the poor' - are malnourished at any one time, they do highlight the association between malnutrition and general poverty. However to talk of poverty as the causal factor in all cases of malnutrition is to oversimplify the issue. A more useful approach is to

try and isolate aspects of that poverty, which have a more direct bearing on levels of nutrition. In discussions with health officials in various parts of the country who had experience of working in socially and economically poor communities, it appeared that a great many factors could influence levels of nutrition. An assessment of literature confirmed the multitude of factors affecting nutrition (Robertson and Kemp, 1963; Visweswara and Gopalan, 1969; WHO, 1976; Smith, 1977; King, King and Martodipoero, 1978; Westcott et al., 1978; Walker, 1978; Hansen, 1979; Adam, 1980; Newman, 1980; Burney and Shahyar, 1980; Thomas, 1980, 1981; Bekker and De Wet, 1982). After careful consideration it was decided to select six variables for analysis. These variables are:

1) size of household;
2) levels of formal education of parents and/or guardian of children;
3) degree of family stability and organization;
4) attitudes to breastfeeding;
5) household income; and
6) access to medical facilities.

Each of these variables, or factors, is discussed below.

1. Size of Household

Newman (1980) has pointed out that all members of families in many African societies compete for food from the communal pot and that the children receive what is left by the adults. One may assume therefore that the fewer the number competing for food the better the level of nutrition of that family, especially that of the young. Visweswara and Gopalan (1969, p.263) support such a contention, stating that "even under the existing economic conditions and given the present food resources, limitations of family size to three or less children will significantly improve the nutritional status of pre-school children and reduce maternal ill-health and mortality". The relationship between family size and nutritional status is however regarded as weak by some (Westcott et al., 1978). Larger families may have more breadwinners and overall community conditions, for example endemic poverty and infectious disease such as tuberculosis may cut across most households, irrespective of family size (Burney and Shahyar, 1980). Family composition, especially the number of

young children and old age people dependent on the breadwinners in the family, may be the more crucial factor in a household's nutritional status.

2. Levels of Formal Education of Parents and/or Guardians of Children

Research in the Keiskammahoek area of Ciskei by Thomas (1980) suggests that primary levels of education of parents and/or guardians play little part in the nutritional status of young children. Parents and guardians with no formal education appears to bring up children as nutritionally sound as those with upwards of 5 to 7 years of school education. There is some evidence to suggest that secondary education of parents and/or guardians is related to better nutritional levels of children. The reason is probably that better educated guardians can earn higher incomes making better food resources available in the household. Education levels were obtained in the survey since they do indicate an important aspect of the socio-economic condition in a household and the community at large.

3. Degree of Family Stability and Organization

The persons responsible for rearing the children can play a major role in their nutritional status. Children raised by mothers tend to be better nourished than those raised by unsuitable guardians (Thomas, 1980). Many children in black rural areas do not have their parents at home as they have migrated to urban areas in search of employment. More often the father is the migrant in the family, remitting money to the family in the rural areas. If the father suspends payments home and deserts the family the mother is obliged to seek work and so may also leave the child. Alternatively if she stays at home and is unemployed, the rural household may soon be in extreme poverty. Nutritional status of children declines in an environment of such familial organization. Grandmothers are often entrusted with the case of the child. Old, frail poor people with little money cannot provide a suitable home for young children and once more nutritional status is likely to be unsatisfactory.

4. Attitudes to Breastfeeding

Walker (1978) notes that there has been a marked fall off in the frequency and duration of breastfeeding in all ethnic groups in South

Africa, a trend which he views with concern. King, King and Martodipoero (1978) advocate that the mother in third world situations should breastfeed her babies for at least the first eighteen months of the baby's life. Newman (1980) considers feeding of the child for at least the first six months as important. Thomas (1980) has shown that babies in the Ciskei show a marked decline in nutritional status, as measured by weight for age on the Boston scale, when children are taken off the breast and the mothers leave the children in the care of an unsuitable guardian. Mother's milk is therefore vital food for children brought up in environments of food scarcity. Every effort should be made to prolong breastfeeding since in addition to being a valuable food source for the young child, it also is more nutritious than cow's milk, so often used; is more hygenic than bottle feeding in environments where sterilisation of utensils is difficult if not impossible and provides greater immunity against infection than alternative milk sources (Adam, 1980).

5. Household Income

The household income is a difficult but important factor to consider. One's income is a personal, sensitive issue and people are understandably reluctant to divulge the amount of their earnings. In the case of many rural households the issue is further complicated because households may also be dependent on more than one form or source of income. An extended family household in Ciskei may, for example, have income from wages and salaries; cash remittance from migrant workers; pensions and the sale of animals and other goods produced (Bekker, 1982).

To obtain reliable information about all sources of income can therefore in itself be a major undertaking. Setting aside the likely problem of data collection, income availability is the critical factor in preventing many household problems. As Alleyne et al. (1977) show, a lack of household income from whatever sources results in the inability to buy sufficient food which in turn predisposes children to increased infection, to endemic morbility, and in the final instance, death.

6. Access to Medical Facilities

Access to medical facilities is influenced by the distances users have to travel to facilities as well as modes of transport available; attitudes towards institutional care and perceived benefits by patients of using

the facilities and the severity of the illnesses of patients (Smith, 1977). The greater the degree of satisfaction offered by a hospital as opposed to a clinic also means that patients are likely to go greater distances for better care. An important issue to arise from deliberating on the importance of distance is that a functional relationship between distance and usuage of facilities exists: the classic distance decay function operates as is shown in Figure 7.

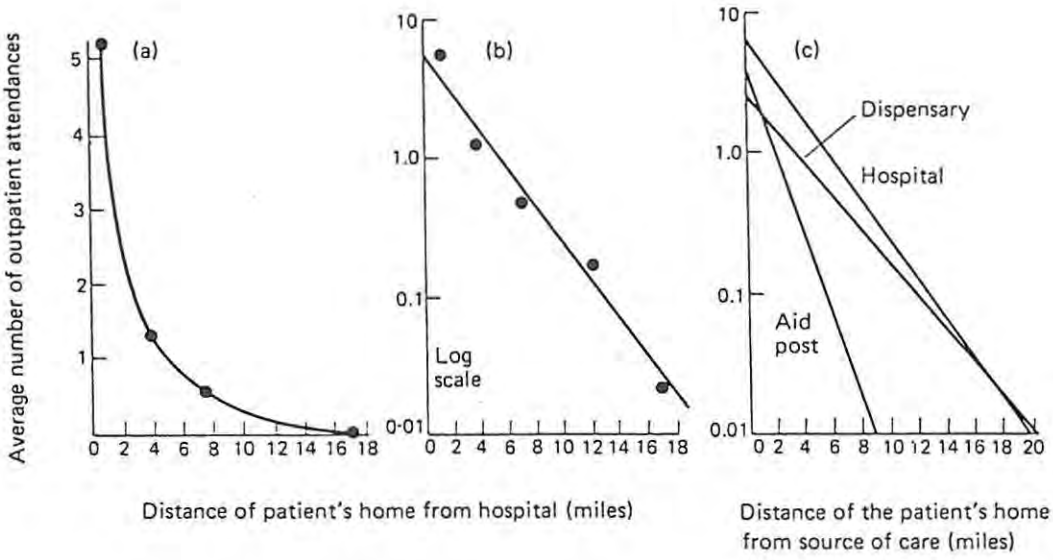

Figure 7 Relationship Between Utilization and Distance from Health Care Facilities in Uganda

Source: Smith, 1977, Figure 11.6, p.311.

In a study undertaken in 1978 (Engelbrecht, Fincham and Selvan, 1978) it was found that 40 percent of all patients admitted to the Lovedale Hospital in Alice, Ciskei, came from within a radius of 5km from the hospital and 56 percent from within a 10km radius; 85 percent of all patients were no further than 20km from the hospital - results in keeping with those illustrated in Figure 7. The origin of patients admitted to the hospital in July 1978 is depicted in Figure 8. The study also suggested that people will go greater distances for better care. In the study of village communities around Alice it was found that 52 percent of the sample, on first becoming ill, went straight to hospital in preference to nearby clinics. Only 19 percent went to the nearest clinic while the rest either frequented traditional practitioners, private doctors, chemists, or did not seek any medical help at all.

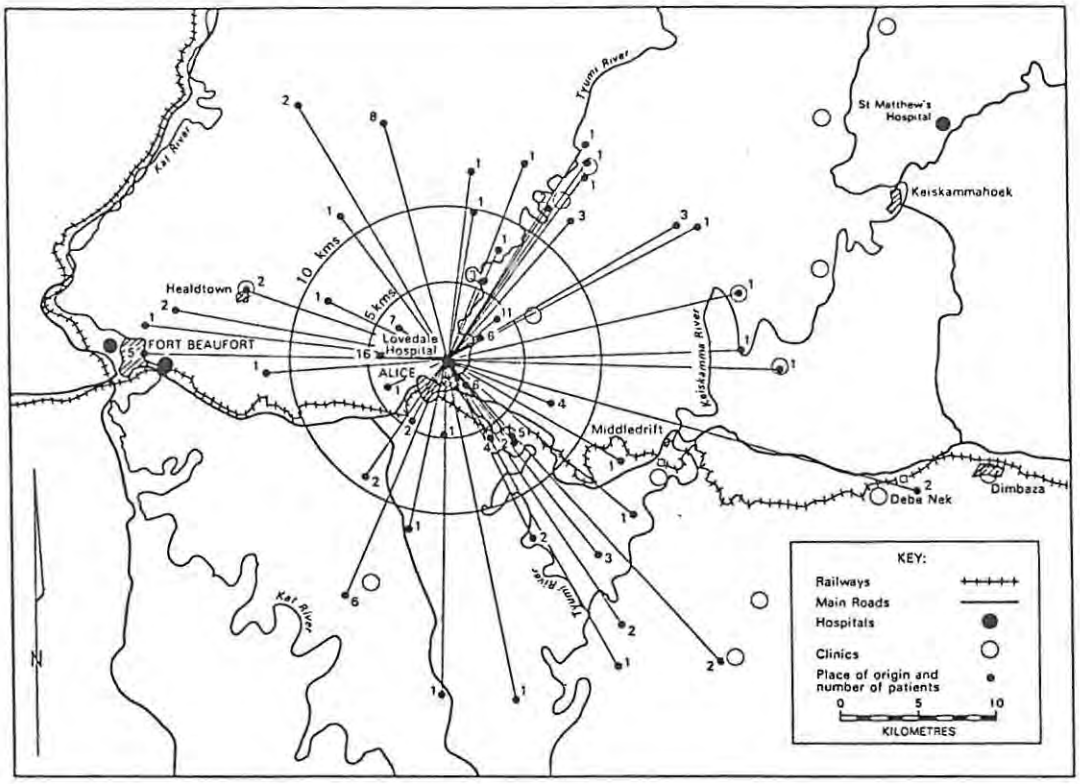

Figure 8 Place of Origin of Patients to Lovedale Hospital, July 1978

Source: Engelbrecht, Fincham and Selvan, 1978, p.25.

In concluding this section on malnutrition and socio-economic conditions, attention is drawn to the fact that the factors mentioned above are very much interrelated. If, for example, the guardian of a child is unable to provide sufficient food because of a lack of income, the child is likely to become increasingly susceptible to disease. Sick children in turn require more food, place greater burdens on available health services and cause the spread of infectious diseases. The highly interrelated web of factors influencing nutritional status is outlined in Figure 9.

E. Nutritional Intervention

In conclusion, this chapter on the assessment of nutritional status is focussed on the end point of nutritional surveillance, namely nutritional intervention. Once levels of community nutrition and its association with social and economic conditions can be ascertained, possible intervention strategies for ameliorating the situation, where necessary, can be considered. The analysis of the broad spectrum of intervention strategies which include food price subsidies, food fortification, educational programmes, land reform and supplementary feeding of at risk children (Austin and Zeitlin, 1981), is beyond the scope of the thesis. Instead the issues discussed are related to the particular needs of the

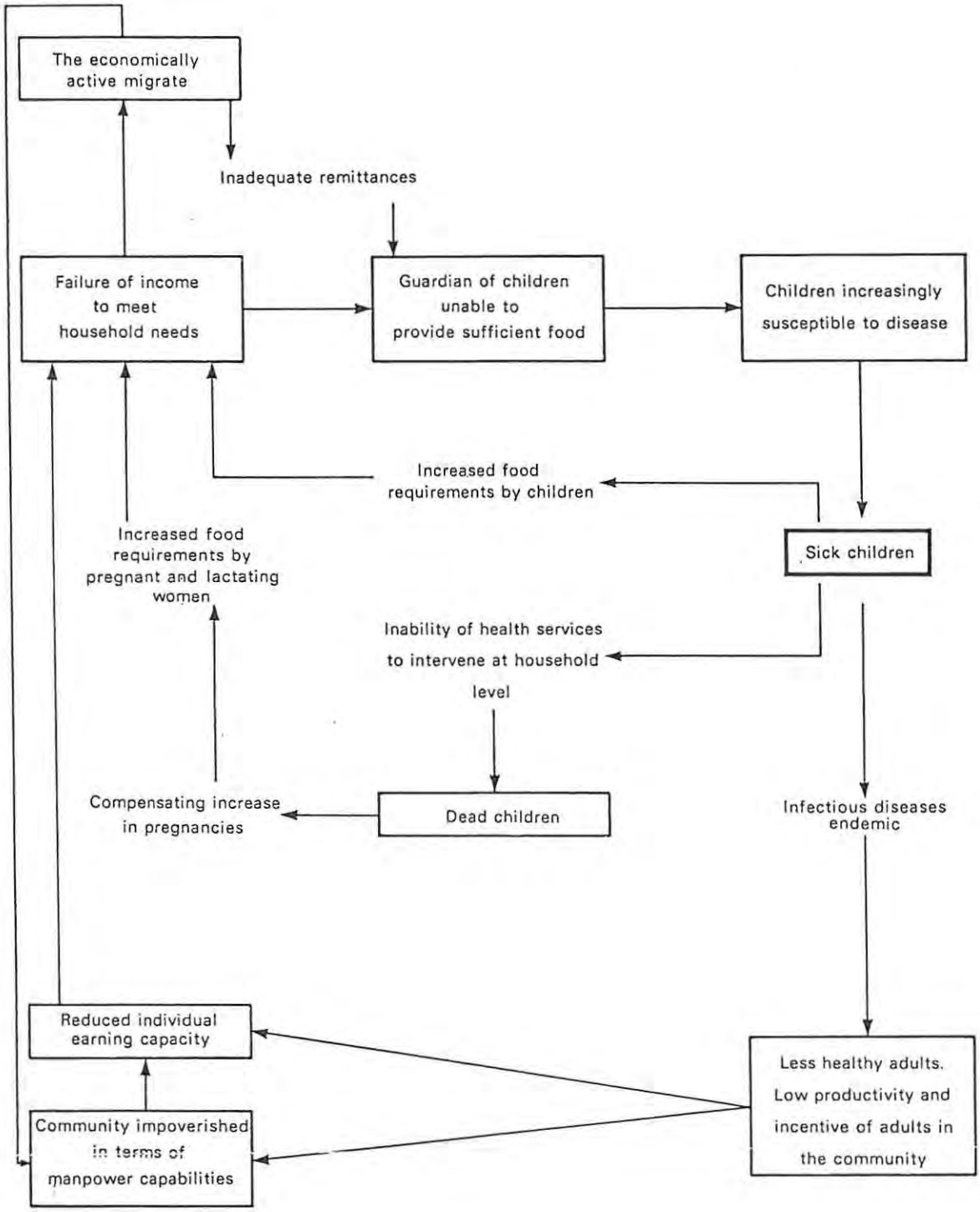

Figure 9 Interrelationship of Factors Influencing Nutritional Status

After Alleyne et al. in Newman, 1980, Figure 2, p.82.

agencies which requested the research undertakings. Some further thoughts on intervention are also discussed which arise out of the comparison of prevalence rates of children at risk from the various communities studied.

Austin and Zeitlin (1981, p.5) state that "nutrition interventions are planned actions that introduce new goods or services into existing food systems for the explicit purpose of improving the nutritional well-being of designated groups". For the purpose of the thesis the introduction of new goods or services - intervention - into communities is considered as a two-fold problem:

1. Assessment of the Efficacy of the Department of Health's Subsidized Skimmed Milk Powder Scheme

As will be more fully discussed in chapter 5, section C(1), the Department of Health required a yardstick against which they could assess the efficacy of a subsidized milk scheme. This scheme is in reality a supplementary feeding scheme and is available to all children (at the time of the surveys) falling below the Boston third percentile of weight for age. Clinic records suggested that there were few children making use of the scheme. If the assessment of community nutritional status indicated significantly more children at risk to malnutrition (that is, below the third percentile of weight for age) than the clinic records implied, then the scheme was not reaching those at risk within the community. Possible reasons for the inability to reach malnourished children, should the surveys indicate their presence, needed to be considered as well.

2. Assessment of the Causes of Malnutrition and Related Nutrition Intervention Strategies

It is essential to broaden the role of intervention beyond the assessment of the State funded feeding scheme to look for the root causes of malnutrition and ways of tackling these. "Nutritional assessment must therefore, through the analysis of factors influencing nutritional status, indicate what causal factors are crucial to poor levels of nutrition. In isolating these factors the type of intervention strategy adopted can be appropriate" (Austin and Zeitlin, 1981, p.5).

The role of intervention is given an added dimension in the thesis through the comparison of the nutritional status of children in various communities. As Dowler et al. (1982, p.110) note, "prevalence rates of individuals falling below certain critical values can be used as a basis for comparison of the needs of different social groups". The issue is whether or not significant differences in prevalence rates are found between communities and whether or not these disparities justify contrasting intervention strategies. If, for example, a high incidence of malnutrition is found in one community it probably indicates the need, in the short term, to institute a feeding scheme. A low prevalence rate accompanied by signs of obesity among children in another community indicates the need for education programmes to further better eating habits.

While intervention is of necessity a limited issue in the thesis, it is nevertheless an important one. As stated in Chapter 1, applied research is satisfying and the formulation of intervention strategies provides that dimension to the thesis.

F. Chapter Summary

This chapter has taken some of the themes raised in chapter 1 and embellished upon them. A major concern has been to provide a suitable conceptualization of the environment in which malnutrition is found, the nature of malnutrition, ways of measuring nutritional status and strategies for ameliorating unsatisfactory nutritional conditions.

While malnutrition is a problem in its own right, it is a condition which is often present in children as a complicating factor for many infectious diseases such as gastro-enteritis and tuberculosis. Multiple causality of disease is an important concept because mortality and morbidity in poor communities is invariably a result of a combination of infectious diseases exacerbated by the presence of malnutrition. The eradication of malnutrition is therefore important in efforts to raise healthier children more capable of warding off infection.

Infections and deficiency diseases are more common in environments of poverty whereas chronic and degenerative diseases are prevalent in more affluent societies. The nature of these two generalized conditions has been discussed to show that disease etiology must be understood within a

societal context. The targeting of resources for preventative medicine is necessary in both affluent and poor societies, but it is vitally important where infectious and parasitic diseases as well as malnutrition are prevalent.

Against the above background, attention was focussed on the question of malnutrition and its assessment. Malnutrition is a condition caused through a deficiency of essential nutrients which prohibit the proper support and growth of those affected. It is one of the most important causes of admission to paediatric hospitals in the Third World, high infant mortality rates and the inability of young individuals to contribute fully to their society in later life.

In the thesis anthropometry is proposed as the means of assessing the nutritional condition of children. Before outlining the particular anthropometric measures used, reasons for studying malnutrition were discussed. The reasons are many and include social, economic and humanitarian ones. Of considerable importance too, is the fact that malnutrition can result in physically stunted growth and contribute to mental and intellectual maldevelopment. The role of malnutrition in mental development is not yet fully understood. Other factors such as stimulus depriviation are also associated with the failure of intellectual development so that a whole range of factors appear to relate to mental and intellectual stunting. It is because of the failure of experts to concur on such issues as which norms and measurements to use to assess nutritional status and the uncertainty of malnutrition on brain development, that a sensitive cut off point on an international reference standard (the NCHS norms) is adopted to identify those children of nutritional risk. The nature of the NCHS norms employed in the thesis have the advantage of making comparisons feasible between this and other similar studies.

Anthropometric measures are a suitable proxy of nutritional status and as such offer the opportunity to explore the relationship between nutritional status and socio-economic conditions prevailing in a community. Some of these factors such as family size and attitude to the utilization of health facilities were considered. The analysis of these factors should highlight key problems in communities where levels of nutrition are unsatisfactory.

The chapter concludes with a discussion on nutritional intervention, an important end product of nutritional assessment. Since intervention is in itself a complex and wide-ranging issue only limited attention is given to it in the thesis. The formulation of nutritional intervention strategies does, however, provide an applied dimension to the thesis and those interventions which are germane to the present work were discussed.

CHAPTER 3

PATTERNS OF HEALTH AND NUTRITION IN SOUTH AFRICA

The present chapter provides a picture of health and nutritional status in South Africa as background to the specific nutritional studies undertaken in the Eastern Cape and reported on in this thesis. It is the intention to use selected studies reported in the literature to indicate broad trends of, and highlight particular problem areas in, both the health and nutritional status of the population. Two factors have been isolated as guidelines for the following discussion. Firstly, patterns of general health as measured by proportional mortality rates appear to be differentiated on a largely racial basis: the diseases of affluence outlined in chapter 2 appear characteristic of the white population, and the diseases of poverty, endemic within the black population. Such a dichotomy on strictly racial lines is simplistic but it provides a useful starting point for the analysis of the wider health and disease patterns in the country. Secondly, after examining mortality patterns, the discussion focusses specifically on the problem of malnutrition, especially, although not exclusively, as it affects the black population. The discussion will focus on geographical variations in nutritional status, seeking to highlight those problem environments which display high rates of malnutrition. The analysis is based on secondary sources and can be conveniently divided into those studies resulting from the analysis of hospital and clinic derived data and those compiled from data collected from particular communities.

A. Health Status in South Africa

South Africa spends approximately 2,5 percent of the G.N.P. on health (Gordon, 1981); taking into consideration the input of private medical care the figure is about 3,6 percent (Archer, 1978). By comparison with the 3,6 percent spent in South Africa, the U.S.A. spends 8.6 percent; Canada 7,1 percent and West Germany between 8,0 and 9,0 percent (Archer, 1978). While these are selected unadjusted estimates, they do indicate a discrepancy in expenditure on health between the countries quoted. The relatively small percentage of the G.N.P. spent on health in South Africa appears to be sufficient to maintain satisfactory standards of health for whites - certainly free from the high incidence of infectious, parasitic and deficiency diseases - if proportional mortality rates are considered.

On the other hand blacks and other groups such as the 'coloureds' display much higher rates of disease incidence as well as different patterns of disease when proportional mortality rates are analyzed (Dick and Bourne, 1978; Van Rensburg and Mans, 1982).

In a thought-provoking study of mortality in South Africa, Dick and Bourne (1978) acknowledge the limitations of using mortality measures to indicate health status: for example mortality rates offer no indication of prevalent diseases which give rise to morbidity but not mortality, and therefore only provide one aspect of the overall health-disease profile for any community. Van Rensburg and Mans (1982) also point to the limitations of using these measures, for example stressing that they are negative indicators of the health of a population. By definition mortality and morbidity are not indices of health, but rather of poor health. In spite of the limitations of mortality and morbidity data the authors acknowledge that there can be little doubt concerning their value as indicators of disease and health in a population. These data give relative indications of demand or health needs of a population in regard to the supply or provision of health services. As such they offer policy makers the opportunity for the "more effective control and prevention of disease and death in a population, and hence to an improvement in the population's general standard of health" (Van Rensburg and Mans, 1982, p.61).

In their study, Dick and Bourne (1978, pp.7 and 8) indicate significant differences in overall mortality rates for whites, Asians, 'coloureds' and blacks based on data available for 1974. "The Whites show a typical 'developed' country spectrum of mortality with Infectious and Parasitic Diseases being of minor importance (2,0%) and Neoplasms (15,6%) and Diseases of the Circulatory System (50,5%) being of major importance. For urban Blacks and Coloureds, Infectious and Parasitic Diseases make an important contribution to the overall mortality (19,5% and 23,5% respectively). ...In general the Asians have a spectrum of mortality intermediate between the Whites on the one hand and the Coloureds and Blacks on the other".

Table 1 provides more recent data on overall mortality according to racial group. These data for 1979 highlight the pattern of chronic diseases among whites, with circulatory and neoplasms constituting almost two thirds of all causes of mortality, only marginally less than in 1970, according to the information supplied by Dick and Bourne above. A

Table 1 The Five Main Causes of Death in Whites, Asians, 'Coloureds' and Blacks in South Africa, 1979

Total Number of Deaths and Percentages of all Deaths

Order of Importance	Whites				Asians				'Coloureds'				Blacks			
	Male	Female	Total	%	Male	Female	Total	%	Male	Female	Total	%	Male	Female	Total	%
	Diseases of Circulatory System (390-459)[1]				Diseases of the Circulatory System (390-459)				Diseases of the Circulatory System (390-459)				Infectious and Parasitic Diseases (001-139)			
1	9348	7745	17093	47,7	1235	897	2132	44,7	3068	3095	6163	25,8	13547	10348	23895	20,9
	Neoplasms (140-239)				Diseases of the Respiratory System (460-519)				Infectious and Parasitic Diseases (001-139)				Diseases of the Circulatory System (390-459)			
2	3266	2840	6106	17,0	269	171	440	9,2	2507	2096	4603	19,3	8698	7781	16479	14,4
	Diseases of the Respiratory System (460-519)				Neoplasms (140-239)				Diseases of the Respiratory System (460-519)				Diseases of the Respiratory System (460-519)			
3	2104	1694	3798	10,6	195	195	390	8,2	1992	1334	3326	14,0	8006	5676	13682	11,9
	Accidents, Poisoning and Violence (external causes) (800-999)				Accidents, Poisoning and Violence (external causes) (800-99)				Accidents, Poisoning and Violence (external causes) (800-999)				Accidents, Poisoning and Violence (800-999)			
4	2066	606	2672	7,4	272	66	338	7,1	2011	613	2624	11,0	10640	2315	12955	11,3
	Diseases of the Digestive System				Infectious and Parasitic Diseases (001-139)				Neoplasms (140-239)				Neoplasms (140-239)			
5	575	472	1047	2,9	159	110	269	5,6	1348	987	2335	9,8	4727	2699	7426	6,5
Total	17359	13357	30716	85,8	2130	1439	3569	74,8	10926	8125	19051	79,9	45618	28819	74437	65,0
Total from all causes	19929	15885	35814	100,0	2801	1968	4769	100,0	13520	10329	23849	100,0	67871	46672	114543	100,0

1. Categories of the International Classification of Diseases (I.C.D.) Ninth Revision, 1975

Source: Republic of South Africa, 19-a, Table 8, pp.27-44; Republic of South Africa, 19-b, Table 8, pp.59-62.

notable feature of the mortality data for whites is that infectious and parasitic diseases are not among the first five causes of death whereas they are for all the other ethnic groups. The Asians have a similar pattern of mortality to the whites whereas the 'coloureds' have a combination of diseases of affluence and poverty: diseases of the circulatory system account for just over a quarter of all 'coloured' deaths (25,8%) but infectious and parasitic diseases are almost as important, accounting for a further 19,3 percent of all deaths. The data for blacks in Table 1 are essentially for urban blacks. The data is from selected magisterial districts which exclude black homeland or independent states and most other black rural dwellers (Republic of South Africa, 19-a). Among this group of blacks the infectious and parasitic diseases still rank as the number one cause of mortality (20,9%). It is noteworthy that the urban black is gradually displaying a pattern of mortality not unlike that of the more affluent whites - the typical disease spectrum associated with the developed world. As such, diseases of the circulatory system (14,4%) and neoplasms (6,5%) are significant causes of mortality.

An examination of all causes of death in South Africa since the 1970's (Republic of South Africa, 19-a and b) shows that nutritional or deficiency diseases are a problem among blacks. In 1976, 558 or 1,4 percent of all black deaths were caused by nutritional deficiencies (categories 260-269, WHO International Classification of Diseases [ICD], 1975). In 1979 the number affected was 2582 or 2,3 percent of all deaths, an actual increase in this particular disease of poverty. The number of whites affected by nutritional deficiency diseases were so few that the category is omitted from the analysis of cause of death for whites.

If attention is focussed on the infant mortality rates (IMR), a sensitive barometer of social conditions (Republic of South Africa, 19-b), then a differentiation along ethnic lines emerges once more. Fullerton (1979) gives the IMR for whites as 18 per 1000; for 'coloureds' as 115 per 1000; for blacks, figures ranging from about 70 per 1000 in the Durban area to over 200 per 1000 in Transkei. More recent figures supplied by the Department of Statistics (Republic of South Africa, 19-b) give the following IMR's for 1979: Whites, 14,9 per 1000; 'coloureds' 69,9 per 1000 and Asians 25,0 per 1000. The comparable IMR's for these three

Malnutrition, implying a lack of nutrients in the diet, is not, at the macro scale, a major problem in the industrialized nations of the world and little attention need be paid to these countries. As Learmonth (1978, p.127) says, the problem here is more likely to be that of overnutrition. "An appreciable proportion ... suffer from overnutrition in the average pub or football crowd or even disco in Britain, Australia or the US, and in several western societies there is much public preoccupation with slimming in both sexes".

It is in the non-industrialized nations, those euphemistically called 'developing' countries of the world, that malnutrition is most prevalent. Austin (1981, p.1) estimates that half of the people in the 'developing' world are malnourished and that "over 1 billion individuals do not consume enough food to meet their daily calorie requirements. Of these, 895 million have daily calorie deficits in excess of 250 calories". The majority of the malnourished are located in Asia, Africa, Latin America and the Middle East as shown in Figure 10a. Within these countries the percentage of the population with deficit calorie intake is shown in Figure 10b. It is noteworthy that Africa, with 61 percent of its population having calorie deficits in excess of 250 calories per day, is second only to Asia (63%) in this regard, and way ahead of Latin America and the Middle East.

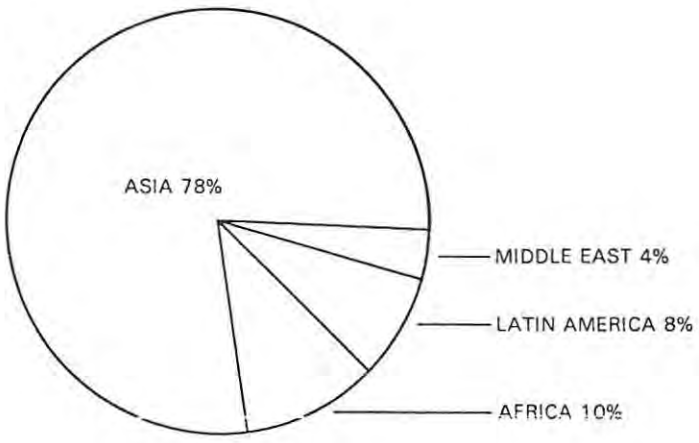

Figure 10a Distribution of World's Population with Calorie Deficits in Excess of 250 Calories Per Day

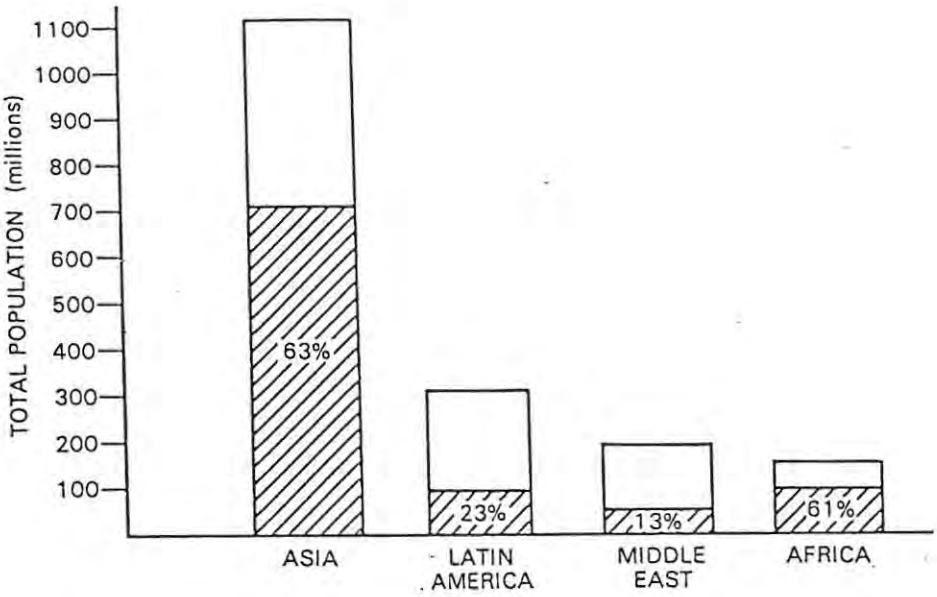

Figure 10b Percentage Population in Each Region with Calorie Deficits in Excess of 250 Calories Per Day

Source: Austin, 1981, Figures 1 and 2, pp.2 and 3.

One does not have to search far to find evidence of malnutrition among the worlds' young population. According to the 'State of The World's Children' report published by the United Nations International Childrens Emergency Fund (UNICEF) of the approximately 125 million children born in 1981, twelve million or approximately 10 percent would die before their first birthday and another five million before their fifth (Madeley, 1981). The bulk of these children at risk to premature death live in the developing countries where, as the report states, malnutrition and infectious diseases cause the majority of deaths. UNICEF's chief operations are in countries which together have a population in excess of one thousand million children; of these children 1 in 4 is likely to suffer from malnutrition. It is ironic to note that in 1981 the world's military organizations spent the equivalent of UNICEF's annual budget every four hours!

Famines and wars in places as far apart as Indochina, Bangladesh, the Sahel and Uganda point to the most pitiful conditions possible (Dalby, Church and Bezzaz, 1977; Dando, 1980; United States Department of Health, 1980; International Christian Aid, 1981). International Christian Aid members visiting Uganda, for example, established that of the 12 million Ugandan population 4,5 million were seriously underfed and 1,5 million in a present state of starvation. Against such a depressing picture of deprivation in many parts of the world, South Africa's

nutritional problems appear less severe. Kotze (1980), Head of the Division of Nutritional Services in the Department of Health, concludes from his research that only 3 percent of the population under the age of five could be classed as sufferers from protein-energy malnutrition.

Another factor to suggest that the problem of malnutrition is of limited importance within the country is that from 1968 malnutrition was no longer a notifiable disease (Critical Health, 1981). In 1967, the last year in which official figures were collected, the following cases of kwashiorkor were reported: whites, 7; coloureds, 1046 and blacks, 9765. The figures suggest that even in the black population severe forms of malnourishment were limited, if the nearly 10 000 reported cases are seen against a total black population of approximately 16 million at the time.

The 3 percent of malnourishment proposed by Kotze (1980) must be viewed with circumspection. Even if the rate of 3 percent is accepted - and it is likely to be a conservative estimate - it helps little to elucidate problem areas and variations of levels of malnutrition between ethnic groups. As stated in chapter 2, severe forms of malnutrition (presumably what Kotze is referring to) are only the tip of the 'nutritional iceberg' and the incidence of the less severe forms of malnutrition need to be included in the assessment of nutritional conditions so that all those at risk are considered. The following discussion based on the analysis of other studies conducted in the country examines more fully ethnic and geographical variations in nutritional status.

1. Hospital and Clinic Based Studies of Malnutrition

Six studies are discussed in this section. The studies examine ethnic differences in nutrition as well as the differences which emerge from urban, rural and semi-rural studies. Attention is paid initially to differences by ethnic groups, followed by studies which highlight the urban-rural and semi-rural differences in nutrition.

Willoughby et al. (1979) report on two studies undertaken at the Red Cross War Memorial Childrens Hospital in Cape Town which included the analysis of age, race, nutritional status and major illness of outpatients. The first study undertaken in 1961 using the Ford classification of malnutrition (incidence of severe malnutrition was

taken as less than 66,0% of expected weight for age on the Boston scale) suggested that 8,1 percent of 'coloureds'; 10,8 percent of blacks and 1,9 percent of whites were malnourished. In 1972 Willoughby et al. used a comparable form of nutritional assessment which indicated 6,0 percent of 'coloureds', 5,5 percent of blacks and 3,0 percent of whites to be malnourished. The studies highlight the higher incidence of malnutrition among black and 'coloured' patients than among white patients. They also show that declining levels of malnutrition occur with generally improving socio-economic conditions among urban black and 'coloured' inpatients over time.

Socio-economic conditions in urban environments appear to be of major importance in the levels of nutrition encountered. For example, Stein and Rosen (1980) made a comparison of nutritional status of Sowetan children attending hospital in 1956 and 1978. In 1956 a total of 1400 severely malnourished children were treated when the official population was estimated at 300 000. In 1978 a total of 1104 children fell into the category of severely malnourished. The authors conclude that these figures, along with the decline in mortality of children, and the fact that Soweto's population in 1978 had increased four or five fold from 1956, suggest a substantial improvement in child health: "a reduction in incidence in absolute terms and a vast reduction in relative terms" (p.1030). Better levels of health care and improving socio-economic conditions within the Soweto community are seen as key ingredients to the superior levels of nutrition encountered in the latter survey.

