# POPULATION CHANGE AND SOCIO-ECONOMIC DEVELOPMENT IN ZIMBABWE

by

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## Dedication

*This thesis is dedicated to the memory of my father, Samuel Thomas Zanamwe. I wish you could have shared this moment with me, for you had so much faith in me.*

## ABSTRACT

It is a commonly held theory that population is related to levels of social and economic development within a given country or society. The work of Becker in the early 1960s gave much impetus to studies of the relationship between fertility, mortality and migration, on the one hand and their determinants, on the other. The determinants were seen as the social, economic, political and cultural settings of the countries or socities under study. The thesis attempts to apply this theory in relation to the demographic development of Zimbabwe. The thesis postulates that socio-economic differentials within Zimbabwe are sufficiently pronounced as to begin to affect the demographic structure of the country. It is with this in mind that three objectives are set for the thesis:

a) the exploration of the demographic structure of the population of Zimbabwe, as a means of furthering the understanding of the nature of the demographic development of the country;
b) the development and utilization of data estimation techniques as a means of overcoming the deficiencies in the data collected from official sources; and,
c) the investigation of the link between population change, on the one hand, with social and economic development on the other.

The hypothesis proceeds through the examination of such social and economic variables as income, education, health and other social indicators in relation to fertility, migration and mortality. Due to the inadequacy of data on the demographic variables, the thesis estimates such data using the recognized relationships among the demographic variables. The estimated demographic measures are subjected to correlation and regression analysis after the development structure of the country has been explored through factor and cluster analysis. Three geographical scales are used in the analyses viz. the province, the district and the local authority area. Use of the three geographical scales exposes the dangers of extrapolating and generalizing national patterns of demographic, social and economic development to the levels of the district and the local authority, as well as exposing different features of the development profile of the country of Zimbabwe. The thesis concludes that there is a differentiation in the demographic profile of the various geographical regions of the country, based on inequitable distribution of resources in the past when the country was under white settler colonial rule. The advent of independence and the introduction of policies designed to reduce such inequalities had not had time to work by the time the 1982 Census, from whose data the study is based, was taken. The thesis therefore recommends that further censuses are required if the effect of such policies are to be measured. It further recommends the use of cross-temporal instead of the cross-sectional data which was applied in this study.

## ACKNOWLEDGEMENTS

I would like to express my deepest appreciation to my supervisor, Dr. P.H. Rees, who helped shape an over ambitious idea into a thesis. He also stood by me in the mid-term crisis of working on this piece of research. His advice and encouragement was invaluable. Further thanks go to the team who were my work conscience, the Research Support Group, of Dr. J. Stillwell and Dr. D. Preston.

To the various government departments in Zimbabwe, I also express my heartfelt thanks for all their help. Without the data they provided this thesis would not have been possible. Special thanks to D. Mzite, of the Central Statistical Office, who sadly, will never see this thesis, for having passed away in tragic circumstances.

To my wife, Sharai Florence, I also express deep gratitude. You kept the home fires burning while I worked late in various computer annexes. You also provided inspiration and comfort when spirit and flesh were both unwilling. And, when the chips were down, you sat up half the night typing, so that the thesis could get to done.

To the University of Leeds, whose scholarship enabled me to study here, I can only say, you gave me a fishing rod. Your great financial assistance will never be forgotten. Chris Duley, with your help we cracked the GIMMS package. Peter Boden, the regression analysis moved because of you. Yim Ling Siu, your advise on factor analysis proved very valuable. Dr. M. Clarke, post-graduate tutor, who kept chiding me to finish and disappear into the warm weather of Zimbabwe. It has finally been done and those completion rates aren't messed up too much, I hope. Frank Cujoe, the mango wine and the jokes helped uplift the sagging academic spirits. To all family, whose letters also kept us well informed and lifted the spirit during the cold winter months. Finally, to all the friends who provided the companionship, all I can say is, it was all worth it.

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# CHAPTER ONE

## INTRODUCTION AND BACKGROUND TO THE STUDY

And I gave my heart to seek and search out by wisdom concerning all things that are done under heaven:....

*(Ecclesiastes 1 v 13)*

### 1.1 GENERAL INTRODUCTION

The chapter sets out the main objectives of the thesis. It outlines the nature and scope of the study. It provides the physical and historical background to the country of Zimbabwe as well as defining some of the major terminology in use within Zimbabwean literature. In the final sections, it explores the history of population data collection as well as examining the data that is to be used in the thesis. Finally, it gives an outline of the structure of the thesis.

### 1.2 OBJECTIVES AND SCOPE OF STUDY

Mzite (1981) noted the lack of detailed study on the demographic profile of the population of Zimbabwe, especially of the African population. He attributed this to the fragmented nature of the data that were available on the population, in the pre-independence era, i.e. pre-1980. The major reason for the dearth of data was the absence of a comprehensive national census prior to 1962. The demographic processes and characteristics of the population could only be gleaned from a few demographic surveys and official estimates of population based on tax registers (see Section 1.4). The overall picture that emerged of the population was, therefore, fragmented.

Recent studies have sought to fill the gaps in the understanding of the demographic processes and characteristics of the population. The current thesis seeks to:

(a) continue the process of completing the understanding of the demographic processes that operate on the Zimbabwean population.

(b) attempt a link between aspects of population change, such as fertility, mortality and migration, and those of social and economic development (health, education), at disaggregated spatial scales.

Previous studies have tended to concentrate at the national level. The approach of the thesis is to adopt a hierarchical approach that investigates population change and socio-economic development at national, provincial and local authority levels, hoping that such an approach will enhance appreciation of the demography of Zimbabwe.

To achieve the objectives outlined above, it is necessary, not only to utilise data collected from official sources, but also to develop methodologies for estimating certain variables in the demographic profile of the nation that are not immediately apparent or available from the raw data per se. Thus, a further aim of the thesis is:

(c) to develop methods of estimating data from the available data as a means of covering existing gaps in the official data sources.

It is expected that the estimation methods developed in the thesis will be of benefit in future analyses of population data in Zimbabwe.

## 1.3 PHYSICAL AND HISTORICAL BACKGROUND

### 1.3.1 Physical and climatic background

Fig 1.1 reveals that Zimbabwe is a landlocked country. It lies wholly within the Tropics, having four neighbouring countries, namely: Zambia to the north, Mozambique to the east, South Africa to the south and Bostwana to the west. It has a total land area of some 391 000 square kilometres (CSO 1985b).

There are three principal physical divisions which modify the

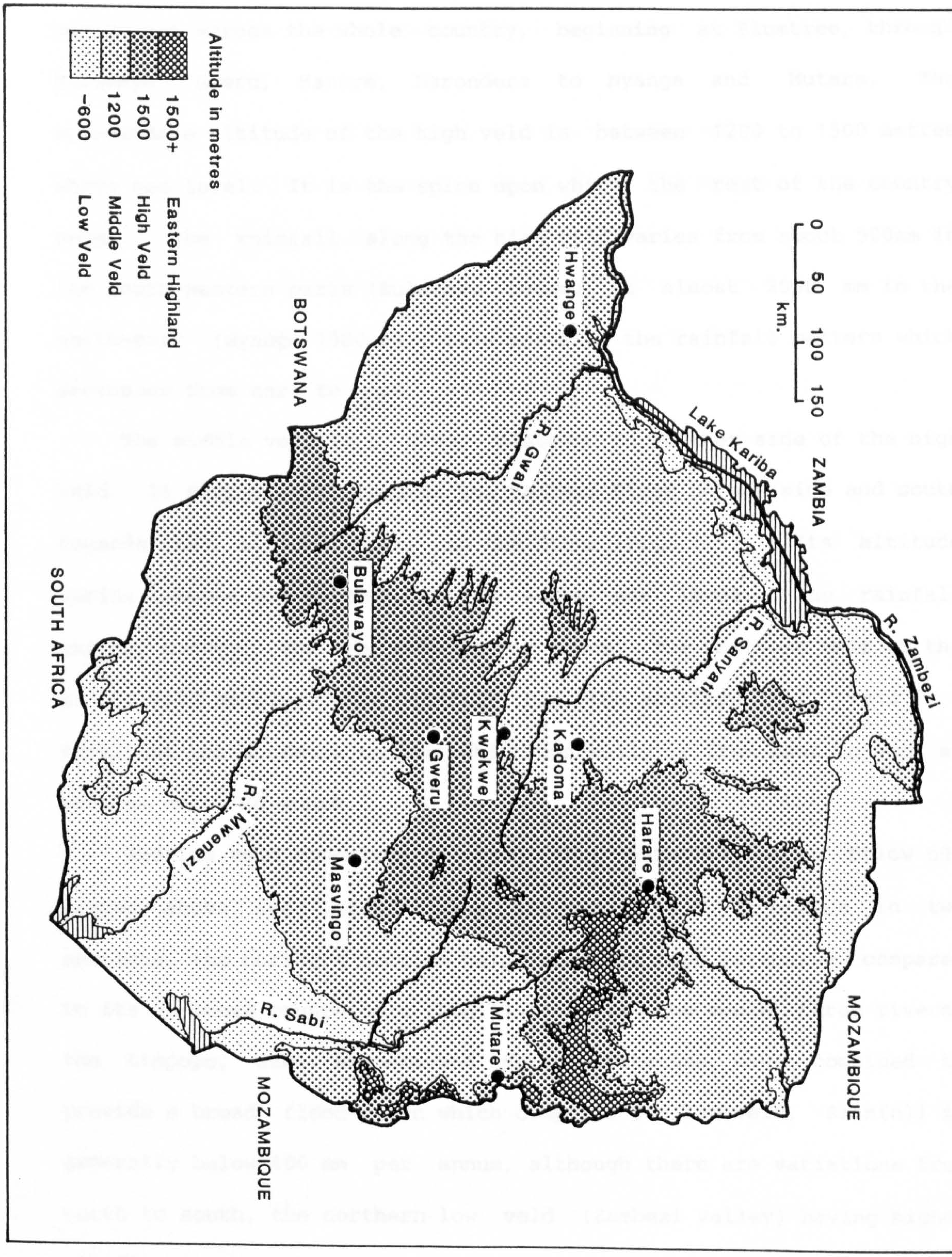



Fig 1.1: Main physical features of Zimbabwe

tropical climate of the country. These are the high veld, the middle veld and the low veld (Fig. 1.1). The high veld is a narrow plateau (about 80 kilometres wide) running from the south-west to the north-east across the whole country, beginning at Plumtree, through Bulawayo, Gweru, Harare, Marondera to Nyanga and Mutare. The approximate altitude of the high veld is between 1200 to 1500 metres above sea level. It is the spine upon which the rest of the country hangs. The rainfall along the high veld varies from about 500mm in the south-western parts (Bulawayo 500mm) to almost 2000 mm in the north-east (Nyanga 1980mm). This affects the rainfall pattern which decreases from east to west.

The middle veld is a wider plateau on either side of the high veld. It slopes north towards the Zambezi River on one side and south towards the Limpopo River on the other (Fig. 1.1). Its altitude varies between 600 to 1200 metres above sea level. The rainfall varies between 400 to 800 mm per annum. The northern half of the middle veld receives more rainfall than the southern half. This is a result of the decrease in rain which generally is from east to west as well as north to south.

The low veld comprises of land that generally lies below 600 metres above sea level. Like the middle veld, it occurs in two sections, the northern section being somewhat less extensive compared to its southern counterpart (Fig. 1.1). In the south, three rivers, the Limpopo, Sabi, Mwenezi and their tributaries, have combined to provide a broad flood plain which comprise the low veld. Rainfall is generally below 400 mm per annum, although there are variations from north to south, the northern low veld (Zambezi Valley) having higher rainfall than the southern one. For example, Kariba (Zambezi Valley) and Beitbridge (Limpopo Valley) have altitudes of 518m and 457m, respectively. However, the former has an annual mean rainfall total of 730mm (almost equivalent to the average for the middle veld and higher than that of Bulawayo on the high veld) compared to Beitbridge's 260mm per annum (near desert average and well below the low veld average).

The importance of the physical regions is seen in the existence of five ecological regions within the country illustrated in Fig. 1.2. A comparison of Fig. 1.2 with Fig. 1.3 reveals that the division of land by white settlers followed closely the patterns of rainfall, which is influenced by the physical features of the land. Thus, the bulk of commercial farms are found in ecological regions I-III, which are suitable for very specialised intensive farming to semi-intensive farming. The communal lands, are found within regions IV-V suitable only for extensive farming. In fact, most commercial farms found in regions IV-V are involved in the extensive rearing of livestock compared to the cropping activities of the communal farmers.

1.3.2 Political, economic and social background

If one was asked to state in a word the main concern of research literature on Zimbabwe, the simplest answer would be land, Land is at the heart of most research issues, be they historical, political, social or economic. The recent history of Zimbabwe is written in terms of land alienation by European settlers from the Africans and its gradual recovery since independence in 1980. The impoverishment of the majority of African peasants stems from the loss of their productive land and their confinement to less fertile areas of the country.

The result is a research methodology which borrows heavily from dependency theory to explain differential social and economic development. This most common approach relies on the use of dualism.

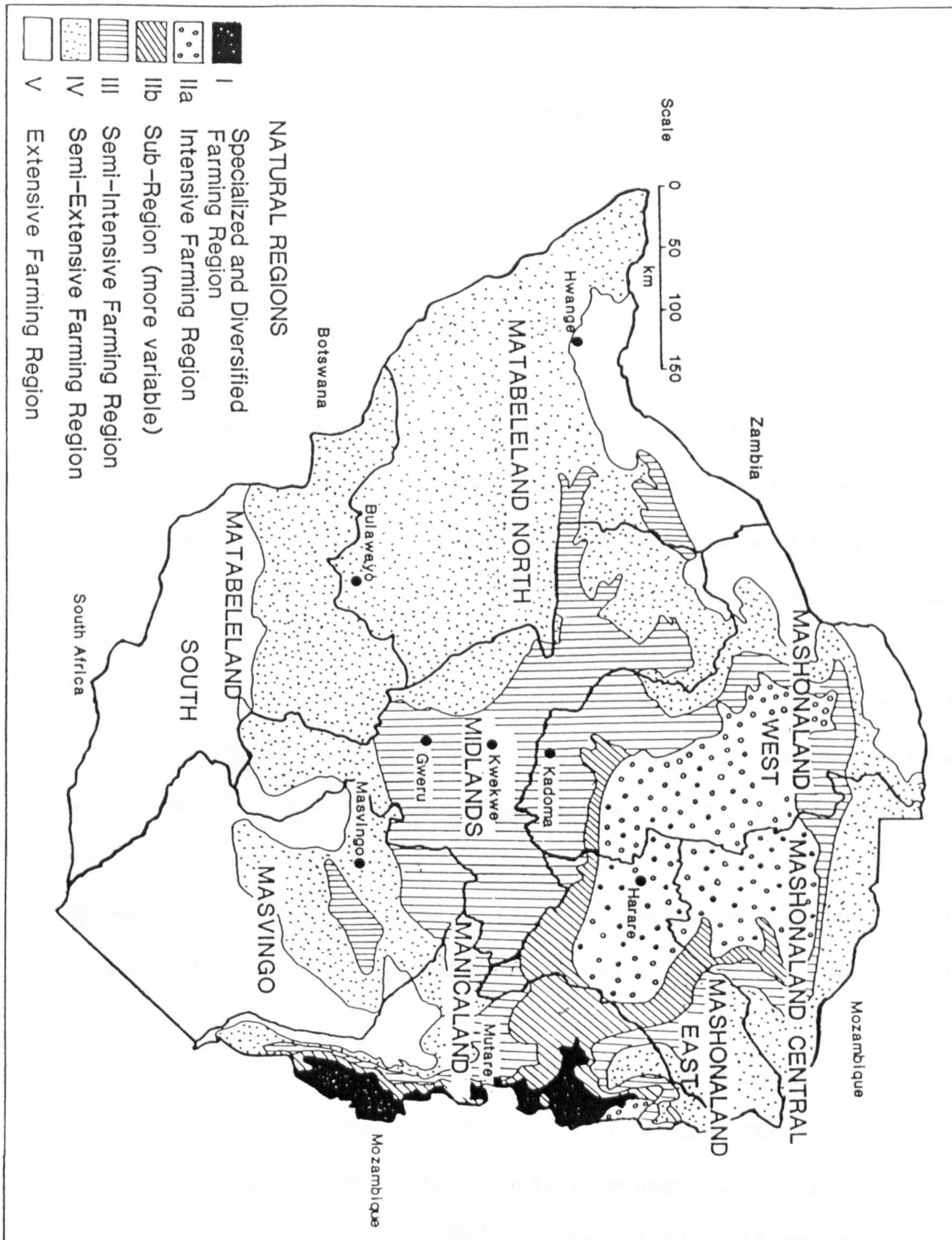


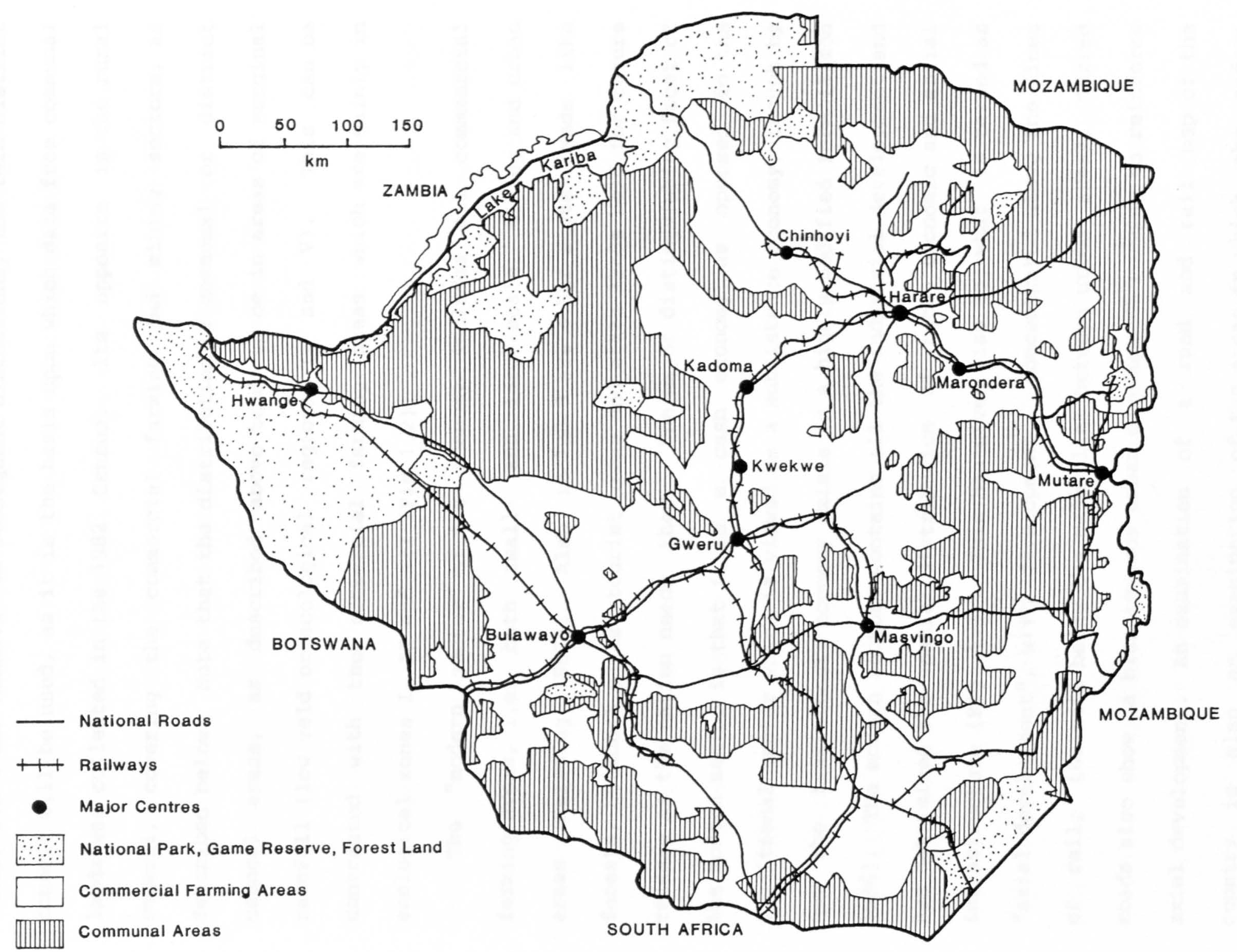

Fig. 1.2. Zimbabwe : Provincial distribution of natural regions

Land alienation created what one could term "two worlds". One was the traditional society that existed before the advent of the colonial period whilst the other, termed modern, was introduced by the colonialists (Mitchell 1969).

The "traditional sector" of the economy is contained in communal areas, shown in Fig 1.3. The term "communal area" defines the type of land tenure found in there. Cultivated land is held by households or families but it does not belong to them. They only have the right to cultivate it, as they have the right to graze cattle on the communal grazing areas. All land is held by the chief in perpetuity for the tribe or nation. During colonial times this right passed onto the district commissioners (though at various times these rights were restored in reduced form to the chiefs). The present government has stripped chiefs of their traditional powers or the ones they acquired under the white settler state (1890-1979) and given them to district administrators. The communal areas contain by far the largest proportion of the population (57%, CSO 1985a) though they occupy 42% of the land (Helmsing 1987; Zinyama 1987). For both demographic and development purposes, what happens in the communal areas has a great influence on what goes on in the rest of the nation. It is not suprising therefore to find that most research work looks at the relationship between the communal lands and the modern sector of the nation.

It is important to note that before 1980 the communal lands were referred to as Tribal Trust Lands under the Land Tenure Act of 1969 which divided the country almost equally between the white and black population (CSO 1985a; CSO 1985b; Zinyama 1987). After independence these were renamed communal lands and new local authorities called district councils were constituted to run them. Thus, a district

Fig. 1.3. Zimbabwe : Urban Centres, Infrastructure, Communal Areas and Commercial Farming Areas



council is made up of several communal lands. For example, Nyaningwe District Council in Masvingo Province is made up of two main communal lands; Chivi and Mashava. In subsequent discussions, the term district council will be used, as it is the basis upon which data from communal lands was collected in the 1982 Census. Its opposite is the rural council, covering the commercial farming and mining sectors, as described below. Note that the distribution of communal or district council areas, as described above tends to be in areas of marginal rainfall (low veld or ecological regions IV and V). This can be contrasted with the commercial farming areas which are mainly in ecological zones I, II and III (Fig 1.2).

The "modern sector" of the economy includes all commmercial farming areas, i.e. both small- and large-scale, mining and urban areas (Helmsing 1987). Also included are other state lands like forests, national parks, tourist areas and state lands held for future release as the nation needs them. The major distinguishing facet of the modern sector is that it is a cash economy as opposed to the traditional sector which is viewed as a subsistence economy, though by now the traditional economy exists in a highly modified form (Simon 1986). The modern sector contains all the industrial development and has determined the spatial distribution of both economic and social infrastructure (Fig. 1.3). This has given rise to what is termed as "axial development", with development concentrated along the lines of rail; the rail being the major link between urban areas. Tarred roads also show a bias towards urban development serving to reinforce axial development. An examination of a road and rail map of the country is also an examination of the areas in which the modern economy predominates. The areas in-between, which include all rural areas (both communal and commercial), have poor communication links though, on a comparative basis the commercial farming areas are better off than the communal areas. Note also the close assocaition between ecological regions and axial development. From the Land Apportionment Act (1931) through to the Land Tenure Act (1969), all the best land was generally apportioned to the white community. The settler governments concentrated development resources on the white areas to the exclusion of the traditional sector which could only act as a large labour reservoir for the modern sector (Helmsing 1987; Cheater 1982).