There is evidence to suggest that the incidence of malnutrition can be curtailed in rural as well as urban environments. The Valley Trust, established to promote health among rural Zulus in the Bothas Hill area of Natal, has made significant steps to reduce the incidence of malnutrition (Stott, 1974; Valley Trust, 1976). Figure 11 shows the dramatic decline in the occurence of kwashiorkor brought about through the programme of intervention in the area.

However, in most black rural homeland or 'independent' state populations, where intervention programmes are largely absent, the available evidence suggests high levels of malnutrition. In a benchmark study of malnutrition in the Nqutu district of Kwazulu in 1972, Schlemmer and Stopforth (1975) stated that on the basis of hospital records, the outlook for cumulative malnutrition among infants and children was bleak. Of the 536 patients admitted to the hospital in 1972, 30 percent

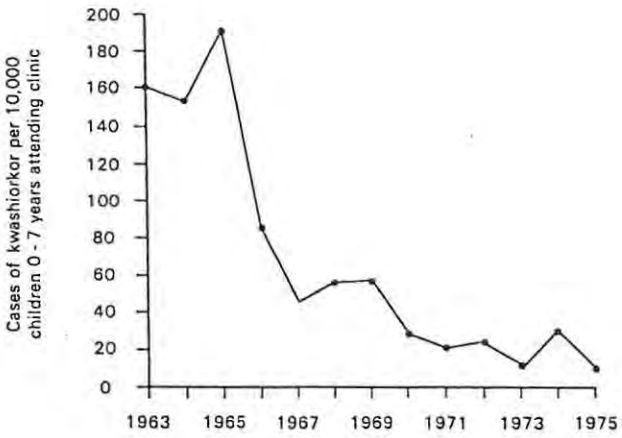

Figure 11 Cases of Kwashiorkor (with Oedema) Seen at the Botha's Hill Health Centre 1963-1975

Source: Valley Trust, 1976, p.10.

suffered from malnutrition. The authors ascribe the high incidence of malnutrition to general poverty and socially deprived home environments, including fragmentation of families due to migration and the resultant absence of household heads for extended periods.

Studies undertaken in Lebowa by Booth (1982) seem to epitomise and summarise the problem of health and disease in rural environs. Basing his analysis on the diagnosis of children under 5 years of age seen at the Jane Furse Memorial Hospital in Southern Lebowa, he concludes that gastro-enteritis, malnutrition and respiratory disease are all pervasive. Examining the reasons for the dominance of these diseases, he concludes that local food production is inadequate to meet demands; that there is a poor standard of basic hygiene in the community; and that these problems are exacerbated by a poorly developed infrastructure, and lack of medical personnel to help cope with the problem.

There is another geographical dimension of the incidence of malnutrition which needs to be considered: that of the semi-rural community. Griffiths (1981) looked at the admissions to a semi-rural hospital called Moroka in the Thaba Nchu district, Boputhatswana between the late 1950's to the late 1970's, a period of 18 years. He wanted to ascertain whether a measurable change in the disease pattern of patients had occurred over the time period mentioned. His conclusions are that there is little evidence to suggest that the degenerative or chronic type diseases are increasing in importance. The traditional diseases of poverty continue to feature, including malnutrition. What is interesting from his

analysis is that the number of patients suffering from hypertension has increased. These results suggest that in the semi-rural community where socio-economic conditions have not improved significantly for the community as a whole, when compared with urban environments, diseases of poverty will continue to plague the community. However, the problems of living in an environment in which patterns of life reflect dislocation from traditional norms, may foster the incidence of some diseases of the urban environs, such as those related to stress. The semi-rural environment typed in Griffith's study may well suffer from the worst of both the rural and urban worlds.

2. Community Based Studies of Malnutrition

A total of seven studies are reported on in this section and as in the previous section, differences in nutritional conditions are considered between race groups and between urban, rural and semi-rural environments. Conditions of blacks on white farms are also mentioned since 'rural' in all the other studies so far has meant the study of conditions in black homelands or 'independent' states.

Richardson (1973; 1977; 1978) has compared the nutritional status of black and white pre-school and school children in the Transvaal, in both rural and urban environments. White children were drawn from six middle to upper-middle class schools in the Johannesburg area; urban blacks were selected from nine schools in Soweto and rural black children came from 18 schools in the north-eastern and eastern Transvaal. Figure 12 compares the weight for age of rural and urban black and white urban children and emphasises once more the black-white differences in nutritional status and the rural-urban differentiation as well. Approximately 30 percent of rural black, 15 percent of urban black and 5 percent of urban white children six years of age and younger fall below the third percentile of weight for age. Wasting is therefore more prevalent in rural areas and in blacks rather than whites. Results of stunting from the same study endorse the rural-urban and black-white dichotomies, with a significantly higher percentage of black than white children exhibiting stunted growth. The main ingredient that Richardson's work introduces is the comparision between rural and urban groups and the affirmation that rural children are at greater nutritional risk than urban children.

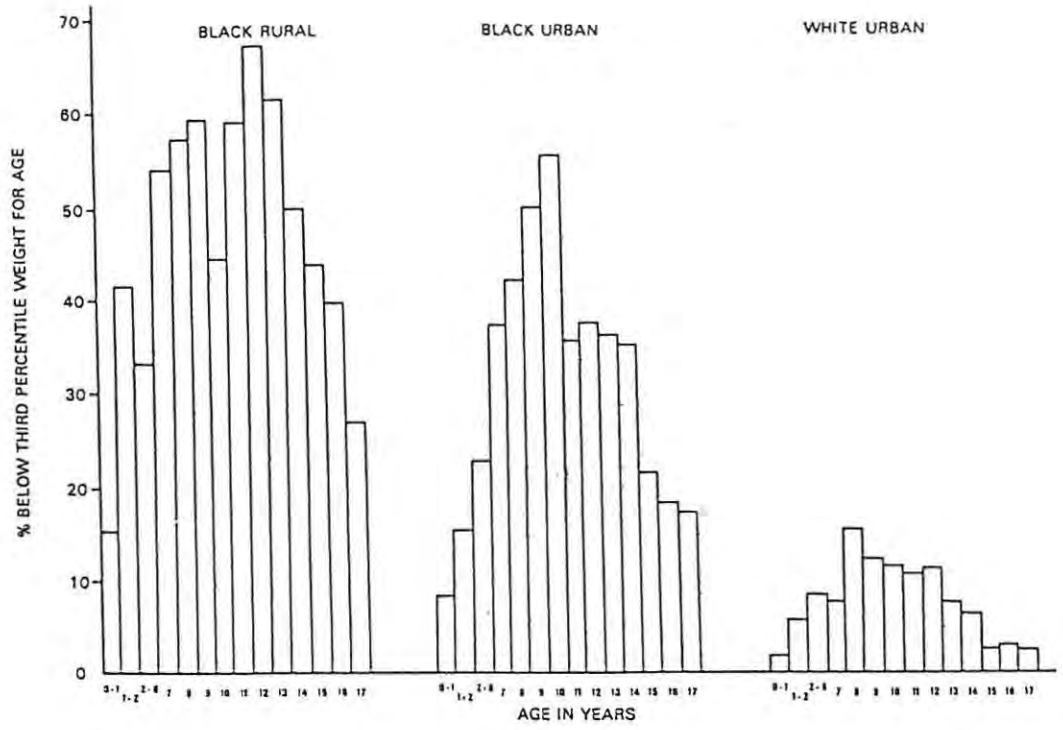

Figure 12 Histograms Depicting Percentages of Black and White Children from Birth to 17 Years (sexes combined) Falling on or Below the Third Percentile of Weight for Age

Source: Richardson, 1977, Figure 1, p.211.

Shuenyane et al. (1977) carried out a random sample survey of 186 households in Diepkloof, Soweto in 1975. Weights and heights for age assessed against the Boston reference population or norm were used to determine children at risk. Table 2 indicates the percentage of children falling below the third percentile for each measure.

Table 2 Children Below the Boston Third Percentile, Weight and Height for Age, Diepkloof, 1975

Age (Yrs)	Weight for Age % < 3 Percentile	Height for Age % < 3 Percentile
2	18,9	63,5
2 - 5	29,1	66,4
6 - 9	38,1	55,5
10 - 12	45,4	59,2

Source: Shuenyane et al., 1977, Table 3, p.498.

The results shown in Table 2 point to a distinction between present and long term nutrition of the children. The members at risk on the weight for age measure increase with age, from less than 20 percent for those under two to almost 50 percent for those in the 10-12 year age category, possibly because of the even greater need of sufficient food to help children cope with the growth spurt into adolescence. Stunted growth indicated by the height for age results was prevalent in all age groups affecting approximately two thirds of the children surveyed. Higher rates of stunting than wasting were recording for all age cohorts. The authors of this study conclude that lack of income was a key variable in households where children were at risk or were malnourished.

Conditions in a semi-rural environment are reported on by Margo et al. (1976). The authors conducted a survey of 119 randomly selected children aged 1 to 5 in the Muldersdrift location in 1975. They found 27,6 percent of children below the third percentile on the weight for age, and 22,8 percent below the same cut-off point on the height for age Boston norms. The weight for age results are similar to those of Shuenyane et al. (1977) mentioned in Table 2. However stunting is much lower in the Muldersdrift group, 22,8%, compared with the almost two thirds in Diepkloof. One may conclude that the long term environmental conditions under which children grew up were superior in Muldersdrift, a finding somewhat at odds with that of Griffiths (1981).

An interesting comparison of nutritional condition between children in an urban area and a rural homeland area has been made by White (1978). Using the Shakir Strip technique which tends to underestimate those at risk (see chapter 2, section C(1) Figure 4). White nevertheless is able to demonstrate that the incidence of malnutrition in the Crossroads Squatter Camp, Cape Town is lower than that in the Nqutu district of Kwazulu. Taking a selective sample of just over 400 children aged 1-5 from each environment, he concludes that 1,9 percent of the Crossroads children and 7,3 percent of the Nqutu children suffered from PEM. The reasons for better nutritional conditions in Crossroads is ascribed to the maintenance of the family unit and the pooling of family income for the household's use. Mean income for Crossroads households included in the survey was R86 per month compared with R25 per month in Nqutu. A major drain on household resources in the Nqutu households according to White was the absence of the migrant worker. All income earned by the migrant was not funnelled into the rural home with the resultant lack of

family income and resources. A study carried out concurrently with that undertaken by the author appears to offer a sound reflection of the extent of the problem of malnutrition in rural Bophuthatswana. Van der Knaap and Bekkers (1980) point out that in 1979 the three leading causes of death in young children admitted to the Gelukspan Hospital were malnutrition (40% of all child deaths in the hospital), gastro-enteritis (30%) and chest infection and tuberculosis (15%). Most of the children who died of gastro-enteritis
and tuberculosis were underweight as well. As a result of these findings a community study of nutrition of children under six in the Gelukspan area (part of the Ditsobotla district) was undertaken with the emphasis on comparing nutritional conditions of children in resettlement villages, established since 1976 to accommodate people from 'black spots' in South Africa; trust villages, established between 1936-1940 on land expropriated by the South African government from white farmers; and traditional villages, established in the nineteenth century and still ruled largely in accordance with traditional custom. Their results suggest that rates of malnutrition did not appear to fluctuate markedly between the different village types except for the incidence of severe malnutrition, which was greatest in the resettlement villages. The incidence of children at risk, when measured by weight for age (the cut-off point is 80% of the mean of the Child Health Card Bophuthatswana, which is slightly lower than the third percentile of the Boston weight for age norm) was 51 percent for all villages combined; stunting, using the Boston third percentile, affected approximately 16 percent of the children. Severe malnutrition was designated by measuring the upper arm circumference of children between 12 and 60 months. Just over six percent of resettlement children; 2,4 percent of trust village children and 0,9% of children from traditional villages had arm circumference of less than 13,5cm, the cut off point used to indicate severe malnutrition.

In the Eastern Cape and Ciskei little evidence of community nutritional studies can be found. Du Plessis et al. (19-) report on a wide scale community study undertaken in Ciskei in 1977. He differentiates between nutritional conditions in rural and urban areas and using very stringent criteria to those at risk (below 75% standard weight for age on the Boston, that is, a more conservative cut off point than the third percentile) shows that conditions are worst in rural areas.

Using randomly selected households in several representative rural and urban areas du Plessis estimates that 3 percent of 6 to 23 month old children, 10 percent of 2 to 3 year olds, and 34 percent of 7 to 8 years olds fall below 75 percent of standard weight for age in rural areas. The comparative figures for children in urban areas, using the same age categories, is 6 percent, 7 percent and 22 percent respectively.

In concluding this section, mention needs to be made of the paucity of material on black labourers and their families on white-owned commercial farms. As Westcott (1978, p.1) states "the extent to which health needs are being met in farming areas has to my knowledge received very little systematic consideration. It may be that [these areas] suffer from none of the environmental deterioration of urban townships and shanty towns with their corresponding health hazards, or the poverty and dearth of facilities of the homelands; but very often we do not know". Wescott's statement and the inability of the author to find nutritional studies of blacks on white-owned commercial farms suggest that conditions in such communities are in need of assessment. That the study of such communities and those in homeland environment needs to be undertaken is borne out by Gish (1975, p.42) who is of the opinion that the broad pattern of illness and mortality in poor communities is sufficiently well known to proceed with the drawing up of more suitable health plans than are now generally operable. However, it "is in specific, local geographic areas that more useful disease statistics might be developed and acted upon in the context of the ongoing work of the health services".

C. Chapter Summary

The amount of the G.N.P. spent on health in South Africa is significantly lower than that of many of the highly industrialized western nations. The money spent appears however to be sufficient to have eradicated most preventable diseases among the white population. The 'coloureds' and blacks are not as fortunate and the analysis of mortality rates within the country suggest that infectious, parasitic and deficiency diseases are still endemic within these groups. The IMR within the 'coloured' and black communities is very high when compared with that of whites. The national health system appears to be one based heavily on curative medicine which critics of the system see as depriving 'non-whites' of adequate preventative medical care.

After briefly considering the broader health picture in South Africa, the discussion moved specifically onto the topic of nutrition. When compared with the spectre of malnutrition in the 'developing' countries of the world - and the issue of famine was only cursorily mentioned - South Africa's nutritional problems appear at first to be minimal. A selection of studies conducted at hospitals and clinics on the one hand and within communities on the other, however, highlight particular areas in which malnutrition gives considerable cause for concern. The problem lies within poorer communities and conditions within the black ethnic group were considered in some detail. The review of studies already undertaken shows that urban areas tend to enjoy lower levels of malnutrition than rural and semi-rural homeland ones. Scant information is available on nutritional conditions of blacks on white-owned commercial farms and nutritional and related problems may well exist on these farms. Information is available for homeland and 'independent' states where nutritional conditions are generally poor. Within these areas nutritional status varies, with rural areas once more being more badly off than urban ones.

There is little if any literature on nutritional studies in the Eastern Cape and Ciskei. Community based studies are particularly noteworthy by their absence so that the present work fulfills a singularly important role in providing information on nutrition in the area. Studies which have been done in Ciskei point to malnutrition as a problem of some importance.

The review of literature suggests that knowledge of nutritional conditions in the country is still fragmentary, although the broader pattern of which areas are most at risk is clear: it is the poor communities wherever they are, but especially those homeland and 'independent' state communities within South Africa. The need to collate all nutrition studies already undertaken in the country is a task which in itself appears to be an important one for future research.

PART II

Part II consists of chapter 4, The Study Area, and chapter 5, The Research Methodology. Chapter 4 outlines the socio-economic characteristics of the communities surveyed. The Eastern Cape and Ciskei are shown to fall within an economically depressed region of the South African space economy. While poverty is endemic, variation in the degree of poverty is discernible, so that the Dias and Amatola Basin communities are portrayed as less poor than the Tsweletswele community. Chapter 5 outlines the research methodology and, in so doing, traces the development in survey design from the pilot survey to that employed in the survey of the Dias, Amatola Basin and Tsweletswele communities. The pilot survey focused attention on the nutritional status of school entrants in the Albany magisterial district. The problems encountered in the survey of school entrants resulted in the later surveys being concentrated at the household level, making it possible to measure directly the nutrition of pre-school children. The survey format of the pilot and later surveys are considered in detail. The chapter is concluded by setting out the research hypotheses which provide the framework for the presentation of the survey results in chapter 6.

CHAPTER 4

THE STUDY AREA

The study area consists of a number of different communities in the Eastern Cape and Ciskei. The communities studied are:

A. The black township community of Grahamstown and the black community on white-owned commercial farms in the surrounding rural environs of the Albany magisterial district;

B. The labourers and their children on white-owned farms in the Dias Divisional Council area of the Eastern Cape;

C. The rural community of an area in Ciskei known as the Amatola Basin; and

D. The community of Tsweletswele, a closer settlement in Ciskei.

The following section is devoted to an outline of the main characteristics of the relevant communities.

A. The Eastern Cape: Grahamstown and its Associated Rural Environment and the Dias Divisional Council Area (Figure 13)

'Eastern Cape' is a term used synonomously with that of 'Settler Country'. The English Settlers, enticed to the region by Lord Charles Somerset in 1820, initiated the beginnings of Western culture here. The settlers and their descendants have dominated the social and economic development over the last 160 years, supposedly providing the overriding raison d'être for the region's present day character. The region consists essentially of white-owned commercial farms with small service centres. There is little industrial development except in the Port Elizabeth/Uitenhage complex. In general, Settler Country is an economically depressed region when compared to the country as a whole. The region's depressed nature is apparent if the contribution of the Port Elizabeth/Uitenhage industrial complex to the country's Gross Geographic Product (GGP) is considered. The GGP is the value of all final goods and services produced within a region of a country and the GGP for all regions should approximate the Gross Domestic Product (Fair, 1982). The

contribution of the Port Elizabeth/Uitenhage region to the GGP along with that of other selected regions within the country is given in Table 3. In 1970 the Port Elizabeth/Uitenhage complex was responsible for 4 percent of the GGP, a figure which had dropped to 3,6 percent in 1975. The contribution to the GGP is small when compared with that of the Durban/Pinetown Complex and the Pretoria, Witwatersrand and Vereeniging (PWV) region. The contributions of Albany, East London and Ciskei to the GGP are also provided for comparative purposes. Besides the GGP, personal income can also illustrate disparities. The average per capita income in the Johannesburg area in 1970, for instance, amounted to R933 compared with R185 in the Albany Magisterial District, the heart of Settler Country. In 1975 the per capita personal income for whites in Albany of R2 477 was below the R2 876 for the average white income in South Africa as a whole (Truu, 1981).

Table 3 The Gross Geographic Product for Selected Regions, 1970 and 1975

Region	Gross Geographic Product, R Millions (at current prices)			
	1970	%	1975	%
PWV[1]	4 689	42,0	10 111	41,4 (41,3)
Durban/Pinetown	955	8,5	2 026	8,3 (8,3)
Cape/Wynberg/ Simonstown/Bellville	1 208	10,8	2 416	9,9 (9,9)
Port Elizabeth/ Uitenhage	445	4,0	868	3,6 (3,5)
Albany	20	0,2	39	0,2 (0,2)
East London	147	1,3	308	1,3 (1,3)
Ciskei[2]	-	-	55	- (0,2)
South Africa	11 172		24 483	

1 Pretoria, Witwatersrand and Vereeniging

2 The figure given for the Ciskei is the Gross Domestic Product, which is likely to approximate the Gross Geographic Product (GGP) (Fair, 1982).

Sources: Fair, 1982, Table 5.2 p.52; Republic of South Africa, 1978, Table 5.1, p.7; Republic of South Africa, 1981, Table 2, pp.3-31.

To fully understand the fabric of the region one has to take cognizance of the status of the black population in both the rural and urban environments. As the settlers set about establishing themselves in the nineteenth century, a clearcut division made itself apparent between whites and blacks. The blacks were relegated to secondary roles in the developing economy, becoming in most instances servants in the small settlements, labourers on the white farms or peasant farmers in their own 'reserves'. Today the dichotomy is reflected in the generally modest but adequate standard of living of the whites and the poverty of the blacks. Although blacks have a lower standard of living - per capita income of blacks in 1975 was R169 compared with R2 477 for whites in Albany (Truu, 1981) - they are the majority in the region. In 1980 the black population in Albany numbered about 57 000 (74% of the total population), compared with 12 062 whites, 7 762 Coloureds and 298 Asians. The total black population for the Dias area is estimated at present to be 363 703 of which 80 749 live in the rural area (Dias Divisional Council, 1981). The following section discusses Grahamstown and the surrounding environment, site of the pilot study of nutrition, before outlining conditions in the broader Dias Divisional Council area in section 2.

1. Grahamstown and the Surrounding Environment

Grahamstown is located on a site selected for strategic reasons, including the availability of water, by Col. John Graham in August 1812 (Daniel, 1974). In many respects it forms the focus of activities within the Albany magisterial district, being the main service centre for the surrounding farming community as well as a significant legal and educational mecca within the Eastern Cape.

Grahamstown's geographical position, almost equidistant from the two coastal metropolitan centres of East London and Port Elizabeth (Figure 13), is the root cause of many present-day problems (Daniel, 1974). The metropolitan centres preclude the town attracting new functions and the paucity of natural resources which could form the basis of processing industries means that there are few industrial enterprises. Those that have developed generally suffer by being distant from the major market centres of the country. As a result of limited job opportunities due to lack of industries and a sizeable population, unemployment and underemployment, especially within the black and 'coloured' communties,

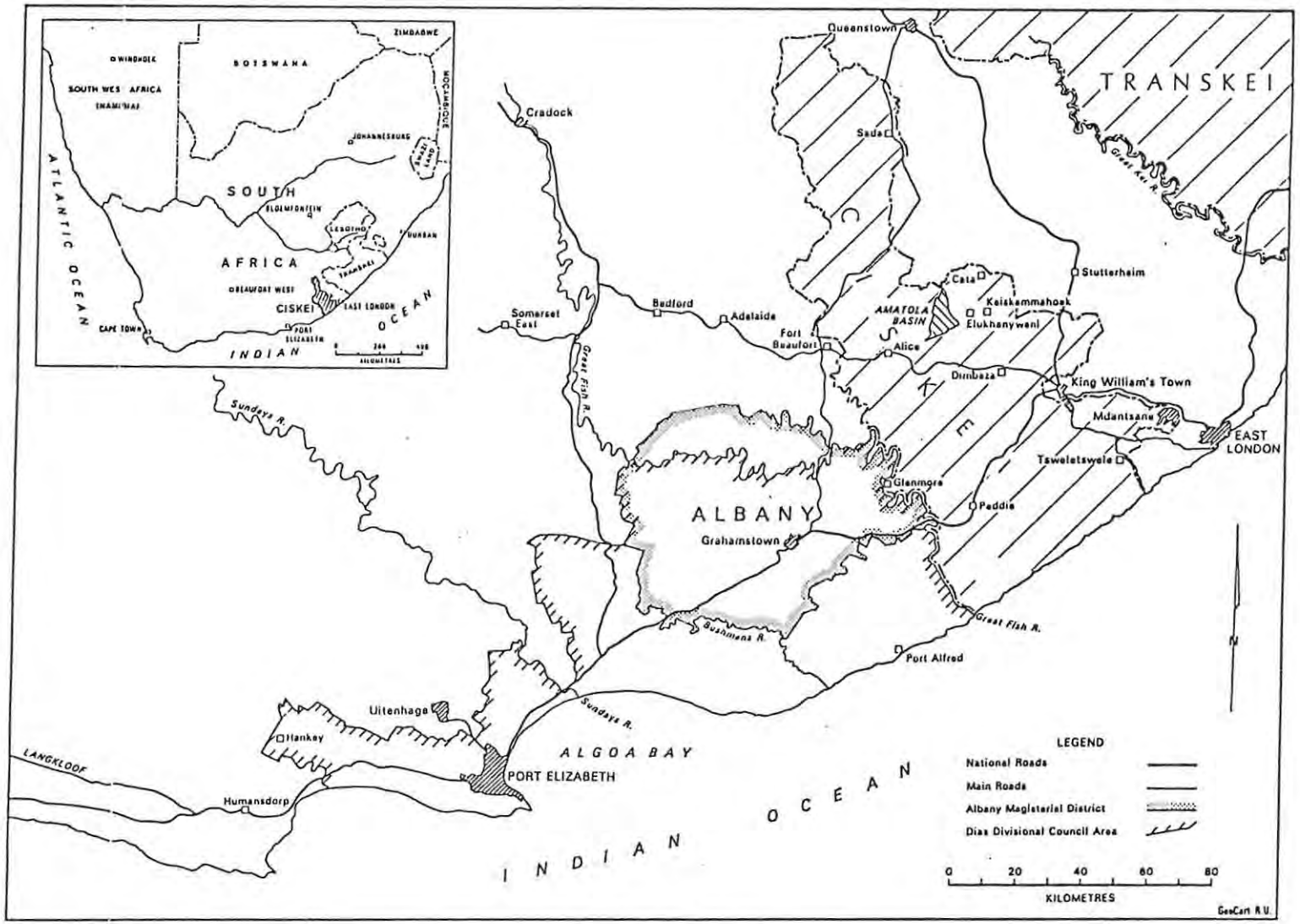

Figure 13 The Study Area

is a major problem. After discussing the population of the town, attention will be given to the issue of employment in Grahamstown, before turning to conditions in the rural areas of the Albany magisterial district. The section is concluded by briefly outlining health facilities in Grahamstown and the surrounding farming district.

Grahamstown has a total population of 57 719 of which 38 192 or 66,2 percent are black (South African Association of Municipal Employees, 1983). The black residential areas occupy 22,5 percent of the City area compared with 60,7 percent for the city's commercial centre and white residential areas where the white population amounts to 12 448 or 21,6 percent of the total population. The situation has therefore developed in Grahamstown where the majority of the population is housed in a very small proportion of the urban environment. The total area of the black townships is approximately 3 square kilometres which would give an average population density of 12 731 per square kilometre, compared with 1 748 per square kilometre for whites. Conditions in the black township vary considerably but in general overcrowding is a major problem within the township as a whole and within individual households.

For blacks in Grahamstown the rates of unemployment and underemployment are high and incomes low. A political science student organization at Rhodes University, Delta, estimated that in 1981 the cost of feeding a black family of six per month was R229 (Rhodeo, 1982). The average income for such families amounted to R174, indicating, on average, a shortfall of R55. In another study reported by Moolman (1984) 68 percent of black households were said to have monthly incomes of less than R60. In contrast, only 27 percent of Port Elizabeth black households had similarly low incomes. Low income is a major problem in the township and it is aggravated by high rates of unemployment, estimated in 1982 to be in the region of 32 percent (Bush, 1982). Moolman suggests from her study that approximately 9 000 blacks are employed in Grahamstown, representing 33,7 percent of all adults aged 15 and 64 years. A further 1,9 percent are in part-time employment and 22,2 percent unemployed. The 22,2 percent represents only those blacks actively seeking employment and therefore registered as unemployed; the actual numbers, as Moolman admits, are likely to be higher since many unemployed do not register with the Administration Board as being unemployed. The remaining 42,2 percent of the 15 to 64 years old group are either at school or are

classed as 'other'. In summary one must conclude that blacks in Grahamtown live in overcrowded conditions where high rates of unemployment and low wages give rise to poverty and general hardship.

The population pyramids for the urban and rural areas of the Albany magisterial district are shown in Figure 14. The 'urban' pyramid is made up of Grahamstown and other minor centres such as Alicedale, Riebeek East and Salem. The 'rural' pyramid represents blacks on white farms. Of particular note is the absence of potential male wage earners between the age of 15 and 65 in the rural areas and the small percentage of male and female wage earners in both the rural and urban areas. The reason for the dearth of these potential job seekers is that they have invariably migrated to the large urban and metropolitan centres of the country in search of work. Another inherent problem depicted by the pyramids is the dependency burden placed on wage earners. Roughly 45 percent of the urban and just over 50 percent of the rural population is under the age of 15.

The analysis of the 1970 and 1980 preliminary census data by Truu (1981) shows that a marked decline has occurred in the black rural population in Albany since the early 1970's. In 1970 there were 23 122 rural blacks compared with 13 482 in 1980, a decline of 9 640 or 41,7 percent of the 1970 number. Antrobus (1982) confirms the decline in farm labourer numbers; between 1957 and 1976 a decrease of 3 000 farm labourers has taken place largely as a result of improved methods of farming and more sophisticated technology requiring less labour. In addition, a major farm industry, that of pineapples, is being curtailed. In 1957, 4 000 hectares were under production. In 1960 the total was 2 400 hectares and in 1976, 847 hectares. Antrobus notes that a canning firm has a pineapple farm near Alexandria for example, which in 1960 had a labour force of 600 and produced 3 000 ton of pineapples. In 1980 the farm had 120 labourers and production stood at 10 000 tons. The curtailment of labour on the farms means that rural black families have had to move to the towns such as Grahamstown or to their 'homeland', Ciskei.

The wages for labourers on white farms are low and the hours of work long. Antrobus (1982) found from studies in the Albany area that the average wage earned in 1976 was R14,08 in cash per month. With contributions from children and other family members, together with

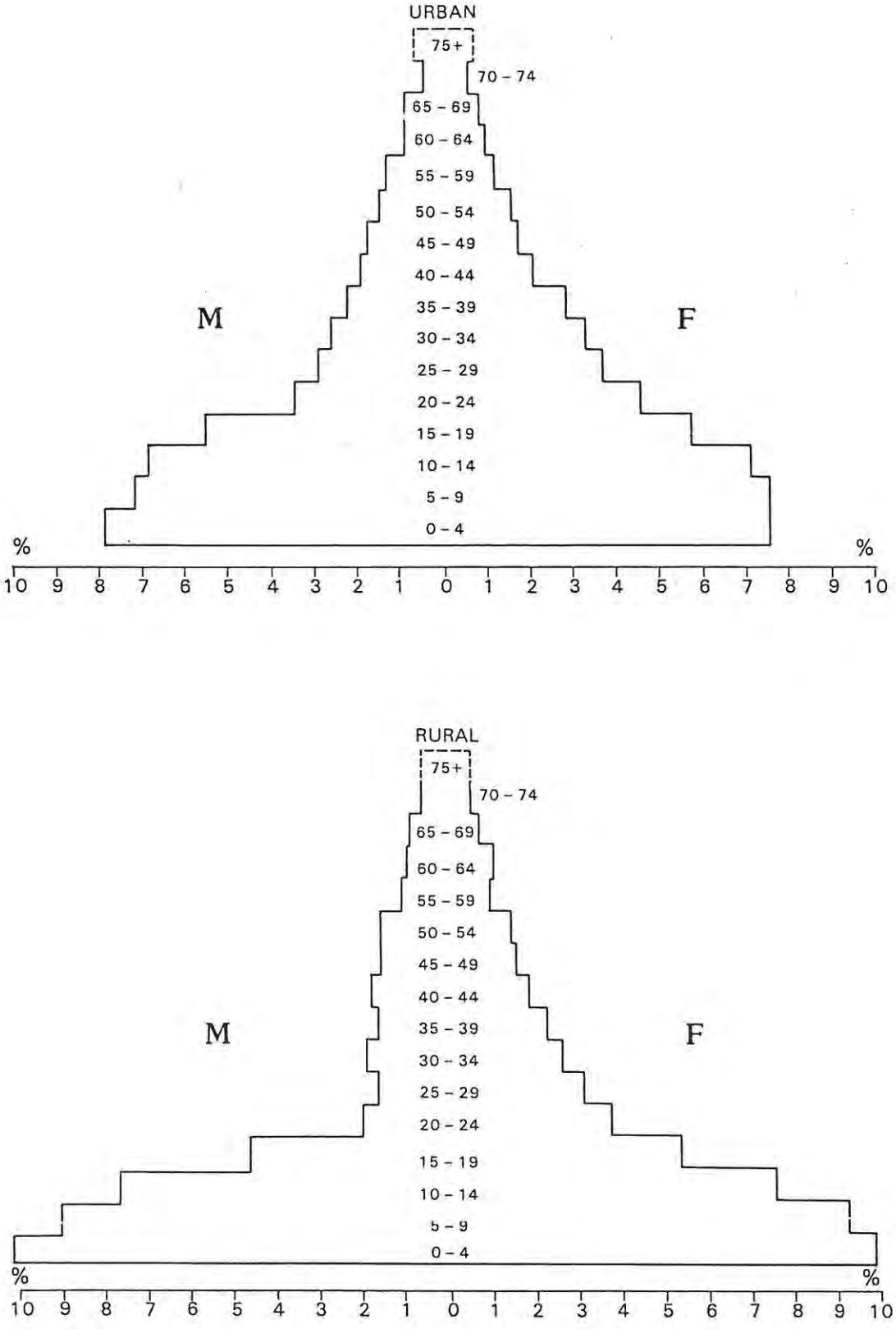

Figure 14 Black Population by Sex and Age, Albany Magisterial District, 1980

Source: After Truu, 1981, Figure 4, p.4.

rations, the regular farm labourer earned the equivalent of R36,80 per month. Even supposing an annual increase in wages and income in kind equivalent to approximately 15 percent, the earnings would be equivalent to only R74,02 in 1981, still far below that of the income of the R174 earned by a Grahamstown black family.

Blacks in the Grahamstown townships and in the rural areas of Albany can make use of both provincial and municipal health facilities, as well as predominantly white private practitioners and traditional community practitioners (for example igqiras, or diviners, and ixhwele, or herbalists). Settlers Hospital in Grahamstown forms the focus of provincial health services along with a day clinic or hospital. Two municipal clinics are also run in the townships for blacks while the nuns of the Assumption Convent run a clinic in Joza. Mental patients are treated at the Fort England Hospital in Grahamstown although some patients are referred to the Tower Hill Psychiatric Hospital in Fort Beaufort. A tuberculosis (TB) hospital under the auspices of the South African National Tuberculosis Association (SANTA) also operates in Grahamstown. A mobile clinic service is run for people in the rural areas. The service is essentially geared to screening patients for TB and offering family planning services. For most illnesses, blacks in rural areas must travel to Grahamstown for treatment.

No community based studies of health have been conducted in Albany so the issue is not pursued here. Discussions with the superintendent and staff at Settlers Hospital as well as the Sister-in-Charge in the Raglan Road Municipal Clinic indicate that infectious, parasitic and deficiency diseases are the likely problems to be found among black children. Gastro-enteritis and malnutrition were given by the superintendent as major causes of morbidity and mortality. 'Non-white' children, predominantly blacks, accounted for 23 percent of all deaths at the hospital in 1982 (Settlers Hospital Annual Report, 1983). By comparison the number of deaths of white children was negligible, while that of whites who died from chronic diseases (diseases of old age) accounted for 12 percent of all deaths. The diseases of affluence and of poverty appear to be once more clearly demarcated along racial lines, as suggested in chapter 3.

In conclusion, the black 'urban' communities of Albany live in crowded household conditions where high rates of unemployment and low wages give rise to poverty. Wages of farm labourers in rural Albany are low and the hours of work long. Mechanization on the farms is making many labourers redundant. Competition for the remaining jobs keeps wages low so that the rural farm community in Albany is also one marked by a poor standard of living. It should be noted that conditions of rural blacks in the Albany district epitomise conditions of blacks throughout the Dias area. As a result, the following section is less detailed and simply highlights key aspects of the Dias area.

2. The Dias Divisional Council Area (Figure 13)

The first major nutritional survey conducted after the pilot survey was in the rural part of the Dias Divisional Council area, hereafter referred to as the Dias area. The Dias area comprises approximately 10 000 square kilometres and includes the magisterial districts of Albany, Bathurst, Alexandria, Port Elizabeth and Hankey. In some instances the Dias boundary deviates from that of the magisterial boundaries, for example in the Hankey and Albany magisterial districts, but the differences are minimal. Figure 13 indicates the extent of the Dias area. According to the preliminary 1980 census results, the area has a black population of 363 703 of which 80 749 or 22,2 percent live in the rural area, very similar to that outlined for the Albany district. The 'coloured' population number 135 591 which includes 12 690 or 9,4 percent rurally based people. The majority of the 'coloureds' in rural areas are found in the Hankey-Port Elizabeth districts. These people live in a coastal or semi-coastal environment, very often hilly and dissected as a result of down-cutting by eastward flowing rivers. Ecologically the Dias area varies from mixed scrubland, thick woody terrain and indigenous forest clusters in the coastal areas to grasslands and karoo-type forms further inland. The blacks and 'coloureds' are employed essentially on white-owned farms which have markedly altered the natural environment. Stock farming and the cultivation of key crops such as pineapples and chickory predominate. In the Gamtoos valley irrigated farming is practised on an intensive basis.

Health services in the area include 12 permanent clinics as well as 13 mobile clinics. These clinics provide curative and preventative services along with child health, family planning and dental services. In

addition, a State subsidized skimmed milk powder scheme is administered from all municipal clinics. If a child falls under the third percentile of the Boston weight for age norm, that child is eligible for skimmed milk to supplement its diet and the guardian of the child pays a nominal fee for the skimmed milk. If the guardian cannot afford to pay, the milk is provided free of charge. Two provincial regional hospitals are located in Port Elizabeth and Grahamstown; additional private and state hospitals in the region cater for infectious diseases and mental disorders, as discussed in section A(1).

As implied at the start of this section, the black urban communities of Port Elizabeth were not included in the present study. The analysis of conditions in urban Port Elizabeth is part of on-going research which is not discussed in the present work.

B. Ciskei : The Amatola Basin and Tsweletswele (Figure 15)

Before embarking on an outline of the two communities in the Ciskei it is essential to grasp the wider social and cultural milieu in which they fall. The wider context is essential to understanding the differences between Ciskeian conditions and those found in the rest of the Eastern Cape and emobodied in the outline of conditions in Albany and the Dias Divisional Council areas.