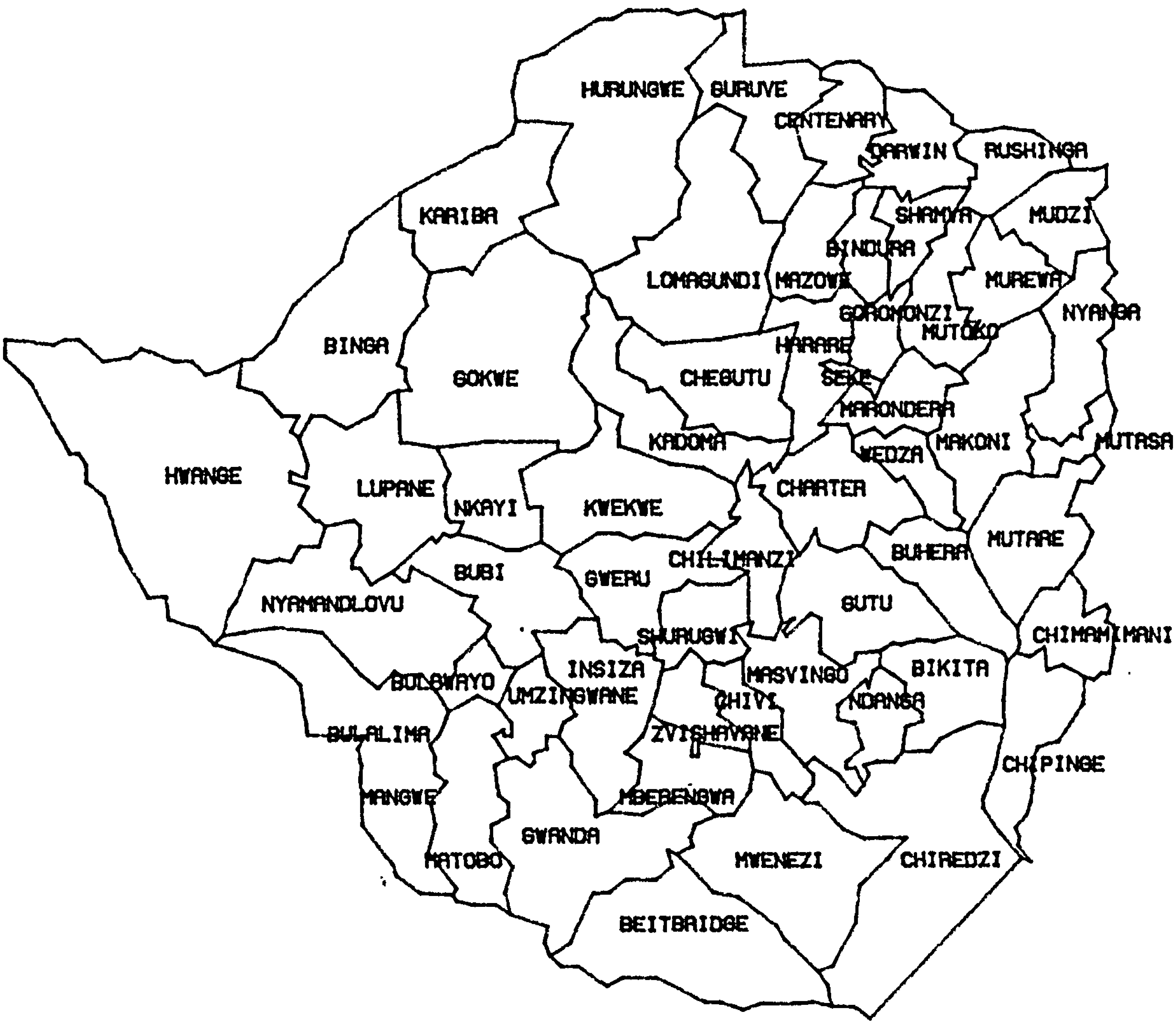
A notable feature of the modern urban economy is the growth of the 'informal sector'. The informal sector is to the urban economy what the traditional sector is to the commercial farming sector. However, after asserting this, it is important to note that some informal sector activities have both a rural and urban component, i.e. they are produced in rural areas and sold in urban areas or vice versa. Thus the two sectors are not necessarily in competition but are complementary and mutual supporting.

The growth of the informal sector within the urban areas reflects on two aspects of development and population. The first is the inability of the modern economy to provide full employment to the majority of job seekers. The second is the continued rural to urban migration which ensures that there is no shortage of job-seekers and, when the jobs cannot be found in the modern sector, migrants integrate into the informal sector (Todaro 1969). The informal sector is an absorption ground for workers laid off during periods of contraction in the economy. It operates as a form of social security without being financed by the state or the firms making workers redundant. It also serves, together with the communal areas, as a reservoir for cheap labour (Helmsing 1987; Mandaza 1986) ensuring that firms maintain low wages. The existence of the communal and informal sector ensures the continued operation of the migrant labour system, at varying levels of intensity, for the foreseeable future.

Administratively, the country is divided into a three tier hierarchy, viz. province, district and local authority. There are eight provinces which are shown in Fig. 1.2. The eight provinces are in turn divided into districts, of which there are a total of fifty-five. These are shown in Fig. 1.4. The district is in turn divided into three local authorities types. These are the district council, made up of communal lands; the rural council and, the urban or town council. As implied by the term council, the local authority is administered by a council, responsible for overseeing road maintenance, schools, clinics, townships, growth points, and conservation. In theory, the council should be able to run local affairs with minimum interference from higher authority. The council should produce development plans for its area to be incorporated into the national development plans. The overall aim is for planning from the grassroots upwards to government (Government of Zimbabwe 1986).

The study aims to use the local authority division as its spatial or geographical regions of study wherever possible. Where the data available do not allow the use of the local authority as the region of analysis, the next rung in the administrative hierarchy will be used (i.e. the district or province). Thus, the demographic and socio-econominc development picture to be painted will depend on the detail of the data available.

*Fig. 1.4: Zimbabwe: the fifty–five districts*



## 1.4 HISTORY OF POPULATION DATA COLLECTION

### 1.4.1 History of Population Data Collection Prior to 1948

The first census in Zimbabwe was held in 1901 followed by another in 1904, then 1907, 1911, 1921 and from there on at five-year intervals up to 1961/1962 (Mzite 1981). The pre-1962 censuses where not complete enumerations of the population. They concentrated on the non-African population: Europeans, Asians and Coloureds (people of mixed racial origin). Demographic data on the African population were lacking despite the fact that it constituted the largest segment of the national population. Shaul (1952) advances three reasons why the European dominated administrations felt that the enumeration of the African population was not necessary:

1). the levels of literacy among the African population were felt to be very low, leading to the view that the African population could not complete census schedules. To enumerate the African population fully would require the extensive training of field officers who would collect the data from the African population;

2). the vastness of the areas to be covered meant that the administrative machinery felt that it was too thinly extended to be able to cope with a full census for the whole country;

3). the financial and manpower resources were felt to be too slender to deal with the vast areas and the largely illiterate population.

The need to enumerate or at least have an idea of the demography of the African population arose from their increasing involvement in employment within the modern economy. Also, legislation such as the Land Apportionment and Land Husbandry Acts required some knowledge of the numbers of the African population to be confined to the reserves (communal lands). Thus, by 1948 it became obvious that there was a need for estimation of the African population. Indeed, the Native Commissioners (the equivalent of the modern district administrator), were advocating that the African population be enumerated more effectively, if only to provide an idea of the tax base for the reserves.

The estimation of the African population prior to 1948 depended upon the imposition of taxes on the African population. The taxes were imposed as an inducement to make the African leave the traditional subsistence economy to work on the European farms, mines and towns (Shaul 1952; Johnson 1969; Mzite 1981). Johnson (1969) points out that the first tax to be imposed was a hut tax which came into effect in 1894. The tax was known as a hut tax because each hut was taxed ten shillings. After the First Chimurenga (Revolution) of 1895-1896, the hut tax was replaced in 1901 by a tax on every African male over the age of 18 years of ten shillings plus ten shillings for every wife exceeding one. In 1904, the later was repealed and replaced by a tax of one pound for every adult male plus ten shillings for every wife exceeding one. In all cases the number of huts represented the tax yield each family was supposed to pay. Native commissioners kept tax registers which related the number of taxpayers to the number of huts. Each hut was supposed to be occupied by 3 to 4 persons. Thus, the number of huts, raised by a factor gave the total population in a given district. From such estimates the total African population could be arrived at.

### 1.4.2 <u>The demographic sample surveys: 1948 and 1953</u>

The first serious attempts at collecting data or investigating the demographic nature of the African population came with the demographic sample surveys of 1948 and 1953-55. According to the Central African

Statistical Office (CASO, 1959) the aims of the surveys were:

(a) to ascertain for each district the de facto population of the rural farms and villages as well as the total population of these villages and farms including the absentees both inside and outside the country. Other demographic information or data sought on the African population included:

(b) composition by sex and quinquennial age group; crude birth and death rates as well as the infant mortality rate; reproduction rates and the mean expectation of life at birth (Mzite 1981).

Data were collected from the communal lands using the taxpayers' registers as the sampling frame. The surveys failed to estimate the African population accurately. The major reasons for this might lie in the failure by relatives in the villages and farms to report absentees accurately. Also the sampling frame used could not have been complete as young unmarried men did not appear in the taxpayers registers (Johnson 1969; Mzite 1981), and the enumeration of the female population was dependent upon their being reported by the males. Thus, while forming a vital and necessary step in the chain towards complete enumeration, the demographic sample surveys did not fulfill the goals that were set out for them.

1.4.3 The 1962, 1969 and 1982 Censuses

The 1961 census of non-Africans and the 1962 census of Africans marked the beginning of complete enumeration in the country. The non-African population was enumerated at a fixed data whereas the African population was enumerated over a three week period in April-May (school holidays) (CASO 1962, CSO 1976). The enumeration of the African population was by the canvassing method due to the prevailing view among the administrators that the African population had low literacy rates. Even the 1982 census employed the canvassing method.

In all three censuses the enumeration was on a de facto basis. Basic demographic data were sought in all three censuses. The censuses were aimed at collecting demographic and socio-economic data which would enable characteristics of the population to be estimated such as birth and death rates, life expectancies and the educational and health status of the population.

The difference between the 1962 census and later censuses lay in the fact that, in the latter two censuses, the entire population was enumerated at the same time. The non-African population was still enumerated over a single date with the African enumeration spread over three weeks. A mean date was found upon which the census could be said to have taken place. In the case of the 1969 Census this was 29th April, while for the 1982 Census, this was the 18th of August (CSO 1976; Mzite 1981; CSO 1984; CSO 1985a). Thus, the two censuses are thirteen years, three months and 20 days apart.

The 1982 Census is the most comprehensive to date, providing a host of demographic and socio-economic characterstics of the population of Zimbabwe. Unlike the 1969 Census, it did not dwell on divisions of the population by race though such data are available. However, the smallness of the non-African population makes analysis along racial lines unnecessary though, at times, it is useful to show the extent to which the African population must advance to close the gap with the former.

1.4.4 <u>The Post-1982 period</u>

The post-1982 period has seen an increase in the amount of statistical information available on the various characteristics of the Zimbabwean population. For example, between 1983 and 1984, the Permanent Sample Survey Unit of the Central Statistical Office carried out some more demographic and socio-economic surveys within the district council areas of the country. These have to a certain extent indicated that the 1982 census was a fairly accurate enumeration of the population in these local authority areas. In most cases, the population totals arrived at in these samples are lower than those of the census. The chief differences might arise from the timing of the census and the surveys. Surveys or censuses taken in April-May tend to inflate the district council population due to the harvesting operations which will be in progress. Those taken in August, which is the slack time in the rural calendar show lower populations in district council areas. The demographic sample surveys of 1983/84 were spread over a period of time which would reflect these variations. They were also compounded by the existence of a severe drought which would have sent a significant number of the rural population in search of employment in the urban areas. This probably accounts for the lower populations in the surveys than in the census of 1982.

Besides the surveys, a Reproductive Health Survey of women has been conducted in both urban and rural areas. This was undertaken in 1983 and was meant to collect information on the reproductive history of the population for the National Family Planning Council (ZNFPC 1985). A Statistical Yearbook produced in 1985 by the Central Statistical Office provides a summary of most of the demographic, social and economic data collected since 1980.

### 1.5 THE DATA USED IN THE STUDY

The study utilises data from the 1982 Census as the most comprehensive data base is available. Wherever possible, the data are supplemented from the other sources discussed above, especially for comparative purposes.

The data from the census are of two types. The first are based on a ten percent sample of the main census, made public in 1985. The second are from the full census count which became available in 1987. At the time of writing, the author had only collected data for the complete count for two provinces only: Manicaland and Masvingo. Because of the completeness of data available for these two provinces, they will be used in most of the examples and discussions in subsequent chapters. However, whenever possible, the type of data used in the analysis, i.e. whether ten percent sample or full count, will be highlighted.

The chapter has provided, in summary form, background material to the current study, which will be useful to readers of this research. The brief nature of the summary does mean that certain gaps or omissions exist in the picture provided, especially on data collection. However, as the thesis unfolds, such gaps may or will be filled.

## 1.6 STRUCTURE OF THE THESIS

The remainder of the thesis is divided into eight chapters. Fig. 1.5 illustrates, diagrammatically, the structure of the thesis. Chapter Two is a review of literature on population change in relation to socio-economic development. The chief aim of this chapter is to provide a theoretical and analytical framework for the thesis. Literature. covering a broad range of the field of interest, is reviewed both nationally and globally.

Chapter Three examines the age and sex structure of the population at the provincial and local authority level. The chief aim of the chapter is to provide a descriptive analysis of the population structure as a pointer to likely patterns of fertility, mortality and migration behaviour in relation to the populations likely social and

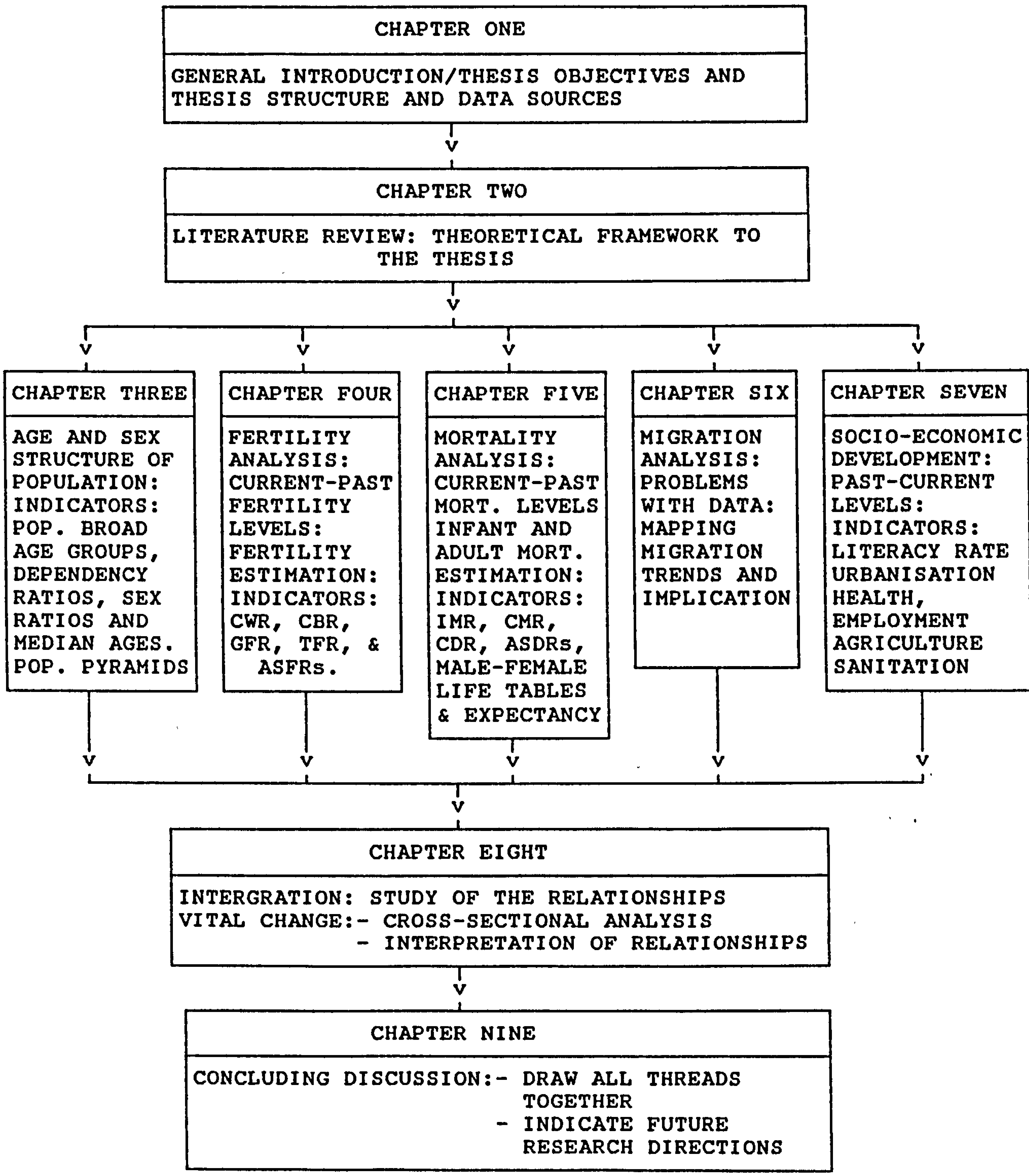



Fig. 1.5: The structure of the thesis

economic characteristics. Chapter Four shifts the emphasis to an analysis of fertility at the provincial and district scales. Fertility estimation is carried out based on some of the age and sex characteristics of the population highlighted in Chapter Three.

Chapter Five discusses the issue of mortality. Estimates of infant and child as well as adult mortality rates are carried out. Other mortality indicators such as life expectancies and life tables for both sexes are derived. Estimates are restricted to the national and provincial levels due to the nature of the data collected i.e. it lacked breakdowns at the district or local authority scales.

Chapter Six sees the estimation and mapping of migration trends and rates. Most of the data on migration are based on place-of-birth and place of-residence at the time of the census type of statistics. Data is at the provincial and district level. No data were collected or tabulated at the local authority level.

Chapter Seven focuses on the socio-economic aspects of the thesis. Indicators of social and economic development will be presented for the various provinces and districts. Thirty-five districts of the country will be used as the main focus of the chapter because they have the most complete data available. The districts of the three Mashonaland Provinces are excluded in this analysis since data for them were not available at the time of writing. Local authority level data and analysis are provided for Masvingo and Manicaland. Social and economic indicators will include percent population employed, with education, access to health facilities, in agriculture and in urban areas.

Chapter Eight will link the demographic characteristics of the population with its socio-economic ones. Statistical packages such as SPSSX will be utilised in the analysis. The argument posed is that, given certain levels of social and economic development it is possible to predict the associated demographic development of a population or country under study. Such an association opens up the possibility of estimating demographic trends where data are not available but a few socio-economic indicators are available.

The final chapter, Chapter Nine is a concluding discussion in which the findings of the thesis will be summarized and evaluated. Pointers to future areas of research will be given and an assessment of the current thesis given.

# CHAPTER TWO

# REVIEW OF LITERATURE ON POPULATION CHANGE AND DEVELOPMENT

## 2.1 INTRODUCTION

The chapter reviews some of the literature on population and development in Zimbabwe and the wider world in general. The field reviewed is wide and varied. The literature falls within two broad categories i.e. that which deals with Zimbabwe and that with the rest of the world. The literature will be dealt with separately. The separation is a response to the different approaches and issues on population and development in Zimbabwe and the rest of the world.

The aim of the literature review is to place the present study within its proper context. Just as Chapter One sought to provide or sketch the background to the study in terms of political and social/economic fields, the review seeks to establish the field of research as well as the theoretical boundaries of other studies in the field of population and development. Subsequent chapters can therefore be read with the theories and concepts as well as the boundaries of the research field already defined.

The remainder of the chapter is divided into four main sections. Section 2.2 discusses the issue of population and development in general while Section 2.3 highlights literature on population and socio-economic development in the broader world context. Section 2.4 focuses on the specific context of Zimbabwe. In last two sections (2.3 & 2.4), the theories, the concepts, and the approaches used by other researchers are analysed. Concluding comments to the review are provided by Section 2.5.

## 2.2 DISCUSSION OF POPULATION CHANGE AND SOCIO-ECONOMIC DEVELOPMENT

The United Nations (1981) urges that the study of population and development should be linked through models. The linkage is justified on the grounds of the long recognised fact that population and development affect each other. Jones (1980) argues for the need to provide accurate population forecasts at the national, regional and, if need be, at the local level by linking these to development and planning issues at the relevant levels. Development is a term both Jones and the United Nations use comprehensively. It is used to refer to both economic and social developments as well as cultural and political issues of development. The United Nations (1981) argue for demographic variables to be central to the development process. They cite the fact that the age structure of a population has a profound influence on the size of the labour force, the demand for health services, the demand for education, the size of the pension bill and the overall consumption patterns of the nation. In their turn, social and economic variables affect demographic ones. Fertility, mortality and migration are affected by social and economic factors such as health, education, employment opportunities and differential wage rates, to mention only a few. Due to this connectedness of demographic and development factors, it is possible to influence demographic events through appropriately designed developmental issues, though Todaro (1969) notes that the direction is not always that predicted or desired.

So far, population and development have been used without being defined. Clark (1985) defines population as the total number of a specified group of people,..., living in an area. This definition is echoed by Goodall (1987) with the addition that, it is the number of people living in an area at a particular time. Development on the other hand is more difficult to define. It is surrounded by a lot of controversy as its interpretation involves ideological issues. Clark (1985) defined it as the act of causing to grow or to expand or to realize what had formerly been potential. Goodall (1987) calls it the process of becoming mature or better organised. He further makes the more specific definition related to economic and social contexts. In economic and social contexts it is the state of nations and the historical processes of change experienced by them. For example, from a geographical viewpoint, development can be viewed as the extent to which natural resources of a nation have been brought into productive use. In this sense, it is realizing what formerly had only been potential. Johnston (1981) makes a lengthy argument over what development should be. In his view, no nation has as yet attained the stage of development because this stage involves no exploitation and an equitable distribution of resources. The study adopts the conventional definition as used by Clark and Goodall. This is probably a recognition that the definition propounded by Johnston has not been attained in Zimbabwe and is not likely to be for the foreseeable future. Indeed the whole basis or rational for the study rests on the recognised inequalities which exist in the Zimbabwean society and how they become reflected in the processes of population change.

Conway and Joun (1983) note the recognised interaction between regional economic and demographic activity. They cite the interest shared by economists, demographers and geographers in this field. They back their argument by pointing out the wide range of empirical and theoretical work which has been carried out, from Isard's channels of analysis through Becker's economic theory of fertility to Gordon and Ledent's demoeconomic model. This establishes firmly the continued interest in the interaction between population and development, mainly within the context of the developed or industrialised nations. The current study seeks to develop that interest within the context of a developing nation.

Cochrane (1975) reviewed the rapid expansion in both theoretical and empirical work that links fertility variations to economic activity since Becker's paper in 1960. The most noteworthy aspect of this growing research area was the focus on the household as the decision making unit that affected demographic outcomes. The decisions of the household are themselves based on the perceived economic and social conditions prevailing within the region or nation. The focus on the household has not shifted much since the 1960s though in the 1980s concern is being voiced over the wisdom of continuing to focus on the household without mapping in fully, the social and institutional surroundings. These act to encourage as well as constrain the household in its decisions (United Nations 1981; Cain 1985, 1986). The present study cannot focus on the household per se as the data available is mainly of population in the administrative units defined in Chapter One.

Governments have also shown an interest in the interaction between population and development. This stems from the need to design plans and policies that can be implemented accurately. Most developing nations follow the socialist model of producing five year development plans. Jones (1980) argues that, to implement such plans successfully, planners must take into consideration all the social, economic and demographic issues that are likely to influence the plan. Further, they must be able to predict the changes in both the developmental and the demographic conditions as well as the direction such changes will take. To do so effectively, they need to understand the link between population and socio-economic development.

The United Nations (1981) supports Jones's view by stating that understanding the interaction between population and development might mean the difference between successful or disastrous national planning policies. Understanding the interaction of population and development will provide a framework for the analysis of issues that are at the interface between the two and produce projections that are mutually consistent. The need for consistent and accurate projections arises from the need to forecast future changes in either population or development as well as the direction of such changes.