1. Ciskei : An Overview

Ciskei, according to South African legislation, became fully independent in December 1981. Along with the other 'independent' homelands such as Transkei, Bophuthatswana and Venda, Ciskei has not received international recognition other than from the South African Government. While the Government provides financial and other assistance, Ciskei is nevertheless expected to run its own internal affairs. The authorities find themselves having to raise the relatively poor standards of living of Ciskeians in their territory while being geographically located in what must be considered an area of peripheral economic potential (Board, Davies and Fair, 1970; Fair, 1982). A cursory glance at Table 3 will indicate that the 'national' income for the whole of Ciskei is less than that of the East London urban complex in the 'white corridor' between Ciskei and Transkei. The following account outlines key features of the 'state' of Ciskei.

The Ciskei is at present comprised of about 5 300 square kilometres of land. In terms of the 1936 Native Trust and Land Act together with subsequent proclamations and agreements, the state is to encompass 8 300 square kilometres. Even when, and if, the additional land is added to its present holdings, the Ciskei will still be 280 percent smaller than the minimum area claimed by its leaders, namely the land bounded by the Fish and Kei Rivers and the Stormberg mountains and the Indian Ocean (Ciskei Commission, 1980; Daniel, 1981). The Ciskei, according to proposed consolidation plans in 1981, is shown in Figure 15. With regard to its present size, Ciskei can therefore be considered a small territory or country (Maasdorp, 1976b), with attendant problems such as a limited resource base, confined domestic market and economic reliance on larger neighbouring states.

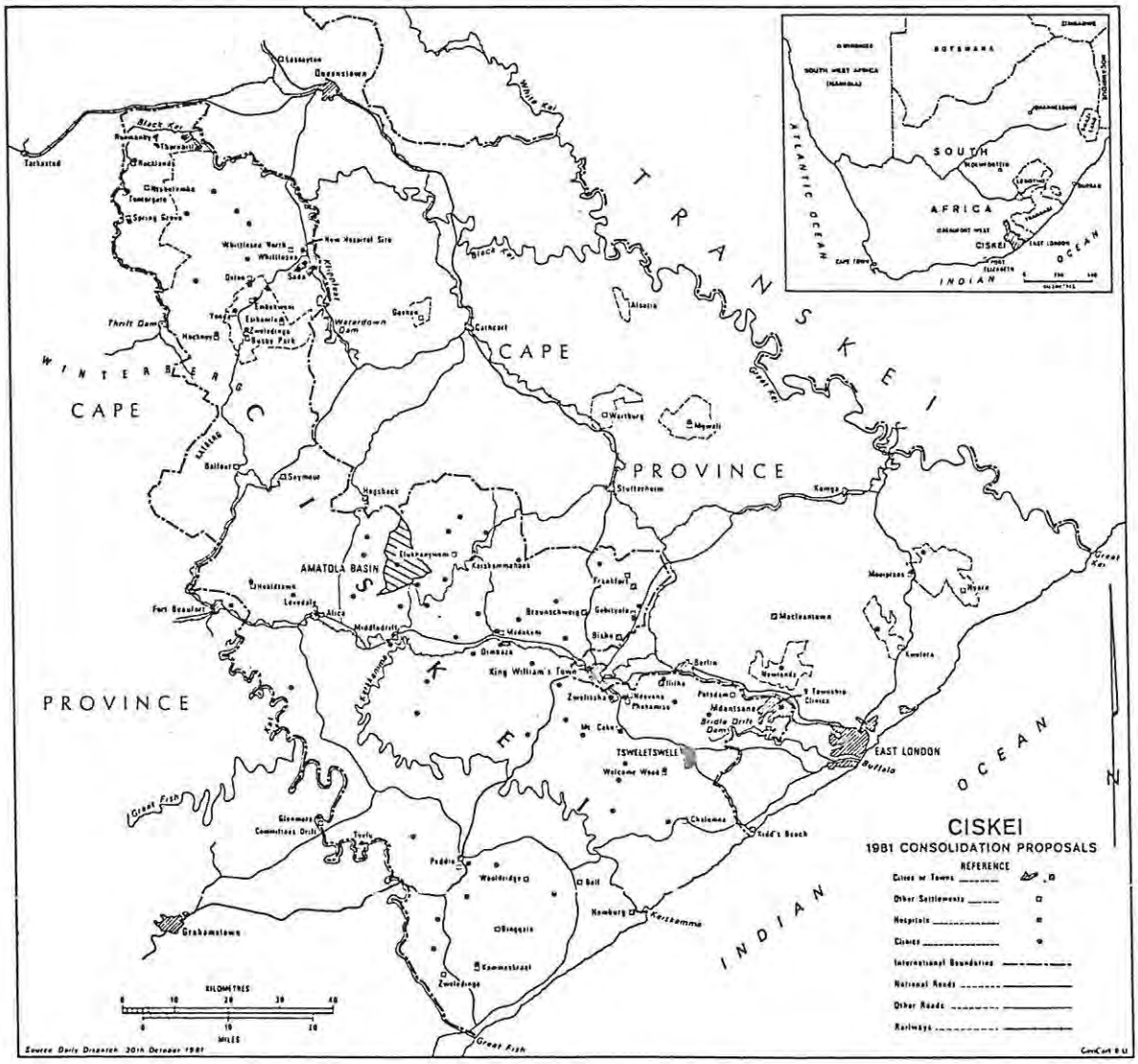

Figure 15 Ciskei

An appraisal of the de facto population in Ciskei also places the state within the category of a small territory. A total of 666 000 or 31,7 percent of all Ciskeians live within the territory; the remaining 68,3 percent live in the South African Common Area. Many of those living outside Ciskei are migrant labourers who return annually to the Ciskei after completing their contractual obligations on the mines or in other, usually urban-based employment. The density of population in Ciskei is about 126 persons per square kilometre, representing a dramatic rise of 125 percent over the period 1975 to 1980 (Daniel, 1981). The increase can be explained by the South African Government's policy of repatriation of Ciskeian South Africans to their 'homeland', the incorporation of Mdantsane into Ciskei and a high rate of national increase in the population, estimated at 3,07 percent per annum (Charton, 1982a). The result of the rise in the de facto population in the territory is that Ciskei has to support a relatively large number of people in a small area, possessing a limited resource base and scant opportunity for large scale industrial expansion and employment.

Approximately 46 percent of the population in Ciskei is urban. These citizens live predominantly in the dormitory towns of Zwelitsha outside King William's Town or Mdantsane outside East London. Significant numbers of Ciskeians are also concentrated in resettlement areas (officially designated as 'closer settlements') such as those at Ntabetemba, Zweledinga and Tsweletswele. The remaining people are located in small rural villages where the major occupation is the dry land cultivation of subsistence crops and the rearing of stock.

The overall standard of living in Ciskei must be considered low. The per capita income in 1977 was R303 compared with R530 in South Africa as a whole (Charton, 1982b). Unemployment is rife and Mdantsane, for example, has about 30 percent of work-seekers unemployed while upwards of one third of rural inhabitants in non-resettlement areas are unemployed (Charton, 1982b). The rate of unemployment in resettlement areas is probably well in excess of the above figures.

The Ciskei Commission (1980) estimates that 25 percent of the 100 000 or more economically active urban population is unemployed, and for those between the ages of 15 and 25 years, the figure is closer to 40 percent. Many people in the rural area are landless and those who practise dryland agriculture do not grow sufficient crops or have adequate stock numbers

to be considered subsistence farmers: more income probably comes from migrant remittances than from efforts to till the soil (ISER Discussion Group, 1982). Erosion is also a serious problem in most dryland agricultural areas in Ciskei, resulting in the destruction of some of the best cultivable land available (Gordon, 1981).

The resultant lack of employment opportunities in both the urban and rural areas, as well as in the resettlement areas, the inability of the land to provide even subsistence levels of living for those in rural areas and the migration of breadwinners to 'white' South Africa results in unsatisfactory health conditions in the Ciskei. High infant mortality rates and malnutrition are widespread (Ciskei Commission, 1980). Du Plessis et al. (19-) found that wasting and stunting were to be found in both rural and urban areas of Ciskei, as elaborated on in Chapter 3. Westcott et al. (1978) suggest that the Gomez classification used by Du Plessis and his co-workers to detect malnutrition is very stringent, but even so the numbers found to be at risk were considerable. Du Plessis et al. attribute the poor nutritional conditions encountered in their survey to the lack of recognition of nutritional disease by health personnel and the ignorance of healthy feeding patterns by the guardians of the children. Thomas (1980; 1981; 1982) is sceptical about ignorance being a major reason for malnutrition and rather suggests that poverty and lack of financial resources together with social dislocation at the household level are key factors responsible for households with malnourished children.

The per capita expenditure on health in Ciskei amounts to R11 or one third of that spent in white South Africa (Ciskei Commission, 1980; Gordon, 1981), reflecting the budgetary constraints as a whole within the territory. The money is used to finance a service structured specifically for homeland or 'independent' state environments within South Africa. The structure of the service is depicted in Figure 16. The large regional Cecilia Makawane Hospital is located in Mdantsane, a position remote from the majority of Ciskeians in the rural areas and small towns of the state although well situated for the needs of the urban dwellers of Mdantsane and Zwelitsha. Many people in Ciskei do not have ready access to any hospitals or doctors. "The residents of the Thornhill-Sada-Ntabathemba relocation camps, although comprising 7-8 percent of the territory's population, have no doctor" (Gordon, 1981, p.404). Where hospital services are available only the people within

walking distance; those who can afford expensive transport by taxi or bus; or those who have the time to catch a train (only to Lovedale Hospital in Alice or to Cecilia Makawane Hospital in Mdantsane) can readily make use of hospital facilities.

Most people seeking medical care in the rural areas have to make use of clinic facilities, the primary level of service offered as shown in Figure 16. Besides the central, satellite, and sub-clinics, mobile clinics operate in many areas. These mobile vehicles equipped to treat minor ailments, screen people for TB and provide family planning services, are an attempt to "ensure that all people have real access to medical care" (Smith, 1977, p.312). However, a serious problem in the functioning of the mobile clinics and the various other tiers of the health system, is the frequent vehicle failure due to poor infrastructural development. Roads are mostly gravel and tend to deteriorate markedly during rains and also in periods of prolonged drought. Hospital vehicles which convey people from the clinics to hospitals and also take hospital teams into rural communities, soon succumb to the tortuous road conditions. Vehicle failure and accidents are commonplace occurrences and village communities can find themselves cut off from mobile clinic services for long periods of time (Schrader, 1979; Gysman, 1981).

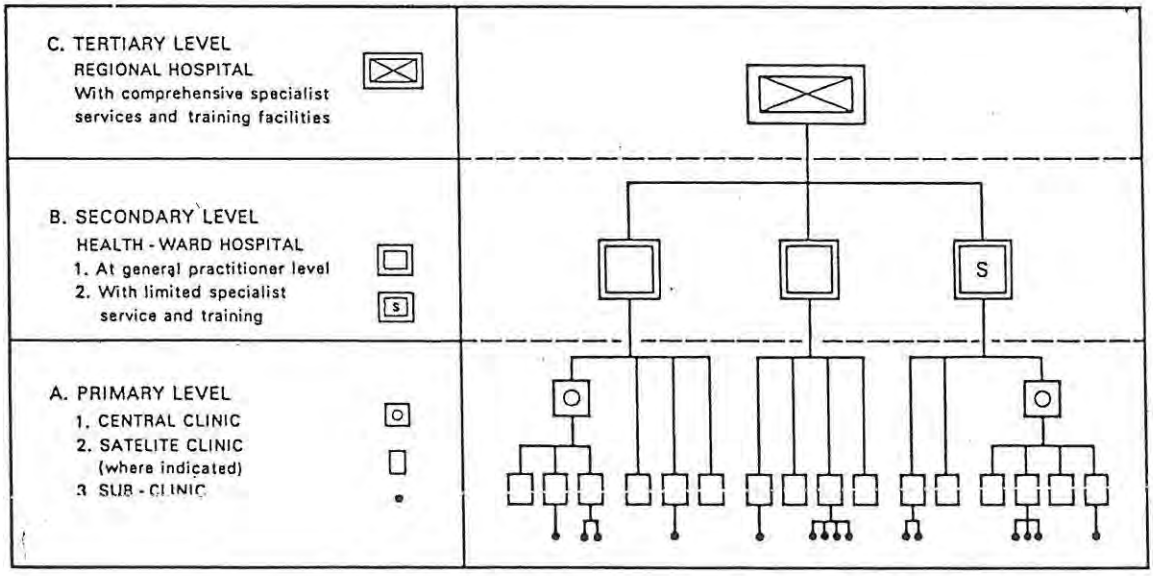

Figure 16 Structure of the Homeland or 'Independent' State Health Service

The foregoing analysis suggests that the Ciskei is a poor 'state' or region within South Africa, typified by high rates of unemployment and

generally low levels of health for its inhabitants. A rudimentary health service, in theory able to dispense care right down to the community level, is hamstrung by the Ciskeian health budget which is only able to allocate R11 per capita to health. It is within the context of a poor country with limited infrastructural development that the Amatola Basin and Tsweletswele study areas are presented. The following section provides an overview of the Amatola Basin.

2. The Amatola Basin

The Amatola Basin is a relatively isolated geographical entity located within the northern section of the Middledrift magisterial district. It is encircled by the Tyume valley to the west, the Keiskamma valley to the east and the Amatola mountains to the north. The Amatola River flows from north to south through the heart of the Basin and exits the Basin near the Fort Cox Agricultural College which is found just beyond the southern precincts of the Basin. The location of the Basin within the Ciskei is shown in Figure 15.

For purposes of study the Basin is divided into three sections: the North Valley, the South Valley and the Highlands (Figure 17). A total of thirteen villages are located within the Basin, three in the North Valley, seven in the South Valley and three in the Highlands. Komkhulu, located in the South Valley, is centrally placed within the Basin and is the hub of all Basin activities. The three gravel roads within the Basin converge on it and what infrastructural development has occurred, tends to be in the village. The chief and his tribal authority, the one high school, its main trading store, the clinic and the residence of the agricultural extension officer are all located at Komkhulu (Bekker, de Wet and Manona, 1981).

The largest village is Mqhayisa which consists of 99 households; the smallest is Chamama which has 42 households. Irrespective of size, villages present a very similar appearance to the visitor. Homesteads with their vegetable gardens and cattle pens are the key contituents. The inhabitants encountered tend to be women (very often, older people) and children, attesting to the drain of economically active members of the community to work opportunities outside the Basin.

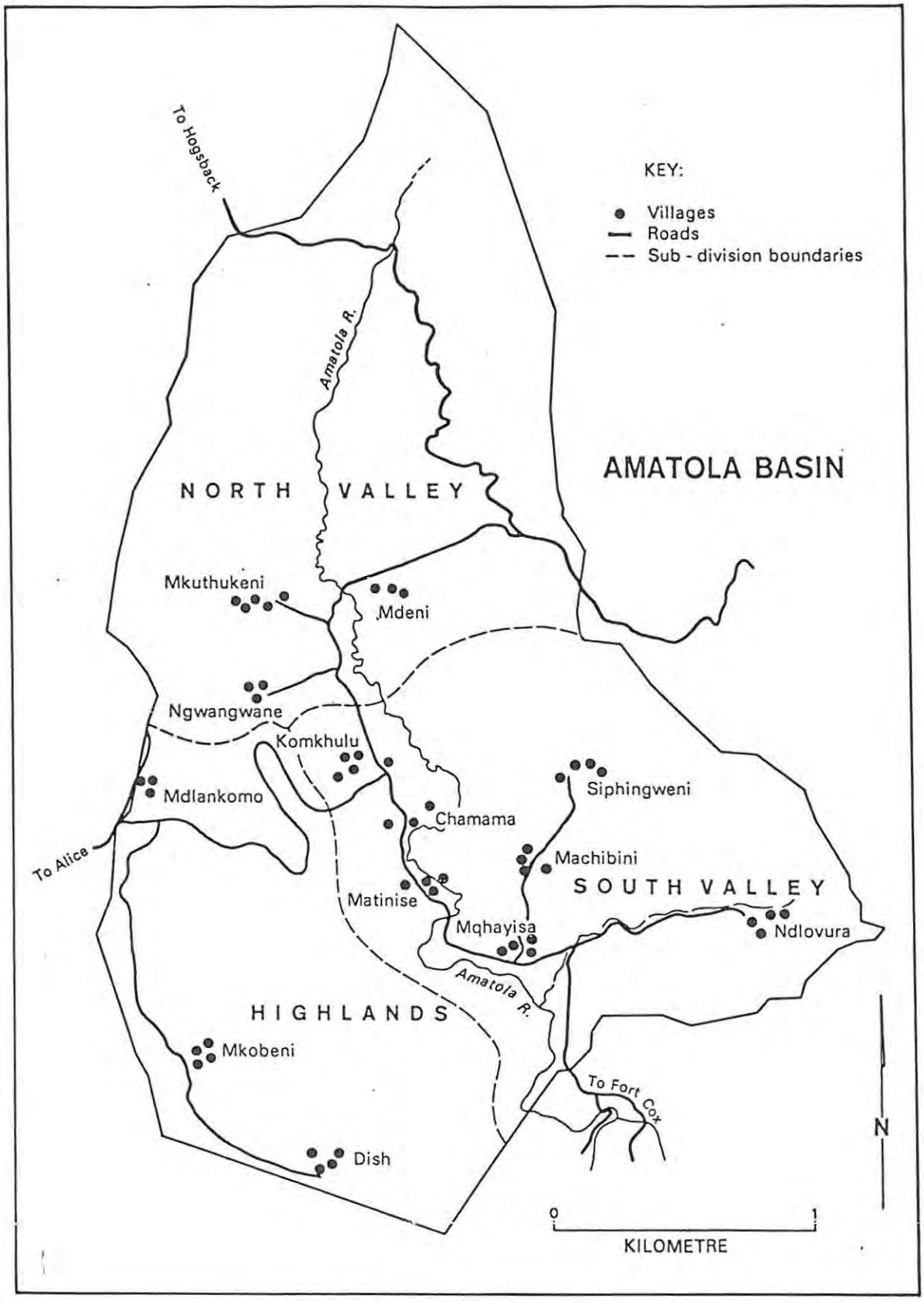

Figure 17 The Amatola Basin, Ciskei

Surrounding the villages and within easy walking distance of the homesteads are the arable lands. These lands are owned by the households under a system of perpetual quitrent. The household pays a nominal annual fee to the state in return for the exclusive right to cultivate the land. According to Bekker, de Wet and Manona (1981), 46 percent of households in the valley own land, the rest are landless. Extensive rather than intensive dryland agriculture is practised. The absence of males and inefficient land use practises result in low yields of maize and some vegetables (Ciskei Commission, 1980). Stock, mostly cattle, tended by young boys, is the other chief farming activity. Farming is essentially a subsistence activity and invariably does not produce sufficient food for the household. Migrant remittances and other sources of cash income such as pensions are needed to provide the basic household necessities.

The de facto population of the Basin is 3 817, the de jure probably in excess of 5 600 (Bekker, de Wet and Manona, 1981). Roughly 75 percent of the men and 46 percent of the women between the ages of 20 and 60 live outside the Basin; the Basin as a result is comprised almost exclusively of children and the aged. Thirty six percent of the population living in the basin are aged from birth to 10 years and 14 percent are 61 or older. Analysis at the household level shows two out of three heads of household to be male (63%), but of this 63 percent, one third is absent and "attempting to play the double role of head of household and cash earning migrant" (Bekker, de Wet and Manona, 1981, p.13). The absence of males of working age means that women and old people generally play important roles in maintaining the Basin households. The average household has 6 residents living at home; if members of the household living outside the Basin are included, then the household size averages 7,4 inhabitants. Although the figures suggest large household numbers, Amatola residents are fortunate not to have the added burden of resettlement within the Basin, as is the case in many other Ciskeian areas. There has been little influx of people into the Basin recently, making for an isolated group of people who have a positive sense of community identity.

There are few wage or salaried jobs in the Basin. The few that do exist are usually state paid posts designated, for example, for clinic staff or agricultural extension officers. Most cash coming into households does

so from migrant remittances as shown in Figure 18. Pensions and the sale (usually informally) of livestock and agricultural produce are other key sources of remuneration.

Figure 18 Source of Monthly Household Cash Income, Amatola Basin, 1981

Source: Bekker, de Wet and Manona, 1981, p.32.

It is apparent from Figure 18 that 59 percent of household cash comes from outside the Basin in the form of remittances and State pensions. Less than half the cash income of the Basin is therefore generated locally. The mean household cash income on the basis of the survey conducted by Bekker and his associates is R74 per month or R888 per annum; the mean per capita income, R16 per month or R192 per annum. The annual per capita income of Ciskeians in 1977 is estimated at R303 (Charton, 1982b). Taking into account inflation and salary increases, the 1981 real per capita income in Ciskei may be in the region of R400 (Black, 1982). The Amatola residents are therefore likely to have incomes below that of the Ciskeian average but possibly above that of the average rural dweller in Ciskei (Bekker, 1982).

The Basin has a central clinic located at Komkhulu. If the clinic is unable to treat a serious case, that case is referred to the regional hospital, St Matthew's, which is situated just outside Keiskammahoek, a distance of about 30 kilomtres from Komkhulu. Discussions with Matron Gysman (1981) at St Matthew's Hospital show that a team of two sisters visits the clinic once a month. A doctor is supposed to make a monthly call, but according to the Matron, staff shortages preclude such visits.

Furthermore, the lack of vehicles and the high rate of vehicle failure means that the ambulance service from St Matthew's to the clinic is poor. In bad weather hospital vehicles do not even attempt the journey into the Basin, no matter how urgent the need of the Basin communties. In such emergencies the residents of the Basin have to rely on their own vehicles or taxis to transport them to the hospital.

The Komkhulu Clinic, in common with facilities of its kind, provides ante-natal care, child care, domiciliary visits and aids for minor ailments. Records are kept for all patients visiting the clinic and the child care programme for children under the age of two years appears to be well-implemented. Most children in this age category are seen on a regular basis by the clinic staff. According to the clinic sisters a key factor influencing the nutritional status of the young children is that of drought. During periods of insufficient rain, crop yields fall off considerably or are non-existent and stock lose what little condition they have had. They maintain that during such periods food scarcity becomes chronic and malnutrition increases. The clinic records indicate that there were 52 cases of kwashiorkor in the Basin in 1979 and 68 in 1980. According to the local inhabitants 1978 and 1979 had been years of below average rainfall, whereas the dry conditions had been broken in 1980, in time to positively affect the crop for the following year. If environmental conditions affect crop yields, which in turn affect the nutrition of children, then the number of malnourished children should have decreased in 1981.

The author examined the records of the St Matthew's Hospital Nutrition Clinic which included information on Amatola Basin children. All children falling below the 3 percentile of the Boston weight for age norm were recorded by the clinic staff on a monthly basis. According to these records an average of 73 Amatola children per month fell below the 3 percentile in 1979. In 1980 the number was 94 and for the months preceeding the nutritional survey in November 1981, the number was 33, a dramatic reduction from the previous two years. From these preliminary findings prior to instituting the survey it would appear that local environmental conditions affecting crop production can play a role in the nutritional status of the Basin inhabitants. The nutritional survey would therefore take place during a year in which crop production had been better than in previous years, a factor which may have a positive affect on nutritional status in general.

3. The Tsweletswele Closer Settlement

The settlement of Tsweletswele, as indicated in Figure 15 is situated in the extreme south-eastern corner of Ciskei, about twenty kilometres due east from Zwelitsha and thirty kilometres due west of the city of East London. It lies on a coastal plateau between an escarpment situated further inland and the less elevated coastal plain of the Indian Ocean. As the crow flies, the settlement is situated approximately fifteen kilometres from the sea.

The indigenous vegetation in the vicinity of Tsweletswele consists predominantly of thornveld bushes and a mixture of sweet and sourveld. Wattle has been grown extensively in the area where the settlement developed and has spread into the indigenous flora. Commercial farmers towards the coast have also cleared the indigenous bush to develop large pineapple plantations, and a number of stock farmers practice extensive agriculture around Tsweletwele.

For administrative purposes, Tsweletswele falls within the Amakhambashe Tribal Authority area of jurisdiction (Figure 19). The Ciskei Tribal Authorities of Nowawe, Imighayi and Chalumna lie to the north, west and south of Amakhambashe, respectively. East of Amakhambashe lies land which has been declared a Released Area (No. 64) and is scheduled for incorporation into Ciskei. At present, this land falls under the jurisdiction of the South African Government. The Tribal Authority headquaters is located ten kilometres east of Mount Coke on the main Zwelitsha-East London tarred road. Three kilometres further east, a second major tarred road runs south to Kidds Beach on the coast. At this junction, lying immediately south and west of these two tarred roads, is the settlement of Tsweletswele.

Tsweletswele covers an area of approximately 6 square kilometres. A well wooded area to the east of the Kidds Beach road forms the catchment for the Gxulu river dam where there is also some grazing land. The bulk of the settlement is found to the south-west of the junction of the tarred roads. Most of the area in which Tsweletswele is situated is uninhabited and consists of thorn bushes and trees which grow densely in the many valleys as indicated in Figure 20. Effectively, the Quru river to the west, and the Gxulu river to the east form boundaries for the settlement.

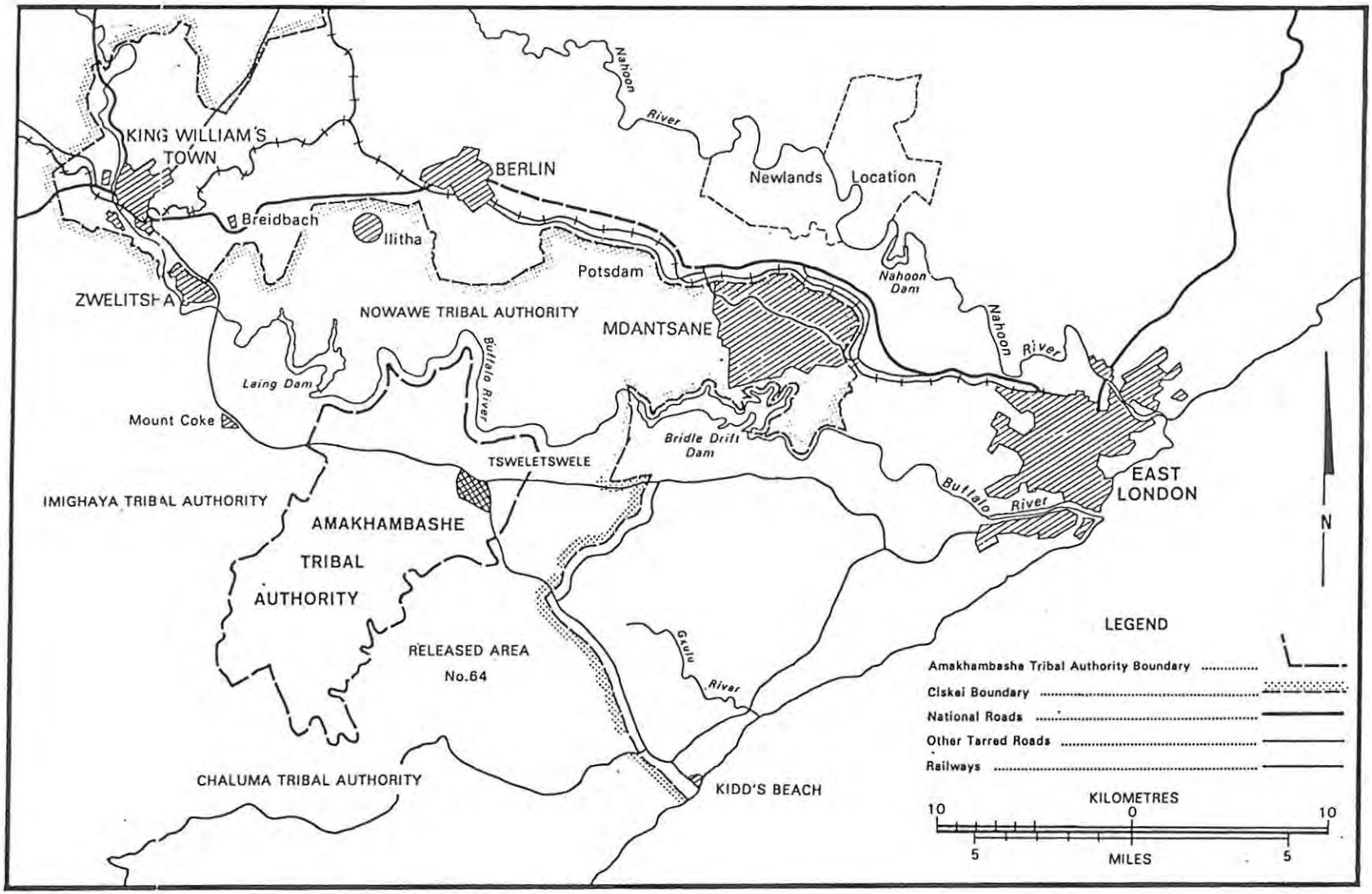

Figure 19 The Location of Tsweletswele within the Amakhambashe Tribal Authority Area

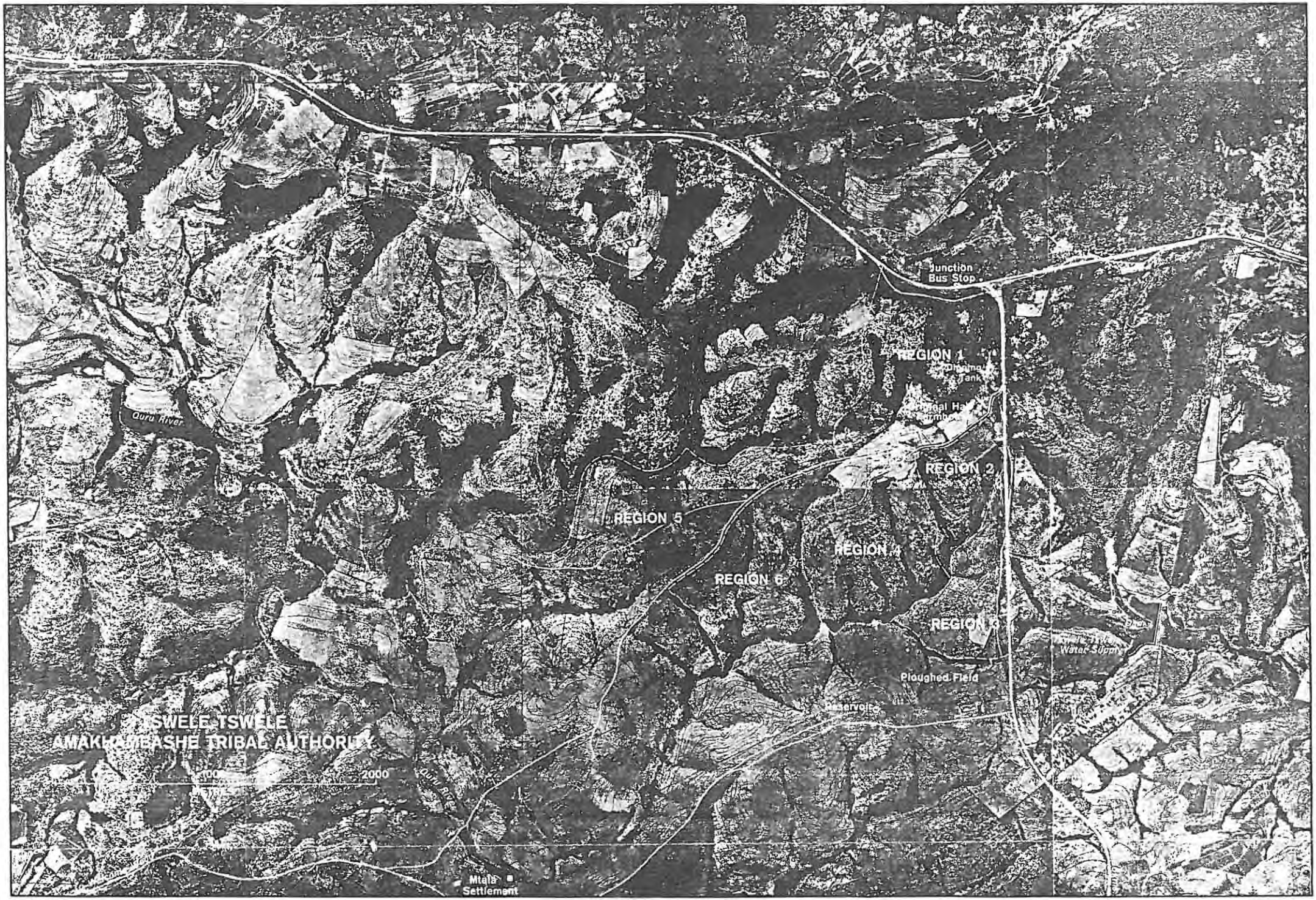

Figure 20 Regional Breakdown of Tsweletswele

The physical development of the settlement was probably influenced by three major factors. In the first place, Amakhambashe authorities and the first residents of Tsweletswele were keenly aware of the proximity of regular bus service to East London. The bus-stop at the junction was a major issue in deciding upon homestead location. Secondly, the strip of land east of the Kidds Beach road is not considered to be available for residential purposes by the local authorities. Since the Gxulu Dam, the major source of water supply, is situated in this strip, homestead development tended to take place as close to the strip as possible but outside the immediate catchment area of the dam so as to reduce the distance from this resource to a minimum. Finally, since Tsweletswele used to be a white-owned commercial farm with rudimentary gravel roads, homestead development has tended to follow these roads which run west from the Kidds Beach tarred road. As a consequence, homesteads are clustered along the western side of the Kidds Beach road and are found densely packed in the north in the vicinity of the original farm house. This particularly dense cluster of homesteads is accessible to vehicles on a number of passable dirt roads, is close to the junction bus-stop and is within walking distance of the Gxulu Dam situated at some two kilometres from the farm house.

Tsweletswele can best be described as a semi-rural community which owes its origin to essentially two factors. As stated previously, mechanization on white commercial farms in Albany and other areas of the Eastern Cape has resulted in a declining demand for black labour. Those farm workers whose services have been terminated have little alternative but to return to their 'homeland', Ciskei, since farmers cannot or are unwilling to have excess people on their properties. Many ex-farm workers opt for the 'urban' environs of Ciskei rather than having to face the prospect of trying to eke out a living as rural peasant farmers. Unfortunately many immigrants cannot find accommodation in urban centres because complexes such as Zwelitsha and Mdantsane are experiencing rapid growth at present. As Smit (in Maré 1980) says, an important step in the South African government's efforts to restrict black urbanization in 'white' South Africa is to promote the urbanization of the homelands and 'independent' states. As a result of this strategy, local authorities in Ciskei cannot keep up with the pressure from immigration and housing is in short supply. Many migrants displaced as a result of government policy or because of the curtailment of labour on commercial farms therefore seek accommodation on the periphery of the already established

urban centres. Accommodation in these peripheral settlements such as Tsweletswele also has the advantage of being cheaper than that in the formally established urban centres, since there are no rentals to pay out of limited household funds (Bekker et al., 1983).

In addition, timber, ample water and available land have attracted displaced people to Tsweletswele. Since timber is an important and inexpensive form of fuel and water a commodity in short supply in many resettlement areas, their availability makes the settlement a desirable one. It is worth noting that Tsweletswele differs from many other resettlement areas in Ciskei in that people have moved there on a voluntary basis.

Employment opportunities for community members are scarce as a result of general unemployment in Ciskei, as discussed in section B(1). Those opportunities which do exist are in East London, although Mdantsane and Zwelitsha offer some opportunity for employment. Those that are employed usually spend the week close to the source of work. For example, those who work in East London may rent lodgings in the black township of East London, Duncan Village. Almost all workers return to Tsweletswele for the weekends so that one can consider them as commuters rather than migrants.

The nutritional survey of Tsweletswele was undertaken as part of a wider survey which sought to assess the 'strategies for survival' of the inhabitants of the settlement. The rationale for the wider survey and the role of the nutrition survey will be discussed in more detail in chapter 5 on the research methodology. The wider survey is mentioned, however, since the following information is drawn from the ISER report of that survey, of which I was a co-author (Bekker et al., 1983).

There are approximately 800 homesteads in Tsweletswele, 80 percent of which have been built during the past three years. By using the regional subdivision displayed in Figure 20, it is possible to estimate the distribution of these homesteads. Region 2 is the densest and oldest residential cluster in Tsweletswele. In other regions, most homesteads have been built more recently, especially since 1982 and their residential plots and gardens are usually larger. Homesteads are found in two other areas of Tsweletswele. A few are scattered to the east of the Kidds Beach tarred road in the vicinity of the Gxulu Dam, and a small cluster has grown at the Mtala settlement in the extreme south of

Tsweletswele on the banks of the Quru river. Estimates of the number of homesteads found in each region are given in Table 4.

Table 4 Approximate Number of Homesteads in Tsweletswele, October 1982

Region 1	130
Region 2	200
Region 3	130
Region 4	70
Region 5	175
Region 6	60
Vicinity of Gxulu Dam	15
Mtala Settlement	20
Tsweletswele	800

Source: Bekker et al., 1983, p.6

Figure 21 shows the sex and age pyramid for the population of Tsweletswele. The permanent residents amount to 5 313, commuters 1 340 and migrants, predominantly males, a further 204, giving a total population of 6 857.

Major characteristics of this demographic profile are worthy of note. First, the young form a majority of the resident population of the settlement. Two out of every five residents are under the age of ten, and two out of every three under the age of twenty. Secondly, adult residents are overwhelmingly women. Thirdly, when the commuter profile is considered, it is clear that men predominate. Sixty percent of adult men (aged 20 to 60) are commuters whereas two out of every three adult women are permanent residents in Tsweletswele. In sum, during the week, Tsweletswele is a youthful community with mothers or grandmothers caring for homesteads and children, whilst over weekends, fathers and, to a lesser extent mothers, return to their homesteads.

Very little income is generated within Tsweletswele. The bulk of earnings come from residents working elsewhere. The role of earnings from commuters and migrants is particularly important. Bekker et al. (1983) estimate that 82 percent of households include at least one commuter; if contract migrants are included, 85 percent of households obtain a proportion of income from wage earners living and working

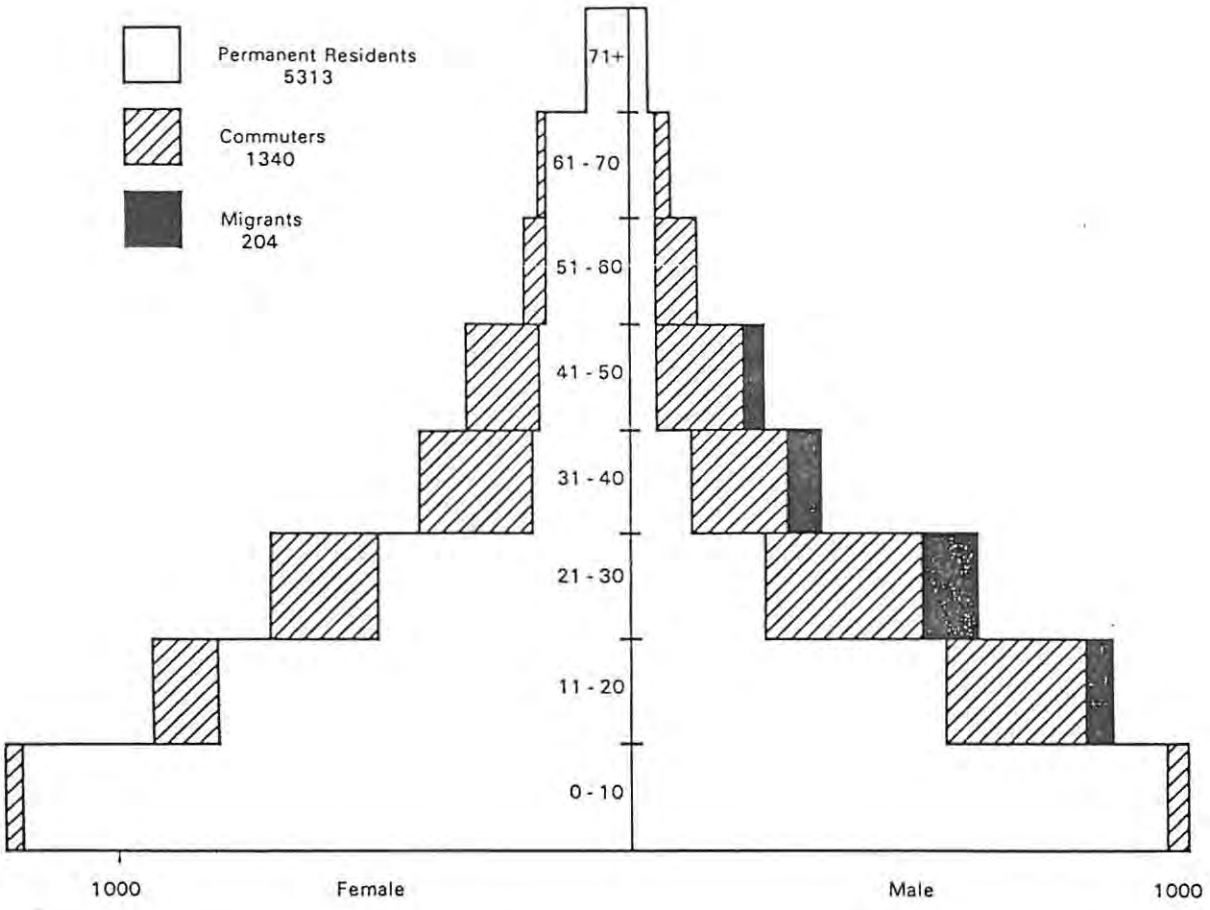

Figure 21 Age and Sex Pyramid, Tsweletswele, October 1982

Source: Bekker et al., 1983, p.32.

outside Tsweletswele. Other sources of income are pensions and the very meagre earnings from people employed in Tsweletswele. By aggregating the various sources of income, Bekker et al. (1983) calculate the mean monthly household income to be R50 and the mean monthly per capita income to be R8. A comparison of these incomes with those of Amatola Basin residents (mean households income R74 per month; per capita income, R16), shows the immense poverty of Tsweletswele.

The Amakambashe Tribal Authority (KTA) area of jurisdiction falls, for the purpose of the delivery of both preventative and curative state health services, under Mount Coke Hospital. The hospital is responsible for 23 permanent clinics with resident sisters in 23 different villages, and 30 subclinics, health points visited on a weekly basis by a mobile team from one of the permanent clinics. A major problem facing the satisfactory operation of the subclinics is that of transport. Mount

Coke Hospital has 14 vehicles at its disposal and has servicing facilities provided by the Ciskei Department of Transport at Mount Coke. During one week in September 1982, only two of the fourteen vehicles were road-worthy. Mobile clinics therefore fail to make their scheduled weekly visits to subclinic points on numerous occasions due to the unavailability of vehicles in working order.

Tsweletswele is serviced by a mobile clinic and the 'clinic' marked on Figure 20 represents the vehicle which arrives, supposedly each Monday, to deliver services 'under a tree'. Vehicle failure means that the service to the settlement is irregular. During 1982, the mobile clinic arrived 34 times out of the 52 scheduled visits. Vaccination programmes for children (for example, measles) are, therefore, poorly attended because many guardians do not go to the mobile clinic point on the grounds that the vehicle 'will not come'! The regular monitoring of the nutritional status of children is also not possible because of the irregular service. Two important aspects of the children's health status, immunization and nutrition, are therefore almost entirely neglected because of the poor access inhabitants have to medical care.

At the time of the survey the Ciskeian authorities regarded Tsweletswele as a temporary settlement. The lack of infrastructure in the settlement attests to the authority's view that the inhabitants of the settlement should be resettled in undisclosed rural areas of the Ciskei. Poverty, combined with the availability of minimal preventative medical care suggests that the survey was to take place within a community hardpressed to maintain the health of its inhabitants.

C. Chapter Summary

The Eastern Cape is an economically depressed region within the South African space economy. Initial research, in the form of a pilot survey, was conducted in the Albany magisterial district. At least two important issues arise from the outline of the characteristics of Albany. First, urban blacks in small towns such as Grahamstown, generally live in conditions of poverty. Low wages and high levels of unemployment are key variables responsible for the poor conditions. The result of low wages and unemployment is that those who are employed have to support the unemployed as well as large numbers of young children and the aged. Secondly, analysis of conditions of blacks on white farms suggests that

they too live in situations of impoverishment. Salaries are low and hours of work long. Mechanization and efforts to increase farm profitability have effectively brought about a decreased demand for farm labour. The farm labourer population in Albany is therefore declining, a trend likely to be characteristic of the Eastern Cape farming areas as a whole.

The Dias Divisional Council area incorporates the Albany district. The physical environments incorporated within the Dias area vary from coastal to semi-coastal and inland ones, but the nature of employment for blacks throughout the region is similar: they are essentially labourers on white farms. As in the Albany district, health services for blacks include hospitals, clinics, mobile clinics and specialized TB and mental hospitals. Skimmed milk powder for young childen who fall below the third percentile of the Boston weight for age norm is available at all municipal clinics.

The Ciskei is an 'independent' state within the Reublic of South Africa. The South African government provides financial assistance but the country is expected to run its own internal affairs. The Ciskei can be considered a small country with a weakly developed infrastructure, little potential for industrial development and a population suffering from varying degrees of endemic poverty. The overall standard of living is low and high rates of unemployment are exacerbated by migration of the more capable individuals to jobs outside the country. Urban areas appear to be better off than rural areas in general. The resettlement or closer settlement areas are the worst off because of the lack of employment opportunities and the generally low level of skill of the inhabitants.

While no previous community-based studies of nutritional conditions have been undertaken in the Eastern Cape, studies completed in Ciskei suggest that wasting and stunted growth are both problems. The health care system is designed to incorporate preventative medicine as an important constituent in its makeup. Clinics are the primary level of health care available to most Ciskeians, especially those in the rural and resettlement areas. Four regional hospitals and the major hospital at Mdantsane provide the more sophisticated levels of health care.

Two communities are studied in Ciskei. The Amatola Basin Community is a relatively isolated but stable one. Dryland cultivation and the raising

of stock for subsistence purposes are important activities. Drought can minimize the availability of food, and in years when it occurs nutritional status may be adversely affected. Migrant remittances, pensions and salaries of people working in the Basin are important sources of household income. The standard of living provided from these various sources of funds is low, but probably above average for rural Ciskeians, largely because of the stable nature of the Basin's community and the lack of immigration and resettlement of people in the area. Tsweletswele, in contrast with the Amatola, can be characterized as a dislocated community with conditions aggravated by the almost total lack of a suitable infrastructure and the sense of impermanency of the settlement. The Ciskei government sees the settlement as temporary and has failed to provide any funds to upgrade it. At present the settlement is home for commuters who work mainly in East London and Mdantsane and many others who are unemployed after having moved into the settlement in recent years.

In summary, the study area consists of a number of separate communities distinguished by their location within the Eastern Cape and Ciskei, the nature of employment within each community and the prevailing socio-economic conditions. The material presented suggests that the overall level of welfare experienced by blacks in the study area is low, with that in Ciskei being the least satisfactory. It may be expected that levels of nutrition will reflect the varying conditions encountered in the different communities.

CHAPTER 5

THE RESEARCH METHODOLOGY

The material presented in this chapter can be conveniently separated into five sections. The initial two sections, dealing with the period January 1980 to January 1981, summarize the thinking and work undertaken prior to the launching of the major Dias survey. The conceptualization of the survey of the school entrants in the Albany magisterial district hereafter referred to as the pilot survey, is taken as a convenient starting point for section A. In the section some of the problems encountered by the author in operationalizing the survey are discussed together with an account of the survey methodology and the results of the survey. Section B recounts the assessment process which followed the completion of the pilot survey and minor field work undertaken in the Albany area. The assessment process consisted of considerable discussion with Department of Health officials and researchers who had a knowledge of community-based survey work. On the basis of these discussions, and the author's own assessment of the pilot survey, the survey design was refined so that it would be more suitable for cross-sectional surveys of various communities in the Eastern Cape, the first of which was to be the Dias survey planned for January 1981. The methodology and results of the survey work undertaken prior to the Dias survey are presented, the results, as in section A, being included since they are important for a full understanding of the evolving research methodology which formed the basis of all later surveys. Section C outlines key features of the Dias, Amatola Basin and Tsweletswele surveys, stressing the similarities and unique features of each survey design. The Dias survey, for reasons outlined in this section, only took place in May 1981. The Amatola Basin survey took place in November 1981 and the Tsweletswele survey, in October 1982. Section D puts forward the research hypotheses, or problem statements, which provide the framework for the presentation of the results of the three surveys which follow in chapter 6. Section E consists of the chapter summary.

A. The Pilot Survey of School Entrants, January 1980

The Institute of Social and Economic Research (ISER) in collaboration with the Department of Health, undertook an anthropometric survey of

black Sub A and Sub B pupils 8 years old or younger at schools in both the rural and urban areas of Albany in January 1980. The reasons for this joint pilot survey were twofold. First, news media coverage of the MOH's annual report focussed attention on nutritional issues in Albany, suggesting that malnutrition was rife. Secondly, the Department of Health maintained that on the basis of the information available from clinic records, malnutrition did not appear to be a major problem and community surveys were necessary to make an accurate assessment of the situation.

Some of the key factors of all future survey work soon emerged as preparation for the pilot survey got underway. In discussion with Department of Health officials from the Division of Nutritional Services and the Head Office in Pretoria and from the Regional Office in Port Elizabeth, it was decided that the ISER would undertake to formulate the design of the survey and the Department of Health would supply the personnel and equipment needed to carry out the anthropometric measurements of children. Qualified sisters from the Department of Health were therefore seconded to the project for the duration of field work. The advantage of using these sisters, both black and white, was that it was unnecessary to school them in many of the nutrition and health issues essential for them to undertake the field work. They had a thorough grounding of nutritional concepts and were capable of identifying independently signs of malnutrition in children, for example, thin, pale (reddish) and weak hair and oedema so common in children suffering from kwashiorkor. Sisters from the Department of Health formed the backbone of all surveys other than that undertaken at Tsweletswele. However, the same principle governed the choice of team personnel in the case of Tsweletswele. Via the office of the President of the Ciskei and the superintendent of the Cecilia Makawane Hospital in Mdantsane, two community workers, one a sister and the other a nurse with experience in community work, were provided for the survey.

The need to provide the Department of Health with results as soon as possible made it necessary to survey a readily accessible population. School entrants appeared to offer the solution. The rationale behind the choice of school entrants was that their nutritional status should reflect that of their younger brothers and sisters, the children less than five years old and at greatest risk to nutritionally related morbidity and mortality, as stated previously in the preface and chapter

2. To make use of such a methodology, it was assumed that weight for age as measured on the Boston scale was an acceptable measure of the present nutritional status of school entrants. Presupposing co-variation between weight for age and height for age (the measurement of long term nutritional status or stunting) on the Boston scales, height for age of school entrants should be a useful indicator of the nutritional conditions prevailing among pre-school children. As such, the survey results were seen to offer a means of pinpointing those communities, represented by the school children, that had high numbers of children at risk and where nutritional intervention needed to be targeted.

Prior to conducting the actual pilot survey, preliminary fieldwork was undertaken to establish whether any major problems existed in executing the survey. The following section outlines key issues which emerged from the work and which had a bearing on all future survey work undertaken.

1. Fieldwork Undertaken Prior to the Pilot Survey

Visits were made to an urban school in Grahamstown and a farm school in the Seven Fountains area of the Albany district. A meeting was also held with the circuit inspector from the Department of Education and Training. The inspector stressed that children were accepted at schools only on being able to provide a birth or baptismal certificate. From the author's point of view it was important to know that the exact ages of the children were available since the key anthropometric measurements of the survey, weight and height, had to be assessed against the ages of the pupils. Discussions with the headmistress of a Grahamstown school appeared to substantiate the inspector's claim. She maintained that the ages of the children were taken from either their birth of baptismal certificates and then transferred onto the school register. The register ages of children were therefore accurate. The visit to the rural school, however, shed doubt on the universal availability of certificates to verify the ages of children. The teachers somewhat hesitantly stated that many children had no certificate to indicate ages. Two problems appeared to give rise to the lack of certificates. Births have to be registered with the magistrates court in Grahamstown and the friction of distance simply meant that many farm-based families did not register their childrens' births. Another problem arose because parents appeared to be afraid that if they registered their children, it would have to be as citizens of one of the homelands, invariably Ciskei for blacks in the

Eastern Cape. Rather than be relegated to the status of homeland citizens they preferred to confer a measure of anonymity on their children. The school registered age of the children as a result often reflected the teachers assessment of the age of children rather than their actual ages. These registered ages, given to a particular day and month were made to satisfy the visiting school inspectors who would exclude any child from attenting school if their 'exact' ages were not shown on the school register!

Clinic cards, used for recording immunizations and other pertinent health related data, were available for some children. The age of the child is recorded on the card. As a result of the preliminary fieldwork, it was decided to record the certificate age of the child, that age coming from either a birth certificate, a baptismal certificate or a clinic card. In addition, the register age would be recorded as well as the age of the child as given by the child. In this way ages could be ascertained for all children, although those coming from the school registers and the children would have to be carefully assessed.

The fieldwork in the rural areas also revealed that a farm school is only erected once the Department of Education and Training has received a request from the farmer to do so. Many farmers were not interested in having schools on their farms so that children often had no access to schooling at all and others had to walk substantial distances to attend the nearest school. It did appear as if some children who had no access to schooling would not be picked up in the survey and that they may be the ones who were on farms where living conditions were particularly unsatisfactory. This observation was confirmed by the farm school teachers who suggested that one of the farmers who refused to have a school or allow his labourer's children to go to school, also paid the lowest wages in the district. There appeared little one could do to assess the nutritional status of children not attending school but it was possible to see whether the distance pupils had to walk to school influenced nutritional status. Distance walked to and from school was therefore included as a variable in the assessment of all children surveyed, on the assumption that those who walked long distances may consume more energy than was supplied from the intake of their daily food allowance.

Teachers at the schools also suggested that the guardian of the child was another important factor in dictating regularity of attendance at school

and, very often, the state of health of the child. Grandmothers were cited as the ones invariably in charge of poorly kept children. Grandparents and female relatives, it seemed, had to care for children while parents migrated elsewhere in search of job opportunities. 'Grandmothers' were also mothers of young daughters who had had illigitimate children. Custom dictates that the parents of the daughter bring up the child, the daughter often abandoning the child to the mother as she seeks self-advancement elsewhere. The guardian of the child was therefore another factor analyzed in the survey, key results of which are highlighted in the following section.

2. The Execution and Results of the Pilot Survey

During the last two weeks of January 1980 survey teams were dispatched to both urban and rural primary schools. Each team carried a good quality bathroom scale to measure the weight of children in kilograms and a standard measuring rod and base for measuring height in centimetres. A data sheet provided the means on which to record age, sex, guardian, weight and height of the child, as well as the daily distance walked to and from school.

It is worth mentioning that clinical scales were initially used to obtain the weight of children. The nature of the roads, many with very poor surfaces, soon destroyed one of these expensive machines and it was considered expedient to find an alternative weighing system. A substitute system was developed in which a set of good quality bathrooms scales were purchased, checked for accuracy and then used. The scales were checked, or calibrated, each morning and each afternoon (i.e. before and after use) against a standard weight, approximately the same weight as the average child being weighed, to see that no significant alteration had occurred in the weighing mechanism. The scales proved to be durable and an alternative to big and unwieldly clinic scales. This latter point is important in a situation where the survey teams are travelling considerable distances and the use of easily managed equipment becomes a relevant factor.

It was the intention to survey all 93 farms schools and the eight 'urban' schools in the centres of Alicedale, Riebeek East (one each) and Grahamstown. In reality, 73 farms schools, representing 78 percent of all farms schools and all the urban schools were surveyed. The coverage

of the farms schools was planned in such a manner that, even if all schools were not surveyed, representative schools from all areas would be included in the survey. In all, a total of 2 823 Sub A and Sub B pupils from urban and rural schools were surveyed. As the preliminary survey work suggested, certificated ages were not easy to obtain. A total of 216 or 7,6 percent of the children produced certificates to verify their ages. The principals of the urban schools insisted that the register age of all children were obtained from certificates presented by the students at the start of the school year. News of the survey (Appendix 1) however had not reached them so that they had not asked pupils to bring certificates to school. Only the Tantyi primary school headmistress had received the letter and 142 pupils at the school were able to produce certificates verifying their ages.

The survey data, were captured on computer tapes. A statistical package called SPSS (Statistical Package for the Social Sciences) (Nie et al., 1975), was used to process the data. The following results are singled out for discussion since they have a bearing on the design of the surveys which followed that of the pilot survey.

a. The Assessment of Age

The product moment correlation coefficient was used to assess the association between certificate age, register age and the age given by the pupils. Assessment of certificate and register age of pupils at Tantyi revealed on almost perfect correlation ($R = 0,99$, $p\ 0,00001$). The analysis of certificate age against the age given by the child revealed a very low correlation of 0,29 which was not significant at the required confidence level. The statistical analysis supported observations made in the field, namely that in the urban areas, tighter administrative controls imposed on the schools by the Department of Education and Training and the assertions of the school principals, suggested that register ages may be taken as accurate indications of the actual age of children in the town. Children, on the other hand, did not know their ages accurately, that is to the nearest month, so that ages given by pupils were unsatisfactory for the anthropometric analysis of nutritional status. In the rural areas, the correlation between certificate age and register age was low, 0,38, and not significant at the 0,00001 level. As preliminary work had suggested, the registers in the rural schools cannot be used in place of certificates to ascertain the accurate ages of pupils.

b. The Survey Results

Table 5 presents the results of weight and height for certificate age according to the Boston norms.

Table 5 Assessment of Weight and Height for Certificate Age According to the Boston Norms, Pilot Survey, January 1980

	Number and Percentage Below the 3rd Percentile				
		Weight for Age		Height for age	
Location	No. of Children	No. <3P[1]	%<3P	No. < 3P	%<3P
Rural Farm Schools	73	26	35,6	23	31,5
Tantyi Primary School, Grahamstown	143	83	58,0	92	64,8
Total	216	109	50,5	115	53,2

[1] Third percentile

If the third percentile of the Boston weight for age norm is taken as indicating those children at risk, then children at Tantyi (58,0%) have greater numbers at risk than those children in the rural areas (35,6%). A similar position exists if the measure for long term nutritional status, height for age is examined. Twice as many Tantyi children (64,8%) as rural children (31,5%) fall below the third percentile.

A simple non-parametric test, the Chi-square test (X^2), was used to assess whether or not statistically significant differences existed between the various values given in Table 5. The Chi-square analysis confirmed that the difference in levels of children below the third percentile in the urban and rural areas, using weight and height for age

measures, is significant at the 0,05 level. Significantly more children in the urban areas, represented by the Tantyi results, are at risk than in the rural areas.

A comparison of the weight for age and the height for age results shows that 83 (58,0%) weight for age cases and 92 (64,8%) of height for age cases from Tantyi fall below the third percentile. These differences are not significant at the 0,05 level. Similarly those differences in weight and height for age for the rural cases are not significant. Weight and height for age therefore appear to co-vary. In terms of the postulate that if they co-vary, height for age could be used as a measure of the nutritional status of pre-school children, the results indicate that in excess of 60 percent of the total pre-school population is at riks to malnutrition in the urban environment and about one third in the rural environment.

If registered age is accepted as being compatible with that of certificate age in the Grahamstown schools, then height for register age results should be an accurate reflection of the long-term nutritional conditions of the children in the Grahamstown townships. Table 6 shows the results of height for register age of Grahamstown community schools. The lack of compatibility between certificate age and register age in the rural areas precludes register ages being used in the assessment of nutritional conditions.

Table 6 Assessment of Height for Register Age According to the Boston Norms, Grahamstown Schools, Pilot Survey, January 1980

School	Number and Percentage Below the 3rd Percentile		
	No. of Cases	No. < 3 Percentile	% < 3 Percentile
Tantyi Primary	270	161	59,6
Fikizolo	297	163	54,9
St. Peter Clavers	63	34	54,0
Samuel Ntsila	329	200	60,8
Samuel Ntlebi	239	163	68,2
C.M. Vellum	218	140	64,2
Total	1416	861	60,8

The results indicate that on average just over 60 percent of all Grahamstown children surveyed display stunted growth. By implication, the pre-school children - the brothers and sisters of the school children in many instances - will also display similar levels of malnutrition.

Since so few children possessed birth certificates, the use of age - dependent anthropometric measures appeared to be seriously hampered, and the age - independent criterion of weight for height was employed. Table 7 summarizes the results.

Table 7 Assessment of Weight for Height According to the Boston Norms, Pilot Survey, January 1980

Location	Number and Percentage Below the 3rd Percentile		
	No. of Cases	No. < 3 Percentile	% <3 Percentile
Urban Schools	1 716[1]	449	26,2
Rural Farm Schools	1 107	374	33,8
Total	2 823	823	100,0

[1] It will be noticed that the number of cases of urban children in Tables 6 and 7 differ, the reason being that children from the Riebeek East and Alicedale Schools are included in Table 7.

Tables 5 and 7 appear to contradict each other in predicting the number of children at risk. Since weight for height can be considered to assess present nutritional status, the results from Table 7 must be compared with the weight for age data in Table 5. Whereas the weight for age results suggest that urban children are at greater risk than rural children, the reverse is true of the weight for height results. While 58 percent of the Tantyi children fall below the third percentile, only 26,2 percent of all urban children fall below the third percentile on the weight for height norm. The weight for age (35,6%) and the weight for height (33,8%) results are very similar for the rural children, but in the case of weight for height more children are at risk than those from

urban areas. Another factor to consider, other than the contradictory nature of the data from Tables 5 and 7, is that weight for height and height for age do not co-vary, so casting doubt on the ability to comment on the nutritional conditions of pre-school children using these measures.

The discrepancy in the results from Tables 5 and 7 poses problems for the interpretation of the survey findings, an issue which will be discussed more fully in the following section. In concluding the discussion of the above results, one must acknowledge that the inability to verify age severely restricted the use of age-dependent measures of nutritional status. In spite of these limitations, the certified ages available and the accuracy of school register age in the township schools, made it possible to pick up trends regarding nutritional status of children in Albany. The measures of weight for age and height for age co-vary. The nutritional status of school entrants would therefore appear to be indicative of that of the pre-school children. The results suggest that over 60 percent of urban school children suffer from stunted growth or long-term nutritional deficiency compared with about 30 percent for rural school entrants. By implication, malnutrition appears to be a problem among pre-school children, with conditions most unsatisfactory in the urban areas.

Other important findings to emerge from the pilot survey concern the assessment of the guardian of children and the distance walked to and from school by the pupils. In both cases the children were unable to supply the required information. The nursing sisters found the children confused as to who was caring for them, possibly because of the extended nature of the family. The children were also unable to say with any degree of accuracy how far they walked to and from school. Clearly, the school entrants were unable to supply important information to the survey teams, another factor which needed to be considered in the assessment of the pilot survey.

B. Research Prior to the Dias Divisional Council Area Survey, February to December 1980

Discussions about the pilot survey results were held with Department of Health officials and researchers in various parts of the country. In this section these discussions are considered briefly in so far as they

affect the evolution of the methodology adopted for the three major surveys. Thereafter, the additional fieldwork undertaken prior to the Dias survey is appraised.

1. Discussions with the Department of Health

On the basis of the pilot survey the author prepared a report for the Department of Health. A meeting was arranged to discuss the report with a delegation of health officials. The report proposed that nutritional conditions were unsatisfactory in Albany, with the most serious problems to be found in the urban centres. As a short-term measure it was recommended that a supplementary feeding scheme be instituted for all school entrants in the urban centres and that the nutritional status of the pre-schoolers be carefully monitored through the available health infrastructure, that is, at the municipal clinics, the Day Hospital and Settlers Hospital. It was further recommended that nutritional surveillance be an ongoing process so that a more complete picture of nutritional conditions in the Eastern Cape may be obtained. A major objective of such a wider programme would be to establish which communities were most at risk and what forms of intervention would best improve their situations.

The response of the Department of Health can be summarized as follows:

a. The officials queried the anthropometric findings indicating unsatisfactory nutritional conditions in Albany. They maintained that the lack of certificate ages brought into question the representativeness of the weight and height for certificate age results. While they admitted the results indicated a trend, they felt there was no conclusive statistical evidence of serious nutritional problems in Albany. As such, they questioned the need for supplementary feeding of school entrants.

b. The officials conceded that the trends indicated in the survey suggested that nutritional conditions should to be monitored. They therefore agreed with the need for further nutritional surveillance in the Eastern Cape.

c. The question of using an international set of anthropometric norms was also raised by the Department of Health delegation. They felt

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c. The question of using an international set of anthropometric norms was also raised by the Department of Health delegation. They felt

the international standards were too stringent for judging the nutritional conditions of socio-economically deprived communities. They requested that for future surveys the possibility be considered of establishing a local norm.

Having obtained the views of the Department of Health on the pilot survey, the author then visited researchers at the Natal Medical School in Durban; doctors and staff at the Red Cross Children's Hospital in Cape Town and doctors at the Cecilia Makawane Hospital in Mdantsane in Ciskei. The main points from these discussions are outlined in the following section.

2. Discussions with Private Doctors and other Research Personnel

The key feature to emerge from discussion with the doctors and other researchers was that the international norms should be adhered to for any future survey work. The consensus of opinion was that the third percentile on either the Boston or NCHS norms was a sensitive indicator of children at risk as defined previously in chapter 2. Furthermore these norms offered comparability with studies done elsewhere. An additional factor in favour of the international norms is that they can be used as surrogate indicators of socio-economic conditions prevailing in communities. The more poorly a group or community performs on the norms, the more likely they are to be socio-economically disadvantaged. The NCHS was recommended over the Boston because of its more recent origin and its more rigid statistical base, as discussed in chapter 2. Besides the general consensus on the need to use the international norms a number of other specific issues were also discussed, two of which are considered in some detail.

a. The Implications of Measuring the Nutritional Status of School Entrants

The weights and heights for certificate ages of the children surveyed in the pilot study were presented in Table 5, section A(2a). The high percentage of children below the third percentile of both weight and height for age in the urban area is apparent. The plight of these urban children becomes even more apparent if the scattergram of height for certificate age of the Tantyi children, as shown in Figure 22, is considered. The figure vividly illustrated the nature of black primary

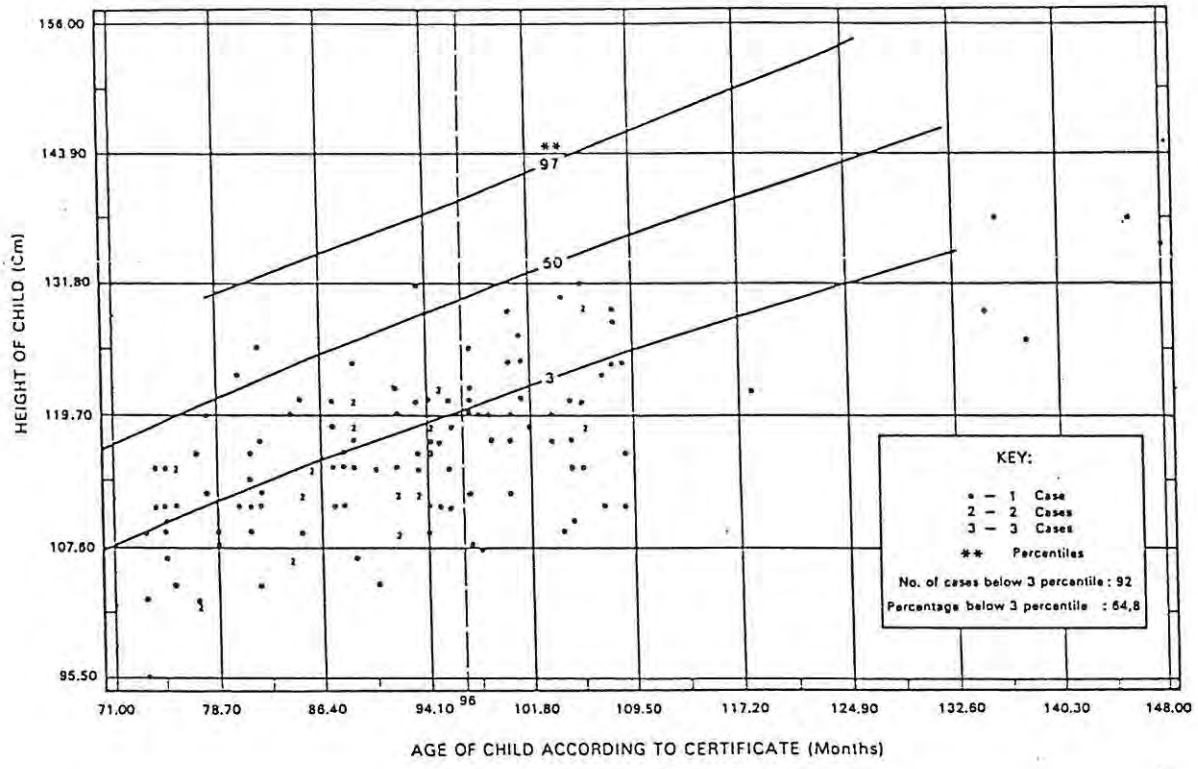

Figure 22 Height for Certificate Age, Tantyi Primary School, Grahamstown, Pilot Survey, January 1980

school conditions: it was assumed that Sub A and Sub B children would be eight years of age or younger. Instead, the results indicate that 48 or just over 33 percent of the 143 certificate aged children in Sub A and Sub B were over the age of eight, the oldest being 12 years 4 months old! The accepted ages for Sub A and Sub B pupils are 5 to 6 and 7 to 8 respectively, but clearly pupils can be much older. It is interesting to note that 5 of the 6 oldest children exhibited stunted growth according to the Boston norm. As discussed in chapter 2, malnutrition is likely to affect intellectual development and the tedious progress of these older children through school may be because of the ill effects of malnutrition at earlier ages in their lives.

Discussion with teachers at the schools surveyed showed that the children under the third percentile tended to attend classes as regularly as those children above the third percentile. They also appeared to be alert and to participate fully in games with their companions. These observations taken from the author's field notes, together with the survey results, were put to Dr Trudy Thomas and others at Cecilia Makawane hospital in Mdantsane. Dr Thomas maintained that what the survey had measured was 'survivors'; those children, who although malnourished, had survived the

crucial first five years of life. She doubted that these children were in danger of dying from malnutrition, since they had adapted to diets of low food intake. Dr Thomas was also doubtful that the number of school entrants falling below the third percentile was necessarily a true indication of the nutritional status of pre-school children. The incidence of children at risk in the pre-school population may be even higher than the numbers of children falling below the third percentile in the school entrants group. The necessity of measuring the pre-school child directly was therefore important.

b. The Assessment of the Present Nutritional Status of Children

The discrepancies in the weight for age and weight for height results (Tables 5 and 7) were also discussed with Dr Thomas and her collegues as well as with researchers elsewhere. The opinion most often expressed was that weight for height was not a very sensitive measure of present nutritional status. These children had low weights for their ages and heights for their ages. A child may therefore have its weight reflected adequately against the height, that is the child's weight is in proportion to its height, but both measures are unsatisfactory in terms of the child's chronological age. As such, the numbers at risk according to the weight for height norm under-represent the true degree of child malnutrition in a community.

c. Obtaining the Correct Ages of Children

The inability to obtain the correct ages of children was considered by the Ciskeian and Durban medical groups to be a universal problem for researchers working in 'Third World' type situations. Dr Thomas maintained that on the basis of her research in the Ciskei there was a strategy to overcome the problem. If the parents or guardian could be asked the child's age, then it might be possible to obtain the correct age of the child through the association of the child's age with particular local and national events such as the erection of a cattle-dip by the local authority and major measles epidemics. Using such benchmark events, the age could then be ascertained to the nearest month by careful probing on the part of the interviewer.

On the basis of the discussions held with these various groups and individuals, the author considerably redesigned the survey format. The format together with its testing is discussed in the following section.

3. The Design of Household Nutritional Surveys

The inability to obtain correct ages of children in the pilot survey and the desire to measure the pre-school child directly led to the conclusion that future studies should be conducted at the household level. Besides offering the chance to obtain ages more accurately, it provided the opportunity to explore the socio-economic background of the households of surveyed children. Before drawing up a questionnaire as the basis for the Dias survey it was necessary to consider three factors. First, it was essenial to decide on the basis of the review of literature and the discussions held with other researchers which anthropometric measurements to employ. Secondly, the need was to decide whether to use the NCHS norms or a local norm for considering who were to be the children at risk. Finally, a decision was required about the range of socio-economic variables which should be included in the survey. Each of these factors is discussed briefly before outlining the methodology adopted in the Dias and later surveys.

a. The Choice of Anthropometric Measures for Future Surveys

It was decided to continue to use weight and height for age as the main indicators of present and past nutritional status, on the assumption that the age of children could be ascertained accurately from guardians of children even if certificates were not available to verify age. In addition, weight for height and skinfold measurements would be used as further measures of the present nutritional status of children surveyed. The skinfold measures were included after a number of additional meetings held with Department of Health officials. To measure the skinfolds, Harpenden Calipers were imported from Germany, the calipers having the reputation for being very accurate instruments. The principle involved in taking the measurement is for the field worker to grip the skinfold firmly between the index finger and thumb and, while holding the skinfold, apply the calipers. Three measurements at each skinfold site are taken and the average of the three regarded as the reading for that particular site.

The weight and height measurements would continue to be made in the same manner as for the pilot survey except for two modifications. The bathroom scales were satisfactory measuring devices, but to preclude any questioning of the accuracy of the weight measurements, a set of Detecto balances were used. Those are portable clinical scales, very accurate if calibrated and sufficiently hardy to be taken on the tortuous road conditions found in many rural areas. The height measurements for children over two years of age would continue to be made using an upright calibrated board and a wooden base on which the child could stand. Children under two years are not always able to stand perfectly upright and to obtain accurate measurements a portable measuring board for measuring length in the recumbent position was built according to a model described by the Food and Nutrition Board of the National Research Council, Washington D.C. (WHO, 1976). All children 2 years of age or younger were therefore measured in the recumbent position.

b. International and Local Norms

On weighing the evidence for using international and local norms, the author decided to rely on the former. Before making the decision, and during the period of the review of literature and discussions with other researchers, the author undertook a small survey in the Grahamstown township to help clarify in his own mind the suitability of using international norms.