The main components of demographic activity are: fertility, mortality and migration. These determine the size of the population and its age and sex structures. They influence the rate at which regional and national social and economic progress is made. The economic and social variables are many and more varied. Aspects covered in the literature on population and development include land (tenure, size, availability), labour force, urbanisation, employment, health, education, and cultural factors such as religion and ethnicity. These influence the population in various ways. Improvements in health cut down mortality rates leading to improved survival chances at birth as well as increased life expectancies. Increased life expectancy in its turn affects the size of the pensions bill as well as matters of insurance such as life insurance and the need for various social security schemes. Education, especially that of females, induces changes in tastes and attitudes towards family sizes and the desired number of children as well as consumption patterns (Sandell 1977; Cochrane 1975; Rosenzweig and Evenson 1977).

Enhancing the understanding of the interdependence between population and development and the patterns of change between them will enable more effective planning. These changes are not as simple as outlined in the paragraph above. They are mostly complex, often non-linear, subject to lags and may run in either direction i.e. from population to development and vice versa (United Nations 1981). Theoretical and empirical research must provide planners with a thorough understanding of the processes of population and development. This will enable them to formulate national and regional plans and policies that respond to changes in either the population or the development variables. Failure by planners to take into cognizance the interaction between population and development might lead to policies and plans that are poorly conceived and that do not come to grips with the genuine development needs of the nation or regions.

## 2.3 REVIEW OF THE GLOBAL LITERATURE

The section examines some of the literature on population and development in the context of the world. It is divided into three major subsections. The first examines issues related to fertility and socio-economic development. The second investigates similar issues with regards to mortality with special emphasis on infant and child mortality. The third then examines the issue of migration.

### 2.3.1 Fertility and socio-economic development

The determinants of fertility have for long fascinated both economists and demographers. Becker(1960) ushered in the era of the economic theory of fertility. This theory applied to the analysis of fertility the same supply and demand theory that the economists used in analysing consumer or production goods. The result was the rapid growth in both the theoretical and the empirical investigation of the determinants of fertility (Cochrane 1975). Becker's paper focused mainly on fertility and income but his theory has been extended to cover a wide range of social and economic factors of development. These include such areas as education, health and contraceptive use, land, labour force status, urbanisation and so on. The literature covering these factors shall be examined in detail below.

*2.3.1.1 Fertility and income*

Becker(1960) argues that fertility should be positively related to income. He draws this argument from Malthus who postulated that increased income should enable parents to afford more children. However, Becker notes that in reality this relationship is not always a positive one. The wealthier members of society are also known to have less children. He therefore proposes two hypotheses. The first postulates that children will be positively related to income only if they are seen as productive goods. The second sees them as negatively associated with income if they are taken as consumption goods like cars and other consumer durables. The household decides through a series of cost-benefit analyses whether to have another child or not as their income increases. If the child is viewed as contributing to further family income then the parents will have another child. If not, then the child is not "produced". All this decision making is arrived at through weighing the relative advantages of children vis-a-vis other goods. Opportunity costs are what then determine what the family decision will be.

The relationship hypothesized by Becker seems to hold for different communities. Rural communities tend to afford more children with rising income because of the lower costs of raising children on the farm as well as the early age at which children begin contributing to household incomes. Urban communities seem to afford less children with rising income because of the higher opportunity cost of raising children in urban areas as well as a host of other factors like urbanisation which seem to influence parental taste for children.

The arithmetic sign for income and fertility still causes some debate. As mentioned above Malthus thought that it should be positive. Isserman (1985) and Cochrane (1975) reviewing models on fertility find that a lot of empirical studies find the relationship with income to be negative. The conclusion they reach is that overall fertility levels have fallen with rising incomes despite continued belief that this relationship should be positive. Why then is a relationship postulated to be positive found to be negative in empirical studies?

Isserman (1985) asserts that this is because the indirect effects are not considered in most specifications. Increased income induces a lot of social changes which are not always taken cognizance of in most theoretical specifications. For example, rising income is related to rising literacy levels which it influences positively as parents afford to send more of their children to school. This raises the opportunity cost of the children by decreasing their contribution to family income or at least postponing it to latter ages. Rosenzweig and Evenson (1977), investigate such a relationship for rural families in India. Malthus' postulate was also based on a constant price of children. Becker argues that this assumption is unrealistic as the price of children rises with rising income simply because parents begin to demand high quality children i.e. better educated, better fed, and better clothed. Thus the price of bring up children is dynamic, responding to changes in social and economic conditions. McInnis (1977) argues that children formulate their desired family size whilst still living with their parents. This causes them to desire a better life for their offspring than they had themselves.

This raises the price of their children so that despite higher income than that of their parents they will "consume" less children.

The above arguments would seem to indicate strongly that the relationship is non-linear. With rising incomes, fertility initially rises as parents afford to consume more children as well as in conjuction with other improvements associated with the rise in their living standards, e.g. health and education. A point is then reached where the improving style and standard of living force parents to demand more high quality children leading to a fall in the overall numbers of children produced. In other words, high quality children do not go hand in hand with a high degree of child production or consumption by parents. The effect is reinforced by other socio-economic factors such as rising literacy and health standards, which change attitudes to family size.

How_ever income and fertility are related in terms of arithmetic signs, it is significant to note that they relationship has a profound effect on overall levels of fertility. Maybe Isserman's suggestion that a model that allows the sign of the relationship to vary with varying social and economic conditions needs to be given further careful thought.

*2.3.1.2 Fertility and land*

The relationship between land and fertility is assumed to be positive. This stems from the factor mentioned above under income i.e. children are both productive and consumption goods in rural areas and their price is lower than that of urban areas. Several issues will be discussed that affect the land-fertility relationship. These include the measurement of land, land tenure, land size and inheritance structures.

An issue that causes controversy is how to measure land. Land is a multi-faceted variable with both economic and social meanings. The way in which it is measured has a direct bearing on the sign of the regression equations. The facet of land which needs to be measured is that of size of landholding or at least the land to which an individual family has access. Schutzer et al (1983) argue that the proportion of land to which the family has access has an important bearing on fertility. The argument is based on the fact that the land is a proxy for income and decisions on the number of children to have will depend on the land the household has access to. They define three types of land users. The first is the farm labourer who only gets a labour return from working the land. The second is the tenant who gets a management and a labour return from the land. The third is the land owner who gets both the management and labour return plus an equity return. Based upon these forms of return from the land and the access they imply, Schutzer et al argue that fertility will vary among the three groups identified. They hypothesize that because of the equity return from the land, land owners might be able to substitute children for land.

The second hypothesis is termed the land - security hypothesis. The argument here is that farming households with insecure land tenure or with very little land will tend to have large families as a means of ensuring support in old age. Land owners will also have large families because they need them to inherit and work the land. But, the large land owner can afford smaller families because of the equity return he can get from the land. This equity return is more sure and more secure than that to be got from children. Thus, while the family of the land owner is on average smaller than that of the the peasants, it is still larger than that of the urban family. In other words, it seems to compromise between the two hypotheses as it tries to balance security in old age with equity returns from the land.

Both hypothesis have been questioned. Cain (1985) provides the most critical questioning. His first query is on the conclusions reached from a limited number of observations and regressions. He believes that these might have failed to capture all the relationships inherent in such a difficult concept as land. He further questions the use of the proportion of land worked as against land owned in the regressions and points out that the concept is poorly defined. This concept is important because it is the variable that measures land and is therefore likely to influence the direction and the magnitude of the relationship.

A further criticism of the theories stems from the fact that the land security hypothesis is founded on rather tenuous grounds. The uncertainity of land tenure in most developing countries makes children a more secure form of investment than land. This is enhanced in situations where land reform policies are rampant. For children to be substituted by land one must assume that land owners can forecast stable land tenure systems for the duration of their working life and into retirement. This is probably not possible to do because, like anyone else, land owners operate in situations of incomplete and distorted information. Cain concludes that any observed negative relationship between land and fertility must derive from some as yet unspecified variable whose influence is captured partially by the land ownership variable.

Schutzer et al (1983) and Stokes et al (1986) admit that the association between land and fertility operates indirectly through other factors. Schooling is one such factor which might also be responsible for the observed negative association between fertility and land (Rosenzweig and Evenson 1977). The ignored institutional security in old age with equity returns from the land.

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Schutzer et al (1983) and Stokes et al (1986) admit that the association between land and fertility operates indirectly through other factors. Schooling is one such factor which might also be responsible for the observed negative association between fertility and land (Rosenzweig and Evenson 1977). The ignored institutional settings might act further to confuse the land - fertility relationship. Both Cain (1985, 1986) and the United Nations (1981) argue that the institutional settings are important for understanding the demographic - socio-economic relationship. For example, Schutzer et al choose to ignore the role of polygamy within rural Egypt. This might be due to the fact that it is not easy to regress or that they do not view it as significant. Yet, it must determine the size of the land worked in relation to the land owned and if parents want to pass on land as an inheritance to their children, the total amount of land owned might depend on whether they are polygamous or not.

The lower cost of children in rural areas has also created some controversy. Schutzer et al (1983) and Rosenzweig and Evenson (1977) argue that policies that are designed to give more land to the peasants as well as increase ownership might prove detrimental to the goal of lowering fertility and increasing school enrolments. This follows from the land - labour demand hypothesis as well as the established fact that schooling lowers fertility by increasing the cost of children. Because the peasant household would like to maximise the income it realises from the land, it would demand more children and that those children work more regularly on the farm from an early age. Cain (1986) believes these to be erroneous conclusions. Children on the farm are not always engaged in farming per se. They undertake other work. For example, the sale of certain products at the market might be more compatible with schooling. Further, the trend towards universal education will exert pressure on parents to send they children to school. This means that parents are not acting in a totally independent way. They are constrained by the institutional settings within which they operate. The low cost argument would seem to support the view that the status quo is better than any change which might bring in the improvement of the life styles of rural populations and in this sense seems to be a reactionary view of land reform and developments.

Merrick (1978) reached another interesting conclusion with regards to fertility and the length of settlement in an area. He argues that areas of longer settlement exhibit lower fertility than those of latter settlement or what he terms frontier regions. The differentiation is a result of land scarcity and higher population densities in the regions of longer settlement when compared to frontier ones. McInnis(1977) working on 19th century fertility differentials in Canada notes a similar relationship. He also argues for the land - labour demand relationship. Thus land availability is positively related to fertility. As Schutzer et al (1983) and Rosenzweig and Evenson (1977) have claimed, this finding has an important policy element for land reform programmes though their recommendations for the status quo are not acceptable.

Two further factors deserve a brief mention. The first has to do with the timing of demographic and economic events. For example, which takes place first, marriage or land acquisition? The answer to this question determines the direction of the relationship. If land is acquired first, then children might be produced to meet the needs for labour by the household. If marriage comes first, then the land acquired might be tailored to meet the desired family size. Thus Stokes et al (1986) and Cain (1986) argument for a two way relationship between land and fertility might be valid in some respects.

The second point is related to the question of inheritance already alluded to above. The way the land is inherited determines fertility in both a direct and indirect way. For example, if each male offspring is assured of inheriting some land then the family size might be tailored to meet the perceived land to be inherited. If only one son inherits the land then the others must be forced to migrate either into frontier regions or urban areas thus influencing the fertility of these regions. Van de Walle (1979) notes an interesting case of inheritance, migration and fertility in Ticino. Because all male offspring were assured of land in Ticino, land fragmentation occurred. The result was migration by the male population to work in other regions. The effect this had on fertility was to lower it as the females delayed their age at first union due to a scarcity of male partners. The indirect effects of an inheritance system can be seen operating to reduce the fertility of a region.

The arguments outlined above would seem to imply a non-linear relationship between land (however measured) and fertility. High ratios of land owned are associated with lower family sizes. It is probably in the medium sizes of land owned that the largest family sizes occur, i.e. they find the compromise between security and equity more profitable. Those with very little land will also have fewer children as they cannot support them adequately. The fact that the children of the landless might be more than those of the landowners might be a reflection of the land-security hypothesis in operation.

*2.3.1.3 Fertility, education and contraceptive use*

Education and contraceptive use have a negative influence on fertility. It is useful to discuss them together as they are related to each other. Education influences the use of contraceptives. For example, the Zimbabwe National Reproductive Survey carried out in 1984 found that educated women had more knowledge about contraceptives and also had a higher usage rate when compared to their less educated counterparts (ZNFPC 1985). Two components are identified as operating on the education and contraceptive variables. The first is the general literacy of the population and the second and perhaps more important is the educational attainment of women. The latter shall be discussed first.

Rosenzweig and Evenson (1977) argue for the greater effect of female educational attainment on fertility than that of males in rural India. The effect is achieved through delayed marriage while the women complete school as well as through the use of family planning techniques which are more effective than that of their counterparts. Education changes attitudes torward desired family sizes and lead women to demand higher quality children. In Becker's terms, women with education have high aspirations for their children and will therefore substitute child quality for child quantity in an effort to fulfill those aspirations for their children.

Hicks (1974) argues that the education of women opens up employment opportunities for them. This has the effect of increasing the opportunity cost of the women's time in the home. The cost of time spent on such a labour intensive activity as child rearing is raised at a time when the woman's productive capability outside the home is being increased. Added to this is the increased awareness of new consumption goods vis a vis children. The effective assimilation and use of family planning measures means that the woman can fulfil her birth expectations. The net effect of the woman's educational attainment is to reduce the number of children desired and hence the overall fertility levels of the region or nation.

Merrick sees the role of literacy in terms of its influence on health and sanitation of the population. With increased literacy comes better health delivery systems which ensure the survival of infants. As child survival increases, fertility is noted to decline, an effect captured in the demographic transition theory and model. Thus literacy strengthens the negative effect of child survival on fertility.

Education or literacy reduces the demand for children by reducing their role as productive agents contributing to family income and at the same time increasing the cost of their upbring. They therefore become an expensive consumption good which can now be consumed as a matter of choice (Rosenzweig and Evenson 1977; Cochrane 1975). Cochrane notes that the prevalence of contraceptive devices makes it possible to separate sexual activity from the decision to have a child. The result is to give couples greater freedom in choosing to consume children or not. This works to strengthen the negative impact of education on fertility.

*2.3.1.4 Fertility and infant mortality*

As referred to above, child survival is negatively correlated with fertility. Merrick (1978) found that increased child survival reduces the number of births required to fulfil the desired family size. In low infant survival regimes, a certain number of excess births is required to fulfil desired birth expectations. The number of excess birth necessary under a given low infant survival regime has not been determined. However, the existence of the excess births is seen in the initial rise in fertility rates as child survival chances increase. As soon as households realise that it is no longer necessary to produce the excess births to meet their desired family targets, the fertility rates begin to decline as well.

Merrick uses child survival as his variable in rural Brazil. Other reseachers use the variable infant mortality. It is the opposite of Merrick's child survival and is therefore positively correlated with fertility. In high infant mortality regimes, fertility will be high as well. Again, the demographic transition theory captures this relationship quite well (Hicks 1974; Seiver 1975; Hazledine and Moreland 1977).

Hicks argues for a less straightforward relationship between infant mortality and fertility. He believes that the effects might be in either direction. For example, by reducing periods of lactation and postpartum amenorrhea, which would delay conception, infant mortality can have a positive effect on fertility. On the other hand, the trauma of losing a child might cause couples to delay the next birth thus acting to reduce fertility. He notes that in France fertility seems to have declined ahead of mortality which seem to support his contention for a two way effect of infant mortality on fertility. The relationship is influenced directly and indirectly by socio-economic changes that improve the infant's survival chances, as pointed out below.

Infant mortality is a useful proxy for health and sanitation development and improvement. It effectively reflects the progress made in this field and hence its inclusion as both a demographic and a social factor of development. For example Hazledine and Moreland (1977) found for Asian countries a positive relationship between infant mortality and fertility. The magnitude of the relationship was also related to the availability and access to health services of the countries concerned. Their conclusion is that policies which act to spread better health and sanitation conditions for the largest section of the population will have a greater chance of influencing fertility especially when combined with developments in other social and economic spheres.

*2.3.1.5 Fertility, urbanisation and labour force status*

Urbanisation and labour force status have a significant influence on fertility. Labour force status can be discussed under its three major components which are also related to urbanisation. These are: percent of labour force in agriculture, female labour force participation and rural nonfarm activities. These will be discussed in turn.

2.3.1.5.1 Percent of labour force in agriculture and urbanisation

The percent of the labour force in agriculture has a positive effect on fertility. This stems from the land - labour hypothesis of Schutzer et al (1983). As the labour force composition shifts in favour of employment outside agriculture so fertility declines. One of the implicit assumptions of demographic transition theory is that industrialisation and urbanisation will induce changes in the fertility structure of the population. Seiver (1975) examines the economic development of Mexico from 1950 to 1970. He noted that economic development including declining shares of the labour force in agriculture have taken place without the accompanying falls in fertility as postulated by the demographic transition model. He concludes quite erroneously that the demographic transition is not taking place within Mexico. It is an erroneous conclusion because the transition starts when mortality begins to fall and fertility either rises or remains constant for a time. In actual fact, Seiver's findings support the fact that declining shares of the population in the labour force engaged in agriculture induce falls in fertility as he notes for the province of Mexico City. All that has been happening is that national data has masked falls in fertility in more urbanised regions where the percent of the population in agriculture has declined below that in rural areas.

Phillips <u>et al</u> (1969) and Schutzer <u>et al</u> (1983) find a positive relationship between fertility and percent of the labour force in agriculture. This caused the latter to worry about the effects, on fertility, of land reforms that give people more land as discussed above. Hicks (1974) also found for Mexico a positive relationship between percent of labour force in agriculture and fertility. It can therefore be concluded that urbanisation will affect fertility in a negative way while the percent of the labour force in agriculture acts in the reverse direction.

Urbanisation is a difficult concept to deal with. Its effects are more pervasive than the area identified as urban. Urban values are transmitted into rural communities through the mass media and the return migrants. These indirect effects or influences of urbanisation might mean that the decline in fertility might be greater than the percent of the population living in urban centres suggests. Maybe a measure of rural families with a radio or who receive a newspaper weekly might help in establishing the indirect effects of urbanisation on fertility.

2.3.1.5.2 Female labour force participation.

Female labour force participation is strongly related to educational attainment and income and has a strong and negative influence on fertility. Becker's (1960) economic theory of fertility is used to explain why female labour force participation should have such a negative impact on fertility i.e. through the use of relative prices and opportunity cost . Cochrane (1975) notes the higher opportunity cost involved in rearing children where the wife is working and children are taken as consumption goods. Phillips et al (1969) note that the direct and indirect cost of raising children are higher for urban than for rural families because of the loss of wife's income these entail. Sandell (1977) proposes an economic model of migration decision processes which focuses on the contribution of the female to family income. She also notes that as the level of female participation in the labour force increases, there is an accompanying increase in the rise of single parent families. This further depresses fertility.

Van de Walle (1979) finds a negative relationship for female participation in the labour force in the rural area of Ticino. Because of the high rates of male outmigration, wives were forced to manage and work the farm. This resulted in lower fertility for them when compared with others who worked less on the farm. Redwood (1983) finds a similar relationship for farming communities in the USA. Thus, female labour force participation has a negative impact on fertility in both urban and rural settings though these are higher under the former than the latter.

2.3.1.5.3 Rural nonfarm activities

The relationship between rural nonfarm activities and fertility is an ambiguous one at the best of times. It has not been well investigated despite the fact that it is a significant sector in developing countries. Phillips et al (1969) argue for intermediate price and opportunity costs for children in rural nonfarm households. The desired family size will also be intermediate. However, this argument is not fully developed and they dwell more on the normal urban and rural division.

Brown and Schneider-Sliwa (1986) argue that rural nonfarm activities are labour intensive. They also think that they have a significant effect on fertility but do not examine the direction of the effect. From their claim of the labour intensive nature of rural nonfarm activities they would seem to have a positive effect on fertility though probably still lower than that of the farm communities.

In summary then, fertility is related to various socioeconomic factors in many ways. Some of the interactions are positive, others are negative and yet others are two way. The relationships are not always straightforward. They are complex, multi-causal, interrelated and subject to time lags.

2.3.2 Mortality and socio-economic development

In Section 2.3.1, mention has been made of the effects of socio-economic development on infant and child mortality. The section gives a brief review of literature on the relationship bearing in mind what has been discussed in the previous section applies equally well to mortality. The only differences that might arise are related to the direction that the relationship assumes.

The discussion focuses on the effect of socio-economic development on infant and child mortality. The adopted focus is justified on the assumption that it is the improvements in the health status of children that are most noticeable. Normally, infant and child mortality account for the highest number of deaths in a population. For example, Ominde (1983) and Sulaiman (1984) found that within Africa, between 34 to 54 per cent of male deaths occur to children under five. The figures are even higher for females varying from 40 to 62 per cent. Ominde provides the following data with regards to four African countries. The deaths to male children under the age of five in the Central African Republic accounted for 48.6% of all deaths. In Ghana it was 34.4%, Liberia 53.5% and in Tunisia 40.2%. These figures can be compared to about 7% among white South African male children under the age of five. The corresponding figures for females in these countries are 49.6% (Central African Republic), 39.6% (Ghana), 62.2% (Liberia) and 44.9% (Tunisia) compared to only 6.5% for white South African female children (Ominde 1983:35). Mzite (1981) notes that in certain countries harsh environmental and socio-economic conditions lead to an excess of deaths to children between the ages of 1-4 years i.e. child mortality is higher than infant mortality. This is in direct contrast to the situation found in industrialised countries were deaths in the first year of life form a large proportion of the deaths under the age of five. These stark facts with regards to Africa make it imperative to explore the link between infant-child mortality and socio-economic development.

Three major areas have been the focus of research on the relationship between mortality and socio-economic development. These are; parental education with emphasis on the maternal education, parental occupation and area of residence within the country or in cross-national studies, within a continent (Sulaiman 1984; Mzite 1981; Okoto and Tabutin 1988; Vallin 1988; Sweemer 1984; Goldberg et al 1984; Hobcraft et al 1984; Ominde 1983; Economic Commission for Africa 1979; Ekanem 1979). These three major factors act directly and through other proximate factors to help lower or raise the mortality of a population.

*2.3.2.1 Parental education infant and child mortality*

Parental education, especially that of the mother, has a very strong influence on infant and child mortality. Sulaiman (1984), Vallin (1988) and Okoto and Tabutin (1988) identified maternal education as being very important in determining the levels of child mortality. The reasons for this was found in the greater knowledge and access to health that educated women had. He discovered that education changed mother's beliefs towards health related matters. The ZNFPC (1985) and UNICEF (1985) found that the major cause of death among infants in Zimbabwe were diarrhoeal diseases together with diseases linked to malnutrition. Vallin (1988) recognises the link between infant/child mortality and incidences of malnutrition which make a child more suspectible to infections. These diseases are linked to the environment in which the child grows as well as parental attitudes towards the treatment of the diseases. The UNICEF report pointed out that dehydration was the ultimate cause of death in diarrhoeal cases. However, mothers within Zimbabwe, especially those in rural areas and those who are less educated tended to withhold fluids from their infants during diarrhoeal attacks. At the same time, a simple solution of sugar and salt was found to be an effective means of preventing death from dehydration during diarrhoeal attacks. However, only 15% of the rural women in Zimbabwe were able to prepare such a solution correctly. It is in such situations that one realises the importance of education in preventing needless deaths. As Ekanem (1979) and ZNFPC (1985) pointed out, the death of infants tend to maintain fertility at a high level because of the need for a replacement birth. Elimination of the need for replacement births through educating women will therefore lead to a transition to lower fertility.

However, Ndhlovu (1987) and Caldwell (1979) point out that for education to be effective it must be of the mass education type and aimed at both sexes. Zanamwe (1988) and Zvobgo (1986) have demonstrated that education prior to 1980 was biased against women, especially at the secondary and tertiary levels. Sex ratios of male to female students in secondary schools varied between 112 for Harare to an incredible 488 for the Midlands province in 1982. These figures reflect that school enrolment was in favour of males. Anker (1978) also argues for a broad based educational and health system in order to have a favourable impact on fertility and mortality within a country. The noted higher death rate of female children over males within African countries is partly a reflection of the favoured status of the male child within the African household. With mass education, such discrimination tends to disappear. Further, because education leads to higher incomes within the household, the dietary needs of all children are taken care off, leading to lower mortality (Ominde 1983; Sulaiman 1984).

*2.3.2.2 Parental income and infant/child mortality*

Parental education and income actually act together to bring about a significant lowering in infant-child mortality (Caldwell 1979; Ominde 1983; Goldberg et al 1984; Hobcraft et al 1984; Caldwell and McDonald 1981; Sulaiman 1984). This is because where both spouses are educated, their economic circumstances tend to be more favourable than when only one of them has an education. These favourable economic circumstances lead to an improved quality of life which improves the survival chances of their children.