Many researchers maintained that if a group of well nourished black children could be clearly defined, it would be found that they performed adequately on the international norms. The author accordingly sought such a group and after enquiry established that a crèche had been established in Joza, the relatively better-off section of the black township, as discussed in chapter 4. The children attending the crèche were given supplementary food in the form of a substantial breakfast which included items such as Pro Nutro (a Cerebos Food Corporation fortified cereal), milk and peanut butter and bread. Before returning home each day they were given lunch, which consisted of soup and bread or food of equivalent calorific value. Besides the obvious care taken of the health and educational needs of this group of children, the group appeared ideal for closer analysis because their ages, verifiable from certificates, ranged from two to five, therefore covering an important sector of the pre-schooler age group, the target population of the future surveys.

Permission was obtained to survey the children and a medical doctor, the superintendent of Settlers Hospital, agreed to make a medical examination of all the children. The survey was conducted in November 1980 with the doctor making the medical examinations and a team of qualified nurses taking weight and height measurements. The measurements were assessed according to the Boston norms, making it possible to evaluate the extent to which well-fed black children may approximate a set of international nutritional criteria. Fifty eight children were studied.

The doctor declared the children to be healthy although two children were ranked as 'mildly malnourished'. None of the children showed any of the classic signs of malnutrition such as anaemia, oedema and enlarged livers. Active skin lesions were not present, but healed lesions on some children indicated possible periods of malnourishment in the past, prior to attending the crêche.

The results of the anthropometric assessment of the children is shown in Table 8.

Table 8 Assessment of Weight and Height for Age According to the Boston Norms, Joza Créche, November 1980

Number and Percentage Below the Third Percentile

No. of Children 6 years of age	Weight for Age		Height for Age	
	No. < 3P	% < 3P	No. < 3P	% < 3P
58	1	1,7	15	25,9

Present malnutrition, designated by children falling under the third percentile, is almost non-existent. One of the two children singled out as mildly malnourished by the doctor fell below the third percentile, the other barely above it. The rest of the children fell well above the third percentile with many approximating the fiftieth percentile. Two children were above the 97 percentile indicating that they were likely to be obese, a statistical probability confirmed by the doctor who examined them.

Stunting according to the Boston height for age norm occurred in about a quarter of the children (25,9%). It is interesting to note that 8 of the 11 children with signs of skin lesions, indicative of possible periods of

nutritional deficiency in the past, were also children who fell below the third percentile of height for age. An important line of analysis the author intended to pursue was to examine the home environments of the crêche children. If those who fell below the third percentile on the height for age norms came from families who had not been capable of feeding their children adequately prior to their crêche days, even more light could have been shed on the ability of the norms to predict children at risk. Unfortunately such a step was not possible because of time constraints and the need to prepare for the Dias survey.

Another reason for using international norms became evident in the preparation phase of the Dias survey. As will be discussed in section C, the farm labourers in the Dias area are drawn from the black and the so-called 'coloured' ethnic groups. Visits to farms, especially in the Hankey and Port Elizabeth areas, revealed that a great deal of inter-marriage had occurred between these groups, so that the people questioned were often unable to say whether they were 'black' or 'coloured'. The implication of establishing local norms is that they can be used to measure the nutritional status of a particular ethnic group. Since there would be insoluble problems in attempting to designate which people should be classed as 'black' and which as 'coloured', international norms that apply irrespective of ethnic group have great appeal.

On the evidence from the crêche survey, the findings from preparing for the Dias survey, the review of literature and the discussions held with researchers, the author decided to use the international norms and the third percentile as the cut-off point to designate those at risk. For reasons given in chapter 2 the NCHS norms were chosen above those of the Boston for the future surveys.

c. The Analysis of Household Socio-Economic Conditions

It was decided that a pilot survey at the household level should be conducted to help finalize the format for the Dias survey. Provincial and municipal nursing staff were seconded to the project which was to take place after the Joza crêche survey. The intention was a take a random sample of households in Grahamstown and a comparable sample of black households on white-owned commercial farms. As preparations for this survey got underway unrest broke out in the black townships of

Grahamstown. Contingency plans were made to continue with the survey, but access to the townships was essentially cut off for the survey teams. Some interviews were held on the farms before the survey was prematurely halted by the author. For all intents and purposes the survey achieved very little. The questionnaire design, the sampling procedure and other facets of the Dias survey were therefore based largely on lesson learnt in the pilot survey, from secondary sources and discussions with the various researchers mentioned previously.

One of the main objectives of the planned survey was to assess the range of socio-economic information available from households. Furthermore, it was hoped that the relative importance of these variables could be examined so that only the most important ones would be included in the Dias survey. The Dias survey therefore provided the first real opportunity to assess household socio-economic conditions at first hand.

C. The Surveys of the Dias Divisional Council Area, the Amatola Basin and Tsweletswele, May 1981 to October 1982

The format for the three surveys was similar, with exceptions being made where appropriate to accommodate local conditions. Four aspects of the survey are discussed in this section, namely the rationale for each survey, since the objectives of each survey were slightly different; the sample procedure adopted to select households for the surveys; the preparation of the survey teams; and the form of the questionnaire used to obtain the necessary field data.

1. The Rationale for the Nutrition Surveys

As stated briefly in chapter 2 section E(1), the pilot and the Dias surveys were undertaken by the ISER at Rhodes University in consultation with the Department of Health. The Amatola Basin and Tsweletswele surveys were conducted by the ISER as part of the Institute's wide commitment to assessing socio-economic conditions in the Eastern Cape and Ciskei. In this section the reasons for the surveys, other than the pilot survey, are outlined in more detail.

a. The Dias Survey

The Department of Health has run for many years a Skimmed Milk Powder Scheme for the prevention and treatment of malnutrition. The scheme is subsidized by the Department of Health and the various local authorities through which the milk is channeled. The Department's share of the subsidy is 54 percent and that of the local authority, 46 percent. The local authority can theoretically reclaim its share of the subsidy by charging for the skim milk sold. However the Department's attitude is that if people cannot pay for the milk, they must be given it free of charge. In reality the local authority invariably has to pay for the skim milk because of the poverty of the users of the scheme. These local authorities are responsible essentially for white local government, but in the case of the Skimmed Milk Powder Scheme, they must provide food and services for black communities who do not pay into the local authority coffers by means of taxes or in any other way. Discussion with local authority officials suggest that they are unhappy about the way in which they have to subsidize the scheme.

The Department of Health contends that because of the scheme no pre-school children need suffer from malnutrition. All clinics use the third percentile of the Boston weight for age norm as the cut-off point at which children qualify for treatment. In 1980 the Port Elizabeth municipality estimated that it would use 1500kg of skimmed milk powder annually for the scheme. In retrospect 563kg were used for 116 children of all races who fell under the third percentile and were seen at the clinics. The Dias Divisional Council estimated a need for 1050kg and used 899kg for 193 black and 38 'coloured' children during the same period. The total black population of the Port Elizabeth municipality for 1980 was 250 000; for 'coloureds' the figure was 120 000 (figures supplied by the Port Elizabeth Municipality and the Administration Board). Comparable figures for the black and 'coloured' populations of the Dias Divisional Council area was 81 000 and 13 000 respectively (figures supplied by the Dias Divisional Council, Port Elizabeth). In view of the low usage made of the scheme in terms of the total populations, the Department of Health felt that the media reports about malnutrition in the Grahamstown and other areas of the Eastern Cape were questionable.

As a result of the media coverage, the Department approached the ISER to conduct a survey which could provide information about the nutritional status of specific communities and at the same time assess the factors which appeared to influence nutrition. In this way those communities which might be at greater risk to malnutrition could be isolated and intervention strategies implemented to improve conditions. In addition, such surveys should attempt to ascertain the usage made of clinic facilities by families who had young children. The pilot survey in Albany did not address the latter issue but concentrated on providing information on the nutrition of both urban and rural communities. The Dias survey therefore built on the work of the pilot survey, with the major objectives of the survey being to establish the nutritional status of pre-school children, the socio-economic nature of the household surveyed, and the level of usage made of clinic facilities where the Skimmed Milk Powder Scheme was available. The Dias survey was envisaged as the first of a number of surveys. The small towns and the metropolitan centre of Port Elizabeth were other areas to be surveyed in the future.

b. The Amatola Basin Survey

In early 1981 the ISER was invited to undertake a socio-economic survey of the Amatola Basin by the Amatola Basin Steering Committee of the Agricultural and Rural Development Research Institute (ARDRI) at the University of Fort Hare. ARDRI was already involved in the assessment of certain aspects of the agricultural potential of the Basin but felt that it needed to call on the expertise of the ISER to undertake the socio-economic survey. The survey was "to establish the basic demographic, kinship, consumption and employment patterns of the residents of the Amatola Basin. Practices and traditions related to dryland agriculture would also be identified" (Bekker, de Wet and Manona, 1981, p.1).

Once the initial survey team from the ISER commenced work, it became apparent that it was necessary to obtain some indicator of socio-economic conditions in the Basin. The author was approached to conduct a nutrition survey which would provide such a measure. It was envisaged that an assessment of the nutritional status of the children would be a sound indicator of the standard of living of the Basin inhabitants in general. The introduction of a development programme to raise the

standard of living of the people was planned by ARDRI and the reassessment of the nutritional status of the Basin children at future dates would provide a measure of the impact of development programmes instituted.

In addition to the primary aim of providing an assessment of nutritional conditions in the Basin, the author was asked to analyze the impact of the health services on the Basin community. As stated in chapter 4, the Basin's infrastructure, including that of the clinic, is focussed on Komkhula. The survey design would have to be of such a nature so as to incorporate an analysis of whether or not the clinic had a positive influence on levels of nutrition and other health-related issues.

c. The Survey of Tsweletswele

The survey materialized after President Sebe had requested the ISER to investigate the living conditions of residents in Tsweletswele. As stated in chapter 4, section B(3), Tsweletswele owes its existence to the immigration of people from white-owned farms in the Eastern Cape as well as to the process of urbanization occuring within Ciskei. Tsweletswele, with its wood, water and land resources, makes it an acceptable location for people who want access to job opportunities in the urban conurbations of East London and Mdantsane, but cannot find or afford the price of housing in Mdantsane.

The survey team consisted of three permanent research staff from the ISER as well as three seconded members from other academic departments on campus (two anthropologists and the author). The major aim for the survey was to establish the strategies the people in Tsweletswele adopted to survive, given that their level of living was low, their access to state services minimal and their tenure in the settlement uncertain. The survey consisted of tracing the history of the settlement; making an assessment of the resources available to the community, including work opportunities; and obtaining information about the schooling, health and other welfare aspects of the community inhabitants. As will be discussed in the following section on sampling procedure, the nutritional survey was conducted as a separate survey, after the initiation of a survey into the nature of the community had already begun. The rationale for the

nutritional survey, as in the case of the Amatola Basin Survey, was that it could provide an indicator of socio-economic conditions in the settlement.

It should be noted in concluding this section on the rationale for the surveys, that the hypotheses given in section D must be viewed against the material of this section, thereby linking them to the aims of the surveys undertaken.

2. The Sampling Procedures

The major components of the sampling procedures are discussed in this section. In general, the objective of all the sampling procedures was to ensure that a random, unbiased sample of the relevant population was taken. Due to differing conditions in the communities, the procedure adopted was not always the same. As a result the sampling procedure for each survey is outlined separately.

a. The Sampling Procedure of the Dias Survey

The survey was supposed to take place in January 1981 but heavy rains caused postponement. Many of the farm roads were impassable so survey teams were unable to operate. The survey took place in May, but due to the rescheduling, the nursing sisters who comprised the survey teams could only be seconded to the survey for ten days instead of the planned three weeks. As a result, the number of children surveyed was less than anticipated. On the basis of information supplied by the Dias Divisional Council on the population of the area and the time constraints on the survey, it was decided to survey approximately 10 percent of the children under the age of six years. The assumption was made that roughly one fifth of the total population of blacks and 'coloureds' would be under the age of six years. As a result of such an assumption, a projected 1 880 children were to be surveyed. In reality the survey teams were able to survey 1 478 or 7,8 percent of the estimated total population of black and 'coloured' children under the age of six. The projected number of children under 6 years per farm was estimated at 10 to 12; an average of 10,7 children were surveyed on each farm.

The Dias Divisional Council supplied 1:50 000 map sheets covering the entire Dias area. The sheets contained all farm boundaries as well as

details of the road network, major rivers and the magisterial boundaries within the Dias area. For administrative purposes the Dias Divisional Council has allocated a unique number to each farm within its jurisdiction. So, for example, W.K. Wilmot owns a farm called Hebron in the Riebeek East area and the farm is number 162; T.T. Hoole owns a farm called Eureka in the Sidbury area and the farm is number 291. This numbering system greatly facilitated the sampling procedure. In the Alexandria magisterial district, for example, 45 farms were selected for the survey to obtain a roughly 10 percent sample of all children under six. A random numbers table was employed and the first 45 numbers drawn corresponding to the farm numbers in the magisterial district represented the farms selected for the survey.

Once the farms for the survey had been selected, lists of farmers, the names of their farms and 1:50 000 sheets clearly indicating the location of the farms were given to the six survey teams each consisting of four persons. The teams had at least one sister who could speak Xhosa, the first language of most farm labourers in the Dias area. Prior to the survey teams going out to do the fieldwork, letters were sent to all farmers selected for the survey advising them of the impending survey and the day and time of day the survey teams would arrive.

Three problems encountered in the fieldwork are worth mentioning. In the first instance, some farmers did not receive letters alerting them to the survey. As a result, parents were not available to answer the questionnaire and supply important information, since they were out working in the fields or at tasks far away from home. If the parents were recalled from their work it often took time which in turn slowed the rate at which the survey teams could cover the required farms set for them to do. If they were not recalled, it meant that the teams had to move on to other farms drawn from reserve lists. Another problem encountered was that a handful of farmers refused the teams entry onto their farms and it may be that these were farms on which labourers were unsatisfactorily treated, a factor which was beyond the ability of the teams to probe.

A third problem related to the failure of the survey teams to record 151 of the recumbent length and height measurements. The reason was an apparent misunderstanding between the survey teams and the Regional Director of Health for the Eastern Cape, who made some impromptu comments

to them just prior to their departure for the field work. The comments were construed by the teams as a directive not to take height measurements of children for whom certificates could not be produced to verify their ages. The author had the teams take all measurements as soon as he realised the problem, but since not all teams could be contacted immediately in the field, a number of relevant measurements were not made. The reduction in the number of recumbent length and height for stated age results is reflected in Table 14, chapter 6.

b. The Sampling Procedure Adopted in the Amatola Basin

As shown in Figure 17, there are 13 villages in the Basin. Time and money restraints precluded an analysis of all villages. It was decided to survey 5 villages, the central village of Komkhulu, Mdeni in the North Valley, Mkobeni and Dish in the Highlands and Matinise in the South Valley. These villages were drawn for the survey because they provided a cross-section of conditions in the Basin, according to the ARDRI researchers, and they also represented a good geographical coverage of the Basin.

Since all children under six were to be surveyed, there was no need to select households within the villages on a random basis. In a preliminary visit to the Basin and in discussion with village personnel, it become evident that the villagers viewed the impending survey very positively and that their cooperation would be readily given. As a result of not having to choose random households and the positive attitudes of the villagers it was decided to set up a central survey station in each village rather than conduct the survey on a house to house basis. Village leaders agreed that such a strategy would be in keeping with village norms, where villagers often gather for meetings and events which affect the community as a whole. The procedure adopted was for the two survey teams to arrive at a convenient meeting place and set up their equipment before moving through the village to inform all households who had children under the age of six of the teams' arrival.

Mothers or the guardians of the children would arrive at the survey point where three members of each team would carry out the necessary anthropometric measurements on the children. The mothers or guardians

would then go to one of the two senior sisters who had set themselves up at discrete distances from the measuring operations and the main group of children and their guardians. The socio-economic survey questions were then put to the respondents in privacy.

One of the ISER research officer's was seconded to the survey. While the survey was in progress he made a check of each household to ensure that all children were included. In all, only three children were sick and unable to be surveyed. A further six children were outside the Basin with their mothers at the time of the survey. A total of 225 children of whom 117 or 52 percent were male and 108 or 48 percent were female were surveyed. These children are, therefore, the majority of children in the villages surveyed so that the survey results are representative of conditions in the surveyed villages and presumably of those in the Basin as a whole.

c. The Sampling Procedure Used in Tsweletswele

As stated in section C(1c), the nutrition survey followed that undertaken by the ISER to ascertain the wider picture of living conditions in Tsweletswele. The initial survey utilized a systematic sampling design to select 150 of the 830 households for assessment. To obtain the sample the settlement was subdivided, on the basis of population density, into six regions as shown in Figure 20. The subdivision was made largely on the basis of photographs taken specifically for the survey, since the haphazard arrangement of houses made it difficult to make sure all houses had been taken into account before drawing the sample. Field maps were constructed for each region using the photographs as a base. Individual households, roads and other landmarks of significance were included on the maps and used by the survey team to locate the randomly selected households for the survey.

It was decided to survey the identical households to those chosen by the main survey teams since important socio-economic data could be obtained from their questionnaires and simply transferred to the nutritional survey questionnaires. The information for questions relating to household numbers and income were obtained in this way, relieving the nutrition survey team of collecting these data.

The survey team consisted of a sister and a community nurse who comprise one of the rural health teams that normally monitor health conditions in

the areas served by the Cecilia Makawane Hospital in Mdantsane. The team was made available for a period of four days. Their other work commitments precluded them spending more time on the survey. As a result, a decision was taken to survey approximately one tenth of the children under six years of age in the settlement; that is approximately 140 children given a permanent resident population of 6 857 (Figure 21) and assuming about one fifth to be under the age of six. To achieve this aim the survey was restricted to three regions in which 52 households supplying information concerning 138 children (exactly half male and half female) of 90 mothers was obtained. The break down of the households surveyed by region within the settlement is as follows:-

16 in the relatively heavily populated region 1;
24 in the most densely populated region 2; and
12 in the more thinly populated region 5.

The consensus of the ISER team was that the choice of regions, 1, 2 and 5 would provide a representative picture of nutritional conditions in the entire settlement.

3. The Preparation of the Survey Teams

The preparation of the survey teams is an important issue since the accuracy with which information is collected influences the final results. However, it is unnecessary to consider the preparation of the survey teams in detail or separately for each survey undertaken. In this section only some of the main principles guiding the preparation process are discussed.

All survey teams had fluent Xhosa-speaking members. It was essential to be able to converse with the questionnaire respondents, some times at great length, to elicit the required information. Fluency in the respondents language is not enough, so that intensive briefing sessions were held with all team members prior to the surveys. The following are the main points made by the author at these sessions.

a. Taking the Anthropometric Measurements

Careful instruction was provided in the use of all survey instruments. The teams were also given the opportunity to use all instruments and problems were discussed as they arose. The transfer of the field measurements to the questionnaire was also fully discussed.

b. Obtaining Household Information

The questions relating to the household status on the questionnaire were carefully explained. Comments and suggestions made by nursing sisters experienced in community work were discussed, and where valid, incorporated in the strategy for obtaining the information from respondents.

c. Consideration for Respondents

The sisters are well qualified people who live in urban environments. For the duration of the surveys they would invariably be away from homes and families, and would be living in rural areas. The author stressed that often poor rural dwellers lack confidence when in discussions with more sophisticated urban folk, and that they were to be treated with every consideration so that they at no time felt threatened. All information given to the teams was confidential and needed to be solicited with tact and courtesy. These remarks were made in the light of earlier experiences. Sisters involved in the pilot survey sometimes tended to criticize children for not speaking up and for not knowing information required of them. The response of the children involved was often one of fear. It is important that positive contact with respondents be established.

The briefing sessions were important for disseminating information. They also provided the author with the chance to get to know the members of the teams and to create a sense of enthusiasm for the surveys to be undertaken. The author also spent time with the teams in the field monitoring their work during the actual surveys. Report back sessions were held throughout the surveys so that the questionnaires could be checked and any problems dealt with.

4. The Questionnaire (Appendix 2)

The questionnaires used for the various surveys were very similar in design. Minor differences resulted from the idiosyncrasies of the surveyed communities. For example, the sources of income for some people in the Amatola Basin included that from a drought relief programme (Londoloza). Allowances had to be made in the questionnaire for this. Rather than present all the questionnaires, Appendix 2 includes the

questionnaire used for a major survey undertaken in December 1982 into conditions in the metropolitan area of Port Elizabeth and the small towns of the Eastern Cape. This questionnaire reflects the information contained in the others and was designed to be more universally applicable.

The questionnaire contains information on the location of the survey (Question 1); the role of the respondent in the household (Questions 3 and 4); the nature and number of members in the household (Questions 5 to 8) and various other facets of the socio-economic conditions prevailing in the household (Questions 9 to 36). A number of the latter questions on socio-economic conditions in the household have a dual purpose. Besides highlighting the conditions within the household, they also provide insight into the role that health facilities may play at the household level. Question 19, for example, "Does the household have a garden?" may reflect the influence of the local clinic on a community. An expressed objective of the clinics is to act as centres of innovation. Gardens can provide the necessary fresh vegetables for households and if the clinic garden is good, local villagers will take note of the clinic message regarding the importance of keeping gardens. The clinic at Komkhulu keeps an excellent garden and it may be that the Komkhulu villagers have more gardens, on average, than those villagers in remote parts of the Basin. Questions 22 to 34 directly or indirectly provide insight into the influence of the health services on individual households.

In addition to information available from the questionnaire, other information was suplied by the sisters, who were asked to keep field diaries. During report sessions, the questionnaires would be scrutinized and observations made by the sisters noted. In the Dias survey, for example, a great deal of additional information was gathered for question 34. "Does the child(ren) attend a clinic regularly?" These observations are discussed together with the rest of the survey results in chapter 6.

Question 37 provides the anthropometric data needed to assess nutritional conditions prevailing in the community. Most of the questions are self explanatory and should be viewed within the context of the discussions on socio-economic conditions outlined in chapter 2, section D and the

nutritional assessment as discussed in chapter 2, section C. An elaboration of the anthropometric assessment, question 37, is however offered, since some information is included which has not been discussed before.

Work undertaken in Tsweletswele suggested that accurate age data of children would be difficult to obtain. Registration of births among the members of the community was almost non-existent, clinic cards for children were scarce (indicating the lack of access to medical care on the part of the inhabitants of the settlement) and the guardians, unlike those spoken to in the previous surveys, had scant knowledge of the age of children in their care. It was decided to make the usual age-dependent anthropometric measurements and to assess present nutritional status by the age-independent weight for height criterion. Skinfold measurements were not made in the Tsweletswele survey because there appeared to be problems with their reliability as a measure of nutritional status in the Dias survey. The reasons will be discussed in the final assessment of the survey results. Instead, a measure for oedema was included. There are many possible causes of oedema, "the excess of tissue fluid, either throughout the body (dropsy) or around some local disturbance" Wingate (1976, p.316). The oedema associated with malnutrition is due to lack of protein. Insufficient protein in the blood means that the osmotic pressure (caused by protein dissolved in the blood drawing water into the capillaries from the tissue fluid) "is no longer high enough to oppose the mechanical pressure from the heart beat, and an excess of water remains in the tissue fluid as oedema" (Wingate, 1976, p.317).

Oedema can be readily discerned by pressing the index finger onto the lower limb of the child. Figure 23 shows the way in which marasmus and kwashiorkor manifest themselves in the young child. The swollen limb of the kwashiorkor case is an indication that oedema is present. For the survey, two points on the lower limb were used to test for oedema. The one was on the ridge of the foot, just above the toes, as shown in Figure 23, the other on the lower leg, with the index finger pressed against the line of the tibia to test for the presence of excessive fluid. Three categories of oedema were stipulated, severe, moderate and mild. It requires considerable fieldwork to begin to differentiate accurately between severe, mild and moderate oedema, but not between oedema and

non-oedema. The team was therefore instructed to differentiate between cases with oedema and those without. If oedema was present then the other signs of kwashiorkor were also sought. The sisters took the normal anthropometric measurements, that for oedema, and also made a note of kwashiorkor cases using Figure 23 as a guide. Figure 23 was replicated on the survey questionnaire with an empty square next to each sign of kwashiorkor. The team filled in these squares, three or more signs being taken as indicative of a kwahiorkor child.

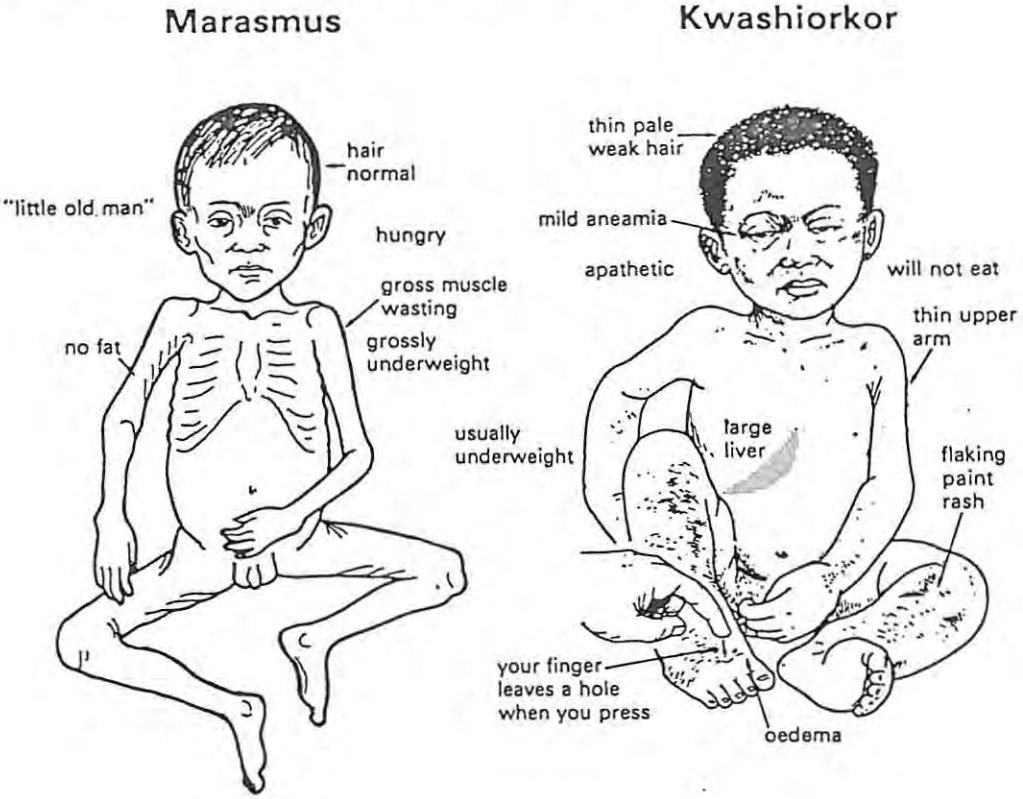

Figure 23 The Symptoms of Marasmus and Kwashiorkor.

Source: King, King and Martodipoero, 1978, Fig. 7-10, p.94.

Once the information from the survey had been gathered from the questionnaires the data were transferred to the Rhodes University mainframe computer. A statistical package, SPSS, as mentioned previously, was then employed to analyze the data. The package consists of a series of sub-routines or statistical procedures which are used to carry out descriptive and inferential statistical analysis. Two sub-routines, FREQUENCIES and CONDESCRIPTIVE were used to perform the initial description of the data. The FREQUENCIES routine, for example, provided measures of central tendency (e.g. the modal class) and dispersion (e.g. the class range) for ordinal or ranked data. Questions

3, 4 and 9 on the questionnaire, are examples of questions which were initially analyzed using the FREQUENCIES sub-routine. The CONDESCRIPTIVE sub-routine examines the distributional characteristics of data at the interval or ratio level of measurement. The calculation of the mean and standard deviation of questions 16 and 18 are examples of variables analyzed by this subroutine.

SPSS also contains 'routines' for assessing the degree of association between two or more variables. The SCATTERGRAM routine, for example, produces a scatterplot of the relationship between two variables. The total correlational pattern may be visually inspected. Figure 22 is an example of a scatterplot or scattergram obtained from examining the height of children (dependent variable) against age (independent variable). In addition to the plot itself, the Pearson correlation coefficient, the standard error of the estimate, the intercept and slope are also available. To assess the degree of association between ranked data, the CROSSTABS sub-routine was employed. CROSSTABS produces a 2-way to N-way cross-tabulations and a variety of non-ponametric tests such as Chi-square, are supplied to measure the strength of association between variables. The mothers education, may influence attitude towards the use of contraceptives. CROSSTABS will provide a 2-way cross- tabulation of these variables and the relevant statistics.

The above sub-routines of SPSS provided the bulk of the analysis of data. Yet other routines made it possible to modify data (RECODE) and select certain cases for analysis (SELECT IF). RECODE could be use to change the income data (interval data as it stands) to ranked data, while SELECT IF allows the user, for example, to analyze a selection of questionnaires from all the questionnaires of a particular survey. Once all data analysis has been completed on the computer by the researcher, it remains for him or her to select the most meaningful way of presenting the data to portray the survey results.

The hypotheses which guided the analysis of the data are set out in the following section which is in turn followed by the chapter summary.

D. The Research Hypotheses

A major objective of the thesis is to assess the geographical variation in nutritional status of young children. The main research hypothesis is intimately tied to this objective. A set of secondary hypotheses explore facets of the variation in nutritional status more fully.

On the assumptions that anthropometric criteria provide a suitable means of assessing community nutritional status, that age-dependent anthropometric measures are the key to making nutritional assessment within nutritionally at risk communities, and that internationally accepted anthropometric standards such as those of the NCHS are the preferable means of measuring nutritional status, the following hypothesis is proposed:

1. The nutritional status of young children will vary geographically, that is, between the communities studied.

   The following subsidiary hypotheses are also proposed:

2. The limited use made of the Department of Health's Skimmed Milk Powder Scheme suggests that malnutrition is not a problem in the Dias Divisional Council area. Should the survey indicate that levels of malnutrition are high (using the Brown and Brown (1979) criterion of above 15 percent of a community's children at risk, as high) then the discrepancy between the clinics' assessment of the level of malnutrition and that made on the basis of the survey may be explained by:

   a) the lack of access that rural children have to clinic facilities; and

   b) the generally low standard of living of black rural households.

3. On the assumption that the St Matthews's Hospital Nutrition Clinic records reflect nutritional conditions of children in the Amatola Basin as a whole, the present nutritional status of the children should be satisfactory, but their long term nutritional status, less so. It is further postulated that environmental factors such as drought may help explain the difference between present and long term nutritional status.

4. Nutritional status will be most satisfactory in the central village of Komkhula in the Amatola Basin because of the ready access to the clinic and the services it offers. Nutritional status will be most unsatisfactory in those villages at the greatest distance from Komkhulu.

5. Children in Tsweletswele will display unsatisfactory levels of nutrition because of the poor socio-economic conditions prevailing in the settlement.

E. Chapter Summary

In this chapter the research methodology is outlined in some detail to highlight the development in survey design from the pilot survey to that employed in the three major surveys which followed. The survey of school entrants sheds light on a number of issues. Perhaps the most important of these is the fact that the correct ages of children are not always available and that school children are not capable of giving their own, correct ages to survey teams. Equally as important is the fact that in spite of the limited number of certificate ages available, anthropometry still provides a most suitable means of assessing nutritional conditions. The pilot survey indicates variation in nutrition between rural and urban areas, with the most unsatisfactory conditions being found in the small towns, such as Grahamstown, of the Albany magisterial district. However, the survey also suggests that malnutrition is a problem for black children in both the urban and rural areas of Albany.

The assessment of the pilot survey raises a number of issues. The Department of Health queried the statistical validity of the findings because of the lack of certificate ages; asked for the possibility of developing local norms to be examined; and agreed that further surveys into nutrition in the Eastern Cape are needed. Discussions with other interested groups suggest that the development of local norms is fraught with problems and that international norms, such as the Boston or NCHS, should be utilized in any further survey work. The need to measure pre-school children directly rather than school entrants is also an issue raised. In the light of these discussions and the review of relevant literature, it is decided to focus all future surveys on individual community households and to use the NCHS norms to assess nutritional status. The examination of the crêche children in the Joza township of

Grahamstown suggests that well fed black children perform adequately on the weight for age international norms, further adding to the conviction that these norms are suitable for future surveys.

A pilot survey of pre-school children at their homes failed to materialize because of unrest in the Grahamstown township. Attention is therefore focused on outlining in detail the methodology adopted for household surveys in the Dias, Amatola Basin and Tsweletswele areas. The rationale for the various surveys is also discussed, since the rationale influences the nature of the hypotheses presented in this chapter and of the results presented in the following chapter. Clinic records in the Dias area suggest that malnutrition is not a problem. The community survey of nutritional conditions is designed to help assess the clinic findings and also provide the first comprehensive survey into nutritional status in the Eastern Cape. The Amatola Basin and Tsweletswele surveys provide the opportunity to explore geographical variations in nutrition and to assess the suitability of using nutrition surveys to examine socio-economic conditions prevailing in various communities.

Other methodological issues, related to the three major surveys, are those of the sampling procedures adopted, the preparation of the survey teams and the presentation and discussion of the survey questionnaire. The principle underlying the sampling procedures is that households chosen for the surveys are representative of all households from the surveyed areas. The survey teams are regarded as well trained individuals suitably motivated to conduct the fieldwork which materializes after the preparation and planning stages of the surveys. Finally, the questionnaire has been discussed to outline its key elements and the way in which the data are analyzed.

The chapter concludes by presenting the research hypotheses. The hypotheses signal the completion of Part II of the thesis, comprising chapters 4 and 5. The remaining chapters of the thesis comprise Part III in which the survey results and their analysis are combined with an overall assessment of the research programme reported in the thesis.

PART III

Part III encompasses chapters 6, 7 and 8. Chapter 6, The Results of the Major Surveys, provides the results of the surveys of the Dias Divisional Council area, the Amatola Basin and Tsweletswele. As stated in the Preface, the spatial variation in nutritional status can be contemplated at different levels. The level, or scale of analysis, that is germane to the present study, is that which allows the comparison of nutrition to be made between the three surveyed communities. While it is argued in chapter 6 that nutritional status in the Dias area, for example, is similar throughout the area, there is no doubt that at a different scale of analysis - comparing nutrition between children on adjoining farms, being a case in point - variation in nutrition is discernable. Inter-community rather than intra-community variation in nutrition is, therefore, the focus of attention in chapter 6. A main and four ancillary hypotheses provide the framework for the presentation of the survey results. It is contended that geographical variations in nutrition are apparent and the nature of that variation is contemplated through the testing of the hypotheses. Chapter 7, Assessment of the Survey Results, considers issues such as the time at which the surveys were conducted during the year and the impact of that timing on nutrition, and the suitability of the anthropometric criteria chosen to measure nutritional status. It is maintained that the results from the surveillance programme indicate the need to continue to monitor nutritional conditions in the Eastern Cape and Ciskei. Nutritional surveillance, as a process, is also considered and a rudimentary model of the surveillance process is offered in the concluding section of chapter 7. Chapter 8, the Conclusion, draws together the various themes raised in the thesis. The concern with nutritional issues is regarded as pertinent for the scholar working in the fields of human geography and medical geography in particular. A consideration of the policy implications of the study provide a suitable context in which to draw the thesis to a close.

CHAPTER 6

THE RESULTS OF THE MAJOR SURVEYS

The chapter provides the results of the surveys of the Dias Divisional Council area, the Amatola Basin and that of Tsweletswele. The research hypotheses provide the structure for the chapter. However, the main hypothesis, which states that nutritional conditions will vary geographically, is considered after the secondary hypotheses. The latter hypotheses give the opportunity to analyze separately, the nutritional and socio-economic conditions in each of the three surveyed communities. The main hypothesis acts as the medium for drawing the reseach findings together and comparing the results of the three surveys.

A. The Results of the Secondary Hypotheses

Four secondary or ancillary hypotheses are proposed as stated in chapter 5, section D. The first hypothesis compares the number of children at risk, according to both clinic records and the survey results, in the Dias area. The reasons for any discrepancies are considered. The second hypothesis looks at the nutritional status of the Amatola children in the light of the Nutrition Clinic records kept at St Matthew's Hospital at Keiskammahoek, while the third explores the relationship between nutritional status and access to clinic services in the Amatola Basin. The final secondary hypothesis examines the level of nutrition of the children in Tsweletswele.

1. Nutritional Status in the Dias Divisional Council Area, May 1981

Ancillary Hypothesis 1

The limited use made of the Department of Health's Skimmed Milk Powder Scheme suggests that malnutrition is not a problem in the Dias Divisional Council area. Should the survey indicate that levels of malnutrition are high (using the Brown and Brown (1979) criterion of above 15 percent of a community's children at risk, as high) then the discrepancy between the clinics' assessment of the level of malnutrition and that made on the basis of the survey may be explained by:

a) the lack of access that rural children have to clinic facilities; and

b) the generally low standard of living of black farm-labourer households.

As stated in chapter 5, section C(1a), very limited use was made of the Department of Health's Skimmed Milk Powder Scheme. Any child who falls under the third percentile of weight for age qualifies for treatment under the scheme. Since the scheme operates from the clinics, a record of all users is obtainable. This section compares the number of children regarded as being at nutritional risk (using the third percentile on the weight for age chart as the cut-off point) from the results of the community survey of nutrition and the clinic records.

a. Children at Risk : Clinic Records and Survey Results

A total of 231 black and 'coloured' children under the age of six made use of the Skimmed Milk Powder Scheme. These 231 children may be regarded as the total number of children at risk in the Dias area, according to all clinic records in the area. For purposes of the survey, the number of children under six years of age in the Dias area were taken as one fifth that of the total population, on the assumption that the black population is characterized by high birth rates and declining death rates. The 231 therefore represent 1,2 percent of the approximately 18 900 black and 'coloured' children under six, a figure well below the 15 percent stipulated by Brown and Brown (1979) and used in this thesis as the benchmark above which communities are regarded as having a serious nutritional problem.

The only anthropometric measurement taken at the clinics is the weight for age of children, the age-dependent measure of present nutritional status. Weight for age is recorded against the Boston norm. It should be kept in mind that the 231 clinic cases making use of the Skimmed Milk Powder Scheme represent children falling below the third percentile. On the assumption that the Boston and the NCHS are very similar and the percentile scores of children are comparable (as discussed in chapter 2, section C(1)), the clinic results can be compared with the weight for age assessment made in the Dias Survey and presented in Table 9.

If the weight for certificate age results of the community survey are used, then 83 or 15,4 percent of the 540 male and female children fall

below the third percentile. Using the ages of children, as stated by their guardians and as shown by certificates, 241, or 16,3 percent of the 1 478 children surveyed, fall below the third percentile of weight for age. Both sets of figures are significantly higher than the suggested level of children at risk according to the clinic records, and also marginally higher than the 15 percent level adopted to indicate communities with a nutritional problem.

The initial assessment of Table 9 suggests that far greater numbers of children should be making use of the Department of Health's Skimmed Milk Powder Scheme. If the sample survey of the Dias community represents the conditions of children under six years in the Dias area, then the number of children at risk in the area is likely to be in excess of 3000 children, many more than the 231 proposed by the Department of Health. In terms of the first ancillary hypothesis therefore, the survey results vary from the clinic records in projecting the number of children at risk.

Before pursuing the reasons for the relatively high number of children at risk according to the community survey the anthropometric results are outlined more fully, starting with those given in Table 9. The elaboration of results highlights specific aspects of nutrition within the Dias area, for example, comparing the present and long term nutritional status of the children. The number of children at risk in Table 9 is very similar, according to sex and by stated age and by certificate age. The number of male children at risk according to weight for certificate age, 34 or 12,7 percent of 267, is however slightly lower than that in the other categories and bears further analysis. A two-by-two contingency table was constructed and the Chi-square test ( ) used to assess whether a significant difference exists between the number of male and female children at risk, according to certificate age measurements. Table 10 provides the test results.

Table 10 indicates that the difference in the number of males and females at risk is not significant at the 0,05 level. The results of the test however are not entirely conclusive. At the 0,10 level (critical value 2,71), the difference between the two groups is significant, suggesting that females may be more at risk than males. What the results may tentatively point to is preferential treatment of males for limited household food resources. If food is limited, the male, as tradition dictates, may be given first choice of food in the family pot.

Table 9 Assessment of Weight for Age According to NCHS Norms,[1] Dias Survey, May 1981

Number and Percentage of Children Under Six Below the Third Percentile

Males						Females					
Weight for Age Stated			Weight for Certificate Age			Weight for Age Stated			Weight for Certificate Age		
No. of Cases	No. < 3P	% < 3P	No. of Cases	No. < 3P	% < 3P	No. of Cases	No. < 3P	% < 3P	No. of Cases	No. < 3P	% < 3P
487	84	17,2	267	34	12,7	451	74	16,4	273	49	17,9

[1] Source: The NCHS norms have been drawn from the following three sources:

Hamill et al., 1979, pp.607-629; United States Department of Health, 1977, various tables; Computer tables of the NCHS norms compiled by Dr M. Mann, Red Cross Memorial Hospital for Children, Cape Town.

Table 10 Chi-Square Test of Significance, Male and Female Children, Dias Survey, May 1981

Sex	At Risk		Not At Risk	
	O[1]	E	O	E
Males	34	(41,0)	233	(225,0)
Females	49	(42,0)	224	(231,0)
	83	(83,0)	457	(457,0)

[1] O = Observed value; E = Expected value

$$\chi^2 = \sum \frac{(O - E)^2}{E} = \underline{2,79}$$

Degrees of Freedom : 1
Significance level : 0,05
Critical Value : 3,84

Since the calculated value is less than the critical value, the difference between the number of males and females at risk is not significant.

A further aspect of the nutritional analysis is to explore the possibility of geographical variation in nutrition existing in the Dias area. Table 11 examines the weight for certificate age of males by magisterial district within the Dias area. While variation does occur in the number and percentage at risk, from a low of 9,8 percent of males in the Alexandria district to a high of 20,0 percent in the Bathurst district, these differences are not significant (χ^2) at the 0,05 level. As stated in the Preface and the introduction to Part III, intra-community variations in nutrition are not pursued in the thesis since the concern is with inter-community variation in nutrition. The χ^2 results suggest that, even if the scale of analysis were shifted to the intra-community level, major variation in nutrition between the various sub-areas is not likely to materialize. What is important from the point of view of the inter-community analysis of nutrition is that the Dias area, as a whole, is homogeneous. The children surveyed come from farm-labourer households and nutritional conditions, for example, in the Hankey magisterial district are much the same as those in the Albany or Alexandria

Table 11 Assessment of Weight for Certificate Age of Male Children by Magisterial District According to NCHS Norms, Dias Survey, May 1981

Number and Percentage of Children Under Six, Below the Third Percentile

Magisterial District	No. of Cases	No. < 3P	% <3P
Hankey	40	5	12,5
Port Elizabeth (rural)	32	5	15,6
Alexandria	82	8	9,8
Albany	83	10	12,0
Bathurst	30	6	20,0
All Areas	267	34	12,7

magisterial districts. As a result, the weight for age results based on data collected in each magisterial district and totalled in the results shown in Table 9, are representative of the Dias area as a whole. That is, the results are not biased favourably or unfavourably because of particular conditions prevailing in any one district of the Dias area.

The weight for certificate age of the Albany district male group is examined more fully in Figure 24. Of particular note is the concentration of cases between the fiftieth and third percentile, with few cases (15 or 18,1 percent of the 83 cases) falling on or above the fiftieth percentile. The children clearly represent a population which has low weights for ages. In addition, it is a population where over ten percent of the children are at risk and fall below the third percentile.

The other measures of present nutrition are the age-independent measures of weight for height and skinfold thickness measurements. The results of these assessments are given in Tables 12 and 13 respectively. Chi-square was again used to test for significant differences between the numbers at risk according to the various anthropometric norms, including that of weight for age. Two interesting facts emerge. First, there is no

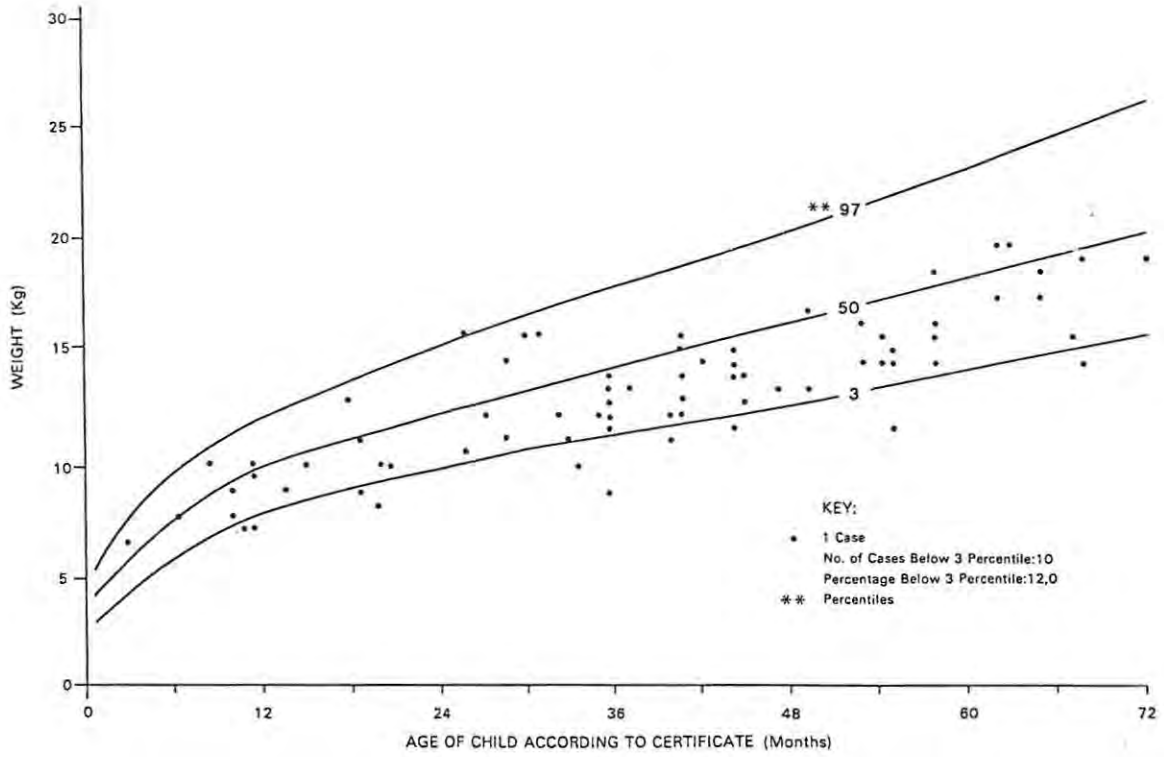

Figure 24 Weight for Certificate Age of Males Aged 0-72 Months According to NCHS Norms, Albany Magisterial District, Dias Survey, May 1981

significant difference at the 0,05 level in the number at risk according to the weight for certificate age, weight for height and skinfold measurements. This fact is especially important since the pilot survey results suggested that a difference existed in the numbers at risk, as measured on the weight for age and weight for height norms. It should be noted that while skinfold measurements are supposed to be nearly independent of age for children between the ages of one and five years, for the purposes of the survey only those results which could be matched with the certificate ages of children were used. The numbers of children measured is accordingly low. Another factor which resulted in the low number of observations given in Table 13 is that some children over the age of one were frightened of having the calipers used on them. Screams and other forms of protest led the author to instruct the teams to measure only children who were not afraid of the calipers. Secondly, a significant difference in the number at risk, at the 0,05 level, does occur between the weight for recumbent height and the weight for height measurements. What the latter results suggest is that nutritional problems may be more marked in the very young childen, namely those between birth and twenty four months of age.

Table 12 Assessment of Weight for Height According to NCHS Norms, Dias Survey, May 1981

Number and Percentage of Children Under Six Below the Third Percentile

Males						Females					
Weight for Recumbent Length (0-24 months)			Weight for Height (25-72 months)			Weight for Recumbent Lenght (0-24 months)			Weight for Height (25-72 months)		
No. of Cases	No. < 3P	% < 3P	No. of Cases	No. < 3P	% < 3P	No. of Cases	No. < 3P	% < 3P	No. of Cases	No. < 3P	% < 3P
234	47	20,1	431	58	13,4	261	63	24,1	400	47	11,7

Table 13 Assessment of Triceps and Subscapular Skinfold Thickness According to Tanner and Whitehouse Norms,[1] Dias Survey, May 1981

Number and Percentage of Children, One to Five Years, Below the Third Percentile

Skinfolds	Males			Females		
	No. of Cases	No. <3P	%<3P	No. of Cases	No. <3P	%<3P
Triceps	183	25	13,7	177	26	14,7
Subscapular	183	20	10,9	178	28	15,7

[1] Tanner and Whitehouse, 1962, pp.566-569.

The assessment of the long term nutritional status of the children is provided in Table 14. The difference in nutrition, hinted at between the children under and over 24 months of age is apparent once more in the results of the male children, but the difference is not significant at the 0,05 level using X^2. No significant difference is apparent between younger and older female children. Both the recumbent length and height results indicate significantly higher numbers of children at risk compared with the measurement of present nutritional status given in Table 13. The recumbent length for certificate age results suggest that approximately a third of males and a quarter of females are at risk to stunting. For the older children, the comparable figures are roughly a quarter of both male and female children. The weight for certificate age results show considerably less than a fifth of both males and females to be at risk.

In summary, the anthropometric results of the Dias survey indicate that the clinic records are not a sound indication of nutritional conditions in the area. Present nutrition, according to the survey results, borders on being unsatisfactory since a number of the measures indicate about 15 percent of children at risk, the level taken from Brown and Brown (1979) to indicate that the surveyed community has a nutritional problem which requires intervention, in some form, to improve conditions. The measurement of long term nutrition shows that the children in the Dias

Table 14 Assessment of Height for Age According to NCHS Norms, Dias Survey, May 1981

Number and Percentage of Children Under Six Below the Third Percentile

	Males						Females					
	Recumbent Length (0-24mths)			Height (25-72mths)			Recumbent Length (0-24mths)			Height (25-72mths)		
	No. of Cases	No.<3P	%<3P	No. of Cases	No.<3P	%<3P	No. of Cases	No.<3P	%<3P	No. of Cases	No.<3P	%<3P
By Certificate Age	98	36	36,7	159	46	27,2	110	26	23,6	160[1]	38	23,7
By Stated Age	134[2]	43	32,1	262	60	22,9	151	35	23,2	240	64	26,2
Total	234	79	33,8	431	106	24,6	261	61	23,4	400	102	25,2

1 Three height measurements were not recorded in the field due to oversight on the part of survey teams.

2 The total number of height (recumbent and standing height) for stated age measurements is 787 instead of 938. The reasons for the descrepancy are explained in chapter 5, section C(2a).

area grow up in environments of food scarcity and that many are prone to stunted growth as a result. Between a quarter and a third of children are likely to be stunted, a very unsatisfactory situation and cause for even more concern for the long term nutritional wellbeing of black children reared on the farms in the Dias area.

The causes of the unsatisfactory levels of nutrition are explored in the following sections. As hypothesized, should the number of children at nutritional risk be higher than that postulated on the basis of the clinic records, then that number can be explained in terms of the lack of access to facilities displayed by the surveyed children and the socio-economic conditions prevailing in the community.

b. Access to Health Facilities

Question 34 from the questionnaire, Appendix 2, sought to find out how many children visited a clinic on a regular basis. The results of this question are considered together with comments on observations made by the field teams about the use of clinic services.

Nine hundred and thirteen, or 61,8 percent of 1 478 children surveyed, appear to visit clinics on a regular basis. Almost 40 percent of the children receive no regular clinic attention which means that their rates of growth are not monitored nor necessary vaccinations received. The nurses at clinics keep growth charts of all children who attend on a regular basis. Failure to grow can be identified and action taken to find out why a child is not growing properly. Supplementary feeding can be instituted if a child falls below the third percentile on the weight for age norm and can be continued until the child shows satisfactory weight gains and lies above the third percentile once more. For the nearly 40 percent who do not attend the clinics, such monitoring is not possible. The lack of attendance must be a partial explanation for the low numbers of children making use of the Department of Health's skimmed milk programme, for it is the non-attenders who are likely to be the ones most at risk to malnutrition. Although it could be argued that non-clinic attenders represent a healthy sub-section of the community and therefore do not need to attend clinics regularly, such a situation is unlikely. Immunization programmes continue throughout the first five years of a child's life and at less frequent intervals thereafter. The MOH for Grahamstown maintains that, on the basis of his experience in the

Albany district, malnourished children who have not been immunized and who get measles usually die within three weeks of contracting the disease (Dippenaar, 1982). As will be discussed in the following sub-section (Alci), hospital records confirm that death from a combination of malnutrition and measles is not uncommon for children in the Dias study area. One further statistic from the survey result is given to lay to rest the notion that non-attenders may represent a healthy section of the children surveyed. One hundred and seventy nine or 74,3 percent of the 241 children surveyed who fell below the third percentile of the weight for age norm did not attend a clinic on a regular basis.

In discussion with the survey teams a recurring theme was the lack of knowledge of the Department of Health's skimmed milk scheme on the part of the guardians of the children. A related point made by the teams was that many children and adults were able to make use of medical facilities only when they became ill. Since they invariably lack their own transport they have to rely on the farmers to transport them to health facilities. Visits are, therefore, only made in cases of serious illness, unless the farmer is aware of the need for regular clinic visits for his staff. The lack of knowledge about the possible roles the clinic can play in maintaining health is an important issue and suggests that educating the labourers about services available to them is a strategy that needs to be pursued by the Department of Health.

c. Socio-Economic Conditions of Farm Labourer Households in the Dias Area

A total of 966 mothers or other guardians were surveyed to supply the information about 1 478 children. Mothers comprised 636 or 65,8 percent of respondents; fathers, 30 or 3,1 percent; grandmothers, 148 or 15,3 percent; other female relatives 111 or 11,5 percent; and other respondents, the balance of 4,3 percent. The following section does not provide an exhaustive analysis of the questionnaire, but rather highlights five issues pertinent to the present discussion. These issues are household size, educational attainment of the child's guardian, degree of family stability or social organization, income and breastfeeding practices.

i) Household Size

Overcrowded households appears to be a problem among many surveyed families. The average number of people per household in South Africa is 3,3 for whites and 5,9 for blacks (Freer, 1981). In the Dias area, black households had an average of 8,3 persons occupying just under 3 rooms per household. The survey teams commented on the degree of overcrowding and many questionnaires have written next to the required information, 'overcrowding in this household'. The transmission of infectious disease in conditions of overcrowding can be very rapid. The children who are malnourished run the risk of succumbing more readily to infectious diseases such as tuberculosis and gastro-enteritis than do well nourished children. While the survey did not set out to note illnesses associated with malnutrition, the author has, since the Dias survey, analyzed data from Settlers Hospital in Grahamstown to look at the relationship between malnutrition and infection in the Albany district of the Dias area. The study was of 164 black children (of whom 155 or 94,5% were less than 48 months of age) who had died after admission to the hospital in 1983. Fourty five of 61 (73,8%) children who had died from gastro-enteritis were under the third percentile of weight for age. Of the fifty children who had died from respiratory measles and other respiratory ailments, 33 or 66 percent fell below the third percentile. Another 12 out of 15 (80%) children who died from other infectious diseases also fell below the third percentile. In all, a total of 106 or 64,6 percent of all deaths were due to infectious diseases. It is sobering to note that 58 or 35,4 percent of these children (of whom 49 or 84,4% had died from infectious disease) came from the farms in the Albany district. The remainder came from Grahamstown, other towns of the district and some from Ciskei. Overcrowding is indicative of people living in unsatisfactory conditions. In the Dias area, it must be considered as a contributory factor to creating an environment in which malnutrition and infectious diseases combine to make many children extremely unhealthy.

ii) Educational Status of the Guardians of the Surveyed Children

The highest level of formal education obtained by the parents and/or the guardians of children is given in Table 15.

Table 15 Education Levels of Parents and/or Guardians of Children, Dias Survey, May 1981

Education Level	Mother		Father		Other Guardian	
	No. of Cases	%	No. of Cases	%	No. of Cases	%
No Education	324	35,6	372	48,7	116	50,7
Sub A to Std 5	532	58,5	338	44,2	98	42,8
Std 6 to 8	45	5,0	41	5,4	12	5,2
Std 9	8	0,9	13	1,7	3	1,3
Missing Cases	57	-	202	-	71	-
Total	966	100,0	966	100,0	300	100,0

Information was not always available about the educational status of the parents. Similarly, the teams found some respondents uncertain about the level of education they had obtained. The nil responses are recorded as missing cases in Table 15. The main feature of the education results is the non-existence and the very low levels of education of many community members. Over a third of mothers (35,6%), nearly a half of fathers (48,7%) and over a half of other guardians (50,7%) have no formal education. The mothers have had more education than fathers; nearly 60 percent of them have some primary education as opposed to about 45 percent of the fathers. The guardians, other than the parents, are often grandparents and their levels of education are even poorer than that of the parents' of surveyed children. The low educational status of the fathers is a measure of the job requirements of males on the farms and the problem young men experience in obtaining education when they can more profitably contribute to family household income on the farms, for example, as herders of cattle, sheep and goats. Educational status must be linked with the possibilities which exist for these families to improve their standards of living and to run stable households, issues which are dealt with in the following two sections.

iii) The Degree of Family Stability and Organization

As stated in chapter 2, section D, social disorganization of the household unit occurs when fathers and mothers migrate in search of work or when either or both parents desert the household. Table 16 provides a synopsis of the role of the parents in the surveyed households.

Table 16 Role of Parents in Surveyed Households, Dias Survey, May 1981

Parents Role in Households	Mother		Father	
	No. of Cases	%	No. of Cases	%
Home and employed	355	36,8	540	57,4
Home and unemployed	493	51,0	27	2,9
Migrants	67	6,9	133	14,1
Deserted	45	4,7	215	22,8
Died	6	0,6	26	2,8
Missing Values	-	-	25	-
Total	966	100,0	966	100,0

Just over 60 percent of fathers and almost 90 percent of the mothers of children were resident in the households. In addition, a further 133 or 14,1 percent of fathers were migrants who contributed regularly to the family household, either in the form of cash remittances or income in kind. What is disturbing about the results is the large number of males, 215 or 22,8 percent of all fathers, who have deserted. Deserters are those persons who no longer contribute to the household, either economically or socially. It is within these households that poorly nourished children are more likely to be found. The survey teams found that many of the 'deserters' were in fact men who had had very short relationships with young women. During these relationships children were conceived, but the fathers at no time intended to support or marry the women.

The author pursued the issues of deserters more fully in discussions with various community leaders such as the teachers on the farm schools. The teachers, and others stated that school girls fall pregnant with alarming

regularity, give birth and return to school after having left the children to be brought up by the school girls' parents. This information ties up with the survey results which indicate that the youngest mother was only 12 years of age! Many male deserters, to return to the main theme of the discussion, are not, therefore, members of an established family unit, but rather casual acquaintances with no intention of supporting the mother and the children born out of the relationships.

iv) Household Income

Household income is difficult to ascertain. The male does not always disclose his income to other members of the family, and the family as a whole, is reticent to disclose its income to outsiders. Since most respondents to the questionnaire were female, it was expected that it would be difficult to obtain exact household income.

To curb speculation about household income on the part of respondents, only the information supplied by parents is used. Rations, or income in kind, is not included in the income figures. The majority of income came from wage earnings on the farms and from pensions and disability grants, in cases where grandparents contributed to household income. Income data were obtained from 641 respondents, the remainder indicating that they did not know the family income. The average monthly household income was R55,31 with a maximum income of R245 being recorded in one household and another household claiming a total monthly income of R3! In the latter case rations were the mainstay of the family 'income'.

The farm incomes are low. Studies done in Grahamstown suggest earnings of R174 per month for a family of six (Rhodeo, 1982). The only other comparable data come from studies of the household subsistence level (HSL) for major urban centres in South Africa, including Port Elizabeth (Potgieter, 1981). The HSL is designed to reflect the lowest costs which a family must meet in order to maintain minimum standards of health and decency, only in the short term. For Port Elizabeth, the 1981 figure for a family of six was R219,46. Although rents (R20,17) and transport to and from work (R5,20) are not paid by farm labourers, their other basic needs are similar to those of urban blacks. Even with income in kind, it is difficult to see the Dias farm labourer population reaching HLS's of R194,09 (R219,46 less rent and transport costs) per month.

iv) Breastfeeding Practices

A total of 826 respondents provided information on the length of time babies were breastfed. The average length of time a baby was kept on the breast was 14,8 months, a very adequate period. Only 53 or 8,3 percent of mothers did not breastfed their babies at all.

In general, the survey showed that rural mothers have a positive attitude to breastfeeding. An interesting feature of the results comes from comparing the level of formal education of mothers with their attitudes to breastfeeding. The results of a computerized cross-tabulation analysis of the two variables, length of time babies were breastfed and the educational levels of mothers, showed no significant difference (, at the 0,05 significance level) in the length of feeding for mothers with no formal education, with primary education or secondary education. Mothers are aware of the value of breastfeeding, irrespective of the amount of formal education they have received. The nutritional problems arise not through lack of understanding of the value of breastfeeding but rather through other pressures on the household, such as lack of income as already discussed. Another problem exists for mothers who migrate in search of work opportunities elsewhere, leaving babies in the care of rural guardians. For the band of female migrants shown in Table 16, the average age of their babies when they migrated was 2,9 months. These children are unlikely to have benefitted from breastfeeding and are probably more at risk to early malnutrition and infection than breastfed children.

The ancillary hypothesis dealing specifically with the Dias area postulated that, if the level of children at risk in the Dias area was significantly higher than that put forward by the Department of Health, the greater numbers could be partially explained by the socio-economic conditions prevailing in the community as a whole. The analysis of the socio-economic conditions of the Dias community suggests that it is one in which overcrowding in individual households is the norm; educational levels are extremely low; desertion of the mother and child by the father happens with great frequency, thereby endangering the stability of the household; income levels point to a community living in poverty; and breastfeeding practices are adequate except where mothers are forced to leave the child and rural home in search of work opportunities. These

factors point to a community in which malnutrition is likely to be a problem, an observation borne out by the anthropometric analysis of the surveyed children.

2. Nutrition in the Amatola Basin, November 1981

Ancillary Hypothesis 2

On the assumption that the St Matthew's Hospital Nutrition Clinic records reflect nutritional conditions of children in the Amatola Basin as a whole, the present nutritional status of the children should be satisfactory, but their long term nutritional status, less so. It is further postulated that environmental factors such as drought may help explain the difference between present and long term nutritional status.

a. The Assessment of Present and Long Term Nutritional Status

A total of 225 children under the age of six, from 168 guardians, were surveyed. Two questionnaires were not filled in satisfactory and were discarded, so that information was available for 223 children, of whom 115 or 51,6 percent were male and 108 or 48,4 percent female. The present and long term nutritional status of the children is discussed in accordance with the ancillary hypothesis which states that present nutritional status should be better than that of the long term nutritional status of the children.

Table 17 presents the results of the weight for age assessment of the children. An initial look at the table suggests that males appear to be at greater risk than females, according to both the weight for stated age and the weight for certificate age categories. The numbers in each category are, however, too small to make any statistical inferences about the significance of the results, X^2 requiring the number of cases in a 2 x 2 contingency table to be no less than 5 in any one cell (Matthews, 1981). The weight for stated age results suggest greater numbers of both males and females at risk when compared with that of the weight for certificate age results. Two factors could explain the apparent

Table 17 Assessment of Weight for Age According to NCHS Norms, Amatola Basin Survey, November 1981

Number and Percentage of Children Under Six Below the Third Percentile

Males						Females					
Weight for Age Stated			Weight for Certificate Age			Weight for Age Stated			Weight for Certificate Age		
No. of Cases	No. < 3P	% < 3P	No. of Cases	No. < 3P	% < 3P	No. of Cases	No. < 3P	% < 3P	No. of Cases	No. < 3P	% < 3P
49	11	22,4	66	8	12,1	58	8	13,8	50	2	4,0

differences. In the first instance, children with certificates to verify their ages may well be those with better care. It can be argued that caring parents and other guardians will do all within their power to ensure the health and development of their children. Obtaining certificates for their children can be a difficult process, as suggested previously (chapter 4, section A(1)) and may indicate their concern for the welfare of their children. The difference in nutritional status, as shown by the weight for stated age and weight for certificate age, may therefore be real. A second line of reasoning could be that the differences arise because of inaccuracies brought about by the guardian giving ages to the survey teams without being able to substantiate these ages according to certificates. As stated in chapter 2, Thomas (1982) maintains that guardians know the ages of children accurately. Since the Amatola residents are, inspite of the problems of migrancy, a stable community, and in view of Thomas's statement on the issue, as well as the feedback from the survey teams, the author prefers the former explanation of the differences in the numbers at risk. That is, children with certificates to verify their ages, are likely to be a better nourished group than those without certificates.

On the assumption that the weights, according to stated and certificate age, are representative of the children's present nutrition, the numbers at risk according to stated age and certificate age can be amalgamated. It is then possible to employ χ^2 to examine whether a significant difference exists between the nutrition of males and females surveyed. Chisquare reveals that no significant difference exists at the 0,05 level. On the basis of amalgamating the number of males and females surveyed, 29 or 13 percent of the 223 children fall below the third percentile.

As stated in chapter 4, section B(2), the records from the Nutrition Clinic at St Matthew's Hospital suggested that the number of children being treated by the clinic had dropped considerably over the previous year, as a possible result of improved rainfall and its positive impact on the harvest of foodstuffs within the Basin. The average monthly number of children below the third percentile according to their records was 94 in 1980 and 33 in the months prior to the survey in 1981. Assuming a total population in the Basin of 5 600, the number of children under 6 should be approximately 1 120. The 33 cases from the Nutrition

Clinic records suggest an at risk rate of 2,9 percent. The discrepancy between the clinic records and the survey results is, however, likely to mirror degrees of severity of the nutritional problem rather than a contradiction between the two sets of results. Discussion with the St Matthew's Hospital superintendent and the matron and sisters on the childrens' ward were very informative. The general consensus was that the number of kwashiorkor cases from the Basin had dropped in 1981. The discussions also showed that only those children who were verified as having kwashiorkor were treated at the hopistal's clinic, so that not all who fell below the third percentile were seen. The records of the Nutrition Clinic therefore indicate a situation in which the present nutrition of the children is relatively satisfactory when compared with that of previous years. The records and the survey results point to a satisfactory level of present nutrition in the Amatola Basin.

Also of note is the fact that present nutritional status has been assessed solely according to the weight for age criterion, on the assumption that the ages of children have been accurately recorded. The age-independent weight for height measure suggests that 26 or 11,9 percent of 218 children fall below the third percentile. The result is very similar to the 13 percent determined by the weight for age criterion, a factor which will be more closely analyzed in chapter 7 section C(1a) in which the overall assessment of the anthropometric results of the survey will be considered.

The assumption concerning the accuracy of the stated and certificate ages of children is used in the assessment of the long term nutrition of the Basin children, shown in Table 18. The data are only divided between children below and above twenty five months, and not by sex or by stated and certificate ages.

Two important features of the results in Tables 17 and 18, are the difference between the numbers at risk for recumbent length and height, and the significantly lower numbers at risk for the weight for age assessment. The recumbent length results show just under a third of all children to be suffering from stunted growth, whereas the comparable figure for the height for age assessment is well over half (56,4%). The difference for these two assessments is a significant one at the 0,05 level. Overall, the assessment of the long term nutrition of the children suggests unsatisfactory condition prevailing in the environment in which they are raised.

Table 18 Assessment of Height for Age According to NCHS Norms, Amatola Basin Survey, May 1981

Number and Percentage of Children under Six Below the Third Percentile

Recumbent Length for Age (0-24mths)			Height for Age (25-72mths)			Total		
No. of Cases	No.<3P	%<3P	No. of Cases	No.<3P	%<3P	No. of Cases	No.<3P	%<3P
108	35	32,4	110	62	56,4	218[1]	97	44,5

1 Due to a lapse on the part of a sister, seven recumbent length and height measurements were not taken. The lack of entries on the questionnaire were only discovered the next day, at which time the survey teams had already moved to the next village.

The results of Table 18 show that the children 24 months or younger have less of their number stunted than those in the older category. Environmental conditions which affect crop production and the condition of stock appear to offer part of the explanation for the differences in numbers at risk. The adequate rains in 1980 would have resulted in increased foodstocks for many households, so that a great many of the younger children would have benefitted from the improvement in subsistence farming conditions in the Basin. The older children unfortunately would have been through periods of drought years, each period of scarce household resources from the land being cumulative on the long term growth of the children.

The results from Table 17 and 18 point to marked differences in the present and past nutritional status of the children. As postulated the present nutrition of the Basin children is satisfactory while their long term nutrition is not. Environmental conditions have been tentatively put forward as an explanation for the differences in present and past nutrition. Possibilities for further research into the role of environmental conditions should prove rewarding in the light of the recurrent nature of drought in Southern Africa, and the continent as a whole.

b. The Impact of Health Services on Nutrition

Ancilliary Hypothesis 3

Nutritional status will be most satisfactory in the central village of Komkhulu in the Amatola Basin because of the ready access to the clinic and the services it offers. Nutritional status will be most unsatisfactory in those villages at the greatest distance from Komkhulu.

It is postulated that the central village of Komkhulu will have better nourished children, since the clinic and other Basin infrastructure is concentrated here. Table 19 provides the results of the weight for age assessment for male and female children combined for the five surveyed villages. Komkhulu has the least number of children falling under the third percentile and the nearby village of Mkobeni the greatest. However, X^2 shows that no significant difference, at the 0,05 level, exists between the number of children at risk in the different villages. The conclusion to be drawn, inspite of the limited number of cases at risk in each village, is that the impact of the clinic on nutrition is minimal.

It is, however, too simplistic to suggest that the impact of the clinic on nutrition, and health in general, is very limited, and it is necessary to elaborate on the theme. The clinic sisters make regular visits to all the villages to check on the nutrition and health of children, so that, while the clinic is a static entity, the movement of its staff to all villages diffuses health care throughout the valley. As a result, one finds that 93 percent of all respondents claimed that children under their care attended the clinic regularly or were seen by the clinic staff on their domicillary calls to villages. However, lack of proximity to the clinic precludes some clinic services permeating more remote regions of the Basin. The example of the clinic service for the delivery of babies illustrates the point. The labour facilities of the clinic were more widely used by mothers in Komkhulu and the nearby villages of Mdeni (1km away) and Matinise (3/4km away) than the more remote highland villages of Mkobeni (3km away) and Dish (4km away). In Komkhulu, for example, only 2 mothers of surveyed children had their babies born at home, while 15 mothers had children born at the clinic. The remaining 5 mothers had their children delivered in hospital, invariably St Matthew's Hospital, although some claimed to have had their babies delivered at the

Table 19 Assessment of Weight for Age According to NCHS Norms, By Village, Amatola Basin Survey, November 1981

Number and Percentage of Children Under Six Below the Third Percentile

	Weight for Age Stated			Weight for Certificate Age			Weight for Age Assessment (Total)		
	No. of Cases	No. <3P	% <3P	No. of Cases	No. <3P	% <3P	No. of Cases	No. <3P	% <3P
Komkhulu	11	-	-	28	1	3,6	39	1	2,6
Matinise	18	5	27,7	37	4	10,8	55	9	16,4
Mdeni	10	4	40,0	20	2	10,0	30	6	20,0
Mkobeni	41	6	14,6	8	-	-	49	6	12,2
Dish	27	4	14,8	23	3	13,0	50	7	14,0
Total	107	19	17,8	116	10	8,6	223	29	13,0

Lovedale Hospital in Alice (Figure 15). In contrast, 13 of the Mkobeni mothers had their babies delivered at home and only 2 mothers had their babies at the clinic. The other 8 Mkobeni mothers had their children in hospital. The results point to the more ready use being made of the clinic for the delivery of babies by those in close proximity. There is also a tendency to 'leap frog' the clinic facilities in favour of hospitals on the part of mothers from all surveyed villages. The maxim, that people will go greater distance for more sophisticated care (Smith, 1977) is applicable in the case of the mothers of children surveyed in the Amatola Basin.

One further issue is considered in analyzing the impact of the clinic on nutrition and nutrition-related issues. Breastfeeding is crucial in the first six months of a baby's life, to help build its immune system and to provide the nourishment which comes from the mother's milk. The average number of months mothers fed their babies was 17,3 (based on 129 responses) with a remarkably similar pattern emerging from all villages. While there was evidence of bottle feeding, usually by grandparents caring for young children, the results show that mothers know the value of breastfeeding and, where possible, do so for a considerable length of time. These results may appear to suggest that the clinic's nutritional education programme is working well and that mothers are feeding their babies in accordance with information received from the clinic. While the role of the clinic should not be discounted, the discussions held with villagers suggest that breastfeeding practices are more a result of the traditional mores of the community. Breastfeeding has always been an important activity in child-rearing and appears to remain so, even in the contemporary life of the Basin inhabitants.

Two important conclusions can be drawn from the above results. First, the clinic has an important role to play in the dispensing of preventative, curative and promotive services. Identifying children at nutritional risk can lead to the prevention of malnutrition, if parents and guardians can be educated (the promotive aspect of the clinic services) to feed their children more nutritiously, presupposing sufficient household resources exist. Malnourished children can also be referred to the nutrition clinic at St Matthew's hospital, thereby providing the curative dimension to the services offered. The use made of the clinic for the deliveries of babies shows another important function of the clinic. Secondly, the nutrition results from Table 19

and the information on breastfeeding show that in many fundamental aspects of health, the clinic may be playing a minimal role. Malnutrition, exemplified in the survey results and the clinic records, is as likely to occur in close proximity to the clinic as in some remote corner of the Basin. The ancillary hypothesis, that nutrition is likely to be more satisfactory in close proximity to the clinic, is therefore rejected. The reasons for children being at nutritional risk is not a matter of access to facilities, but is more likely to be related to conditions within the individual households, the focus of the following analysis.

Two asepcts of the socio-economic conditions prevailing in Amatola Basin households are considered. They are the role that parents play in the household and the household income. These factors have been selected for discussion because they highlight important features of household conditions in the Basin and how they affect nutrition.