Goldberg et al (1984) found that the employment status of the mother played a significant role in determining the survival chances of the child. Females in employment can afford to meet the cost of a balanced diet for their infants and young children. Further they have greater knowledge of and access to child and maternal health services. This improves the health of both the mother and the children leading to the lowering of child mortality. Sulaiman (1984) has argued like Goldberg et al, for the greater impact of female employment. The reason being advanced is that female employment improves the social standing of the woman within the family as it changes her traditional role from being housewife and mother of children to being a co-breadwinner for the family. The higher status that the female enjoys in the household coupled with the fact that she has to be in employment for long periods of time if she is to supplement family income leads to more spacing between children which increases their survival chances.

A recognised negative factor of both education and female participation in the labour force is the reduction in the length of breastfeeding which leaves infants more suspectible to the scourges of disease in early life. Goldberg et al 1984, Ndhlovu 1987, ZNFPC 1985, and UNICEF 1985 found that the risk of death was very high among children who were not breastfed or were breastfeeding was undertaken for a short period of time. In fact, children who were not breastfed at all, were 1.8 times more likely to die than those who were breastfed for one year. However, it was found that among educated and working women, the mean length of breast feeding varied from 6 months in Latin American countries to about 15 months in Africa compared to almost one and a half years among women with little or no education and those not working. Thus, both education and female employment can increase the risk of children dying in the early years of life but the risk is offset by higher access to health facilities that educated and working parents have.

*2.3.2.3 Infant-child mortality and area of residence*

Allusion has been made to rural-urban differentials in fertility and child mortality. These variations are a response to the distribution of social facilities; such as health, education and information services. Sulaiman (1984) and Ominde (1983) argue that area of residence plays a crucial role in determining changes in attitudes and cultural values towards the family. Urbanisation within Africa implied a distancing of the migrant from the cultural and social ties of the extended family and clan systems. New attitudes and values were acquired which oriented towards a nuclear rather than an extended family. The urban environment provided a better quality of life in terms of water, housing and sanitation systems. Due to this, the urban areas became areas of low infant and child mortality. Conversely, they can be viewed as areas that provided greater chances of survival to an infant than their rural counterparts. (Sulaiman 1984; Goldberg et al 1984; Caldwell 1979; ZNFPC 1985; UNICEF 1985).

The research findings discussed above are not suprising when it is realised that the quality of life within rural areas is lower than that of urban areas. For example, the traditional type of housing common in Africa has been found to be very favourable to the feeding habits of the mosquito that carries malaria due to its poor ventilation and lighting. The PSSU (1984) found that between 17% and 36% of households in Zimbabwe's rural areas still used this type of housing. Water facilities were polluted and far from being wholesome. The PSSU found that in Mashonaland West Province 69% of households fetched water from unprotected sources such as wells, springs, rivers, streams and dams, while only 23% had access to wholesome water; piped water or water from protected wells or boreholes. At the same time 68% of households had no toilet facilities at all, whilst 31% had access to pit-latrines. Sulaiman (1984) reports similar findings within Nigeria while Ominde (1983) recognises rural areas within West Africa, especially in the Sahel region as being the least developed. Thus, the prevalence of diarrhoeal diseases, diseases of the respiratory system and those related to malnutrition, the major causes of death among African infants, come as no suprise. The overall effect is to maintain mortality within rural localities at a high level.

### 2.3.3 Migration and socio-economic development

Migration is related to social and economic development. The direction and strength of the interaction depend on various factors. In this section, these are examined. The first subsection looks briefly at some migration theories and types. The next subsections then examine migration in relation to the factors of development with which it interacts as well as influences.

#### *2.3.3.1 Migration theory and types*

In demographic-economic models migration is viewed as a response to differing economic conditions (Todaro 1969). Since differing economic conditions evolve over a period of time, migration patterns and types will reflect in a large measure that evolution. This led Adepoju (1980), Mitchell (1969) and Kasanga and Avis (1986) to recognise migration types related to the period of economic development within sub-Saharan Africa. For example, Adepoju notes that target or very short term migration was common during the colonial era. Kasanga and Avis take other researchers to task for still using target migration in their hypothesis as they feel that this has changed over the years with the changes in social, economic and political conditions. Target migration is responsible for the circular nature of migration in Africa and other developing countries though this is increasingly being replaced by other forms of more permanent migration (Mitchell 1969). Other types of migration include resettlement, the contract labour system as in Southern Africa and long term permanent migration that shifts the balance of population slowly towards urban areas. Lastly, there is for developing and some developed countries return migration at retirement or when a job is lost (Adepoju 1980).

Mabogunje (1972) presents a different view of population movements in the context of sub-Saharan Africa. Studying movements primarily in West Africa, but his arguments are applicable in most parts of Africa, he decides to term population movements, mobility, instead of migration. He justifies it on the grounds that migration , as normally used is a narrow and restrictive term, one that does not encompass fully the complex nature of regional population movements in Africa. This is because the normal use of the term migration implies a permanent change of residence and probably, though not always, long distances. Mobility as used by Mabogunje (1972:15) simply refers or implies "the ability to move" or "the capacity to change place". This takes care of some of the arguments raised in the previous paragraphs.

Mabogunje's typology of mobility is broadly divided into two groups. The first group involves non-economic movements such as religious pilgrimages or refugees fleeing some form of political persecution. In terms of Africa, these (political movements) arise from ethnic conflict and friction. The second group is economic and encompasses such diverse movements as pastoralism, which are attuned to the changes in weather and do not involve permanent changes of residence, through to more sophisticated inter-city movements in search for better employment opportunities. The latter are a response to differential wage as well as job opportunities whilst the former were a response to seasonal weather variations.

Mabogunje's typology includes the types of migration discussed in the paragraphs above. Its advantage over the others is its explicit recognition of the complex nature of African regional movements which are dependent on a host of interrelated factors, social, economic, political, cultural and even physical/environmental. In providing such a typology, Mabogunje enables researchers to escape the narrow confines of the traditional definitions of population movements contained in the term migration. However, the rest of the paper chapter deals with migration in its conventional sense as it is in this way that it is being used in the literature under review.

The other theory of migration found in spatial demography is that migration is life course related and therefore it is age and sex selective. Within development and population models it is found to be education selective as well. Thus, Kasanga and Avis (1986) note that for Ghana the educated in the 19 to 29 years age range have a high propensity to migrate compared to their counterparts in the same age range but without education. The next subsection examines the role of education and employment on migration.

*2.3.3.2 Migration, education and employment*

The urban bias of employment opportunities in most developing nations have made migration to be positively related to education and employment opportunity. Kasanga and Avis (1986) note a concentration of post secondary educational institutions and job opportunities in the few urban centres of Ghana. They argue that migration cannot be stemmed until this urban bias is changed. Riddell (1984) and Mudhani and Riddell (1982) note a similar situation with regards to Zimbabwe. Adepoju (1980) notes the reinforcing influence of post independence development policies that promoted industrialisation and urbanisation at the expense of rural development. These led to increased rural to urban migration by the young and educated which did not help the development of the rural areas.

Todaro (1969) developed a theory of migration decisions based on conditions at the destination regions. Before then most migration theory examined origin conditions in migration decisions though they acknowledged the importance of destination conditions too. Isserman (1985) sees the reason for concentrating on origins as conditioned by the difficulties of defining a destination population at risk, especially in multi-regional analysis of migration. Todaro's theory makes the decision to migrate depend upon the migrant's information about employment opportunities at the destination plus the economic conditions at the origin less the cost of migrating. The probability of acquiring employment at the destination is also included in his theory unlike in other analysis where all migrants seeking employment are assumed to be absorbed into gainful employment. As a result, Todaro recognises the importance of the informal sector in holding migrants and providing them with some income until they attain more gainful and probably higher paying employment in the formal sector. Education is excluded from Todaro's model but it can be included as a means of differentiating between the probabilities of gaining employment by labour force status. Thus, educated people might spend less time trying to find gainful employment than those with less education.

The major issue is how to measure the probability of gaining employment. Todaro suggests the use of official unemployment figures and the number of new jobs being created as reflected in advertisements in newspapers. These are often not very reliable. The unreliability arises from the fact that not every vacancy is advertised nor is every unemployed member registered with officials. In fact, in most developing countries, there is no official register of the unemployed. Often the size of the unemployed is estimated from statistics on the size of the school leavers and the amount of known jobs available and to be created in official plans. Furthermore, official definitions of unemployed are tailored to suit the needs of the politicians in power, as has been witnessed in the United Kingdom between 1979 and 1987. In most cases, these figures, tampered with by statisticians under political pressure, are likely to reflect lower unemployment figures than the reality.

The other problem inherent in the unemployment measure is that of the inactive members of the labour force who might otherwise become active if economic conditions improve (Isserman 1985; Plane and Rogerson 1985; Todaro 1969). Todaro demonstrates this factor through an experiment that took place in Kenya in the early sixties. The government asked employers to take on extra labour. In return, the government would not legislate for salary increases. The end result was greater migration into Nairobi and Mombasa which soon pushed the unemployment rate to levels higher than before the experiment. This also confirmed the fact that labour responds positively to the existence of job opportunities.

Whatever measure is used, migration remains high and positively related to economic conditions and education. Adepoju (1980) suggests a framework that includes conditions at the origin such as the lack of employment opportunities in the analysis of migration. Kasanga and Avis (1986) argue for development that will ensure a steady monthly income for the young if they are to stay within rural areas. Sandell (1977) also notes the role of female educational attainment and the probability of securing employment in household decisions to migrate. This factor should be included in the discounted present value and the discounted expected value of earning where the decision to migrate is being carried out by working spouses.

*2.3.3.3 Migration and land*

Merrick (1978) discussed the effect of land scarcity on migration within rural communities. The regions of longer settlement exhibit lower fertility partly through the migration of young people into settlement frontiers. This effect is more pronounced where legislation prevents the inheritance of land by more than one son.

Hicks (1974) and Seiver (1975) found that for Mexico, land reform which prevented the further fragmentation of land holdings meant that the excess population migrated into official resettlement areas or into urban areas. Van de Walle has already been cited with regards to Ticino and the effect of inheritance laws that led to the fragmentation of land resulting in high rates of outmigration by males. The second fact about this migration is that it had a strong return component due to the land ownership the inheritance process entailed.

Adepoju (1980) argues for an analysis of migration that includes such variables as land scarcity measured by population density, percent of land overfarmed, soil erosion and other environmental factors. Kasanga and Avis (1986) highlight the fact that it is not employment per se that matters but the lack of a steady monthly income from the land. Land is always available for those who wish to work it but its size and productivity is such that it denies them a reliable income and hence the need to migrate. Bush and Cliffe (1984) argue that peasants with little land act to maximise their income by migrating for a time to work in urban areas within Zimbabwe. All this confirms the fact that migration and land scarcity are positively correlated.

Nonfarm activities are found to have a minor negative influence on migration. This is due to their labour intensive nature. Their need for labour means that they can offer altenative sources of livelihood to the rural population (Brown and Schneider-Sliwa 1986; Preston and Preston 1983). Brown and Schneider-Sliwa even argue that the growth of nonfarm activities might be able to attract frustrated jobseekers from urban areas into rural ones. Preston and Preston (1983) caution that nonfarm activities might be detrimental to rural development in general by reinforcing the idea that non-farm work is the only gainful form of employment. This might divert attention from the possibility of implementing agricultural reform and innovations within the community which might realise higher income for more people.

Briefly, migration has significant impacts on both the origin and destination areas in terms of social and economic development. Isserman points out that migration is considered as an investment in the regions with the highest potential for development by bringing to them the best in youth and brains. He ignores the reinforcing nature of the development process and the fact that the regions losing their populations are affected adversely by migration.

From the survey of the world at large, let's now turn to the examination of one specific country, Zimbabwe, as the literature review is to enable us to study the variables discussed above in this country. We shall review the main literature on Zimbabwe to see what its main concerns and issues are.

## 2.4 ZIMBABWEAN LITERATURE: MAJOR THEMES OF RESEARCH

Chapter One saw the major thread common to all research work in Zimbabwe as related to land and to highlighting the dualistic aspects of national development. Interest ranges from examining aspects of land alienation like the Native Land Husbandry Act of 1951 (Duggan 1980) to trying to map out a development strategy for population and development (Kay 1976, 1980) to examining particular aspects of rural development like resettlement and land reforms (Zinyama 1982, 1986; Simon 1985, 1986; Bush and Cliffe 1984), to reviewing progress in socio-economic and political development since independence (Riddell 1984; Gordon 1984; Stoneman and Davies 1982).

In all these widely ranging approaches there are common facets. The first is that though most claim to examine regional development, the spatial scales remain relatively aggregated. The studies are examining development and population distribution within the broad categories of rural-urban divisions. In fact, most look at the communal lands versus urban areas. Communal lands, commercial farming lands and the urban areas are treated as though they contained homogeneous populations i.e. in terms of their socio-economic characteristics, and as though the rates of development were the same. Simon(1986) tries to examine regional inequalties, but his study is limited to the mere use or comparison of gross population totals for the provinces. Thus he shows that Matabeleland South has the smallest population and no significant urban centre while Mashonaland East, which contains the two major centres of Harare and Chitungwiza, has the largest population and the fastest growth rate. These figures are not used to analyse likely migration patterns though the article deals with migration. Nor is there an attempt to examine the fertility patterns implied though one of the major theme in all the Zimbabwe literature is that of the need to reduce the rate of population growth. At least Simon tries to take the province as the basis of analysis. Other research workers use the communal-urban division and show little interest in variations from the national patterns they describe.

The likely explanation for the use of gross statistics is that the data have been rather sketchy thus far. Further, few of the researchers have any experience or interest in data estimation methods. The other explanation is that most of the data used in these studies derive from other work. Thus, Bush and Cliffe (1984) get some of their data from studies by Kay. Simon (1986) derives some of his own data from Kay as well as the work of Bush and Cliffe, for use in his critique though the bulk of it comes from official data sources. The studies become limited by the data collected in the studies cited. It is supplemented in some cases by data acquired from independent or official sources but there is no attempt to escape the confinement of the sources. In fact one could argue that there is a complacent acceptance of both the data and the research framework so far commonly used i.e. the rural versus urban framework and this acceptance has not led to few attempts at further spatial disaggregation even by such meso units as the province. Of course, some national statistics have, prior to 1983, been collected on a different basis than provinces. For example, educational statistics were collected using five educational regions instead of eight. This meant that the provinces of Mashonaland East, West, and Central, and Matabeleland North and South were simply collapsed into Mashonaland and Matabeleland, respectively (Fig. 1.2). This would make disaggregation difficult though not impossible. The present study tries to escape the confinement imposed by examining data at the aggregate scale. However, it does recognise the difficulties involved in doing this since most of the data prior to the 1982 Census are at an aggregate scale. Thus, the study seeks to study each component of population change and socio-economic development to the most disaggregate unit that the data allows. In certain cases, estimation techniques are used to derive the data at the most disaggregate scale from that provided at the aggregate one.

The links between population and development are also crudely examined in the literature. There is one assumption which is held as a universal constant: that population growth hinders economic development. While this might be true, there is no attempt to study the determinants of population growth and then see, even crudely, how they have affected economic development. As Moyo (1986) points out, the remedy suggested, that of birth control, will not bring about any significant gains in the economic sphere until certain structural changes have been effected in both the economic and social arenas. Kay (1976, 1980) quotes such high crude birth rate figures such as 55 per thousand or 52 per thousand in an attempt to show the need for a national policy on population. His estimates are based on World Bank (CSO 1985a) statistics derived from projections of the 1969 Census. In fact most of Kay's estimates are biased in a manner that tends to support his strong views on what should be done to help the African population which he regards as incapable of pulling itself out of its poverty. Other researchers too do not examine the determinants of population growth and its links to the economic development of the country. For example, no attempt is made to give an explanation of how the continued overcrowding in the communal lands is affecting the fertility patterns of these areas. Even when it is acknowledged that there is a lot of outmigration from the rural or communal areas to urban areas, the effect of this outmigration are not fully explored. For example, if outmigration from communal areas is as high as it is claimed to be and involves the population in the 19 to 29 age ranges, then one would expect that this fact has a great deal of implications for the future development of fertility patterns in the country.

The accepted fact of a dual economic structure for the country is evident in most of the literature as well. Simon (1986) calls it the inherited problem of a well developed urban core and an underdeveloped periphery. The challenge facing planners in the country is to reduce or wipe out the inequalities created by this inherited structure of colonial development. Moyo (1986) argues for the need to end this structural inheritance more than the need for a well defined national population policy. He feels that national resources could be better spent in trying to bring about rural development that would reduce or eliminate the inherited inequalities. Of course, this suggested course of action by Moyo is not easy to implement and as he states, the planners favour the family planning option because it is easier to implement and has less political issues involved. The option of family planning is further favoured by policy makers because aid for developing nation, from developed countries, has become increasingly tied to having a national population policy.

Bush and Cliffe (1984), Simon (1985,1986), Riddell (1984), Kay (1980), Zinyama (1982,1986), Kinsey (1982) and Cheater (1982) have all examined the various routes that Zimbabwe can follow to achieve a more equitable distribution of resources within the country. Of these, resettlement has generated the greatest share of debate and discussion. Tied to resettlement has been the question of ending the migrant labour system. Resettlement is an attempt to redress the imbalance in both population distribution as well as economic development. Moving people from the overcrowded communal lands will achieve a more even distribution of the national population. It will also relieve population pressure on the communal lands and enable those who remain in them to have more land on which to cultivate. Those who move to the resettlement areas will have on average some five hectares of arable land to till. The hoped for result is that the communal farmers will be able to derive some income from the land and therefore to improve their standard of living. The target income for the resettlement farmers is about Z$450 per annum (Kinsey 1982). With the extension of credit facilities to the communal farmers and the stepping up of extension work, it is hoped that the income of the rural areas will be raised sufficiently to reduce the flow of migrants into the urban areas. However, certain gaps remain in this resettlement strategy. First of all, most resettlement schemes are targeted at families. Most of the population that is highly mobile is not married (i.e. 19-29 years of age). In which case resettlement alone will not reduce the migrant flows to urban areas. There is no clear cut policy as to what actually happens to the land left behind by the population moved for resettlement (Zinyama 1986). Researchers only assume that it is taken over by those who remain behind. Also the selection criterion for resettlement (e.g. that the family should be landless) seems to cast some doubt on the ability of such families attaining the production targets forecast for them (Bush & Cliffe 1984; Simon 1985,1986; Riddell 1984).

The second development strategy which has attracted some attention is that of "growth centres". Sibanda (1985) discusses some of the implications of this strategy. The main thinking behind the growth centre strategy is that of reducing the flow of migrants to urban centres by providing a number of nonfarm jobs within selected rural centres. There is a hierarchy of such centres as some of them are there to provide services while others have small industrial projects within them. For example, rural service centres provide collection points for the agricultural produce of the rural populace and might occasionally be serviced by a mobile bank and post office. This makes it easier for rural people in these areas to sell their produce without travelling long distances to the nearest urban centre. The various depots mantained by the agricultural boards provide some nonfarm employment for some of the members of the area. These jobs might not exceed 200 to 250 but they are a significant addition of cash flows into the rural economy. It is hoped that over time forward and backward linkages will develop between these centres and the surrounding areas and urban centres as well. The proper growth centre has some industrial project or firm in it. For example, it might have a cotton ginnery, if the hinterland grows cotton. It might also boast of a bakery, brewery and spinning or clothmaking enterprises. Again, the hope is that the growth centre will take-off and provide a number of permanent jobs for the rural population as well as a market for their produce like milk and vegetables (Hanratty & Heath 1984; Sibanda 1985).

In the discussion above, mention has been made of the migration question. The literature leaves one in no doubt that Zimbabwe is a highly mobile or migratory society. This migration is dominated by males, as a result of colonial development which introduced influx controls into urban areas. Cheater (1982) notes the fact that in one study area more than 50% of all household heads were absent. Mutizwa-Mangiza (1986) works out the differences in the urban and rural growth rates from the 1982 population census and ends up with an annual urban net inmigration rate of 2.3%. This would seem to imply that the urban population is at present growing at a faster rate than the rural population mainly because of inmigration from rural areas. The 1982 Population Census shows that in general there was a loss of population from most of the rural districts to urban areas (CSO 1985a). This implies that the population is still highly migratory. It is also still a migrant labour type of migration as the timing of the population censuses show. The 1962 and 1969 censuses were taken during the harvest season (April-May) and as a result tended to under-enumerate the urban African population as shown by post-enumeration surveys. The under-enumeration was more enhanced for women than males because most of the women are involved in the harvest operation. The 1982 census was taken in the post harvest season (August) and might have under-enumerated the size of the rural population especially because of a combination of drought in some parts of the country and insecurity in the two Matabeleland provinces (CSO 1984). But, all this said, the population still remains highly migratory especially in the young adult age ranges.

The implications of this migration are examined in some of the literature. The main problem envisaged is that of job creation. This is especially so in an era of contracting employment in the formal sector of the economy. One major effect of the provision of minimum wages has been to increase the rate of flow of migrants from rural to urban areas. At the same time, certain firms have cut back on the size of the labour force through capital intensive technology or have merely relocated across the border in Botswana where the absence of minimum labour regulations makes production costs low and profits very high. So far there has been no empirical work on some of the implications discussed above. They are arrived at by inference i.e. from reading literature or theories on migration and development. This explains why there have been no serious attempts to study the determinants of population and economic development as there is an assumption that they are similar to other developing nations and therefore the theories that hold good in them hold good for Zimbabwe as well.

An area that is presently emerging which is linked to migration and employment is the role of women. Kinsey (1982) and Simon (1985) try to review what the role of women should be in economic development. Kinsey notes that women are not explicititly considered in most development plans, except when they are widows. For people interested in some form of planned population growth, this is a strange or unfortunate omission. The 1982 census shows that the participation rate for women in the labour force varies between 16% excluding farming and 19% when it is included. The census report (CSO 1985a) forecasts that with greater access to education the participation rates for women will increase and this will have a direct bearing on the fertility patterns of the future as well as migration ones. The report also points out that women are likely to be laid off first during periods of economic recession as happened between 1982 and 1984 (CSO 1985a). The role of women is an area to explore especially with fertility and migration in mind.

To summarize, the major research framework for Zimbabwe has been provided by the colonial history of the country. This introduced dualistic aspects into the development process which has also determined population distribution and the responses of various governments to the challenges of development. Highlighted in the research are such matters as population policy, resettlement schemes, growth centre strategies, migration and migrant labour systems, the role of women and the implications all these issues have for Zimbabwe's development prospects. Lacking is a detailed analysis of the underlying determinants of the population and development patterns examined. Also, the future effects of present population and development policies are not fully explored. Lacking too are meaningful attempts to disaggregate even to the level of provinces. The lack of disaggregation universalises problems especially of rural development and there is danger that the planners will attempt to provide universal solutions as well. These might fail to address adequately all the problems that exist in the various rural areas.

## 2.5 CONCLUDING REMARKS

The canvas on which the scene of population change and socio-economic development was being painted was a large one. It has covered so much ground that at times the chapter does not seem to hang together. Let it be said that the main concern was to capture as much as possible the multi-faceted nature of this field. It is with this in mind that so much literature was surveyed. Its analysis and treatment might not have been at all times deep or adequate but it is to be hoped that pointers have been established for future exploration.

To summarise then, there has been a growing recognition of the interrelationship between population change and socio-economic development. More and more, researchers and planners alike have come to the conclusion that for the successful execution or implementation of development plans, it is necessary to understand the relationship between population change and socio-economic development. While this has emerged as a desirable goal, it has often been found that the measurement or even the definitions of the variables involved is often very difficult. What is more, the relationships themselves are often non-linear as well as being subjected to time lags. This has to be taken into consideration when one comes to deal with specific countries like Zimbabwe. So far, researchers in this area within Zimbabwe, have not begun to grapple with the issues explored in the wider world context. However, they have identified important development issues and areas whose understanding can further be enhanced by exploration of the links between them and population. These must go beyond the mere prescription of birth control or family planning but must examine the socio-economic sphere with a view to recommending further radical changes. They must also aim to understand the whole nature of the linkages involved as a multi-pronged approach to development is most likely to succeed than a piece-meal one. It is therefore, in understanding current and past patterns of demographic change and socio-economic development that we can hope to come up with solutions that are likely to improve the lives of the majority of the population.