Table 20 shows the role of parents in households and the associated nutritional status of the surveyed children. A distinction is made between those parents at home, those who have migrated and a category termed 'other', which includes those who have deserted households or have died. No immediate pattern is discernible from the results, other than a

Table 20 Role of Parents in the Household and the Nutritional Status of Children, Amatola Basin Survey, November 1981

Number and Percentage of Children under Six Below the Third Percentile, Weight for Age

Parents Role in Households	Mother			Father		
	No. of Cases	No. <3P	%<3P	No. of Cases	No. <3P	%<3P
Home	162	19	11,7	33	2	6,1
Migrant	42	6	14,3	150	22	14,7
Other	19	4	21,0	40	5	12,5
Total	223	29	13,0	223	29	13,0

tendency for those children with parents at home to have a slightly lower percentage at risk. It should be noted that the majority of children have their mothers at home and their fathers away as migrants. The Chi-square test confirms that there is no significant differences at the 0,05 level in the number of children at risk based on parental presence. These results may, at first, appear surprising. However, as Bekker, de Wet and Manona (1981) point out, the villages in the Basin consist of stable family units and even if the father has migrated, for example, he is likely to contribute regularly to the rural home. The extended nature of the family means that grandparents and other relatives can play a part in rearing the children in the absence of the father, so that the family is dislocated by the absence of the father but not disorganized, in the sense advocated by Thomas (1980, 1981). Observations made during the fieldwork substantiate the idea that although many households lacked the presence of one or both parents at home, the children were nevertheless as well cared for as circumstances permitted. Children were generally well dressed and appeared secure within the extended household.

While children may be well cared for, the available household resources are likely to be a more important factor dictating their nutritional status. Table 21 explores the relationship between the family cash income and the nutritional status of the children. Income was available

Table 21 Family Cash Income and the Nutritional Status of Children, Amatola Basin Survey, November 1981

Household Income (Rand)	Number and Percentage of Children Under Six Below the Third; Between the Third and Fiftieth; and Above the Fiftieth Percentile, According to Weight for Age						
	No. of Cases	No. <3P	% <3P	No. 3 -50P	%3-50P	No.>50P	% >50P
0 - 50	45	4	8,8	31	68,8	10	22,2
51 - 100	30	6	20	16	53,3	8	26,7
101	28	-	-	16	57,1	12	42,9
Total	103	10	9,7	63	61,2	30	29,1

from households which accounted for 196 of the 225 children. The nutritional status of the children is broken down for those below the third percentile, those between the third and the fiftieth and those above the fiftieth percentile. Those below the third percentile represent the children at risk, while those between the third and the fiftieth may be regarded as an intermediate group between the at risk children and the well nourished who fall on or above the fiftieth percentile.

It is not possible to test for significant differences between the number falling below the third percentile and the various categories of household income, since one of the cells has no cases within it. The data do show that, for households with average monthly incomes in excess of R100, no children fall below the third percentile. It is also worth noting that, although not significant at the 0,05 level, the percentage of children falling above the fiftieth percentile is appreciably higher for those children coming from homes where cash income is greater than R100 per month. As common sense would have it, better nourished children appear to be those from households with higher cash incomes.

The results in Table 21 imply a trend between nutrition and income, the greater the income, the less the chance of malnutrition. A number of reasons may be advanced for the lack of a definitive relationship between these two variables, but one of the most important is the inability to guage the impact of subsistence production on nutrition. Three quarters of Basin households cultivate land (Bekker, de Wet and Manona, 1981) and since the survey was taken after a satisfactory harvest subsistence production is likely to be an important adjunct to cash income. Housholds with relatively little cash income may still be able to raise adequately nourished children because of subsistence production. The reasoning here, is that subsistence production can result in less food being bought with scarce funds. This does not mean that cash incomes are unimportant. Income is, and will remain, an important means of procuring food. Drought years will seriously disadvantage those rural households which do not have access to sufficient cash incomes, a factor confirmed by ongoing research in various parts of the country (Fincham, 1984).

The postulate that the central village of Komkhula will have better nourished children than other villages because of the ready access to the

clinic is rejected. Clinic services do have a positive role on health in the Basin, but a more important factor influencing the nutrition of children, is likely to be the household environment in which they are raised. The role of parents in households and the cash income of households was discussed to explore the relationship between these variables and nutrition. Contrary to the findings of studies quoted in chapter 2, migrancy and the desertion of the household by parents do not appear to significantly affect the nutrition of household children. The reason for the minimal impact of these negative factors on nutrition may be ascribed to the general stability afforded by the extended family network operating in the Basin. There is a trend for higher household income to be related to better nutrition, but households with access to subsistence production may have satisfactorily nourished children in spite of inadequate cash incomes.

In concluding this section, attention is drawn once more to the difference between the present and past nutritional status of the children. While the present nutrition of the children is satisfactory, the long term nutrition results show that drought, in combination with generally limited household incomes and other resources, can herald dramatic changes in the fortunes of the inhabitants of the Basin and, by implication, the nutrition of the children.

3. Nutritional Status of Children in Tsweletswele

Ancillary Hypothesis 4

The children in Tsweletswele will display unsatisfactory levels of nutrition because of the poor socio-economic conditions prevailing in the settlement.

To test the hypothesis, attention is focussed initially on the representative issues of household size, education levels of parents and other respondents, the role of parents in the household and household income, before looking at the relationship between socio-economic factors and the nutritional status of the children.

a) The Socio-Economic Conditions of Surveyed Households

A total of 49 households were surveyed, supplying information about 138 children, exactly half male and half female, and of 90 mothers and husbands or partners.

Households consist, on average, of 7,0 (median 6,1) members who stay permanently in Tsweletswele, slightly higher than the 6,4 (median, 5,80) found in the major survey of the settlement which preceeded the nutrition survey. The mean household size, including commuters and migrants, is 8,1 (median 8,0) compared with the 8,5 (median 8,3) for the major survey. The number of children under 6 years of age is just under three per household. Most families live in single-roomed dwellings so that crowded household conditions are very much in evidence.

The level of formal education of the parents of surveyed children is low. If the child is cared for by another member of the household, for example the grandmother, that person's educational qualification is even lower. Thirty five, or 41,2 percent of the 85 mothers for whom educational information was available, have no education at all and less than 10 percent of the mothers have gone beyond standard 5. Fathers appear to be equally poorly educated. No educational information was available for 27 fathers. Of the remaining 63, 34 or 54 percent have no education and a further 22, or 34,9 percent, have some primary school education. Only 7, or just over 10 percent, have secondary levels of education. Of the 23 guardians of the children who are not parents, all but one has no education (16) or primary education (6).

The education results are extremely poor and point to the rural farm backgrounds of many of the settlement members, as well as their unsettled past existence, as they have moved from place to place, either forcefully or willingfully, in search of more suitable homes. The household members have, therefore, limited formal educational training and the lack of skills is only too apparent when the contribution of parents to households is considered, as shown in Table 22.

The majority of mothers, 55, or just over 60 percent, are at home and unemployed. A total of 30 (33,7%) mothers contribute to the household earnings by being employed at Tsweletswele (2 cases) or as commuters (28 cases), working predominantly on a weekly basis in East London. As few as 4 mothers have deserted their households. In contrast to the mothers, fathers are not usually at home. The largest group are the 35, or 41,6 percent, who have deserted their households, leaving the mothers to raise and care for the children. The other major group of fathers are the 30 commuters. The results point to disorganized households, a factor made even more serious by the low earnings of households.

Table 22 Role of Parents in Surveyed Households, Tsweletswele Survey, October 1982

Parent Role in Housheolds	Mother		Father	
	No. of Cases	%	No. of Cases	%
Home and employed	2	2,2	2	2,4
Home and unemployed	55	61,8	12	14,3
Commuter	28	31,6	30	35,7
Migrant	-		2	2,4
Dead	-		3	3,6
Deserted	4	4,4	35	41,6
Missing Values	1	-	6	-
Total	90	100,0	90	100,0

The mean monthly household income for those households surveyed for nutritional assessment (see chapter 5, section C(2c)) is just over R53. While every effort was made by the anthropologists and interviewers to obtain incomes accurately, the income figure should only be used as an estimate of household earnings. Commuter earnings, for example, were difficult to gauge since these earnings were more often made in kind rather than in cash. The actual monthly household income, as a result, may be higher than the R53 suggested, although still very meagre when compared with the mean monthly household subsistence level of R194,09 derived from Potgieter (1981).

It is against the depressing background of overcrowded conditions, poorly educated adults, evidence of disrupted family life (exemplified in the large number of males who have deserted families), and low household earnings, that the nutritional status of the children and their relationship to these socio-economic conditions is assessed.

b. The Nutritional Status of the Tsweletswele Children

As the nutrition survey progressed, it became evident that Tsweletswele was a very different community from those in the Amatola Basin and the

Dias area. A sense of despondency was present in most households and the impression of family dislocation was strong. The characteristics of households discussed in the previous section, made themselves felt in the execution of the anthropometric assessment of the children. Only two birth certificates could be produced for the entire sample and the nursing sisters tried nobly but unsuccessfully to ascertain the ages of the children correctly. Obvious gross overestimation or underestimation by respondents suggested that the age-dependent results were likely to be erroneous. Every effort was therefore made to check and double-check the measurement for oedema, since it seemed that the measure would provide an important insight into nutritional conditions.

Table 23 provides a synopsis of the anthropometric assessment of nutrition of the surveyed children. The age-dependent measure of weight for age and the age-independent measure of weight for height both suggest that the present nutritional status of the children is satisfactory, with roughly 6 to 8 percent of the children at risk. At face value these results suggest that the Tsweletswele children are better nourished than either those in the Amatola Basin or the Dias area. Furthermore, in terms of the Brown and Brown (1979) criterion, the present nutrition of the children can be regarded as entirely satisfactory. The long term results indicate stunting is a problem. Just over 30 percent of children are at risk.

Various theories may be advanced to explain the apparently sound present nutrition of the children against the backdrop of a weakly developed community infrastructure and family dislocation. The proximity of the settlement to work opportunities in East London is a case in point. Access to job opportunity is invariably associated with improved living standards and it may be that access to employment opportunities outside the settlement by household members outweighs the disadvantages of the poor internal environment of Tsweletswele. The results of Table 23 indicate that further research is needed to assess the relationship between nutritional status and such factors as employment opportunities. The present attempts to cross-tabulate nutrition and household income failed to show any significant relationships.

It is difficult to believe, on the basis of conducting research in Tsweletswele, that the nutrition of children in the settlement is superior to that of children in the other two surveyed communities. Two observations are made, therefore, to question the age-dependent results

Table 23 Summary of Nutritional Status According to Selected NCHS Norms, Tsweletswele Survey, October 1982

Number and Percentage of Children Under Six Below the Third Percentile

Weight for Age			Recumbent Length for Age			Height for Age			Weight for Height		
No. of Cases	No. < 3P	% <3P	No. of Cases	No. <3P	% <3P	No. of Cases	No. <3P	% <3P	No. of Cases	No. <3P	% <3P
134[1]	10	7,5	53	16	30,2	85	26	30,6	134	8	6,0

1 Four weight measurements were not recorded by the survey team and are therefore treated as missing values.

as being representative of the nutrition of the Tsweletswele children. First, the ages of children were obviously not known accurately by many respondents. Unlike the Amatola Basin community, the respondents appeared to know little about the children in their care. Ages were given to the nearest year in many cases, with no idea of the month of birth. Many dates given could therefore be gross underestimates of the ages of the children: '4 years' could mean 48 months or 58 months, a sufficient descrepancy to significantly affect the anthropometric assessment made of the children. Secondly, Dr Thomas from Cecilia Makawane Hospital, who had trained the survey team for community work in Ciskei, spent considerable time in the settlement examining children. She was most distressed at the obvious signs of malnutrition and kwashiorkor in the community. Her observations, the results from the oedema analysis and the careful noting of all kwashiorkor cases in the survey, present additional information needed to understand nutritional conditions in the settlement.

The oedema results show that 55 or 39,9 percent of the 138 children suffer from the affliction. Two further statistics come out of the survey. Thirteen children, or 9,4 percent of the sample, are characterized as kwashiorkor cases and one child, marasmic. In total, 10,1 percent of the sample fall into these two categories. The oedema results and the identification of kwashiorkor cases therefore appear to point to a very serious nutritional situation, not readily discernible from the other survey measurements given in Table 23.

The question arises as to whether one can reconcile the anomalies arising from these results. The age-dependent measures probably represent an under estimation of the nutrition problem. The weight for height results are interesting in that all eight children falling under the third percentile were also picked up as kwashiorkor cases by the survey team. These results therefore appear to indicate those at greatest risk to wasting, but do not reflect all children at risk. Further research is needed to determine whether oedema results give a more representative picture of <u>all</u> at risk children.

The cross-tabulation routine of SPSS was use to compare aspects of the socio-economic background of households with the nutritional status of children. The cross-tabulation of weight for age, height for age, weight for height and rates of oedema with a number of factors, such as breastfeeding practices, use made of health facilities and income earned were inconclusive. The cross-tabulation of nutritional status, according

to the oedema results, with the role of the parents in the family proved more rewarding. The role of parents in the households is a very important and immediate issue, even in very poorly organized homes, so that the information, as supplied in Table 22, is likely to be correct. The cross- tabulation sought to establish whether a significant difference existed in nutrition of children whose parents contributed to family income (for example, mothers at home and employed, and commuters, whether they be father or mother) and those who did not. What emerged very succinctly is that the role of the father is a crucial variable. The children at greatest risk appear to be those whose fathers had deserted the household and whose mothers are unemployed. Sixteen out of 25 or 64 percent of these children have oedema. If the mother works and the father has deserted, then the child's chance of having oedema drops marginally; 10 of the 23 children (43,5%) are oedematous. If the father, on the other hand works (in the case of the surveyed households, this usually means he is a commuter), then the nutrition of the children appears to be better. Irrespective of the mothers role in the household, if the father works, fewer children are at nutritional risk. The role of fathers in the household and the resultant nutritional status of the children is considered in Table 24.

Table 24 Role of Fathers in Households and the Nutritional Status of Children, Tsweletswele Survey, October 1982

Fathers Status in Household	Childs Nutritional Status				
	No. of Cases	Without Oedema		With Oedema	
		No.	%	No.	%
Commuter	48	32	66,7	16	33,3
Home, employed or unemployed	22	12	54,5	10	45,5
Deserted	52	24	46,2	28	53,8
Other	16	15	93,8	1	6,2
Total	138	83	60,1	55	39,9

Children whose fathers are commuters have relatively fewer of their number suffering from oedema, 32 out of the 48 showing no sign of the

malady. The children most at risk are those whose fathers have deserted the household. Over half of these children have oedema. The 'other' category includes those children whose fathers have died, are migrants or for whom the father's role in the households was not stipulated in the questionnaire. Chi square shows that, at the 0,05 level, a significant difference exists between rates of oedema for children whose fathers are commuters and those whose fathers have deserted the household. The X^2 analysis substantiates the notion that access to resources is a vital factor dictating the nutrition of children. In the case of Tsweletswele, commuters are the main source of resources, so that households with commuters have the best chances of raising nutritionally sound children.

The conclusion that can be drawn from the analysis of the Tsweletswele survey results is that the socio-economic conditions prevailing in the settlement are poor. These conditions in turn affect the nutrition of children. The hypothesis that the nutrition of the Tsweletswele children will be unsatisfactory is therefore accepted.

B. The Main Hypothesis : Nutritional Status and the Geographical Variation in Nutrition

The Main Hypothesis

The nutritional status of young children will vary geographically.

Section A afforded the opportunity to assess nutrition in the three major study areas. In this section, selected results are compared in deciding whether to accept or reject the main hypothesis. The results selected are those of weight for age, recumbent length and height for age and the measurement of oedema. The selection is made in the light of the discussion on the use of anthropometric measurements made in chapter 5, section B(3a), and the applicability of these measurements as discussed in previous sections of this chapter.

The present nutritional status of children from the three surveyed communities is compared in Table 25. The results show very little difference in the rates of children at risk in the Dias area and the Amatola Basin, with just over 16 percent and 13 percent respectively, being so classified. In the strict sense of the Brown and Brown (1979) criterion of over 15 percent at risk being indicative of communities with a significant nutritional problem, conditions in the Dias area should be

Table 25 Assessment of Present Nutritional Status in all Surveyed Communities

Number and Percentage of Children Under Six, Below the NCHS Third Percentile, or Oedematis

	Weight for Age Stated			Weight for Certificate Age			Oedema			Total Surveyed and Total Number at risk		
	No. of Cases	No.<3P	%<3P	No. of Cases	No.<3P	%<3P	No. of Cases	No. at Risk	%	Total Surveyed	No. at Risk	%
Dias Divisional Council Area	938	158	16,8	540	83	15,4	-	-	-	1478	241	16,3
Amatola Basin	107	19	17,8	116	10	8,6	-	-	-	223	29	13,0
Tsweletswele	-	-	-	-	-	-	138	55	19,9	138	55	39,9

regarded as unsatisfactory while those in the Amatola Basin should be considered satisfactory. In reality, the results indicate both communities to be borderline in terms of the nutritional status of the children.

The reasons for the problems of malnutrition in the two communities are however marginally different. The Dias community consists of farm labourer families and the problem of malnutrition among their children is related to inadequate wages, whether in cash or in kind. The Amatola community, in contrast, is a largely peasant community who rely on a range of sources for their income. The satisfactory returns from the lands in the harvest season prior to the survey must be regarded as a contributory factor to the relatively satisfactory nutritional condition of the children.

Both the Dias and Amatola Basin communities are ones in which household resources are scarce, so that the delicate balance between satisfactory and unsatisfacory levels of nutrition can be easily upset. The slightest misuse of scarce resources or unfavourable crop production can lead to the long term failure to grow on the part of children, as will be discussed when analyzing the results from Table 26.

Tsweletswele is a community in which malnutrition is rife. While the socio-economic conditions are so poor that they were indirectly responsible for the inability to measure the nutrition of chilren according to the standard age-dependent anthropometric criteria, the oedema results verify the gravity of malnutrition in the community. Just under half the children are malnourished and kwashiorkor and marasmus affect over 10 percent of the children. While kwashiorkor was not specifically noted in the Dias and Amatola studies, the Nutritional Clinic records at St Matthew's Hospital suggest a rate of just over 4 percent for the Amatola Basin (see previous section A(2a)). Kwashiorkor cases were found in the Dias survey, but assessments made by the survey teams suggested that the rate is much lower than that experienced in Tsweletswele. The nutrition results of Tsweletswele therefore indicate that it has the poorest nutritional conditions of the three surveyed communities. The analysis of the socio-economic conditions of the settlement endorse the idea of Tsweletswele being an unsatisfactory environment in which to raise children. Household resources are extremely scarce and the severe disruption of family life, through desertion by almost half the fathers of surveyed children, helps to explain the reasons for the poor nutrition of the children.

Table 26: Assessment of Long Term Nutritional Status in all Surveyed Communities

Number and Percentage of Children Under Six, Below the NCHS Third Percentile

	Recumbent Length For Age (0-24mths)			Height for Age (25-72 mths)			Total Surveyed and Total Number at Risk		
	No. of Cases	No.<3P	%<3P	No. of Cases	No.<3P	%<3P	No. of Cases	No.<3P	%<3P
Dias Divisional Council Area	493	140	28,4	831	208	25,0	1324	348	26,3
Amatola Basin	108	35	32,4	110	62	56,4	218	97	44,5
Tsweletswele	-	-	-	-	-	-	138	42	30,4

The long term assessment of nutrition is shown in Table 26. The assessment of the children in Tsweletswele suggests that the rate of stunting is high in the settlement. The comparison of the Dias and the Amatola Basin results is interesting. The Dias results suggest that the younger children suffer slightly higher rates of stunting than the older children. Nearly 30 percent of those under two and about a quarter of the older children are at risk. Farmer/labourer relations are undergoing important changes in response to increased mechanization and the need to make farming more profitable (Antrobus, 1982). Under these conditions, some labourers are no longer being allocated land on which to grow crops and run their own stock. The result may be that the nutrition of the coming generations of farm children will become even more problematic as sources of potential food supply are blocked and income from wage labour fails to provide adequate standards of living. The higher levels of stunting among the younger children may, therefore, be indicative of an emerging trend of increasing long term malnutrition brought about by changing farming practices in the area.

The Amatola results are the reverse of the Dias results. Over 50 percent of the older children display signs of stunted growth, compared with a third of those under two years of age. Episodes of food scarcity, coinciding with drought years, point to a cyclical pattern of nutrition among children. As the results of the present nutritional status of the children in the Amatola Basin indicate, nutrition after a good harvest is satisfactory; during poor harvests it deteriorates. Families who can be assured of alternative sources of household income during drought years will probably be able to raise healthy children. For the many who must depend on crop production and stock for much of their food resources, drought years signal the onset of nutritional problems, probably not only for children but the aged as well (Fincham and Thomas, 1984).

The geographical variation in nutrition is a function of the internal and external socio-economic milieu into which the communities fall. In concluding the section and substantiating the above statement, attention is drawn to the profiles of the communities set out in Table 27. The table is not considered in detail, since the profiles tie in with arguments already put forward in the preceeding sections of chapter 6. One issue is raised, however, to highlight the impact of socio-economic conditions on the geograhical variation of nutrition.

Table 27 Community Profiles of the Dias Area, Amatola Basin and Tsweletswele

Components of Community Profile	Community Profiles: Dias Area, May 1981	Amatola Basin, November 1981	Tsweletswele, October 1982
A. Demographic Characteristics			
1. Total population of community surveyed - de facto	94 000	3 817	5 313
de jure	-	5 600	6 857 (including commuters)
2. Estimated total de facto population of community < 6 years	18 800	1 120	1 370
3. Survey sample, no. of children < 6 yrs surveyed	1 478	223	138
B. Socio-Economic Characteristics of Surveyed Households			
4. No. of Households surveyed	966	98	49
	Female / Male	Female / Male	Female / Male
5. % Children in the care of one or both parents	87,8	67,1	61,8
grandparents or other guardians	12,2	32,9	38,2
6. % Mothers and fathers who are	Mothers / Fathers	Mothers / Fathers	Mothers / Fathers
home	87,8 / 60,3	67,1 / 14,0	64,0 / 16,7
migrants	6,9 / 14,1	24,1 / 66,3	- / 2,4
deserters	4,7 / 22,8	1,2 / 6,4	4,4 / 41,6
other (incl. commuters)	0,6 / 2,8	7,6 / 13,3	31,6 / 35,7
7. % Mothers and fathers with the following levels of formal education	Mothers / Fathers	Mothers / Fathers	Mothers / Fathers
no education	32,0 / 36,7	18,3 / 26,2	38,9 / 37,8[a]
primary Sub A - Std 5	63,5 / 46,2	49,6 / 44,4	46,7 / 24,4
secondary Std 6-10	0,9 / 1,7	26,9 / 19,5	8,9 / 7,8
not known	3,6 / 15,4	5,2 / 9,9	5,5 / 30,0
8. Average monthly household income (Rand) (does not include income in kind)	55,31	84,33	53,05
9. Average no. of months for which babies are breastfed	15,6	17,3	13,9
10. % Of surveyed children who attend a clinic regularly or receive domicillary visits from clinic staff	61,8	93,0	48,9
C. Nutritional Status of Surveyed Children			
11. Total no. surveyed	1 478	223	138
12. % At risk to present malnutrition (wasting), all children	16,3	13,0	39,9
13. % At risk to long term malnutrition (stunting), all children	26,3	44,5	?[b]

a These percentages will vary from those given in chapter 6, section A(3a) since the educational levels given in this table are as a percentage of all mothers and fathers surveyed including those for whom education levels were unknown.

b Information unreliable.

Many studies of the past decade have shown oscillatory migration to be a negative factor on the maintenance of strong family units. The Amatola Basin community is heavily dependent on migrants and migrant remittances. Households appear, however, to remain viable social entities even with the migrants, essentially males, away from home. The reason may well be that migrants maintain strong links with the rural home and remit money on a regular basis. The extended family, with grandparents and other relatives present, is able to cope with the raising of children, even with the father absent from the household. In Tsweletswele, in particular, the nutritional problems are serious and a major reason is that nutrition is dependent on available household resources. Migrants who remit cash to the rural home are an asset to the home, as is the case in the Amatola Basin, whereas deserters of the home are not. The table shows clearly that deserters, especially among the males, are prevalent in the Tsweletswele community. While the above argument has not been put forward to vindicate the migrant labour system - an unacceptable system in almost all respects - it does emphasize the importance of income, and the ability to maintain adequately functioning households, on the nutrition of community inhabitants. These variables in turn depend on conditions within communities as well as those impinging upon the community from outside.

The nutritional analysis, along with the socio-economic assessment of community households, has provided a means of not only showing variation in nutrition between communities, but also the reasons for the levels of nutrition encountered. The main research hypothesis, that nutritional conditions will vary geographically, is therefore accepted.

C. Chapter Summary

This chapter provides the results of the three major surveys, using a main and four ancillary hypotheses to provide the framework for the presentation of the results. The ancillary hypotheses are tested prior to the main hypothesis which is used to draw the results of the various surveys together.

The first ancillary hypothesis set out to examine the Department of Health's contention that the low numbers of children making use of the skimmed milk scheme indicates that malnutrition is not a problem in the Dias area. The survey results show significantly higher numbers of children at nutritional risk than those suggested by clinic records and

the use being made of the Skimmed Milk Powder Scheme. The clinic records indicate just over one percent of children under six years of age at nutritional risk, whereas the survey results show approximately 16 percent suffering from present malnutrition and between a quarter and 30 percent from long term malnutrition. The reasons for the levels of malnutrition encountered can be explained by the generally poor socio-economic conditions of households surveyed. Lack of access to health facilities, overcrowded conditions and low incomes are some of the key factors which relate to unsatisfactory nutritional conditions.

Two hypotheses are proposed to examine nutritional conditions in the Amatola Basin. The first hypothesis states that the present nutrition of the children is satisfactory but their long term nutritional status less so. The hypothesis is accepted, on the grounds that about 13 percent of the surveyed children suffer from present nutritional problems, compared with a third (for children under the age of two years) to over 50 percent (for children over two years of age) who suffer from long term malnutrition. The difference between present and past nutritional conditions must, in part, be related to environmental conditions, such as drought, which influence production from the land and in turn affect the availability of household food resources.

The second hypothesis, dealing with nutrition in the Amatola Basin, states that the central village of Komkhulu has better nourished children than those in other villages because of their more ready access to the clinic located in the village. The nutrition of children in the five villages does not differ significantly from village to village, so that the hypothesis is rejected. While the clinic does have a role to play in promoting sound health, factors of the household are postulated as being of greater importance in dictating the nutrition of children. Analysis of socio-economic conditions in the Basin suggests that household stability is a positive factor in promoting adequate nutrition. Probably the key factor that dictates the nutritional welfare of the children is the store of household resources available to members. The cross-tabulation of household incomes with the nutritional status of the children, for example, suggests that this variable is a major determinant in nutritional well-being.

The final ancillary hypothesis postulates that nutrition in Tsweletswele is unsatisfactory. An appraisal of the socio-economic conditions in the

settlement shows that overcrowded, disorganized households with scant income and other household resources are the norm rather than the exception. The disorganized nature of households makes it a questionable practice to use the age-dependent anthropometric measurements taken in previous surveys to indicate nutritional status. The use of the measurement of oedema and the noting of kwashiorkor and marasmic cases, however, provides insight into nutritional conditions. The oedema results show present nutritional conditions to be very unsatisfactory, with about 40 percent of children at risk. The hypothesis is therefore accepted, with the analysis of nutritional and socio-economic conditions of households showing the role of fathers in households to be crucial in the level of nutrition enjoyed by the children.

Attention is finally centred on the question of whether or not nutrition varies geographically in the study area. To test the main hypothesis, the present and past nutritional conditions for the three surveys are compared. The analysis highlights spatial variation in nutrition which can be understood by the careful appraisal of the socio-economic conditions prevailing in the communities, as well as those which impinge upon the community from outside. The Eastern Cape and Ciskei are socio-economically depressed parts of the South African space economy so that, while nutritional conditions do vary between communities, the overall poverty of the communities is a reflection of their position within the national economy. The hypothesis is accepted that nutrition varies geographically, the results reflecting socio-economic conditions within the communities as well as those conditions extraneous to them. The Dias survey results point to approximately 16 percent of the children at present nutritional risk, a barely satisfactory situation in terms of the Brown and Brown (1979) criterion. The long term nutrition results suggest that malnutrition may be a more serious malady in the future with changing farmer/labourer relationships. The Amatola results indicate present nutritional conditions similar to those in the Dias area with about 13 percent of children at risk. The long term results are different however, highlighting the cyclical nature of nutrition in the Basin in response to environmental condition and available household resources. Tsweletswele is the community with the most serious nutritional problems, with a much greater proportion at risk than in the other communities. The severity of malnutrition, exemplified by cases of kwashiorkor and marasmus, is also more pronounced in Tsweletswele than in the other two communities.

CHAPTER 7

THE ASSESSMENT OF THE SURVEY RESULTS

The results of the three major surveys outlined in chapter 6 raise numerous issues, of which four are discussed in this chapter. These are:-

A. The time of year for conducting nutritional surveys;
B. The appropriateness of the criteria used for assessing nutritional status;
C. The contribution made to the surveys by the analysis of the socio-economic conditions of households; and
D. The nutritional surveillance process.

The discussion of these four issues provides a suitable means of making an assessment of the overall survey results and the nutritional surveillance programme to date.

A. The Timing of Nutritional Surveys

There is a growing awareness that in communities such as those under discussion in this thesis, infectious and deficiency diseases as well as the availability of food, have a seasonal dimension (Longhurst and Payne, 1981; Stead, 1982). The timing of nutritional surveys is therefore important. Longhurst and Payne (1981), for example, analyze a comprehensive nutritional survey of Swaziland undertaken in the 1960's which pointed to sharp contrasts in nutrition between the Highveld, Lowveld and Middleveld regions. The contrasts, in part, reflect variations in rainfall and its impact on food productivity. The contrasts are, however, exaggerated by the seasons in which the data were collected. The figures for the most productive agricultural region, the Middleveld, refer to the part of the year when food is most plentiful. The data for the semi-arid Lowveld were, on the other hand, collected in the 'hungry season', beginning in July or August and extending through to late January. Stead (1982), reporting on the Valley Trust's Food Resources Evaluation Project in Kwa Zulu, shows that there is a strong seasonal variation in the availability of cereals and vegetables. Maize, for example, is directly available from the end of January to the end of May. For the rest of the year, inhabitants of the

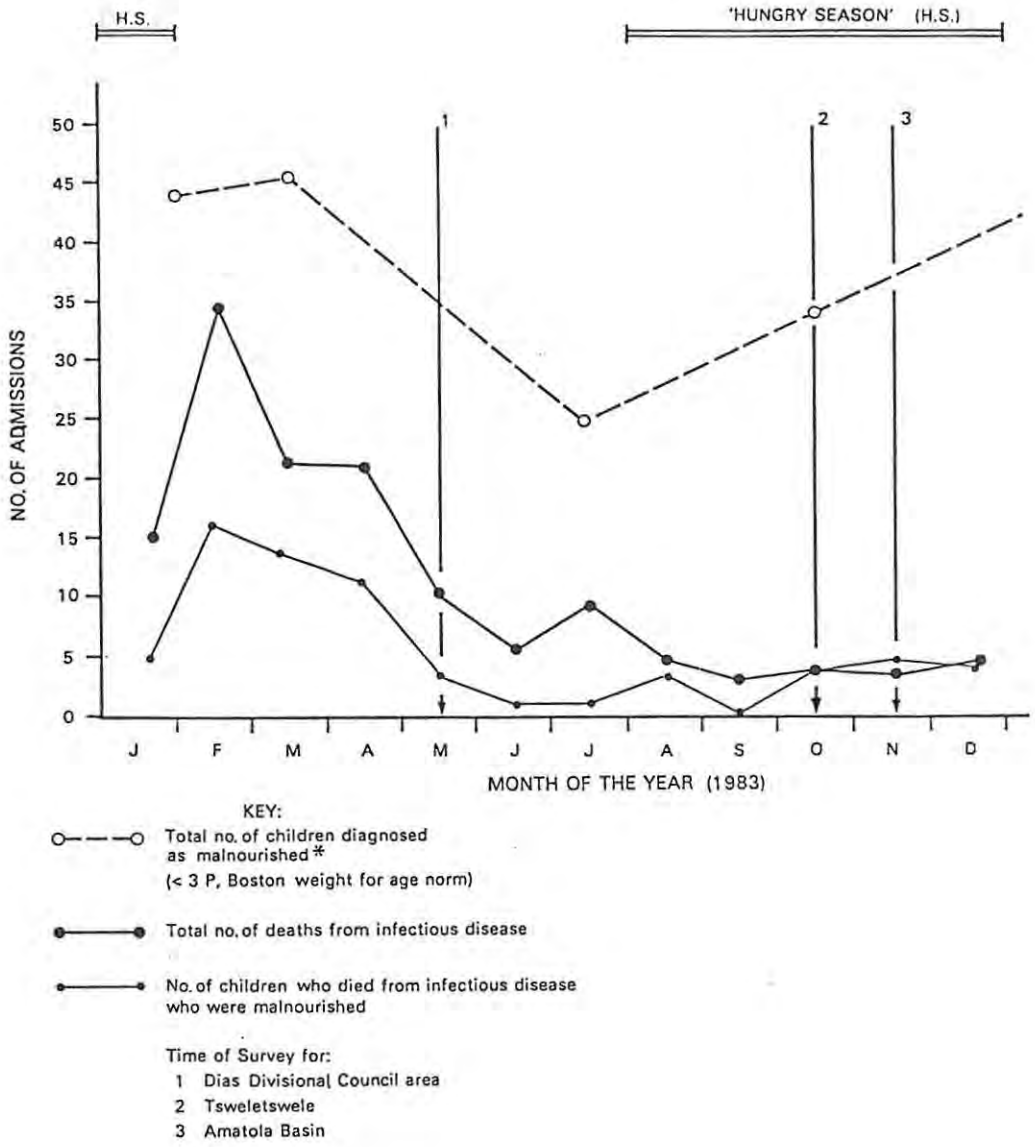

Figure 25 Selected Statistics from the Black Children's Ward, Settlers Hospital, Grahamstown, 1983

* Data taken from Langhan, 1984, Figure 9, p.16.

area must obtain maize from their own storage facilities or from the local trading store. Those families that do not have sufficient stores of maize or the cash with which to purchase it during the 'hungry season', are likely to experience greater levels of malnutrition during this part of the year.

From the above studies, one may deduce that the Amatola Basin and Tsweletswele surveys were conducted in the 'hungry season' and the Dias survey in a more favourable time of the year. Figure 25 shows temporal variations in selected statistics from Settlers Hospital, Grahamstown, to

add a further dimension to the discussion. Infectious diseases, such as gastro-enteritis and respiratory measles, are more common in the summer months when disease agents flourish. Infection and malnutrition are self-reinforcing phenomena, so that during the summer months rates of malnutrition are also high, as children become dehydrated and loose weight because of infection. The critical period for high rates of infection is usually December through to March or April in the Eastern Cape and Ciskei. While the Dias survey falls outside this period, so too do the Amatola Basin and Tsweletswele surveys. One of the concerns of Dr Thomas and the author was that the poor nutritional status of the children at Tsweletswele did not bode well for the summer months following the survey. Infection and malnutrition, acting together, would in all probability mean that nutritional status would deteriorate even further during the summer months. In similar vein, nutritional status in the Amatola Basin could well decline in the period of summer infection, just as the level of malnutrition would have been greater had the Dias survey been conducted in January, as was originally planned.

What the Settlers Hospital data and the works of Longhurst and Payne (1981) and Stead (1982) suggest is that while surveys done in the 'hungry season' may indicate high numbers at risk because of food shortages, surveys done in the height of summer may also indicate high number at risk because of the more marked interplay between infection and nutrition. The Dias results therefore reflect an optimal period of the year for measuring nutritional conditions. Families are likely to benefit from any cereals and vegetables given as payment in kind by farmers, and infections are at a minimum. The other two surveys have been conducted at a period when household resources from the land are minimal. The present nutrition of the Amatola Basin children may have been even better, a factor which could have been assessed had the survey been conducted in May or June. For Tsweletswele children, levels of nutrition are unlikely to have been better, had the survey been conducted in May, since production from the land is non-existent in the settlement.

Two issues arise from the discussion. First, the survey results are satisfactory indicators of levels of nutrition in the surveyed areas, with the added observation that, from a comparative point of view, the Dias results are likely to marginally underscore levels of malnutrition when compared with the other two surveys. Secondly, in the evolving surveillance programme in the Eastern Cape and Ciskei, due weight will

have to be given to a thrice-yearly survey of rural communities to assess nutrition during that part of the year when infection is rife, that part when household resources should be at an optimum, and that part of the year designated as the 'hungry season'. Surveys could therefore be conducted in January or February, May or June, and October or November, for example, to monitor the impact of seasonal factors on nutritional status. In this way, the survey programme should make it possible to assess variations in nutritional conditions through the year within the same community as well as variations between communities. The possibility of monitoring problems related to nutrition more closely also makes attractive the idea of replicating the survey of a community through the year.

B. The Appropriateness of the Anthropometric Criteria Employed to Assess Nutritional Status

The debate regarding the veracity of particular anthropometric criteria and the use or non-use of international norms is likely to continue for a considerable period. The debate dictates, however, that two issues regarding the assessment made in this thesis be discussed. The first is the question of what these anthropometric criteria have measured and the second is the issue of the use of the third percentile to indicate those children at risk.