# CHAPTER THREE

# ANALYSIS OF AGE AND SEX STRUCTURE

## 3.1 INTRODUCTION

The study of the age and sex composition of a population can reveal some interesting demographic and socio-economic characteristics of that population. The examination of the age and sex structure of the Zimbabwean population is aimed at fulfilling three objectives. It is aimed at providing a description of the population by age, sex and geographical regions. These geographical regions are made up of local authority areas (such as district, rural and urban councils) which comprise the provinces of the country. Using all or some of these geographical regions, the spatial distribution and age-sex population composition shall be investigated and mapped.

The thesis aims at analysizing the process of population change in the context of social and economic development. The age and sex structure of a population provides clues to this relationship. For example, Pressat (1972) views the size of any age group as representing three main demographic events (fertility, mortality and migration) while Valkovics (1978) argued that the age structure reflected some of the major economic events that the population has experienced in the past and present. Thus, demographic events are linked to the socio-economic development of the population. The age distribution can also be viewed as a comment on the fertility of a population group, both current and in the past. Mortality acts on the population to give its age-sex composition a particular shape and size. Mainly, the shape and size of the age-sex distribution is a response to differential mortality between the sexes as well as different cohorts (i.e. younger cohorts are likely to enjoy better survival chances because of developments in the health field). The effects of mortality are modified by the factor of migration. Migration is a measure of differential socio-economic opportunities that are available to a population. Regions that provide negative economic benefits are likely to be regions of outmigration while those that provide positive economic benefits become regions of inmigration. Thus, in regions of outmigration, mortality and migration are seen as acting in the same direction, i.e. they reduce the size of any age-group that is involved in the outmigration process. In the destination regions mortality and migration act in opposing direction. While mortality acts to reduce the size of successive age groups, migration actually increases them. Since the process of migration is age and sex selective, its modifying influence on the effects of mortality will vary in magnitude according to age and sex.

The age and sex structure of a population is an analytical tool through which one can explore as well as explain and understand major demographic processes. This objective is closely linked to the second but, differs from it in the sense that, whereas the latter is inferential, the former is explanatory and analytical. For example, the high fertility observed in the population can be attributed to the age structure where more than 50% of the population is below the age of 18 years. Further, the observed age and sex structure can be used in the exploration of likely future trends in the population, in terms of projecting and forecasting.

Before a detailed analysis of the age-sex composition of a population can be undertaken it is useful to examine the data upon which it is based. Yaukey (1985) and Spiegelman (1970) point out that errors occur in demographic data whether is is gathered from a census or from a vital registration system. The data is normally subject to errors of content and those of coverage. It is therefore necessary to evaluate the data to establish the kind of errors it contains as well as finding methods of correcting for these errors.

Section 3.2 examines the common kinds of errors associated with census data and suggests some methods of correcting for them. Section 3.3 investigates two methods, applied to the Zimbabwe data, to correct or adjust for errors. Using the adjusted data, Section 3.4 discusses the age-sex composition of the Zimbabwe population and highlights some of its interesting features. A summary and concluding comments are then given in briefly, in Section 3.5.

## 3.2 ERRORS IN REPORTED AGE DATA

The occurrence of errors in census data has been recognised for a long time. As far back as 1955, the United Nations published a manual that dealt with techniques or methods of adjusting for errors in age data. Errors occur in the reporting of sexes but, in most cases, these are so small as to be insignificant. They are mostly associated with the misreporting of the sex of very small children or those that have died. So the discussion will concentrate on errors that are associated with the reporting of age data. The terms "reported" and "observed" data will be used interchangeably as referring to data collected from the census before it has been adjusted for errors.

Spiegelman (1970) classfies errors that occur in age data into two groups. The first group of errors is that associated with census or even vital registration coverage. These Pressat (1972) terms errors of "underenumeration" though it is safe to point out that overenumeration can occur. The second category involves errors associated with the content of the collected data or what Pressat terms "misreporting".

### 3.2.1 Errors of coverage in age data

Errors of coverage occur when certain persons in the population under survey are not counted or are counted more than once. Most often omission is the more common problem and is discussed here. Three types of errors are associated with this category. These are:

a) underenumeration of young children, especially those below the age of one

b) net count at older age groups and

c) underenumeration at the early adult ages.

Each type is discussed briefly below.

#### *3.2.1.1 Underenumeration of young children*

Underenumeration of children occurs due to the fact that they are not visible to the enumerators. This is more so for infants below the age of one. Parents often omit to mention these children, probably due to some cultural taboos or because it is not in their interests to reveal that they have these children. More often it is just an omission in the excitement of the moment. Spiegelman (1970) found the error difficult to detect, the reason lying in the fact that, a smaller number of children in the 0-4 age group might be an indication of fertility decline. To detect this error from census data it is usual to resort to vital registration systems. Records of births for the five years before the census are examined and adjusted for known under-registration, infant and child mortality. The numbers of children arrived at by the vital registration estimate is then compared to that from the census information. In most cases it is discovered that the numbers from the vital registration system are higher than those from the census which gives a good indication of the extent of underenumeration from the census. Adjustment of the census data is carried out using the vital registration statistics (Yaukey

1985; Spiegelman 1970).

*3.2.1.2 Underenumeration at older ages*

One of the expected features of any age distribution is that the proportion of persons surviving into successive age groups decreases with age. This give the pyramid shape to the age sex distribution of most expanding populations and is a reflection of the increased exposured to the risk of dying as one grows older. Age data is expected to exhibit the successive decline in the number of persons at higher ages of the age schedule. To check for underenumeration in particular age groups, the UN (1955) and Spiegelman (1970) suggest the use of expected survival rate estimates. A complicated series of iterative methods have been developed to both estimate and compare the survival rates to the observed population distribution. In most cases the iterative process requires the utilisation of two censuses at least a decade apart (Yaukey 1985). While this is possible for most developed countries, it becomes a problem for developing countries where censuses have an irregular interval, if they exist at all. Thus most developing countries do not bother with adjusting for underenumeration at all ages. Note that the existing Zimbabwe censuses that give full coverage to the whole population are at least thirteen years apart (April 29th, 1969 & August 18th, 1982; CSO 1985a).

*3.2.1.3 Underenumeration at the early adult ages*

Evidence of underenumeration at early adult ages can be obtained from examining the ratio of males to females in successive five year age groups. The logic applied here is similar to that discussed in the subsection above, though it relates in this instance to the sex ratio of the population rather than the survival rates. For most populations, the sex ratio at birth is above 1 (around 1.05 to 1.07

for most world populations and between 1.01 to 1.03 for sub-Saharan African populations, UN 1983). The sex ratio then declines with higher age groups until it falls to about 1 or below at ages around fifty. It continues to decline with age until the whole cohort or age group has fallen victim to mortality. To detect underenumeration at young adult age groups, a comparison is made of the sex ratio from the reported population data to the expected. A fall in the sex ratio to below 1 in ages between 20 and 39 years with a corresponding rise in the ages between 40-54, as occurred in the United States census of 1930 would imply a marked underenumeration of males within the younger adult ages. The method works mainly on the basis that female data is more accurately reported than male data (Spiegelman 1970). In any case, if the degree or magnitude of error is equal for both sexes then the sex ratio will fail to deviate from the expected and the extent of underenumeration will not be revealed. This is a shortcome in the detection method which has not been overcome though its application does prove the assumption that female data is more reliable than that of males.

### 3.2.2 Errors of content in age data

Errors of content arise when respondents in the census survey give wrong information about their ages. Such errors might be deliberate or genuine depending on the respondent under interview. Three types of errors arise in this area. These are:

a) mistatement of age (around attainment of majority, around age sixty-five and overstatement towards the extremes of life);

b) a preference for ages ending with certain digits;

c) ages not known or unspecified (Spiegelman 1970).

*3.2.2.1 Misstatement of age*

Evidence for the misstatement of age can be derived from an examination of the singulate years of age distributions. Attention should be focussed mainly on those ages that are associated with certain social and economic events. Such socio-economic events are normally associated with benefits accruing to the individual attaining the favoured age (Spiegelman 1970; UN 1955; UN 1983; Yaukey 1985).

In young ages, the singulate years to watch for are those associated with the attainment of majority i.e. 18 or 21 in Western societies. Persons aged 16 or 17 will exaggerate their ages to 18 years because it is associated with a certain degree of relaxation from parental control and probably the gaining of greater economic and personal independence. In the case of Zimbabwe and other non-Western societies, the ages 18 or 21 might not assume any significance. This is mainly due to the cultural structures of such societies. For example, the extended family system which operates for the majority of the population in Zimbabwe does not relax its control on the individual when they attain a specified age. Parental control will only be relaxed when the individual marries or attains his or her own economic independence.

The ages that are probably of greater significance to the Zimbabwean population, are those associated with the schooling calendar. These are the age for entering the formal school sytem as well as those associated with entering into secondary education. Formal education in Zimbabwe begins at age 7. It might be expected that parents eager to send their children to school might report their ages as seven when they are only five or six. For those children who have gone over the formal limit for starting school, it is in the interests of the parents to report them as younger than their actual ages. Thus, eight, nine or even ten year olds are reported as being seven. An examination of the singulate years of age in this instance would tend to show ages seven and probably eight as being larger than expected. The CSO (1985a & 1985b) admits that the opening up of educational opportunities after independence (April 1980), might have led to a greater misstatement of age by males and to a lesser extent females in the age groups 5-9 and 10-14. The sex difference in the misstatement of age being a reflection of parental preference for sons.

The misstatement of age at sixty-five is associated with retirement. Persons age 63 or 64 years state their age as 65 so that they can claim the social security benefits associated with retirement. This is especially true for males than females whose retirement age tends to be at the earlier age of 60. Towards the extremes of life exaggeration occurs because old people want to be seen as being older than they real are. Since the extreme ages of life are normally cumulated into an open ended age group, there is no need to correct for this error (Spiegelman 1970).

From the discussion above it can be deduced that when cumulation takes place into broader age groups, the error of misstatement almost disappears. This is due to the fact that the error tends to concentrate on a single year of age which can normally be encompassed within the broad age group. The wider the band of the age group the more the error is likely to be reduced. It only persists where there is a transference of persons across age group boundaries as is the case with the misstatement at age sixty-five (Spiegelman 1970; UN 1983).

*3.2.2.2 Digit preference in age data*

Like misstatement of age for beneficial purposes, evidence for digit preference is also gleaned from singulate age distributions. Digit preference has long been recognised in reported census data (UN 1983; Yaukey 1985; Spiegelman 1970). The preferred digits are often those ending in zero or 5. The least preferred are those ending in one and odd numbers in general, with the exception of the key 21st birthday!

Examination of population by single years of age will reveal the extent of digit preference. The problem might not be so obvious where the age data has been cumulated into broad age groups. The larger the width of the age group created, the more the effects of age heaping due to digit preference are reduced. The standard broad age group has a width of five years. Due to preference for even ages as well as those ending in zero and five, a transference of population across age group boundaries occur. This calls for adjustments to be made to the age data so that the population transferred across age group boundaries can be returned to their appropriate age groups. The adjustment will reduce the effects of age heaping which the cumulation into broad age groups will have failed to eliminate (UN 1955; Spiegelman 1970; UN 1983). Section 3.3 will deal in detail with techniques for reducing the effects of age heaping.

*3.2.2.3 Age unknown or unstated*

The problem of age unknown or unstated has no easy solution. In certain cases enumerators are asked to make estimates of the respondent's age based on some of the information they have and their judgement of the person's age. This leads to such classifications as between forty and fifty which are not specific enough. Spiegelman (1970) reviewed several methods of dealing with the problem. The one most commonly used is that of prorating the category age unknown over adult age groups. This is in common use in the United States. The prorating criterion is based on the stipulation that it should be consistent with other data or known information. The UN (1983) simply ignores this category when adjusting age data for age heaping or gross defects.

In the case of Zimbabwe, the United Nations convention has been adopted. The age not stated has been ignored in the adjustment procedures. The total populations of the adjusted age groups excludes the age not stated category. The end result is that the adjusted population totals are lower than those for the reported data.

A brief theoretical description of errors associated with age data has been given. Mention has been made of methods that can be applied to detecting such errors and adjusting for them. Section 3.3 focusses on applying such methods to adjust the age-sex data for Zimbabwe for errors of content.

## 3.3 ADJUSTING AGE DATA FOR CONTENT ERRORS: ZIMBABWE 1982

An examination of the reported age data for Zimbabwe from the 1982 Census showed a certain degree of age heaping. Table 3.1 illustrates this point using national data. Data for single years reveals age heaping associated with digit preference. A certain degree of underenumeration of the population in the younger age groups is also revealed (e.g. by comparison of the sex ratios at age 0 and 1 in Table 3.1). The heaping seems to occur in the ages with even numbers as well as those ending in five. Fluctuations in the sex ratios of the single year ages suggest this, though they are also associated with different sizes of births.

Further evidence of underenumeration in the first two age groups is provided by aggregation into five year age groups shown in Table

Table 3.1: Sex ratio for selected single years of age, Zimbabwe 1982

| Age a | Male | Female | Sex Ratio |
|---|---|---|---|
| 0 | 11,307 | 13,696 | 82.5570 |
| 1 | 12,465 | 13,103 | 95.1309 |
| 2 | 13,553 | 13,866 | 97.7427 |
| 7 | 12,626 | 12,794 | 98.6869 |
| 8 | 12,484 | 12,548 | 99.4900 |
| 11 | 8,818 | 8,693 | 101.4379 |
| 12 | 12,114 | 11,691 | 103.6182 |
| 13 | 9,517 | 9,216 | 103.2661 |
| 14 | 10,166 | 9,913 | 102.5522 |
| 15 | 8,861 | 8,338 | 106.2725 |
| 16 | 8,857 | 8,756 | 101.1535 |
| 20 | 6,947 | 9,501 | 73.1186 |
| 21 | 5,033 | 6,208 | 81.0728 |
| 22 | 6,236 | 7,704 | 80.9450 |
| 23 | 5,290 | 6,393 | 82.7468 |
| 24 | 5,532 | 6,614 | 83.6408 |
| 25 | 6,041 | 6,607 | 91.4333 |
| 39 | 3,182 | 2,492 | 127.6886 |
| 40 | 4,966 | 5,104 | 97.2962 |
| 41 | 1,931 | 1,674 | 115.3524 |
| 42 | 3,319 | 3,157 | 105.1315 |
| 43 | 2,096 | 2,056 | 101.9455 |
| 45 | 3,176 | 2,940 | 108.0272 |
| 46 | 2,319 | 2,289 | 101.3106 |
| 47 | 1,914 | 1,695 | 112.9204 |
| 48 | 2,309 | 2,475 | 93.2929 |
| 49 | 1,931 | 1,640 | 117.7439 |
| 52 | 2,335 | 1,904 | 122.6366 |
| 53 | 1,438 | 1,124 | 127.9359 |
| 54 | 1,639 | 1,344 | 121.9494 |
| 55 | 1,812 | 1,580 | 114.6835 |
| 56 | 1,400 | 1,241 | 112.8122 |
| 57 | 1,083 | 884 | 122.5113 |
| 58 | 1,464 | 1,496 | 97.8610 |
| 60 | 3,050 | 2,772 | 110.0289 |
| 61 | 984 | 684 | 143.8596 |
| 62 | 1,395 | 1,152 | 121.0937 |
| 64 | 1,388 | 1,267 | 109.5501 |
| 65 | 1,243 | 1,257 | 98.8862 |
| 68 | 1,033 | 986 | 104.7667 |
| 69 | 553 | 559 | 98.9267 |
| 70 | 1,276 | 1,342 | 95.0820 |
| 71 | 416 | 329 | 126.4438 |
| 75 | 3,941 | 4,676 | 84.2814 |

Source: 1982 Census; Ten Percent Sample, Table 2A.

3.2. The sex ratios for these age groups which should normally be above 1 are seen to be below this figure. This is in direct contrast to the population in age group 10-14 which has a sex ratio of 102 males per 100 females. Underenumeration in the young adult age groups (15-39) is also shown by their sex ratios being below 100 when those of the older adult age groups (40-64) are above 100. Besides underenumeration, the rise and fall in the sex ratios also indicate some transference of population across age group boundaries. The

Table 3.2: Sex ratios by five year age groups, Zimbabwe 1982

| Age Group | Male | Female | Sex Ratio |
|---|---|---|---|
| 0-4 | 643,330 | 665,350 | 96.6905 |
| 5-9 | 612,760 | 619,300 | 98.9440 |
| 10-14 | 529,750 | 518,740 | 102.1225 |
| 15-19 | 390,160 | 412,610 | 94.5590 |
| 20-24 | 290,380 | 364,200 | 79.7309 |
| 25-29 | 243,420 | 281,060 | 86.6078 |
| 30-34 | 185,400 | 206,760 | 89.6692 |
| 35-39 | 147,920 | 170,170 | 86.9248 |
| 40-44 | 142,050 | 139,530 | 101.8061 |
| 45-49 | 116,490 | 110,390 | 105.5259 |
| 50-54 | 111,780 | 90,880 | 122.9974 |
| 55-59 | 67,400 | 60,800 | 110.8553 |
| 60-64 | 76,850 | 65,260 | 117.7597 |
| 65-69 | 38,810 | 38,860 | 99.8713 |
| 70-74 | 29,810 | 30,500 | 97.7377 |
| 75+ | 39,410 | 46,760 | 84.2814 |

Source: 1982 Census; Ten Percent Sample, Table 2A.

increase in the sex ratios from 40 years and over seems to stem from either an underenumeration of females in these ages or from heavier mortality among the female population. This might be an indication of heavier mortality for the females as they near the end of their child bearing cycle and enter into the post child bearing years. No concrete evidence exists to support either contention and further investigation will be required in this regard.

The evidence suggests a need to adjust the age distribution of the population before analysis commences. This is essential if the true broad demographic characteristic of the population are to be brought out. Spiegelman (1970), Woods (1979) and the UN (1983) suggest that the best technique for carrying out the adjustment to age data is one that fits a smooth curve to the reported age data that will be consistent with the expected age distribution. Several methods have been developed for carrying out such adjustments. Only two will be discussed. The first involves a comparison of the reported age distribution to a standard one. The second corrects the reported age distibution by fitting a series of second and third degree polynomials to the age data.

3.3.1 Adjustment: standard age distribution technique

The method is recommended for data that is grossly deficient (UN 1983) as to require drastic action. It was applied to the data on the Manicaland Province as a way of testing whether the data was so grossly deficient as to require drastic adjustment.

The method uses a standard age distribution, in this case, West Mortality Level 17 from the Coale and Demeny stable population tables to adjust for age misreporting. The choice of the standard age distribution is based on the criterion of a similar growth rate and mortality risk as that of the reported population. Selection of the standard age distribution used in the adjustment for the male population of Manicaland Province was based on comparing the unadjusted proportions to the standard age distributions. The standard age distribution closest to the observed was then chosen. This had a population growth rate of 3.5% per annum and a death rate of 10.93 persons per thousand population (Coale and Demeny 1966:154). The latter was closer to the national death rate for 1982 (10.8 per

1000).

The standard age distribution is compared to the observed age distribution, then adjusted to reflect the broad characteristics of the observed in the following manner. The populations, both observed and standard are converted into proportions in each five year age group, p(a). Both age distributions are cumulated to give proportions under each age group ending in zero and five, C(a). Note that the adjustment is applied to age data in five year age groups. It is not necessary to have the age data in single years of age. The method is therefore most useful in cases where the singulate age information is not available.

Both cumulated age distributions are then transformed to enable comparison between them. The y-transformation of both cumulated age distributions is achieved through equation 3.1 below:

$$Y(a) = \ln(1.0 + C(a))/(1.0-C(a)) \qquad (3.1)$$

where Y(a) is the y-transformation of both age distributions. For the purposes of the discussion an S will be added to any signs or notations that refer specifically to the standard age distribution. The y-transformations are then plotted on a graph as a means of comparing the way they relate to each other. Any point lying far from a fitted line or parabola linking the maximum number of points has to be discarded. The parabola is fitted mathematically, using the following equation:

$$Y'(a) = a(YS(a))^2 + bYS(a) \qquad (3.2)$$

where YS(a) = represents the y-transformation of the standard age distribution achieved in equation 3.1 above and
Y'(a) = the estimate of the y-transformation of the observed age distribution which is relatively free from the errors of age reporting.

The $a$ and $b$ parameters are defined or evaluated as follows:

$$a = ((1.0)/(YS_1-YS_2))((Y_1/YS_1)-(Y_2/YS_2) \qquad 3.3$$

and

$b = Y_2/YS_2 - aYS_2$ (3.4)

where $Y_1$, $YS_1$ and $Y_2$, $YS_2$ are means of the first and second group of points on the plotted graph which are used to fit the parabola.

In the case of Manicaland this would imply the first 8 points are used to calculate the means $Y_1$, $YS_1$ and the last 8 points to calculate the means $Y_2$, $YS_2$. These means are then substituted into equations 3.3 and 3.4 above and solved for alpha and beta. The alpha and beta parameter are then substituted into Equation 3.2 which when solved gives an estimate of the y-transformation of the observed population that is free from age reporting bias (Table 3.3). The estimated y-transformation are converted into cumulated age distribution by applying the inverse of equation 3.1:

$$C'(a) = (\exp(Y'(a))-1.0)/(\exp(Y'(a))+1.0) \qquad (3.5)$$

where $C'(a)$ = the adjusted cumulated proportion under age a of the observed population.

The proportions estimated ($p'(a)$) in each age group are then derived from subtracting the lower of the estimated cumulated proportions from the higher one. The full results of the adjustment for Manicaland Province, using the male population for illustration are presented in Table 3.3. The results were derived through the use of the BBC's statistical package, MICROTAB by Higginbotham (1985).

As already mentioned, the method is suitable for drastic data adjustments. Its application to the data from Manicaland seemed to produce an overestimation of the population in the children age ranges especially ages 0 to 4, and an underestimation in the older age groups (65 and over). This indicated that the standard age distribution had higher survival chances among children and lower survival chances for the population over 65 years of age. The results in Table 3.3 can be compared to the results obtained for the same province by the second method below (Table 3.4). Because the method showed that the data did not need drastic adjustment, it was discarded in favour of the second method. However, it was utilised in modified form to extrapolate the population 65 and over obtained by the second method to 85 and over (see Section 3.3.2).

Table 3.3: Adjusted population based on comparison with a standard age distribution; Manicaland males, 1982

| Unadjusted Population (a) | P(a) | Cumulated proportions C(a) | CS(a) | Y-transformation Y(a) | YS(a) | Estimated Y'(a) | C'(a) | Adjusted Population p'(a) | P'(a) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 95,200 | 0.1912 | 0.1901 | 0.3872 | 0.3849 | 0.4468 | 0.2198 | 0.2198 | 109,399 |
| 5 | 92,440 | 0.3769 | 0.3449 | 0.7929 | 0.7193 | 0.8191 | 0.3881 | 0.1683 | 83,796 |
| 10 | 87,200 | 0.5431 | 0.4735 | 1.2171 | 1.0291 | 1.1509 | 0.5194 | 0.1312 | 65,334 |
| 15 | 59,760 | 0.6632 | 0.5803 | 1.5970 | 1.3258 | 1.4567 | 0.6220 | 0.1027 | 51,119 |
| 20 | 32,210 | 0.7279 | 0.6684 | 1.8485 | 1.6157 | 1.7441 | 0.7024 | 0.0804 | 40,013 |
| 25 | 24,210 | 0.7765 | 0.7409 | 2.0730 | 1.9049 | 2.0199 | 0.7656 | 0.0633 | 31,522 |
| 30 | 20,570 | 0.8178 | 0.8004 | 2.3003 | 2.1994 | 2.2894 | 0.8160 | 0.0502 | 25,006 |
| 35 | 16,400 | 0.8508 | 0.8491 | 2.5181 | 2.5058 | 2.5575 | 0.8561 | 0.0402 | 19,993 |
| 40 | 16,200 | 0.8833 | 0.8885 | 2.7812 | 2.8295 | 2.8272 | 0.8883 | 0.0321 | 15,984 |
| 45 | 12,730 | 0.9089 | 0.9202 | 3.0423 | 3.1807 | 3.1042 | 0.9141 | 0.0259 | 12,878 |
| 50 | 13,000 | 0.9350 | 0.9452 | 3.3935 | 3.5694 | 3.3918 | 0.9349 | 0.0208 | 10,336 |
| 55 | 8,120 | 0.9513 | 0.9644 | 3.6906 | 4.0106 | 3.6939 | 0.9515 | 0.0166 | 8,246 |
| 60 | 9,340 | 0.9701 | 0.9786 | 4.1880 | 4.5268 | 4.0147 | 0.9645 | 0.0131 | 6,514 |
| 65 | 4,840 | 0.9798 | 0.9884 | 4.5851 | 5.1441 | 4.3521 | 0.9746 | 0.0100 | 4,990 |
| 70 | 3,940 | 0.9877 | 0.9946 | 5.0851 | 5.9118 | 4.7013 | 0.9820 | 0.0074 | 3,698 |
| 75+ | 6,110 | 1.0000 | 1.0000 | | | | 1.0000 | 0.0180 | 8,962 |
| T | 497,790 | | | | | | | 1.0000 | 497,790 |

Sources: 1982 Census; Ten Percent Sample, Table 2A.
Coale and Demeny (1966); West Mortality, Level 17:148
Notes: Explanation of notation see text.

### 3.3.2 Adjustment using the smoothing technique

While there are indications of underenumeration in certain age groups from the 1982 Census, the more noticeable effects are those of age heaping at even ages and those ending in five (see Table 3.1). A technique which would smooth out the effects of age heaping without being too drastic was required. Woods (1979) discussed two common methods of correcting for age heaping. The first involved interpolation. Population in single years of age is aggregated into five or ten year age groups and plotted onto a histogram. The mid-points of the histogram are joined together and new estimates of the population by age group or single years of age read off the graph. The technique is generally applicable where the adjustment is for a small number of population groups and is adequate for most work in population geography.

For large numbers of population groups the second method is the more useful to apply. It involves the mathematical concept of graduation (Woods 1979). Graduation is a mathematical means of fitting a trend with a smoothing curve to a series of observations. The general form of the series is represented by the use of mathematical equations. The technique is therefore of greater complexity than interpolation and as a result gives better or more accurate estimates of the population in each age group. It also lends itself more readily to computer manipulation, enabling large numbers of population groups to be handled with ease. The UN (1983) provides a graduation technique for adjusting errors in age data through smoothing similar to that described by Woods.

The technique has to be applied were there is an indication that net transfers across age boundaries have occurred when data has been aggregated into five year age groups. The data required in this instance is that of the population classified by singulate ages. The smoothing procedure requires that age boundaries are redefined in a way that will capture the net transfer across boundaries. The fact that both zero and five are favoured digits makes them unsuitable age boundaries for this technique. To capture the net transfers across age group boundaries, ages ending in three and eight are defined as the new age group boundaries. A succession of polynomials is fitted to the observed population distribution expressed either as numbers or as the proportion of persons under ages a + 3, a + 8, a + 13, a + 18; where *a* is a multiple of five. The values of these polynomials are then computed over their central ranges in order to obtain a smoothed age distribution.

One problem associated with the method arises with the choice of threes and eights as the age group boundaries. Ages ending in zero are generally more attractive than those ending in five. As a result, the cumulated proportions for ages ending in eight tend to be too small, whilst those ending in three tend to be too large. To overcome the problem, two polynomials are fitted over the cumulated proportions or population, one for ages ending in three and the other for those ending in eight. The two polynomials are evaluated over a common central range and the best estimates of the true cumulated population, relatively free from the effects of age heaping, is obtained by averaging. Again, by subtracting the lower of the cumulated population from the higher one in successive age groups, the actual population in each five year age group ending in zero or five is then obtained.

The method is illustrated using the Manicaland data shown in Table 3.4 below, for comparison with Table 3.3 above. As mentioned a series of equations are required to fit the polynominals to the age distribution. Equations 3.6 and 3.7 below are used to estimate the population under ages a+12 and a+17 using the cumulated populations ending in threes (column 2 of Table 3.4).

$$P'((a+12)-)=-0.048P(a-)+0.864P((a+10)-)+0.216P((a+20)-)-0.032P((a+30)-) \quad (3.6)$$

and

$$P'((a+17)-)=-0.455P(a-)+0.3315P((a+10)-) +0.7735P((a+20)-)-0.0595P((a+30)-) \quad (3.7)$$

where P'(a-) = the estimated cumulated population under a given age (columns 4 & 5 of Table 3.4)

P(a-) = the cumulated population under age a (column 2 of Table 3.4)

Table 3.4: Adjusted population using the smoothing method Manicaland 1982, males

| Age a | Population under age a | Age a' | Population under age a' adjusted for age ending in Threes | Population under age a' adjusted for age ending in Eights | Estimated Population under age a' | Population age a' to a + n Obs. | Population age a' to a + n Adj. | Proportion in age group p'(a) |
|---|---|---|---|---|---|---|---|---|
| - | - | 0 | - | - | - | 94,200 | 103,312 | 0.2075 |
| 3 | 58,490 | 5 | - | - | (103,312 | 92,440 | 89,740 | 0.1803 |
| 8 | 152,390 | 10 | 192,403 | 193,701 | 193,052 | 82,720 | 77,462 | 0.1556 |
| 13 | 239,160 | 15 | 266,899 | 274,128 | 270,513 | 59,760 | 55,739 | 0.1120 |
| 18 | 309,130 | 20 | 324,557 | 327,948 | 326,252 | 32,210 | 37,462 | 0.0753 |
| 23 | 351,360 | 25 | 364,727 | 362,701 | 363,714 | 24,210 | 24,764 | 0.0497 |
| 28 | 377,540 | 30 | 389,646 | 387,311 | 388,478 | 20,570 | 19,631 | 0.0394 |
| 33 | 400,680 | 35 | 408,472 | 407,746 | 408,109 | 16,400 | 17,065 | 0.0343 |
| 38 | 417,960 | 40 | 425,722 | 424,627 | 425,174 | 16,200 | 15,076 | 0.0303 |
| 43 | 434,860 | 45 | 440,872 | 439,629 | 440,251 | 12,730 | 13,455 | 0.0270 |
| 48 | 447,650 | 50 | 454,585 | 452,826 | 453,705 | 13,000 | 11,687 | 0.0235 |
| 53 | 461,860 | 55 | 466,253 | 464,532 | 465,393 | 8,120 | 9,573 | 0.0192 |
| 58 | 470,660 | 60 | 475,776 | 474,156 | 474,966 | 9,340 | 6,799 | 0.0137 |
| 63 | 480,490 | 65 | | 481,765 | 481,765 | 14,890 | 16,025 | 0.0323[1] |
| 68 | 485,750 | | | | | 497,790 | 497,790 | 1.0000 |
| 73 | 490,820 | | | | | | | |
| 78 | 497,790 | | | | | | | |

Source: 1982 Census; Ten Percent Sample, Table 2A.
1: Population 65 years and over.

The estimation procedure starts by adjusting population under age 15 years using equation 3.6 and under 20 years using equation 3.7. For cumulated ages ending in eights, equation 3.6 is used to adjust for populations under age 20 while equation 3.7 deals with those under ages ending in five beginning at age 25. The logic behind beginning the estimation at ages under 15 years instead of under five is because children 0 to 14 are normally underenumerated as outlined above. It is therefore necessary to treat them as a special case by adjusting them separately from the rest. Equation 3.8 below, is used in adjusting the population under age 10 years using the cumulated population under ages ending in three (3, 13, 23, 33) and for population under age 15 years using cumulated populations ending in eights (8, 18, 28, 38).

$$P'((a+7)-)=0.1495P(a-)+1.0465P((a+10)-) \\ -0.2415P((a+20)-)+0.0455P((a+30)-) \qquad (3.8)$$

where definitions are as for 3.6 & 3.7 above.

The estimate of the population under age 10 based on cumulated populations under ages ending in eight is given by the following equation:

$$P'(10-)=0.672P(a-)+0.504P((a+10)-) \\ -0.224P((a+20)-)+0.048P((a+30)-) \qquad (3.9)$$

Once the estimate of all the adjusted populations under ages beginning 10 have been carried out, it is necessary to average them out. This creates the estimated population under age a' in column 6 of Table 3.4. Essentially therefore, the cumulated population in column 6 is the average of the population estimated in columns 4 and 5. In mathematical terms, it works out as follows:

$$P^*(a-) = (P'_3(a-)+P'_8(a-))/2.0 \qquad (3.10)$$

The estimate of the cumulated population P*(a-) is then used to arrive at an estimate of the population under age 5 which appears in brackets in column 6. Equation 3.11 below is used in the estimation of the population under age 5 using the cumulated populations under age 10, 20 and 30:

$$P'(5-) = 0.9375P^*(10-)-0.3125P^*(20-)+0.0625P^*(30-) \qquad (3.11)$$

The final step is to arrive at the adjusted population in age group a to a+n. This is done by subtracting the lower of the cumulated estimated population under age a' (P*(a-), from its higher value as before (column 8, Table 3.4).

The method depends on population being initially classified by single years of age up to 85 years and preferably beyond. Unfortunately, the Zimbabwe census only gave single year classfication up to age 75 and over (Table 3.1). This results in the adjusted population ending at 65 years and over. This is too early an age at which to end an age distribution even if the life expectancy at birth is still in the middle fifties. From all indications, survival chances for the population are improving (CSO 1985a) and it would be helpful to have the population going as far as age 85 plus for future comparisons and projections. This will be useful for retirement planning purposes.

To overcome the handicap in the method or where data are not fully disaggregated by single years of age, it was decided to extrapolate the population to 85 and over from 65 plus. This was done by working out, from the Zimbabwe male and female life tables, the proportions surviving under the stationary population from 65 to 85 and over. These proportions were then used to split the 65 plus population estimated by the smoothing technique into age groups 65-69, 70-74, 75-79, 80-84 and 85 plus. The heaping in the observed data have been smoothed out by the fitting of a smoothing curve which is quite cons istent with the expected shape and pattern of a youthful population such as Zimbabwe's (illustrated in Fig. 3.1 and Fig. 3.2 below)

The second technique has one advantage over the reference table method. It is able to preserve any genuine or true kinks in the reported age data. Such kinks are normally smoothed out by the reference table method due to its attempt at redressing drastic errors in the data. The second method is therefore more suitable for situations were the are rapid changes in the population structure, as is true of Zimbabwe. Its major limitation is the number of age groups that can be created from the adjusted data if it is not classified up to age 85 plus. Also the demand for a single year age group classification can inhibit the use of the method where such data are not available. However, with the modifications such as were applied to the Zimbabwe data, it is possible to obtain reasonable results with the method.

The adjustment of the population described above was carried out in three stages. The first step was to adjust the population for age heaping as described above. All adjustments were made independent of each other. It was therefore necessary to ensure that the adjusted estimates of the population for lower regional units added up to those of the major regional ones. In other words, the populations of the local authority areas should added up to the provincial populations whilst those of the provinces added up to the national population. The constraint can be written mathematically, as follows:

$$\sum_{i=1}^{11} P_i(s,a) = P_z(s,a) \qquad (3.12)$$

where $P_i(s,a)$ is population of province i, sex s, and age group a and

$P_z(s,a)$ is the national population (Zimbabwe) by sex s, and age group a.

The constraint to be satified is, therefore that, the sum of all the provincial populations by age group and sex must be equal to that of the national population by age group and sex. Note that the equation works equally well for constraining local authority area populations to their provincial totals.

The second step involved ensuring that the constraint set up in Equation 3.12 was satisfied. This involved revising the adjusted population by age and sex through Equation 3.13 below. The equation uses the proportion of the sum of the provincial population to that of the national one to revise the estimate for each age group so that, in the final analysis, all age groups added up to the national total.

$$P_i(s,a)^2 = P_i(s,a)^1 \frac{P^z(s,a)}{\sum_{i=1}^{11} P_i(s,a)} \qquad (3.13)$$

where $P_i(s,a)^1$ is the adjusted population of province i, by age group a and sex s and
$P_i(s,a)^2$ is the new revised estimate of the population of province i, sex s and age group a which satisfies the constraint of equation 3.13 above.

The revised estimates of the population, $P_i(s,a)^2$, are then applied in the third stage for the construction of age and sex structure pyramids as well as in the calculation of various demographic indicators. These include such characteristics of the population as, composition by broad age group, dependency ratios, sex ratios and median ages and child to woman ratios for use in Chapter Four.

## 3.4 ADJUSTED AGE-SEX COMPOSITION OF THE POPULATIONS OF ZIMBABWE

The data used in the description of the observed population are from the Ten Percent Sample. Though, for Masvingo and Manicaland Provinces, data from the full census count are available, it was decided not to use them in the analysis for comparability and consistency with other provinces. The discussion focuses on the identification of patterns considered typical of particular spatial units.

### 3.4.1 Unadjusted and adjusted populations compared

A comparison of the adjusted and unadjusted proportions of the age data show that certain age groups have increased their share of the population after adjustment. The Zimbabwe data for (males) are used for illustration and are presented in Table 3.5. It is observed that the 0-4 age group increases from about 17.55% to about 18.68% for the males whilst both age groups 5-9 and 10-14 are reduced slightly (from 16.72% to 16.05% and 14.45% to 13.76% percent, respectively). The redistribution between age groups continues thoughout the whole age range with some groups gaining whilst others lose. The most noticeable are those age groups which were suspected of being inflated by transfers across age group boundaries. These are reduced while neighbouring age groups are increased. For example, it is expected that net transfers occur in the observed data between age groups 55-59 and 60-64. This is indicated by unadjusted proportions of 1.84% for the former and 2.1% for the latter (Table 3.5, column 3). When smoothing and adjustment have taken place, the proportions change to 2.17% for the former and 1.57% for the latter. These adjusted proportion are more in line with the expected distribution that can result from heavier mortality as the population ages. The effectiveness of the adjustment is provided by the smooth curve that has been fitted to the data as illustrated in Fig. 3.1, based on the male data shown in Table 3.5. The fitted curve reflects the effects of both an expanding population as well as the aging process which results in heavier mortality in the older age groups.

Table 3.5: Comparison of unadjusted and adjusted age distributions: Zimbabwe males, 1982

| Age Group | Unadjusted Population | Unadjusted Proportion | Adjusted Population | Adjusted Proportion |
|---|---|---|---|---|
| 0-4 | 643,330 | 0.1755 | 684,858 | 0.1868 |
| 5-9 | 612,760 | 0.1672 | 588,315 | 0.1605 |
| 10-14 | 529,750 | 0.1445 | 504,420 | 0.1376 |
| 15-19 | 390,160 | 0.1064 | 393,010 | 0.1072 |
| 20-24 | 290,380 | 0.0792 | 304,056 | 0.0829 |
| 25-29 | 243,420 | 0.0664 | 238,492 | 0.0651 |
| 30-34 | 185,400 | 0.0506 | 191,047 | 0.0521 |
| 35-39 | 147,920 | 0.0404 | 155,616 | 0.0425 |
| 40-44 | 142,050 | 0.0388 | 133,881 | 0.0365 |
| 45-49 | 116,490 | 0.0318 | 118,279 | 0.0323 |
| 50-54 | 111,780 | 0.0305 | 100,072 | 0.0273 |
| 55-59 | 67,400 | 0.0184 | 79,578 | 0.0217 |
| 60-64 | 76,850 | 0.0210 | 57,388 | 0.0157 |
| 65-69 | 38,810 | 0.0106 | 46,332 | 0.0126 |
| 70-74 | 29,810 | 0.0081 | 34,302 | 0.0094 |
| 75-79 | 39,410* | 0.0108 | 21,479 | 0.0059 |
| 80-84 | 0 | 0 | 10,403 | 0.0028 |
| 85 + | 0 | 0 | 4,174 | 0.0011 |
| Total | 3,665,720 | 1.0000 | 3,665,720 | 1.0000 |

Source: 1982 Census; Ten Percent Sample, Table 2A.
Note: * - Population 75 years and over.

A further point of interest is the ability of the method to represent genuine kinks in the age-sex data, illustrated most effectively by age-sex pyramids of urban areas like Harare and Bulawayo. These show a genuine increase in the proportion of persons aged 15-29. The increase is a reflection of migration by young people into urban centres. Further, the sex difference element of the migration process is preserved by the method. This is an advantage which the method provides enabling the capturing of the population picture even in situations of rapid population change (CSO 1985a).

### 3.4.2 A comparison of the percentage distribution: 1969 and 1982

Yaukey (1985) regards percentage distribution between age groups by sex an important means of describing population structure. Percentage distributions are very useful in the construction of population

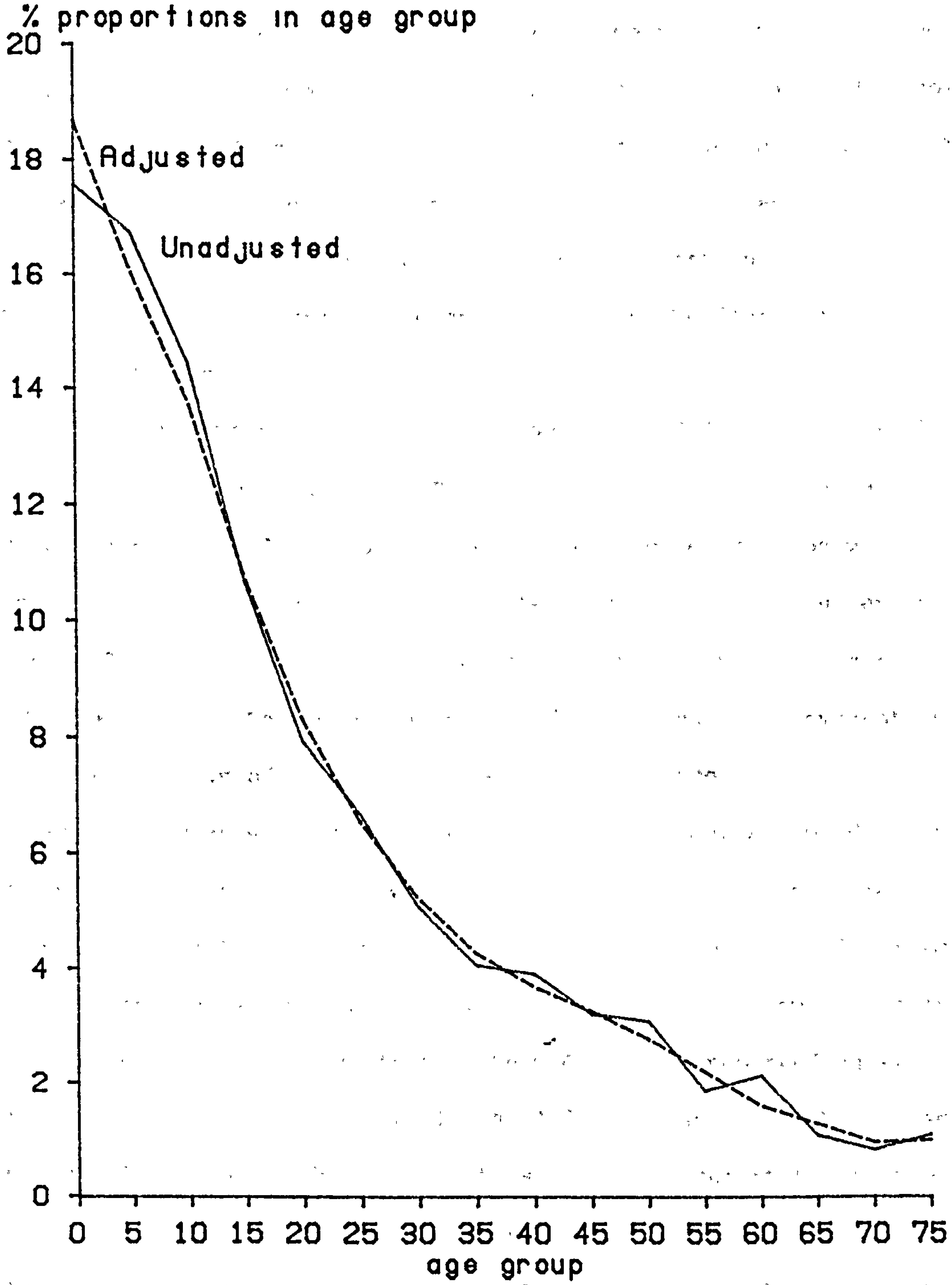


Fig. 3.1: Unadjusted and adjusted proportions, Zimbabwe males

pyramids. Pyramids have a greater visual impact than tables and can be constructed in two ways. The first is to use the actual population numbers, which in actual fact gives a frequency distribution prymid. The second, and more useful for comparing different populations is that of the percentage distribution. More about pryamids in Section 3.4.3. First, a comparison is made between the 1969 and 1982 age-sex distributions. This is to measure the extent of any changes that have occurred between the two censuses at the national level. No age-sex classification exists for lower geographical regions for the 1969 Census. This imposes a severe limit on the degree of comparison between the two censuses.

The percentage distribution in age group 0-4 shows a slight drop between the two censuses. This has led to an increase in the percentage share of the older age groups, especially between ages 5 and 19. Table 3.6 shows that, for females, the increase extends to the 30-34 age group whilst for males it is most evident in the 10 to 19 age group. This would seem to indicate a vast improvement in the survival chances of the female population since 1969 as opposed to males. The changed balance between males and females would seem to support this contetion. In 1969, the masculine proportion of the population was 50.43% (CSO 1976). This proportion had declined to 48.96% by 1982 which would imply an increase in the female proportion of the population. In fact, the CSO (1985a) reported an excess of females over males of nearly a 100,000 persons. Two possible explanations can be advanced for this. The first is the possibility of greater male underenumeration discussed above. The second is the War of Liberation that ended in December 1979 combined with better survival chances for the female population. This might explain the improved proportions in the female population between 5 and 34 when for males it is only between 5 and 19. The CSO views this as a possible explanation and one which is highly plausible. However, it does recommend further investigation into the shift downwards of the masculinity proportion. However, such an investigation seems only possible in the future, when more census data are available for comparison at both national and subnational scales.

Table 3.6: Percent distribution by age and sex: Zimbabwe 1969 & 1982

| Age Group | Males | | Females (Percentages) | | Total | |
|---|---|---|---|---|---|---|
| | 1969 | 1982 | 1969 | 1982 | 1969 | 1982 |
| 0-4 | 10.39 | 9.15 | 10.00 | 9.15 | 10.39 | 18.30 |
| 5-9 | 8.10 | 7.86 | 7.88 | 7.95 | 15.98 | 15.81 |
| 10-14 | 6.52 | 6.74 | 6.41 | 6.83 | 12.93 | 13.57 |
| 15-19 | 5.24 | 5.25 | 5.22 | 5.74 | 10.47 | 10.99 |
| 20-24 | 4.28 | 4.06 | 4.30 | 4.74 | 8.58 | 8.36 |
| 25-29 | 3.54 | 3.19 | 3.60 | 3.79 | 7.11 | 6.98 |
| 30-34 | 2.90 | 2.55 | 2.90 | 2.92 | 5.80 | 5.47 |
| 35-39 | 2.39 | 2.08 | 2.35 | 2.27 | 4.74 | 4.35 |
| 40-44 | 1.94 | 1.79 | 1.88 | 1.82 | 3.82 | 3.61 |
| 45-46 | 1.57 | 1.58 | 1.50 | 1.46 | 3.07 | 3.04 |
| 50-54 | 1.20 | 1.34 | 1.16 | 1.15 | 2.35 | 2.49 |
| 55-59 | 0.88 | 1.06 | 0.87 | 0.91 | 1.76 | 1.97 |
| 60-64 | 0.61 | 0.77 | 0.64 | 0.68 | 1.25 | 1.45 |
| 65 + | 0.80 | 1.56 | 0.96 | 1.64 | 1.76 | 3.20 |
| TOTAL | 50.34 | 48.96 | 49.66 | 51.04 | 100.00 | 100.00 |
| No. | 2,567,101 | 3,665,720 | 2,532,213 | 3,821,170 | 5,099,314 | 7,486,890 |

Source: CSO (1985a) Table II.13.
1982 Census; Ten Percent Sample, Table 2A.