1. What Do Anthropometric Criteria Measure?

It has been argued in chapter 2 that anthropometric measures, such as weight for age and height for age, allow the researcher to make an accurate assessment of the nutritional condition of children. In addition, these measures also act as indicators of social deprivation (Dowler et al., 1982). The use of anthropometry to obtain the thesis results is considered before looking at the implications of using anthropometry to monitor social deprivation.

a. The Use of Anthropometry to Indicate Nutritional Status

Weight for age has been used to indicate the present nutrition or wasting of children. Waterlow (1982), in a provocative paper, questions the ability of weight for age to detect short term changes in the nutritional condition of children. He argues that after the age of two, most

deficits in weight for age are caused by stunting. Children who do not perform well on the weight for age assessment are, in his opinion, getting enough energy but are lacking "some other factor needed to stimulate or maintain skeletal growth" (Waterlow, 1982, p.14).

Weight for age does appear to offer the most pertinent measure of wasting and failure to grow as argued in chapter 2, based on a literature survey, discussion with other researchers and, more recently, through field experience. However, Waterlow's argument should be considered carefully, namely that weight for age measures wasting and stunting. If so, then the role of stunting in the development of the child must be fully understood. It was suggested in chapter 5 section B(2a), that children who are over five years and are stunted are 'survivors', not necessarily in danger of dying from malnutrition because they have adapted to diets of low food intake. One may then ask whether stunting per se carries any nutritional risk. If it does not, then the weight for age assessment used in the thesis is not only identifying children at risk, but others as well who are simply stunted.

Waterlow maintains that stunting may not carry with it any physical handicap. He quotes studies which show that stunted children do not, for example, have impaired immune responses. He does go on to state, however, that stunting does impair mental development. As such, he argues that in young children, everything possible should be done to eradicate stunted growth as well as wasting. In the light of the last statement, it is felt that the weight for age assessment of children under six is an important indicator of those at nutritional risk, even if the measure is recording a wider range of nutritional conditions than those proposed in the thesis.

Weight for height as opposed to weight for age is advocated as a preferable measure of wasting by Waterlow (1982) and Keller and Fillmore (19-). The results of the Tsweletswele survey suggest that eight or 6 percent of 134 children fell under the third percentile of the weight for height norm, a much lower percentage than that found in the Dias and Amatola Basin surveys (Tables 12 and 23). However, in all three surveys the weight for age and weight for height results were similar. The comparable percentages of numbers at risk for weight for age and weight for height for the Tsweletswele Dias and Amatola Basin surveys were: 7,5 and 6 percent for Tsweletswele; 16,3 and 16,2 percent for the Dias

area; and 13,0 and 11,9 for the Amatola Basin. There is no easy answer to the apparently better status of the Tsweletswele children according to the weight for height results, when compared with the children from other communities surveyed. The co-variance between weight for age and weight for height in the Dias and Amatola Basin surveys suggests that the initial distrust of the measure which arose out of the pilot survey may not be entirely warranted. In cases where age is uncertain, weight for height may act as a suitable surrogate measure of present nutrition or wasting.

The use of a measure of oedema arose because of the inability to measure age accurately in the Tsweletswele community and the disillusionment on the part of the author, at that stage, with the weight for height measure of nutrition. Oedema is indicative of those children who need both increased calories and protein in their diet. It is a measure of present deficit in dietary intake but cannot be thought of as entirely analogous to weight for age in terms of what aspects of malnutrition are measured. Oedema is usually associated with kwashiorkor, but not all Tsweletswele children who were classed as oedematous had kwashiorkor. The reason for this apparent anomaly is that many of the children had mild oedema and were, in all probability, in a precursor state to kwashiorkor. It is proposed that the measure be used in future surveys along with the other measurements which comprise the battery of tests for assessing nutritional status. Unfortunately, since the measure is not entirely interchangeable with the weight for age measure, it implies that oedema does not obviate the need for age-independent measures of nutrition when age cannot be accurately assessed. The weight for height and skinfold measurements must therefore still perform an important role in the assessment of nutrition when age is unknown.

The skinfold measurement results were discussed in chapter 6 in relation to the Dias survey. Inspite of careful supervision, the author felt many of the readings were not taken accurately. Skinfolds were not always held correctly prior to the readings and some readings probably reflect skinfold and muscle tissue combined, an error which would lead to the underestimation of the number of children at risk. Inspite of these problems, the weight for age and skinfold measurements were shown to correlate with each other in the Dias Survey. It is therefore proposed to continue to use the skinfold measurements as indicators of present nutritional status in future surveys, noting their applicability only to children between the ages of one and five years.

In summary, the discussion highlights the need to state very specifically the task of nutritional surveillance. In this thesis, surveillance has been geared to isolating communities with nutritional problems. As Moosa and Coovadia (1981) state, surveillance should be able to detect sub-clinical levels of malnutrition, since kwashiorkor and marasmus are only the tip of the nutritional iceberg. Weight for age, height for age, weight for height and skinfold measurements are advocated as suitable ways of determining sub-clinical levels of malnutrition. Well trained teams can, furthermore, ascertain oedema levels and cases of kwashiorkor and marasmus within communities. Together, the battery of tests provide a suitable means of assessing the nutritional status of children in surveyed communities.

b. Anthropometry as an Indicator of Social Deprivation

Dowler et al., (1982) point to anthropometric measures, such as weight for age, being useful indicators of social deprivation. The analysis of the relationship between nutrition and socio-economic conditions in surveyed households, substantiates their point of view. Poor nutrition is linked to those households which have limited resources to feed family members or in which social dislocation is present.

An important function of nutritional indicators arises out of their ability to act as measures of social deprivation. Those communities which have high rates of poor nutrition are the ones which require programmes to improve nutrition and the overall standard of living of community members. If nutritional surveillance is conducted at set periods after such development programmes have been instituted, the attendant anthropometric results can act as proxy measures of the overall impact of the programmes. The Department of Health, for example, may put into operation a programme to make more widely known what clinic and other health facilities are available to labourers and their families in the Dias area. Further surveillance could indicate how successful such a programme had been. Should more children be found to be using facilities and the rates of children at risk to have declined because of the wide availability of skimmed milk, then the programme will have been shown to be successful.

The programme of surveillance, therefore, has the ability to outline prevailing nutritional conditions and, through the use of its

anthropometric assessment, the ability to measure the success or failure of development programmes instituted to improve conditions in a community.

2. The Use of the Third Percentile to Indicate Children at Risk

The third percentile of the NCHS percentile charts has been selected in this thesis as the cut-off point for designating those at risk. Research prior to the surveys suggested that those falling below the third percentile of the weight for age and height for age norms were malnourished, although such malnourishment may only be sub-clinical in nature. Discussion with Waterlow (1983) after the actual surveys suggests that the use of such a cut-off point should be used with care.

Waterlow points out that he introduced cut-off points in the early 1970's such as the third percentile on the height for age percentile chart (90% of expected height for age), to approximate two standard deviations below the reference median. The criterion of the cut-off system was, therefore, that it be a statistically verifiable one. Anyone, as Waterlow (1982) states, who fell outside of two standard deviations of the reference median was, in probalistic terms, abnormal. It remained for other researchers, such as Kielmann and McCord (1978), to show a strong correlation between those cases which fell below the third percentile and the increased risk of death. Thereafter, cut-off points were taken to indicate real risk rather than purely the statistical probability of being at risk. The point which Waterlow makes is that even though the third percentile is taken to indicate real risk, some children who fall below the level will not necessarily be malnourished. They may, for example, be short for their age but mentally and physically sound. Such shortness may be a genetically inherited trait.

The implication of the argument put forward by Waterlow (1982; 1983), is that the optimization of cut-off points is not likely to foster sound statistical analysis. He postulates that it is possible to simply monitor nutritional conditions by the comparison of the frequency distribution of surveyed communities with that of some reference group, for example, the NCHS frequency distribution. The comparison of the number of cases in different parts of the distribution, with the reference frequency distribution, can indicate where nutritional problems lie.

In the light of the preceeding discussion, it becomes apparent that at least two systems of analyzing data are available. The one uses cut-off points to indicate those at risk, the other, employing statistically more correct procedures, assesses nutrition in terms of the frequency distribution of, for example, weight for age, to designate the nutritional problems in a community. In terms of the present results, two observations are offered. The third percentile of weight for age and height for age of the NCHS norms is likely to offer as accurate a picture of nutritional risk as that given by comparing the frequency distributions of surveyed communities with that of the NCHS reference. However, the merits of using, for example, the decile distribution of weight for age to assess nutrition cannot be denied and future surveys will include such analysis. The comparison and use of the two systems of assessment should prove valuable in understanding even more fully the nature of community nutritional status.

The discussion in section C has highlighted some of the complexities involved in using anthropometry to measure nutritional status. There is still considerable debate about what aspects of nutrition various measures encompass. Present nutrition, or wasting, and long term nutrition, or stunting, are two important nutritional maladies and it is argued that measures, such as weight and height for age, used in the thesis, are appropriate for assessing such conditions. Anthropometry, as a proxy measure of nutritional status, can in turn be used as an indicator of social deprivation present in communities, since poor nutrition is invariably linked to the paucity of household resources. In addition, nutritional surveillance of already surveyed communities makes it possible to assess the success or lack of success of programmes instituted to improve nutrition and socio-economic conditions. Finally, the use of the third percentile as a cut-off point for designating those at risk was considered. Such cut-off points were originally statistically based, but have increasingly been used to designate the real risk of malnutrition or death from malnutrition. An alternative system of data analysis is proposed by researchers such as Waterlow (1982, 1983), but it is maintained that the survey results, using the third percentile as a cut-off point, are an appropriate means of assessing those at nutritional risk. The comparison of survey frequency distributions with reference distributions should, however, be included in the analysis of data for all future surveys.

C. The Analysis of the Socio-Economic Conditions of Surveyed Households

The attitude of respondents to the surveys and to answering questions on the questionnaire was generally positive. A major advantage of nutritional surveys, which probe socio-economic conditions of households, over other surveys which concentrate on ascertaining socio-economic conditions per se, is that the former are likely to appear less threatening to community respondents. The welfare of children is an important concern of most respondents, so that enquiries about income and other pertinent information is seen within the context of the assessment of childhood nutrition. The survey results show that many aspects of household conditions have been successfully explored, whereas other aspects suggest areas in which refinement of the questionnaire can be fruitfully pursued.

Factors, such as the level of education of parents, the role of parents in households and household income, have been instrumental in providing a profile of socio-econoic conditions in surveyed households. In addition, the role of parents in households (questions 12 and 13 of the questionnaire in Appendix 2) and income, have been shown to have a signficant impact on the nutrition of children. The relationship is one in which household conditions are the causitive factors dictating nutritional status. In general, the analysis of household conditions shows nutrition to be unsatisfactory when household resources are limited, either through the lack of cash income or income in kind. The degree of household organization is also important, so that when parents desert households, for example, children are likely to suffer and malnutrition to become more prevalent.

Some information was not always easy to obtain. Income data were not always available, for instance, because respondents did not know all sources of household income. The accuracy of such data on the questionnaires are a reflection, therefore, of the diligence of the interviewers, the cooperativeness of respondents and the availability of information. Income data are always difficult to obtain and, no matter how carefully interviewers may probe, many respondents will be unable to supply household income data.

There are questions on the questionnaire which failed to solicit the requisite information from respondents. In these cases, the refinement of the questions may well improve the response to the questions. One example is taken to highlight an area in which refinement of questions may increase the accuracy of answers given by respondents. Questions 25 to 30 were used to probe child mortality rates between birth and five years of age. The answers to the questions proved frustrating. Invariably, mothers stated that they had not lost any children, yet the survey teams felt that they were not getting the correct answers. The problem may simply have been that too much information on a complex topic was required from too few questions. Time is an important constraint on how fully each nutritionally-related issue can be probed in a survey, but Appendix 3 shows part of a maternity history questionnaire (Sahn, Lockwood and Scrimshaw, 1984) which indicates how many questions may be needed for an accurate assessment of childhood mortality in a community.

In retrospect, the assessment of socio-economic conditions in the surveyed communities has fulfilled an important function. Nutritional status cannot be considered in isolation and the analysis of the household units from which the surveyed children come, provide a suitable context for the assessment of nutrition. The survey results also highlight the fact that it is conditions in households which are the causal factors underlying nutritional status. Factors extraneous to the community (for example, wages dictated by outside agencies and the availability of job opportunities for household members) are also important in dictating nutritional conditions, but the analysis of extraneous socio-economic and political factors affecting communities have fallen largely outside the ambit of the present thesis.

D. The Nutritional Surveillance Process

A consideration of nutritional surveillance, as an on-going activity, offers a suitable format for drawing the discussion of the survey results to a close.

The programme of surveillance outlined in the thesis is in its infancy. As the programme continues, experience is likely to play an increasing role in refining the surveillance process. It is nevertheless possible to make an assessment of the various components which go into the process of surveillance. These various components are outlined in Figure 26.

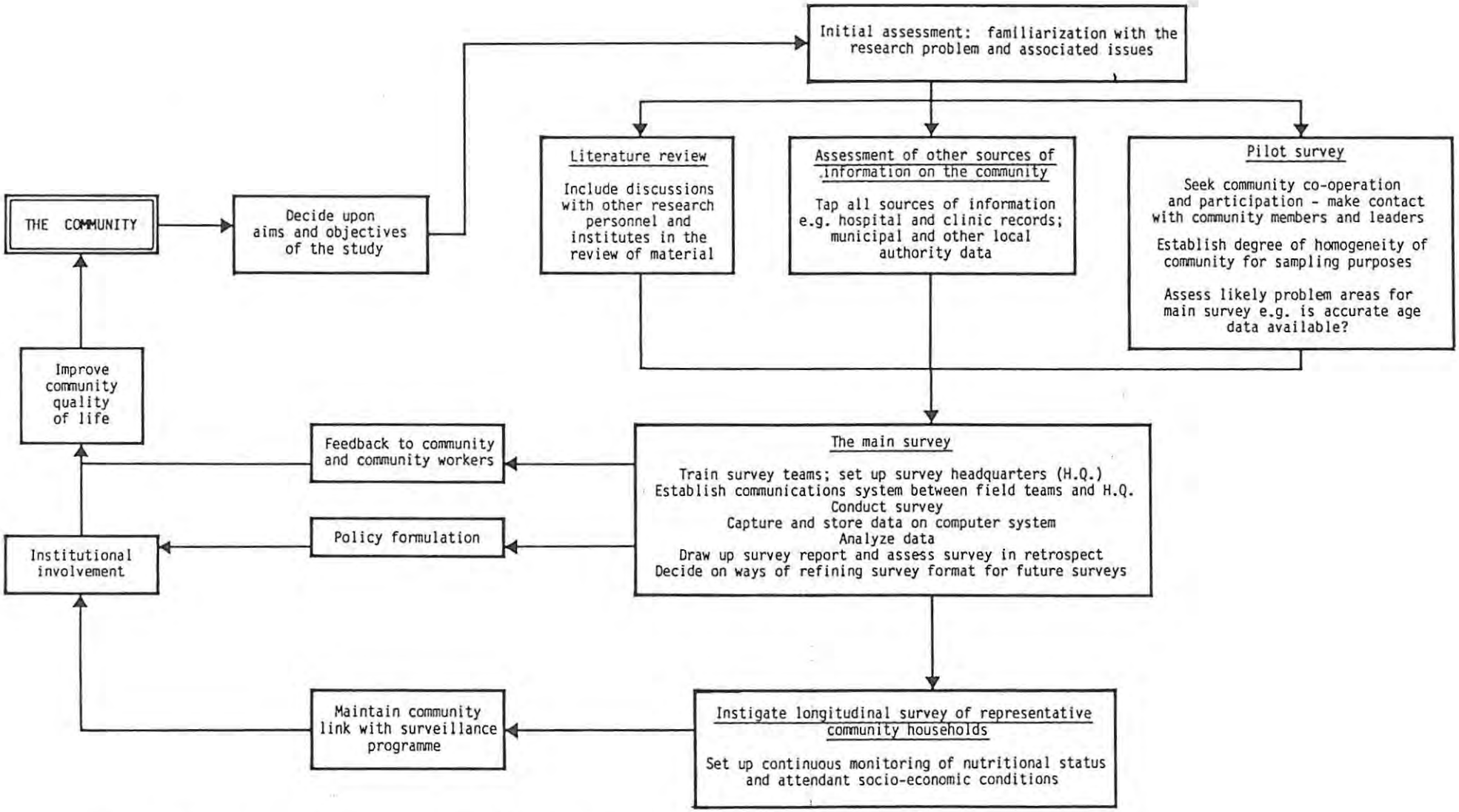

Figure 26 The Nutritional Surveillance Process

The figure suggests a number of steps which should characterize a surveillance programme, starting with the statement of the aims and objectives of the study. Initial assessment, prior to instigation of a major survey, is essential, and the components of such an assessment are shown. The lack of any major problem in the Dias and Amatola surveys is, in part, a measure of the attention paid to the assessment of the research problem before undertaking the actual surveys.

Community surveys are invariably made at specific points in time. An important addition to such cross-sectional assessment could be a set of longitudinal studies which would provide a means of continually monitoring conditions in a community, thereby strengthening the links between the community and the institution undertaking the programme of surveillance. Longitudinal studies give the chance to obtain useful insights into growth patterns of children, and they also allow more detailed analysis of the households selected for continuous monitoring. It is therefore recommended that such studies are undertaken to compliment the survey programme.

The end point of any surveillance programme is to benefit the community concerned. Policy formulation and institutional involvement in the plight of the surveyed communities are other important components of surveillance which can help achieve this aim.

Finally, it should be noted that the various components of the surveillance process are shown as separate entities in Figure 26, with an apparent one-way flow of information, ideas and general interaction. In reality, these various components are highly interrelated and a process of continual feedback helps modify the programme, giving it the flexibility to conform to changing conditions within the survey environment.

E. Chapter Summary

The chapter has considered four issues to assess the survey results presented in chapter 6. These issues should not be thought of as an exhaustive analysis of the assessment process but rather as a focus on topics which are particuarly pertinent to an on-going research programme.

The first issue considered is that of the timing of surveys. Nutritional status can fluctuate during the year in response to the availability of food from subsistence crops and the incidence of infectious disease. The results of the three surveys are comparable, although the surveys were not all conducted at the same time. The proviso is made that the results of the Dias survey are likely to underestimate the number of children at risk when compared with that of the Amatola Basin and Tsweletswele surveys. It is also proposed that surveys of any one community be conducted three times a year, to more fully comprehend yearly fluctuations in nutritional status.

A second area of concern is that of the assessment of the anthropometric results of the survey. The need is to know what the survey aims are before deciding on ways and means of analyzing nutritional status. The three surveys discussed are aimed specifically at identifying all young children at nutritional risk. Implicit in the survey aims, is the desire to estimate the degree of sub-clinical malnutrition using cut-off points on the NCHS norms to dictate what proportion of children are at risk. The measurements taken and the way in which the data were analyzed, are regarded as suitable for indicating those at risk, although other systems of data analysis are available, and acknowledged as necessary for incorporation in future surveys.

The penultimate issue concerns the analysis of the socio-economic conditions of surveyed communities. The discussion points out the value of the socio-economic assessment, noting that socio-economic conditions dictate the level of nutrition encountered. There are problems in obtaining certain data, such as those of income. The collection of such data is always likely to be problematical. Other data which may be useful in predicting, for example, mortality rates, could have been more readily obtained had the questions been more refined, and ways of achieving better responses to such questions are considered.

A final issue raised is that of the surveillance process itself. Figure 26 provides a cursory attempt to model the surveillance process, outlining the various components of a surveillance programme and how they interact with each other. An important aspect, implicit in the discussion of surveillance, is that it is a dynamic process and the research format must be sufficiently flexible to allow changes in the survey design, dependent on community conditions encountered.

This chapter summary draws to an end the concentration in Part III on the research results and the analysis of the survey process. The conclusion of the thesis, which follows in chapter 8, broadens the discussion to draw together the many themes embodied in the thesis.

CHAPTER 8

CONCLUSION

The expressed aim of the thesis, as set out in the preface, was to make an anthropometric assessment of the nutritional status of black pre-school children in selected communities of the Eastern Cape and Ciskei, and to explore the relationship between nutrition and socio-economic conditions prevailing in communities. It was envisaged that in undertaking such a study, the policy implications of the work would materialize, thereby adding an applied dimension to the thesis. In the following discussion, the aims of the thesis are reviewed to provide an appropriate means of drawing together the various themes introduced in the preceeding chapters.

Anthropometry, a superficially simple science, is on closer analysis a complex task which, nevertheless, offers a cost effective and efficient means of assessing nutritional status. While the overall concern has not been with anthropometry per se, considerable effort has been made to outline the nature of anthropometric assessment, so that the results of the research programme could be evaluated. A most satisfying aspect of the anthropometric assessment has been the realization that, for all the intricacies involved in the interpretation of results, it offers a means for exploring geographical variation in nutrition. Tsweletswele has emerged as the community with the most serious nutritional problems, while both the Dias and the Amatola Basin communities display present nutritional levels which are on the borderline between being satisfactory and unsatisfactory. The long term nutrition of both communities indicate that children are raised in environments of general food scarcity.

While anthropometry has provided a means for understanding the geographical pattern of nutrition, the socio-economic assessment of households has supplied the key to understanding the processes underlying such a pattern. The Eastern Cape and Ciskei are socio-economically depressed regions within South Africa and the nature of that depression is nowhere more evident than in the many households in which malnutrition was encountered. Overcrowding, low levels of formal education, disorganized family households with minimal incomes, in either cash or kind, and the limited availability of health services for the members of households are some of the key factors characterizing living conditions in the surveyed communities. These characteristics may

be considered germane to all communities, although the degree to which social deprivation was present varied from community to community. It is significant, for example, that Tsweletswele exhibited the most notable degree of household dislocation and that household resources were more meagre than in any of the other surveyed communities. The results from the Dias survey point to a community in which greater social cohesion than that in Tsweletswele is evident, but where low wages and limited access to health care maintain the community in relative poverty. The Amatola Basin community is a stable one in which the extended family plays an important role in the raising of children. The absence of working-aged males from the Basin and the vagaries of the weather mean that crop production can be easily disrupted. It is at such times that the meagre household income from other sources is inadequate to provide sufficient foodstuffs and the nutritional status of the children declines dramatically.

The concern with the pattern and the processes which help explain that pattern reflect two important facets of contemporary human geography. These two dimensions of the subject fuse into yet another important one, namely the concern with the analysis of socially relevant problems. Nutrition represents an essential ingredient of the quality of life of any community and as Smith (1977) maintains, it is a priority in almost all strategies to improve living standards. The research programme has drawn attention to inequalities in nutrition between communities, inequalities which are becoming even more obvious as the surveillance programme continues and other, more prosperous, urban-based communities are surveyed. One may maintain, therefore, that the thesis has focused attention on an important contemporary issue. The question which must be asked, however, is the extent to which the focus on nutrition can be translated into improving the quality of life, or in the idiom of Streeten (1984), meet the basic needs of the communities surveyed.

As an academic endeavour, the careful analysis of the problem of nutrition in the Eastern Cape and Ciskei is in itself important, with attention being drawn to the extent of malnourishment. It is both necessary and intellectually satisfying, however, to take the work a step further and to look at its policy implications. It is not the intention

to detail all intervention strategies which can be contemplated on the basis of the survey results, but rather to consider selected interventions and the rationale for them.

Access to clinic facilities poses a problem for labourers and their families in the Dias Divisional Council area. If the Skimmed Milk Powder Scheme was more widely known and more ready access was afforded to malnourished children, then the scheme could have an impact on nutrition in the Dias Area. However, the supplements can add only marginally to the store of household resources needed to sustain adequate levels of health for all in those households. The scheme must, therefore, be viewed as a short term intervention which will in no way eradicate the more deep-seated socio-economic problems, which are the underlying cause of malnutrition. Raising the income of farm labourers would appear to be part of the long term solution to malnutrition in the Dias area, since higher wages would in most cases ensure improved food supplies and the concomitant reduction in deficiency diseases. A consideration of the factors which govern wages is an issue outside the scope of the present work, although the issue of wages does isolate an important aspect of the plight of the farm labourer community in the Dias area. Wage rates are dictated solely by the farmers and the viability of their farming enterprises. There is no stipulated minimum wage for farm labourers. Labour is readily available in the study area, so that labourers have little bargaining power to demand higher wages. As a result of these circumstances, wages are a factor outside the control of the household.

The consideration of the Skimmed Milk Powder Scheme in the Dias area brings together a number of important concepts regarding intervention and policy formulation. First, it is necessary to continue with such a short term intervention and to make it more widely known and available to those households that have children at nutritional risk. The skimmed milk provides an added input into scarce household resources. Secondly, a programme to make the scheme more effective might have a number of ancillary benefits. Health education for parents or guardians could accompany the provision of skimmed milk, concentrating on such important issues as hygiene and the preparation of foods to obtain the maximum nutritional benefit for infants and young children. A short term intervention, therefore, can have long term benefits for the community.

Finally, the importance of factors outside the household dictating nutritional status also suggests that nutritional intervention can only be one aspect of a wider programme to enhance all aspects of community living. Nutrition is intimately linked to a number of other factors which dictate community conditions and it is only through tackling the web of factors adversely affecting the community that nutrition can be improved.

It may be argued that improved access to health facilities can in itself positively affect nutrition. The analysis of the Amatola Basin results were, in part, geared to assessing the role of the clinic on nutritional status. Once again, the conclusion that must be drawn from the Amatola Basin study is that access to facilities can only marginally influence the overall health of a community. Malnutrition, as in the Dias area, must be viewed as a component of the problem of overall community development. In the case of the Amatola Basin, subsistence agriculture appears to be disrupted by drought. Strategies for wresting crops from the land during years of unfavourable rains must receive priority in development planning. The construction of small storage dams and the provision of reticulated water for household vegetable gardens are examples of possible projects which can work towards the amelioration of hunger, and by implication, malnourishment during drought years. Any development strategy is likely to be complex, however, since the allocation of scarce resources means that certain facets of development are invariably neglected. While agricultural development is essential, so too is the expansion of the infrastructure of the Amatola Basin, including the availability of more health-related facilities.

Tsweletswele epitomises a community living in poverty, where the threat of relocation has done little to promote confidence among community members about their future prospects. There is, however, hope of improving conditions, even in such a poorly endowed community. The Ciskeian authorities, at the time of the Institute of Social and Economic Reseach (ISER) study of the settlement (Bekker et al, 1983), were adamant that the community members should be relocated, essentially to other parts of rural Ciskei and that no infrastructural development should take place at Tsweletswele. The ISER team submitted a report of the survey to the Ciskeian authorities in 1983, in which a call was made to develop the infrastructure for a permanent settlement at Tsweletswele. The rationale

for recommending a permanent settlement was that Tsweletswele provided the chance of job opportunities for its inhabitants which would otherwise not be available should they be relocated to rural Ciskei. The residents of Tsweletswele apparently do not have the skills to become successful peasant farmers and their main sources of income are likely to remain urban-based.

The nutritional survey of Tsweletswele was instrumental in providing the evidence needed to show that present work opportunities had a positive impact of household conditions, including the nutrition of children. The link between commuter employment and nutrition discussed in chapter 6, section A(3b) was stressed in the ISER report. Another aspect of the nutrition study which was brought to the attention of the planners was the likelihood of an epidemic of infectious disease breaking out in the community. Attention was drawn, in particular, to the dangers of an outbreak of measles and gastro-enteritis where children are malnourished. The need for a more efficient clinic service, for the vaccination of children against measles; the need for clean water to avoid gastro-enteritis; and the availability of supplementary feed, were stipulated as interventions which could prevent the nutrition-related problems becoming unmanageable in the near future.

These recommendations, together with the call for the settlement to be accorded permanent status, have obviously made an impression on the planners. One says obviously because since the report, the inhabitants of Tsweletswele have not been moved and the beginnings of infrastructural development are discernible. Reticulated water has been provided for the settlement, thereby restricting, in part, serious problems from gastro-enteritis. The mobile clinic has been carrying out a more vigorous campaign of immunization, but access to health care remains a major problem. No supplementary feeding programme has materialized. An Anglican Church and more school buildings are being erected. In short, developments in Tsweletswele appear to mark the beginnings of a real sense of community in the settlement. It remains to be seen, however, whether the inhabitants can engender more work opportunities within commuting distance of the settlement, for it is such opportunities which will dictate the extent to which serious problems such as malnutrition can be resolved in the future.

Tsweletswele has been considered in some detail in the conclusion because the discussion illustrates how the surveillance programme can have an immediate and direct impact on the welfare of the communities studied. As part of a wider research endeavour, nutritional surveillance can have a considerable effect on the decision making process. The nutritional surveys, as presently conceived, make it possible to monitor nutrition and changes in nutritional status over time and between geographical localities. Equally important, they act as tools for measuring social deprivation, highlighting key facets of the socio-economic milieu which propagate such deprivation. The ability to establish firm relationships between nutrition and socio-economic conditions makes explicit policy recommendations a feasibility. These recommendations, in turn, give decision makers and planners the necessary material with which to make decisions about the way in which community development can or should progress.

It is argued, in concluding the thesis, that the process of nutritional surveillance is an important one and should be continued. The population in South Africa is expanding very rapidly and there is little evidence to suggest that the malaise of poor nutrition is likely to be eradicated in the near future. Operation Hunger, a programme to feed severely malnourished communities within the borders of the country, and the contemporary famines in Ethiopia, Mocambique and elsewhere on the African continent direct ones attention to the more serious dimensions of malnutrition. Drought in the Eastern Cape and Ciskei in recent years has also brought the spectre of famine to the region. Surveillance provides a mechanism for monitoring deteriorating or improving nutritional conditions. While it is envisaged that the surveillance programme will help monitor improvements in nutrition as a result of the instigation of development programmes, an increasingly important role is also likely to be that of detecting communities experiencing declining nutritional status. In so doing, an increasingly important function of surveillance is going to be its ability to detect those communities most at risk, so that priority may be given to nutritional intervention.

APPENDIX 1

INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH

RHODES UNIVERSITY GRAHAMSTOWN 6140 SOUTH AFRICA

TELEPHONE 2420

Geography Department

3 January 1980

The Manager/Secretary

Dear Sir/Madam

The Department of Health is concerned about low levels of nutrition which exist in many areas and about assessing the success or otherwise of its nutritional programme in force at present. Dr Krynauw, Regional Director of Health Services in the Eastern Cape, has as a result requested the Institute of Social and Economic Research at Rhodes University to conduct a pilot survey to assess the state of nutrition of Black children in the Albany Magisterial District. The Department of Education and Training endorses the study.

The teams carrying out the survey intend to obtain information about all children in Sub A and Sub B including their ages, heights and weight. Please can you try to have the birth certificates of the children at school so that we can check on their ages. This is very vital information when trying to calculate whether or not the child is malnourished. The teams will visit schools between Wednesday 16 January 1980 and Wednesday, 30 January 1980. It will be impossible to say exactly at what time and on which day a survey team will visit your school. We would therefore ask you to bear in mind that we will be visiting your school in the first two weeks of the 1980 school year. We trust that our visit will not interrupt your school programme excessively; we do however believe that you will agree that collecting this information is essential if steps are to be taken to find out the state of nutrition of the children and to implement suitable programmes where serious problems are found.

We look forward to receiving your co-operation.

Yours faithfully

R. Fincham .

R. Fincham
(Project Supervisor)

S. Bekker .

S. Bekker
Co-ordinator

(Please pass the copy to the School Principal)

APPENDIX 2

NUTRITIONAL SURVEILLANCE : QUESTIONNAIRE

1. Location of Survey Column 1 & 2

METROPOLITAN Township Squatter Camp		CITY Township Squatter Camp		TOWN	VILLAGE	FARM
1	2	3	4	5	6	7

HOMELAND/INDEPENDENT STATE				
City	Town	Village	Resettlement Camp	Rural
8	9	10	11	12

2. Questionnaire Number: 3 4 5 6

THE RESPONDENT: (For household surveys; For school surveys move to anthropometric assessment).

Are there any children under 6 years of age in this household? If yes, can we speak to the Mother (if more than one mother separate questionnaires)?

If the mother is absent (not staying permanently in the household) then who cares for the child(ren)?
NB: Ask for birth/baptism certificates.

3. Respondent 7

Mother	1
Father	2
Grandmother	3
Grandfather	4
Male Relative	5
Female Relative	6
Other Male	7
Other Female	8

4. What is the respondents relationship to the head of the household?

	8
Head of Household	1
Wife	2
Child	3
Other Relative	4
Other	5

HOUSEHOLD MEMBERS

	9 10
5. Total number of people in this household at home now	
6. Total number of people in this household including those away from home at present	11 12
7. Total number of children under 6 years of age, in the household now	13 14
8. Total number of living rooms in household	15 16

EDUCATION: (Highest standard passed)

9. Mother

	17
No Education	1
Sub A or Sub B	2
Stds. 1 - 5	3
Stds. 6 - 8	4
Stds. 9 - 10	5
Tertiary	6

10. Father

	18
No Education	1
Sub A or Sub B	2
Stds. 1 - 5	3
Stds. 6 - 8	4
Stds. 9 - 10	5
Tertiary	6

11. Respondent if not mother or father

	19
No Education	1
Sub A or Sub B	2
Stds. 1 - 5	3
Stds. 6 - 8	4
Stds. 9 - 10	5
Tertiary	6

EMPLOYMENT:

12. Mother

	20
Home and Employed	1
Home and Unemployed	2
Is a Migrant	3
Has Deserted	4
Is Dead	5
Commuter	6

13. Father

	21
Home and Employed	1
Home and Unemployed	2
Is a Migrant	3
Has Deserted	4
Is Dead	5
Commuter	6

14. Location of Migrant Mother

	22
Metropolitan Area	1
City or Town in S.A.	2
White Rural Area	3
Homeland City or Town	4
Other Homeland Location	5

15. Location of Migrant Mother

	23
Metropolitan Area	1
City or Town in S.A.	2
White Rural Area	3
Homeland City or Town	4
Other Homeland Location	5

16. Household income per month in Rand

	24 25 26
Remittances	
Pensions	27 28 29
Salaries	30 31 32
Other	33 34 35
Total	36 37 38

17. Does the household receive income in kind? (i.e. food, clothes, fuel)

	39
Yes	1
No	2

18. Amount of income in kind

	40 41 42

19. Does the household keep a garden?

	43
Yes	
No	

20. Did the household cultivate land last season?

	44
Yes	
No	

MOTHERS STATISTICS:

Ask only if the mother is 'Respondent' OR ask whoever is the Respondent only about the surveyed child(rens) mother.

21. Is the mother married or unmarried? — 45

Married	1
Unmarried	2

22. Does the mother breastfeed her babies? — 46

Yes	1
No	2

23. If yes, how old was the last weaned child when the mother stopped breastfeeding him/her? (In months) — 47 48

24. How old is the last weaned child now? (In months) — 49 50

25. Is the mother pregnant now? — 51

Yes	1
No	2

26. If the mother is pregnant how many months is she into her pregnancy? — 52

27. Number of children born to the mother in the last five years? — 53

28. Of the children born to the mother in the last five years, how many have died? — 54

29. Total number of children born to the mother — 55 56

30. Total number of children of the mother who are alive — 57

31. If the mother is not pregnent is she on contraception? — 58

Yes	1
No	2

32. Mother and family planning

	59
Loop	1
Pill	2
Injection	3
Other	4
None	5

33. Where were most of the children born?

	60
At home	1
A clinic	2
A Hospital	3
Other	4

34. Does the child(ren) attend a clinic regularly?
< 1 year, every month
1 - 2 years, every month
> 2 years, every 3 months

	61
Yes	1
No	2

35. Age of mother in years

62	63

36. Absent mother: If the mother is absent, age of youngest baby when she left, in months.

64	65

OBSERVATIONS AND ASSESSMENT (Interviewer: please add any other important information about the household here)

37. Nutritional Assessment

Family No.	Mother No.			Child No.	Sex	Age Given (Months)	Cert. Age (Months)	Weight (Kg)	Wt./Age Assess.	Wt./Cert. Age Assess.	Recumbent Length (cm) 24 Months	Recum./Age Assess.	Recum./Cert. Age Assess.	Height (cm) 25 - 71 Months	Ht./Age Assess.	Ht./Cert. Age Assess.
1	2	3	4	5	6	7 8	9 10	11 12 13 14	15	16	17 18 19 20 21	22	23	24 25 26 27 28	29	30

T. Skinfold[1]				S. Skinfold[2]				Oedema
31	32	33	34	35	36	37	38	39

Wt./Age; Ht./Age

<3 Percentile	1.
3 - 25P	2.
25 - 50P	3.
50 - 95P	4.
> 95P	5.

Oedema

1. Severe
2. Moderate
3. Mild
4. No oedema

1 Triceps Skinfold
2 Subscapular Skinfold

37. Nutritional Assessment

Family No.	Mother No.			Child No.	Sex	Age Given (Months)		Cert. Age (Months)		Weight (Kg)				Wt./Age Assess.	Wt./Cert. Age Assess.	Recumbent Length (cm) 24 Months					Recum./Age Assess.	Recum./Cert. Age Assess.	Height (cm) 25 - 71 Months					Ht./Age Assess.	Ht./Cert. Age Assess.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

T. Skinfold[1]				S. Skinfold[2]				Oedema
31	32	33	34	35	36	37	38	39

Wt./Age; Ht./Age

<3 Percentile	1.
3 - 25P	2.
25 - 50P	3.
50 - 95P	4.
> 95P	5.

Oedema

1. Severe
2. Moderate
3. Mild
4. No oedema

1 Triceps Skinfold
2 Subscapular Skinfold

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