### 3.4.3 Population Composition by Age and Sex Pyramids

Pressat (1972), Valvolkics (1979) and Yaukey (1985) describe the population pyramid as a powerful tool for demographic descriptions. The tool is more powerful when there is a need to compare several population groups. The reason for this lies in the greater visual impact of the pyramid as well as the fact that the shape of the pyramid is sensitive to major demograhic events, namely, fertility, mortality and migration. Effective comparison of the age and sex structure of populations is rendered possible when percentage distributions are used, instead of frequency distributions, in the construction of the pyramids. The reason being that the area under a percentage distribution is all the same as long as the pyramids are drawn to the same scale. Thus, percentage pyramids are relatively free of any biases in the population data enabling comparison to be carried out with confidence. The feature to highlight is the shape of the pyramid which registers the relative sizes of the age-sex groups in the population. Bearing this in mind, the pyramids for the various populations of Zimbabwe were drawn to the same scale to enable comparison between the various administrative areas, using their percentage distributions.

Examination of the pyramids revealed that they could easily be classified into four groups. These groups were related closely to the administrative areas from which the populations were drawn. These were; the nation-provinces, the district councils, the rural councils and the urban councils. The difference between the district and rural council areas lies in the form of land ownership or tenure, both being rural. District councils have communal land ownership while rural councils are privately owned commercial farms (Cheater 1982; see Fig. 1.3). The broad demographic characteristics of the populations associated with the pyramids are discussed below.

*3.4.3.1 National and provincial age-sex composition*

Figure 3.2 illustrates the typical pyramid associated with the national and provincial pyramids. The 1982 Census treated the three largest cities in the country as provinces. The capital, Harare, the second largest city, Bulawayo, and Chitungwiza, the third largest city, are treated as provinces in their own right. Their population

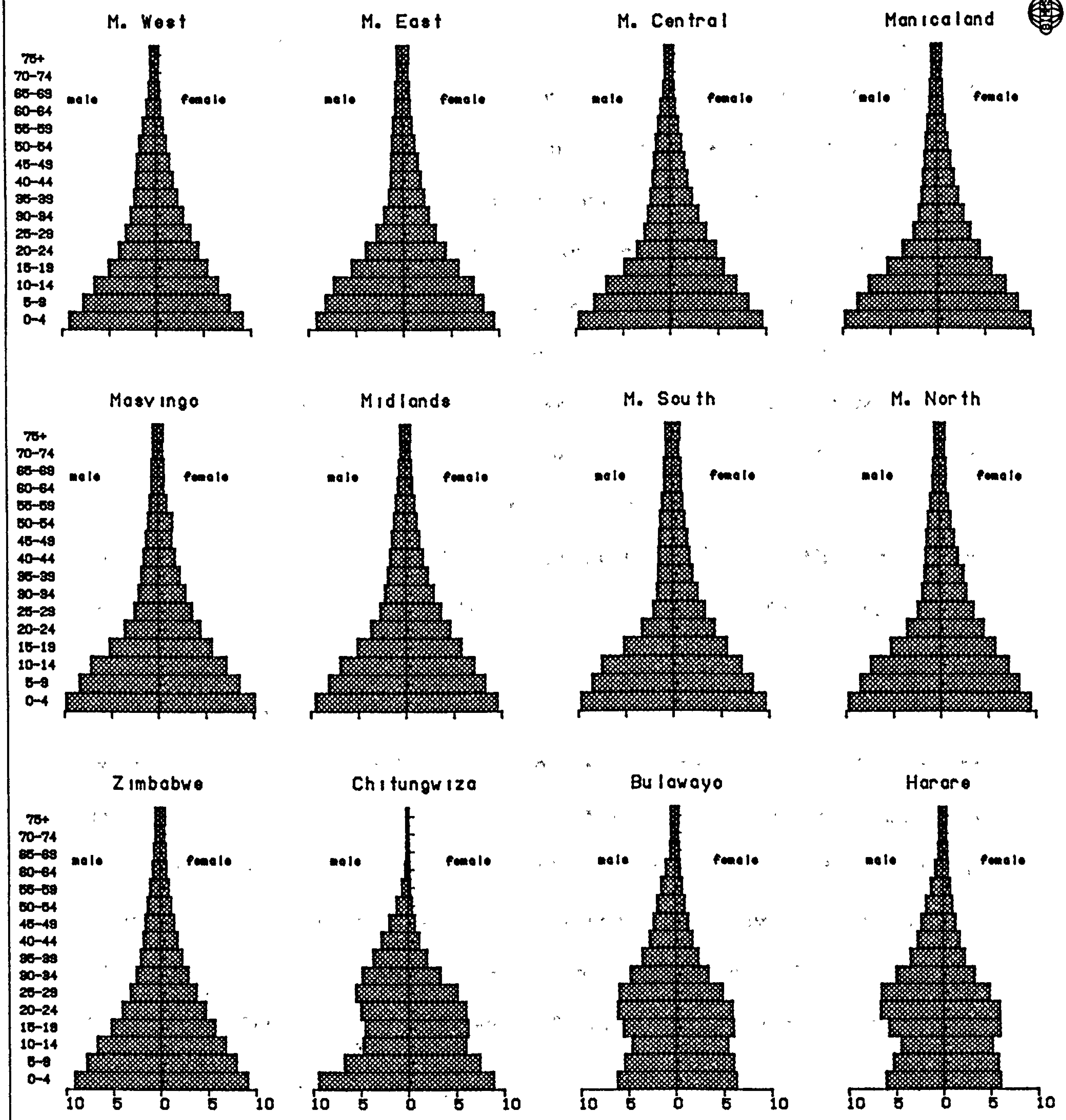


Fig. 3.2: Examples of age and sex pyramids for Zimbabwe provinces 1982

are excluded from that of the provinces within which they are located (Mashonaland East for Harare and Chitungwiza and, Matabeleland North for Bulawayo). The only exception to the pattern described above is Mashonaland West which has an age-sex composition similar to that of rural council areas. The three urban provinces have a structure different from the rest of the provinces and will be discussed under urban councils. It is important to bear in mind when comparisons are made among provinces that the three largest urban areas are included. The age and sex structure defined by the pyramids is typical of most of the developing regions of the world with an expanding population (Yaukey 1985; Demko et al 1970). They show a large proportion of the population being very young (under 15) and a very small proportion being old (over 65) with probably half or even less of the population being within the economically active age range (15-64) (Yaukey 1985; UN 1985; Table 3.7).

Further evidence for the youthfulness of the population described by such pyramids is provided by the median age in Table 3.7. The The national average is only 16.30 years. Most provinces operate below this average with the exception of Mashonaland West and the urban provinces. The median ages, in the non-urban provinces, range from 14.53 years in Masvingo Province to a high of 15.32 years in Mashonaland Central. The existence of many rural council areas within Mashonaland West, meaning it attracts labour, results, in a slightly above average median age of 16.82 years.

Table 3.7: Summary of selected demographic indices: provinces and urban councils

| | Demographic Variables | | | | | | |
|---|---|---|---|---|---|---|---|
| | Broad Age Groups | | | Dependency Ratio | | Sex Ratio | Median Age |
| | 0-14 % | 15-64 % | 65 + % | 1 | 2 | | |
| ZIMBABWE | 47.67 | 49.13 | 3.20 | 103.54 | 97.03 | 95.93 | 16.82 |
| Manicaland | 51.28 | 45.46 | 3.27 | 119.99 | 112.81 | 89.54 | 14.56 |
| Mash. Central | 49.29 | 47.88 | 2.83 | 108.87 | 102.96 | 94.78 | 15.32 |
| Mash. East | 50.02 | 46.20 | 3.78 | 116.44 | 108.26 | 91.46 | 15.00 |
| Mash. West | 47.25 | 49.89 | 2.86 | 100.43 | 94.70 | 103.14 | 16.30 |
| Mat. North | 50.71 | 45.85 | 3.44 | 118.11 | 110.61 | 92.25 | 14.61 |
| Mat. South | 50.92 | 44.53 | 4.55 | 124.58 | 114.36 | 90.24 | 14.69 |
| Midlands | 49.68 | 47.03 | 3.29 | 112.61 | 105.62 | 91.77 | 15.15 |
| Masvingo | 51.34 | 45.31 | 3.35 | 120.70 | 113.31 | 90.83 | 14.53 |
| Bulawayo | 34.10 | 63.44 | 2.46 | 57.64 | 53.76 | 112.88 | 23.35 |
| Chitungwiza | 43.43 | 55.90 | 0.67 | 78.90 | 77.70 | 108.20 | 18.04 |
| Harare | 33.05 | 64.39 | 2.56 | 55.31 | 51.33 | 116.14 | 23.74 |
| URBAN COUNCILS | | | | | | | |
| Mutare | 38.91 | 60.01 | 1.08 | 66.64 | 64.84 | 115.50 | 19.73 |
| Marondera | 41.00 | 57.52 | 1.48 | 73.86 | 71.29 | 111.38 | 19.05 |
| Chegutu | 44.65 | 54.09 | 1.26 | 84.86 | 82.54 | 108.18 | 17.30 |
| Chinhoyi | 43.40 | 55.33 | 1.27 | 80.73 | 78.43 | 97.68 | 17.59 |
| Kadoma | 39.81 | 58.46 | 1.73 | 71.05 | 68.09 | 105.34 | 19.78 |
| Kariba | 37.16 | 62.21 | 0.64 | 60.76 | 59.73 | 140.82 | 22.50 |
| Hwange | 41.87 | 57.37 | 0.76 | 74.30 | 72.98 | 118.72 | 19.23 |
| Gweru | 36.50 | 62.11 | 1.38 | 61.00 | 58.77 | 116.29 | 22.94 |
| Kwekwe | 38.61 | 59.85 | 1.54 | 67.10 | 64.52 | 117.66 | 22.75 |
| Redcliff | 47.51 | 51.76 | 0.74 | 93.22 | 91.79 | 106.38 | 16.16 |
| Shurugwi | 41.75 | 57.23 | 1.02 | 74.73 | 72.94 | 113.39 | 18.90 |
| Masvingo | 31.09 | 65.76 | 3.15 | 52.07 | 47.28 | 129.12 | 24.29 |

Notes: 1 - Child & old age dependency; 2 - Child dependency only.
Source: 1982 Census; Ten Percent Sample, Table 2A

To illustrate the point of youthfulness of the population, a comparison is drawn between the provinces and some African countries with similar age-sex structures. These are presented in Table 3.8. Zimbabwe and the provinces operate above the African average (i.e. excluding the three urban provinces). This implies that its population structure is younger than that of Africa as a whole. Only four other countries have higher percentages below age 15 than Zimbabwe, bringing out the high fertility rate of the countries concerned. In fact, the provincial percentages of those below 15 are closer to those of Kenya, considered to have the fastest growing population of any nation in the world (UN 1985).

Table 3.8: A comparison of age structure: percentage below 15 years: Zimbabwe and selected African countries

| African Country | Percent Below Age 15 | Zimbabwe & Provinces | Percent Below Age 15 |
|---|---|---|---|
| Ghana | 46 | Manicaland | 51.28 |
| Ethiopia | 46 | Mashonaland Central | 49.29 |
| Benin | 46 | Mashonaland East | 50.02 |
| Zambia | 47 | Mashonaland West | 47.25 |
| Zimbabwe | 48 | Matebeleland North | 50.71 |
| Uganda | 48 | Matebeleland South | 50.92 |
| Tanzania | 49 | Midlands | 49.68 |
| Botswana | 50 | Masvingo | 51.34 |
| Kenya | 52 | Bulawayo | 34.10 |
| Africa | 45 | Chitungwiza | 43.43 |
| | | Harare | 33.05 |
| | | ZIMBABWE | 47.67 |

Source: Yaukey 1985, Table 4.2; UN 1985, Table 14; Table 3.7

A second feature which Zimbabwe and the provinces share in common with other nations in general and Africa in particular, is that of the deficit of males over females. The sex ratio is the best indicator of this deficit. The UN (1985) gave the average sex ratio for African countries as 98.3 males per 100 females for the period 1980-1984. This can be compared to a world mean of 100.6, Latin America's perfect 100.0, North America's 95.3, Europe's 95.2 and South Asia's 104.8 (the highest in the world). In comparison, the sex ratios for Zimbabwe and seven of her provinces range from 95.93 (Zimbabwe) to 89.54 (Manicaland). The only exception is that of Mashonaland West which has a sex ratio closer to the South Asian figure at 103.14 (Table 3.7). The reason for Mashonaland West being the exception is the large share of rural councils which weigh the population heavily in favour of males. Zimbabwe's sex ratio is below the African average indicating a greater degree of mortality differential between the sexes. The provincial sex ratios reflect both the mortality differential between the sexes as well as the balance of migration. This explains why Matabeleland South, capturing only 3% of the urban population, has one of the lowest sex ratios (CSO 1985a), while provinces like Mashonaland Central have higher ratios. The combination of rural councils and some fairly large urban areas, like Chegutu and Chinhoyi, gives Mashonaland West the highest sex ratio, implying that it is a destination region for males and, to a certain extent females, in search of employment in the commercial farming and the urban sectors.

Further links to the expanding population pyramid structure of the developing regions are provided by the dependency ratios. The average dependency ratio for Africa between 1980 and 1984 was 93.4 dependents per 100 economically active persons (United Nations 1985). Yaukey (1985) gave a lower figure of 92 dependents per 100 economically active persons for the same period. The provincial dependency ratios are well above the continental average as they range from 100.39 in Mashonaland West to 124.53 in Matebeleland South with a national average of 103.54 (Table 3.7). The world average is 70.6 which gives Zimbabwe a very heavy dependency burden. Discussion of the implication of the age structure to social and economic development will be postponed until the other pyramid types have been discussed.

*3.4.3.2 Urban councils: age and sex composition*

The structure of urban council areas is somewhat similar to those of the first type of rural councils i.e. those containing small towns (compare Fig. 3.3 with Fig. 3.5) The main difference is that the demographic variables in the urban council areas are more pronounced

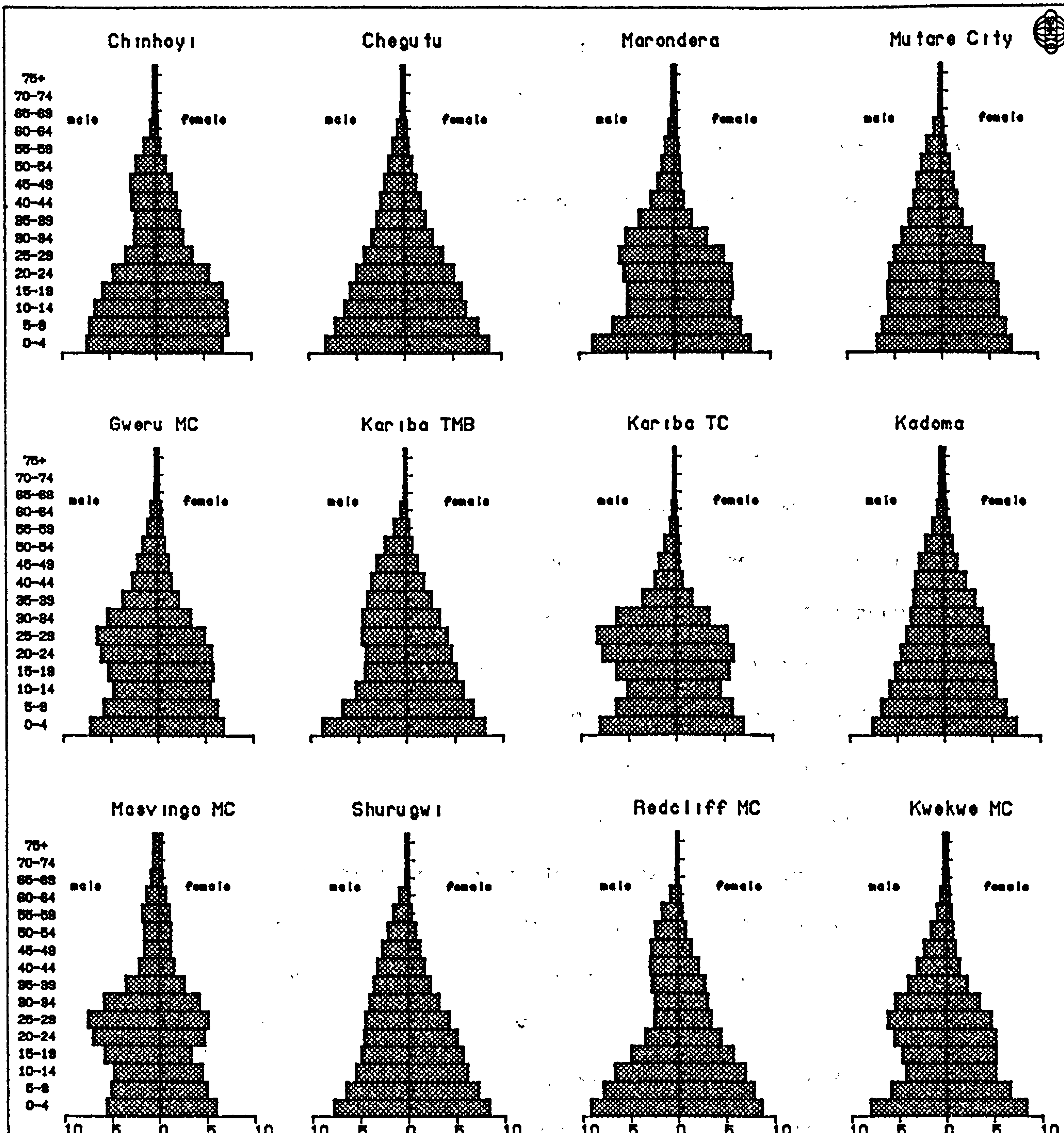


Fig. 3.3: Examples of age and sex pyramids: urban areas 1982

than those in the rural councils. Chitungwiza Town Council deserves some comment before the discussion proceeds. Chitungwiza is a very youthful town having only come into existence in the late 1960s. In fact, in 1969 the town contained some 15,000 persons. Between the two censuses Chitungwiza was the fastest growing urban centre in the country, with an average annual growth rate of 20.7%. In fact, it grew so fast that it has become the third largest urban area in the country, overtaking Gweru and Mutare in the process (CSO 1984; CSO 1985a).

The urban councils exhibit the lowest proportion of children under the age of 15 years. With the exception of Redcliff, the proportion of the population below the age of fifteen in these areas is generally below 45% (Table 3.7; part 2, column 2). The population below the age of 15 years varies from 31.09% in Masvingo MC (Masvingo Province) to 47.51% in Redcliff (Midlands). The three major cities (urban provinces) vary from 33.05 in Harare to 43.43% in Chitungwiza, which as already indicated is still a youthful town whose structure is almost similar to that of Sanyati DC discussed in Section 3.4.3.3 below. Median ages are relatively high, from 16.16 years (Redcliff) to 24.29 years (Masvingo MC), reflecting the concetration of working age people within urban areas.

The working age population in urban council areas is generally above 50%. It varies from 51.76% in Redcliff to 65.76% in Masvingo MC. The three urban provinces do have a large concetration of working age people. Harare has 64.39%, Chitungwiza 55.90% and Bulawayo 63.44% compared to a national average of 49.13%. The 65 years and over population is generally below 3%. Masvingo MC is the exception in this case. It has a population over 65 years of age which is above 3% (3.15%) (Table 3.7, column 4). In fact, all demographic indices related to population by broad age groups point to Masvingo MC as being the most mature of the urban areas. This is not suprising when it is borne in mind that Masvingo MC is the oldest town within the country. It has therefore had a longer period of time in which its urban age-sex structure could evolve.

The age structure of the urban areas described above leads to low dependency ratios. These range from 74.73 dependent persons per 100 active ones in Redcliff down to 52.07 in Masvingo MC (Table 3.7, columns 5 & 6). This compares with a national average of 103.54. It means that the urban areas have the most favourable dependency ratio than any other administrative unit in the country. The sex ratios exhibit the dominance of males in the economic fabric of the nation. These range from 129.12 in Masvingo MC down to 97.68 in Chinhoyi MC (Mashonaland West) compared to the national average of 95.93 (Table 3.7, column 7). The evidence for inmigration or for these areas as destination regions can be gleaned from the sex ratios as well as the structure of the age-sex pyramid (Figure 3.3). The predominance of males is also well illustrated by the same ratios.

So, in contrast to the district council areas, urban councils can be viewed as areas of the young working adult, predominantly male and lacking in old aged persons. This confirms the age selectivity of the migration process. The near absence of older people is an indication of both the increased proportion of persons in the young adult working ages as well as the outmigration process associated with retirement which is picked up in the district council areas at ages 60 to 69. It can be deduced from the discussion in this section that a great proportion of persons, especially males, will spend their childhood years in the district council areas, move into either rural or urban council areas during their economically active years and probably retire back into their district council areas from age 60 onwards.

*3.4.3.3 District councils; age-sex composition*

These pyramids are probably the best illustration of the high fertility effects of the population on the shape of the pyramid. They are also a good illustration of the effects of migration on the age and sex composition of a population. Figure 3.4 presents examples of district councils pyramids, while Table 3.9 provides the relevant demographic characteristics of these areas.

Migration effects show up in the deficit of males over females. These show most clearly in the age groups 20 to 60, with a similar female deficit within the same age ranges though of a less pronounced form. It is only demonstrated by comparison with the national age-sex structure. The effects of these deficits have been to increase considerably the proportion of children (especially males) between the ages of 0 to 14 and to a certain extent between 15 to 19. Further evidence demonstrating the fact that district council areas suffer from an outmigration of persons in the economically active age ranges is provided by the increase in the proportion of persons aged 65-69, as Figure 3.4 amply illustrates. The increase is more pronounced for males than females showing a degree of sex selectivity in the original outmigration process. The increase in the proportion 65 to 69 must be a reflection of the process of return migration. This is a result of the historical way in which migration processes developed in the country. As Mitchell (1969) pointed out, the migration process in Zimbabwe was cyclic, involved mostly males and led to a return to the original point of migration after retirement from the labour force. It was a response to both legislation that existed under the colonial regime as well as the cultural attachment to the place of origin.

Turning to the demographic indices, several interesting features

Table 3.9: Summary of selected demographic indices: district councils

| District Council | Demographic Variables: Broad Age Groups 0-14 % | 15-64 % | 65 + % | Dependency Ratio (1) | (2) | Sex Ratio | Median Age |
|---|---|---|---|---|---|---|---|
| Buhera | 54.54 | 42.36 | 3.10 | 136.08 | 128.75 | 86.01 | 13.73 |
| Chitepo | 53.97 | 41.85 | 4.18 | 138.93 | 128.95 | 78.79 | 13.74 |
| Gazaland | 53.00 | 43.87 | 3.13 | 127.97 | 120.83 | 83.86 | 13.98 |
| Nyanga | 52.10 | 42.65 | 5.25 | 134.48 | 122.18 | 79.94 | 14.30 |
| Mabvazuva | 54.07 | 42.58 | 3.35 | 134.86 | 126.99 | 83.55 | 13.70 |
| Maungwe | 53.75 | 41.64 | 4.61 | 140.14 | 129.08 | 83.17 | 13.81 |
| Mutare | 54.94 | 41.02 | 4.04 | 143.79 | 133.95 | 86.32 | 13.50 |
| Chaminuka | 52.74 | 43.66 | 3.60 | 129.06 | 120.81 | 80.96 | 14.10 |
| Chiweshe | 52.95 | 43.10 | 3.95 | 132.04 | 122.88 | 82.39 | 14.04 |
| Guruve | 50.74 | 44.09 | 5.17 | 126.83 | 115.10 | 84.25 | 14.75 |
| Kubatana B. | 52.44 | 43.64 | 3.92 | 129.16 | 120.18 | 87.42 | 14.20 |
| Mzarabani | 53.29 | 43.25 | 3.45 | 131.19 | 123.21 | 85.71 | 13.81 |
| Pfura | 54.81 | 42.58 | 2.61 | 134.84 | 128.72 | 82.00 | 13.46 |
| Rushinga | 54.73 | 41.27 | 4.00 | 142.31 | 132.61 | 82.60 | 13.46 |
| Goromonzi K. | 54.81 | 41.59 | 3.60 | 140.42 | 131.78 | 81.46 | 13.55 |
| Harava | 51.15 | 47.23 | 1.62 | 111.74 | 108.31 | 77.77 | 14.65 |
| Murewa K. | 49.47 | 46.53 | 3.99 | 114.89 | 106.31 | 95.70 | 15.22 |
| Mutoko | 53.42 | 42.35 | 4.22 | 136.10 | 126.13 | 81.25 | 13.88 |
| Mudzi | 46.85 | 49.20 | 3.95 | 103.27 | 95.24 | 101.47 | 15.32 |
| Rudhaka | 53.79 | 41.18 | 5.03 | 142.84 | 130.62 | 84.01 | 13.80 |
| UMP Zvataida | 52.62 | 43.95 | 3.43 | 127.56 | 119.75 | 86.53 | 14.15 |
| Wedza | 54.82 | 41.09 | 4.09 | 143.38 | 133.42 | 83.08 | 13.56 |
| Chirorodziva | 53.10 | 43.28 | 3.62 | 131.06 | 122.69 | 88.82 | 13.98 |
| Mhondoro | 52.15 | 43.03 | 4.82 | 132.40 | 121.20 | 86.52 | 14.32 |
| Ngezi | 52.07 | 42.50 | 5.73 | 135.29 | 122.52 | 81.79 | 14.38 |
| Nyaminyami | 44.19 | 53.55 | 2.25 | 86.74 | 82.53 | 116.87 | 18.02 |
| Sanyati | 37.49 | 62.08 | 0.43 | 61.09 | 60.39 | 123.65 | 22.66 |
| Hurungwe | 53.65 | 41.93 | 4.42 | 138.51 | 127.97 | 85.51 | 13.79 |
| Binga | 52.20 | 44.84 | 2.96 | 123.02 | 116.42 | 79.79 | 14.13 |
| Kusile | 53.24 | 43.01 | 3.76 | 132.51 | 123.78 | 94.79 | 13.97 |
| Nkayi | 54.42 | 42.14 | 3.45 | 137.32 | 129.14 | 87.22 | 13.62 |
| Tsholotsho | 50.21 | 44.61 | 5.18 | 124.15 | 112.55 | 90.68 | 14.93 |
| Hwange | 50.99 | 44.90 | 4.11 | 122.69 | 113.55 | 86.25 | 14.68 |
| Beitbridge | 51.26 | 45.11 | 3.63 | 121.66 | 113.63 | 89.25 | 14.56 |
| Bulalima M. | 51.56 | 43.22 | 5.22 | 131.39 | 119.31 | 77.58 | 14.48 |
| Gwanda | 52.31 | 42.39 | 5.30 | 135.91 | 123.41 | 86.81 | 14.27 |
| Insiza | 55.23 | 39.57 | 5.21 | 152.74 | 139.58 | 87.46 | 13.36 |
| Matobo | 53.88 | 41.07 | 5.05 | 143.49 | 131.19 | 84.04 | 13.70 |
| Umzingwane | 53.64 | 41.97 | 4.39 | 138.29 | 127.83 | 86.79 | 13.85 |

Table 3.9 (contd)

| Administrative Region | Broad Age Groups 0-14 % | 15-64 % | 65 + % | Dependency Ratio (1) | (2) | Sex Ratio | Median Age |
|---|---|---|---|---|---|---|---|
| Cheziya Gokwe | 55.16 | 41.78 | 3.06 | 139.36 | 132.04 | 86.36 | 13.27 |
| Chikomba | 52.56 | 42.32 | 5.12 | 136.31 | 124.20 | 84.06 | 14.19 |
| Manyame | 52.82 | 43.66 | 3.52 | 129.02 | 120.96 | 79.84 | 14.06 |
| Mashambazhou | 53.66 | 42.99 | 3.35 | 132.59 | 124.81 | 87.34 | 13.86 |
| Mberengwa | 50.96 | 45.67 | 3.37 | 118.96 | 111.59 | 90.97 | 14.67 |
| Shurugwi | 51.25 | 43.40 | 5.34 | 130.40 | 118.09 | 85.14 | 14.60 |
| Takawira | 51.84 | 43.78 | 4.38 | 128.39 | 118.40 | 83.06 | 14.40 |
| Zvishavane | 54.37 | 42.19 | 3.44 | 137.03 | 128.88 | 82.23 | 13.58 |
| Batanai | 53.54 | 43.38 | 3.08 | 130.52 | 123.41 | 86.60 | 13.77 |
| Bikita | 54.64 | 41.76 | 3.59 | 139.44 | 130.84 | 82.35 | 13.45 |
| Gaza Komanani | 54.93 | 42.40 | 2.67 | 135.83 | 129.54 | 80.70 | 13.39 |
| Gutu | 53.58 | 42.50 | 3.92 | 135.28 | 126.06 | 87.11 | 13.87 |
| Masvingo | 53.15 | 42.46 | 4.38 | 135.49 | 125.16 | 85.85 | 14.00 |
| Nyaningwe | 51.74 | 44.27 | 4.00 | 125.91 | 116.87 | 88.21 | 14.42 |
| Zaka | 53.71 | 41.86 | 4.43 | 138.91 | 128.31 | 85.87 | 13.79 |

Demographic Variables

Source: 1982 Census; Ten Percent Sample, Table 2A
Notes : Kubatana B.: Bindura; Goromonzi K. & Murewa K.: Kubatana
Bulalima M.: Mangwe

come to light. First, the percentage of persons under the age of fifteen is very high in district council areas. It is for the most part higher than both the provincial and national averages, ranging from 49.47% in Murewa Kubatana District Council (Mashonaland East, Fig. 1.2) to 55.23% in Insiza District Council (Matabeleland South, Fig 1.2) This indicates that more than half the population of the dictrict council areas is made up of children below the age of 15 years. The median ages indicate this even more clearly. They range from 13.27 years in Cheziya Gokwe DC (Midlands, Fig 1.2) to 15.22 years in Murewa Kubatana DC. This is in contrast to the national and provincial structure where about half the population is made up of both children under 15 and old people over 65 years of age. The high rates of children under 15 are probably an indication of higher fertility in district council areas as well as selective migration.

There are three district council areas which seem to be

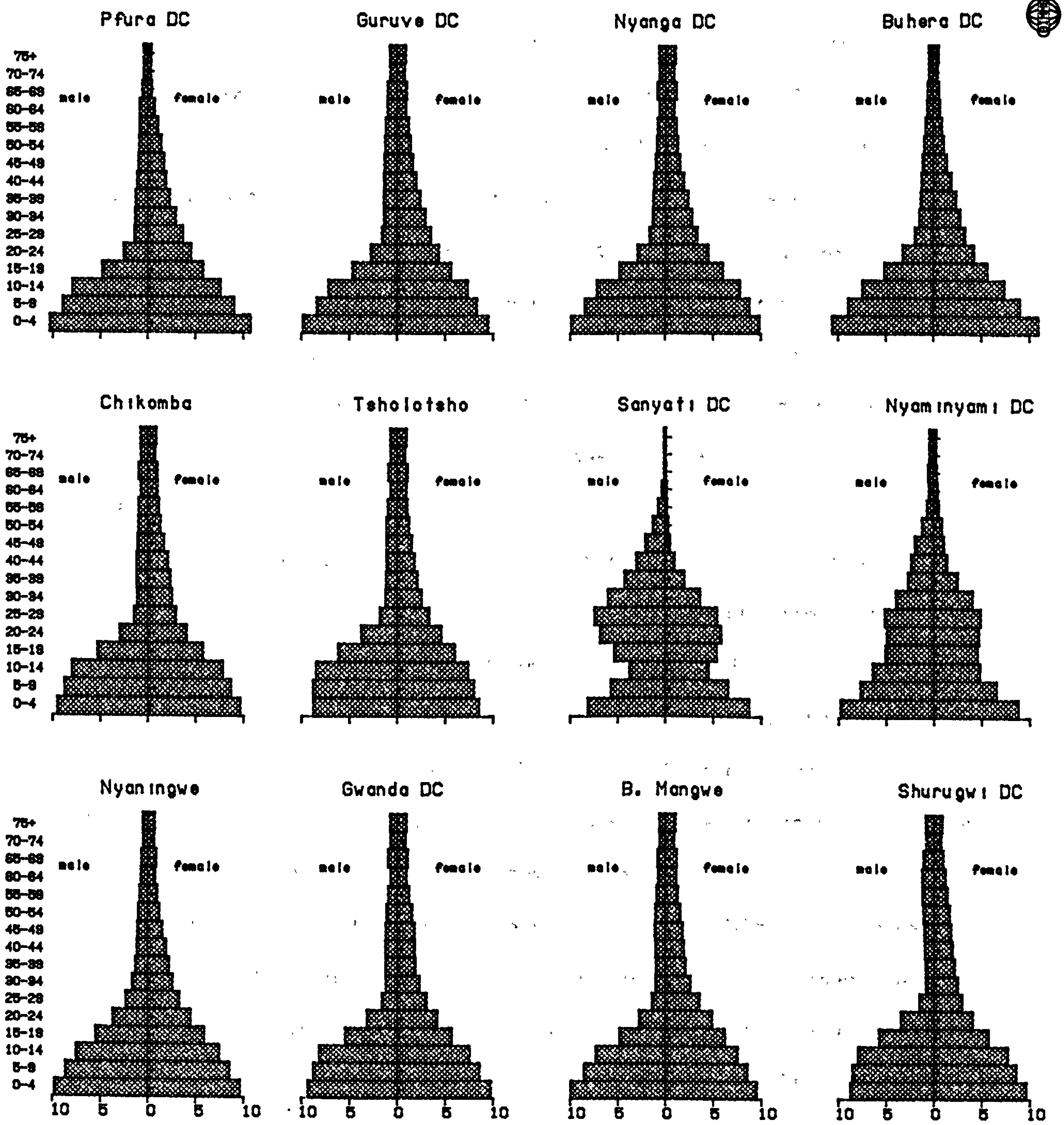


Fig. 3.4: Examples of age and sex pyramids: district councils 1982

exceptions to the rule. These are Nyaminyami, Mudzi and Sanyati. The percentage of children under the age of 15 years is relatively low in these district councils compared to the others as well as to national and provincial averages. For example, Nyaminyami DC's population under 15 years is 44.19% whilst its median age is 18.02 years comparable to Chitungwiza's 43.43% and 18.04%, respectively. Mudzi has a population under 15 years of 46.85% and a median age of 15.32 years, quite close to the Mashonaland West provincial average. Sanyati DC has an age structure that is almost similar to the urban areas. Its population below age of 15 is 37.49% with a median age of 22.66 years (Fig. 3.4) Why are these three district councils different from the rest?

The answer would seems to lie in the existence of nascent urban centres within them. These nascent urban centres are what were referred to in Chapter Two as "growth points". Sanyati carried the pilot scheme for the establishment of growth points. It therefore has the oldest growth point and probably one of the most successful (Sibanda 1985). As argued earlier, the age and sex structure captures developments in the social and economic fields. Probably Sanyati and the other two district council areas illustrate this most clearly. Both Mudzi and Nyaminyami contain growth points though they are of a later stage of development than Sanyati's, explaining why their age structure has not developed to a similar extent as the latter.

The second feature of the district councils relates to the number of old people, above 65 years, which is generally greater than in the rural or urban councils (Table 3.9 & Fig 3.4). This is a reflection of the return migration process at retirement, reinforced by colonial legislation which denied the African population tenure rights within urban areas. The percentage of population above age 65 years ranges from 1.62 in Harava DC (Mashonaland East) through to 5.73% in Ngezi DC (Mashonaland West). These can be compared to a national average of 3.2%, Matebeleland South's 4.55%, Sanyati's 0.43% and Chitungwiza Town Council's 0.67%. So, district councils have a high proportion of children, and old people.

Matabeleland South Province does seem to have the highest concentration of old people in the district councils than any other province. The concentration of old peop le in the district councils of this province is reflected by the fact that they range from 3.63% to 5.30%. Even the district council with the lowest share of the population 65 years and over, Beitbridge, still operates above the national average of 3.2%. It is difficult to pinpoint the reasons for so many people over 65 years being found in Matabeleland South. The most likely reason is that the absence of any significant urban centres within the provinces increases the propensity to migrate for the population in the economically active age ranges. This concetrates both children under the age of 15 years and people in the retirement ages. This would seem to indicate a need to provide growth points along similar lines as those existing in Sanyati and Mudzi if the province is to be adequately developed or if the government is to fulfill the equity goals outline in Chapter Two.

Next, one observes that there is a large proportion of females in the district council areas. The sex ratios range from as low as 77.58 males per 100 females in Bulalima Mangwe DC (Matabeleland South) to 95.7 in Murewa Kubatana DC (Table 3.9). These can be contrasted to the national and provincial averages as well as the rural and urban councils ones. What they reveal is a low masculinity proportion in district council areas which must have some serious repercussions on the agricultural activities of these areas, which is the mainstay of their livelihood. Again, the three district council areas of Nyaminyami, Sanyati and Mudzi are exceptions as they have sex ratios that are above 100 (116.87, 123.65 & 101.47 respectively).

District council areas also have very high age and child dependency ratios due to the lower proportions of economically active people found in them (Table 3.9). The range of the age dependency ratio varies from 111.74 dependent persons per 100 economically active ones in Harava DC (Mashonaland East) to as high as 152.74 in Insiza DC (Matabeleland South). The last is generally speaking the highest for all administrative units in the country, being way above the national average of 103.54 (Table 3.7). Child dependency ratios vary from 1063I in Murewa K. DC (Mashonaland East) to as high as 139.58 in Insiza DC. Again, the three district council areas outlined above prove to be the exception. While the district council areas have high dependency ratios, it must be borne in mind that they share the dependency burden with the rural and urban council areas since the administrative units are linked to each other through labour flows as well as flows of goods and money or remittances from those working in the latter areas (Zanamwe 1988; Cheater 1982; ZNHSCP 1985).

The variables above point to one dominant feature of most district council areas. They are predominantly areas of children, women and old people (Mzite 1981:64). They are also reservoirs of labour for the rural and urban council areas. Thus, they are deprived of their youthful population which might reinforce they continued lack of development as measured by the number of households that contain simple social facilities such as modern toilet or cooking facilities (see Chapter7 ) and the extent of outmigration by the youth from these areas. This is likely to have adverse effects on development programmes aimed at improving the social and economic conditions of these areas. The government of Zimbabwe has targeted these areas as of prime development priority (GoZ 1986; Simon 1986) but the success of the development schemes will depend, in future, upon an improvement in the various ratios of the district councils leading to their greater attractiveness as working areas for a larger number of young adults.

*3.4.3.4 Age and sex composition of rural council areas*

Rural councils are areas of commercial farming activities. Some of the areas classified as rural councils contain small urban centres within them which process and market the agricultural produce of surrounding farming lands or estates. An example is provided by Chiredzi Rural Council, made up of the sugar, maize and sunflower growing estates of Triangle and Hippo Valley, the cotton estates at Mukwasini plus a few large cattle ranches like Mwenezi and Devure. At the centre of these huge commercial farming enterprises are the small towns of Triangle and Chiredzi. These contain the sugar processing plants, the cotton ginneries as well as the maize milling and oil extraction plants. Besides these activities they also provide retailing and wholesaling activities to smaller business concerns which serve the various communal lands around them.

The distinction is made because the age and sex composition of the rural councils tend to reflect the presence or absence of small towns within them. They can, therefore, be divided into two categories. Those associated with small towns or very large scale commercial farming enterprises like tea growing exhibit age and sex structures similar to those found in urban councils. They have a dominance of males, increased proportions of the population between ages 15-44 years and are nearly devoid of old people. On the other hand, those associated with very small scale commercial enterprises or where the small towns are absent exhibit a somewhat different structure. The balance between the male and female population is almost equal though still slightly in favour of the male population. There is an increase in the percentage of the male population in the working ages but this is most evident in the older working age groups i.e. between ages 30 to 55. This would seem to indicate that labour on these rural council areas is generally older than that found in the first type of rural council or the urban councils. In other words, the small scale commercial farming areas are not attractive to labour in the young adult ages and, as Cheater found out in the Msengezi area of Mashonaland West, there is net outmigration from these areas by persons in the young adult ages.

Figure 3.5 illustrates typical pyramids for the first type of rural council while Figure 3.6 illustrates the second type. The dominance of males over females is shown by sex ratios that are way above the national average, for the first type. These generally range from 163.99 males per 100 females in Gwanda RC (Matabeleland North) down to 104.06 in Mazowe RC (Mashonaland Central; Table 3.10, column 7; Fig 1.2). Those for the second group range from 58.92 males per 100 females in Mutoko South up to 127.81 for Marondera RC (Mashonaland East). In other words, they are much closer to the national average than those of the former group. In fact, they are also much closer to 100 than any of the sex ratios for the other administrative units. However, Bulalima Mangwe RC deserves mention. It has the highest sex ratio in the nation of 218.18 males per 100 females. This is any area which is very male dominated. The reason is not difficult to fathom. The area is mainly made up of forestry plantations. This is the area in which hardwoods for making furniture are grown. It seems to be for this reason that the area is so male dominated i.e. the work involved in forestry does not seem to attract females. So the area seems to be more attractive to males as an employment destination than to females. The end result is the very skewed population. The opposite to Bulalima Mangwe would seem to be the Mutoko South RC. Here the dominance is of females as shown by a sex ratio of 58.92 males per 100 females. Mutoko South RC would seem to contain activities that require the use of large amounts of female labour. Among the agricultural activities found in this areas are tobacco growing, the growing of onions and some cotton and peanut crops. These activities require or rather seem to favour the employment of female labour in the picking and sorting processes. This is especially true of the sorting and grading of onions which is repetitive work done sitting in wooden sheds.

The dependency ratios are all generally below the national average showing that children and old people are present in lesser proportion than those in district council areas. The proportion of children below the age of 15 range from 27.20% in Gwanda RC (Matabeleland South) to about 47.88% in the Mazowe RC (Table 3.10, column 2). In contrast those of the second group range from 34.23% in Mberengwa RC (Mid lands) to 55.91% in Nzisa (Matabeleland South), and are much closer to the national and provincial averages than either the district council areas or the urban councils with the exception of Mutoko South. The same pattern is revealed by the proportions over 65 years. The first group seems to be devoid of old people while the second seem to occupy a middle position between these first on the one hand and the district council areas on the other. Even the median ages would seem to indicate a similar trend between these two groupings. However, rural council areas seems on the average to

Table 3.10: Summary of selected demographic indices: rural councils

| Rural Council | Demographic Variables: Broad Age Groups 0-14 % | 15-64 % | 65 + % | Dependency Ratio (1) | (2) | Sex Ratio | Median Age |
|---|---|---|---|---|---|---|---|
| Cashel | 55.07 | 42.39 | 2.54 | 135.89 | 129.91 | 102.92 | 13.17 |
| Chipinge | 44.72 | 53.94 | 1.35 | 85.40 | 82.91 | 108.16 | 17.26 |
| Inyanga | 32.37 | 66.38 | 1.25 | 50.65 | 48.77 | 120.21 | 23.58 |
| Makoni | 48.57 | 48.28 | 3.15 | 107.12 | 100.61 | 105.14 | 15.71 |
| Chimanimani | 42.92 | 55.82 | 1.26 | 79.14 | 76.89 | 111.60 | 18.38 |
| Tsungwesi | 53.24 | 44.64 | 2.12 | 124.01 | 119.26 | 99.10 | 13.98 |
| Mutare | 43.99 | 54.07 | 1.94 | 84.95 | 81.35 | 110.86 | 17.62 |
| Bindura | 42.81 | 55.48 | 1.71 | 80.26 | 77.17 | 110.00 | 18.32 |
| Mazowe | 47.88 | 50.21 | 1.92 | 99.17 | 95.35 | 104.06 | 16.07 |
| Shamva | 45.90 | 52.40 | 1.70 | 90.83 | 87.60 | 115.86 | 17.04 |
| Mvurwi | 46.44 | 51.90 | 1.65 | 92.67 | 89.49 | 108.54 | 16.79 |
| Bromley Ruwa | 45.92 | 50.34 | 3.73 | 98.64 | 91.22 | 97.69 | 16.88 |
| Budjga | 52.03 | 44.89 | 3.07 | 122.75 | 115.91 | 98.24 | 14.36 |
| Macheke | 44.85 | 50.59 | 4.56 | 97.67 | 88.65 | 119.07 | 17.36 |
| Marondera | 42.37 | 53.73 | 3.91 | 86.13 | 78.86 | 127.81 | 19.06 |
| Mutoko South | 34.43 | 62.88 | 2.69 | 59.06 | 54.76 | 58.92 | 22.76 |
| Aryshire | 49.56 | 47.66 | 2.79 | 109.84 | 103.99 | 105.93 | 15.23 |
| Banket T. | 47.03 | 50.13 | 2.84 | 99.47 | 93.81 | 109.44 | 16.50 |
| Beatrice H.S. | 45.64 | 53.23 | 1.13 | 87.88 | 85.75 | 113.94 | 17.40 |
| Chitomborgwizi | 48.62 | 45.32 | 6.06 | 120.65 | 107.29 | 102.85 | 15.59 |
| Kadoma | 45.66 | 49.44 | 4.90 | 102.25 | 92.34 | 104.18 | 17.23 |
| Chegutu | 43.89 | 53.17 | 2.94 | 88.07 | 82.54 | 114.56 | 18.20 |
| Karoi | 44.09 | 54.14 | 1.77 | 84.70 | 81.44 | 116.67 | 17.90 |
| Norton Selous | 41.64 | 57.15 | 1.21 | 74.98 | 72.86 | 121.54 | 18.90 |
| Harare West | 45.80 | 52.00 | 2.19 | 92.30 | 88.08 | 111.21 | 16.96 |
| Umboe | 48.27 | 50.00 | 1.72 | 99.99 | 96.54 | 106.18 | 15.91 |
| Bubi | 51.31 | 45.76 | 2.92 | 118.51 | 112.13 | 95.24 | 14.56 |
| Gwaai Valley | 41.99 | 57.67 | 0.34 | 73.39 | 72.80 | 115.73 | 15.91 |
| Nyamandhlovu | 48.86 | 46.07 | 5.07 | 117.05 | 106.06 | 88.07 | 15.61 |
| Bulalima M. | 42.31 | 52.52 | 5.17 | 90.40 | 80.56 | 218.18 | 17.57 |
| Bulawayo E. | 37.65 | 60.96 | 1.39 | 64.05 | 61.77 | 142.80 | 23.22 |
| Gwanda | 27.20 | 71.36 | 1.43 | 40.13 | 38.12 | 163.99 | 28.56 |
| Nsiza | 55.91 | 39.93 | 4.16 | 150.42 | 140.00 | 88.73 | 13.02 |
| Mwenezi B. | 38.46 | 60.76 | 0.78 | 64.58 | 63.31 | 125.63 | 23.07 |
| Mberengwa | 34.23 | 63.53 | 2.23 | 57.39 | 53.88 | 96.62 | 23.58 |
| Charter | 47.63 | 48.28 | 4.09 | 107.11 | 98.65 | 98.52 | 16.09 |
| Chitenderano | 51.31 | 45.44 | 3.25 | 120.05 | 112.91 | 97.32 | 14.54 |
| Chivhu | 52.26 | 42.78 | 4.96 | 133.74 | 122.15 | 87.88 | 14.24 |
| Featherstone | 41.51 | 56.86 | 1.63 | 75.86 | 72.99 | 106.39 | 19.31 |
| Gweru Shurugwi | 39.08 | 56.67 | 4.26 | 76.47 | 68.96 | 109.14 | 23.00 |
| Kwekwe | 42.49 | 53.56 | 3.96 | 86.71 | 79.32 | 117.00 | 15.66 |
| Vungu Upper N. | 49.13 | 47.44 | 3.43 | 110.80 | 103.57 | 99.71 | 15.41 |
| Chiredzi | 41.43 | 57.80 | 0.77 | 73.00 | 71.67 | 119.41 | 19.28 |
| Gutu-Chats. | 48.54 | 48.62 | 2.85 | 105.69 | 99.84 | 109.10 | 15.71 |
| Nyahunda | 53.84 | 42.22 | 3.94 | 136.87 | 127.54 | 86.88 | 13.75 |
| Masvingo | 47.85 | 48.88 | 3.27 | 104.59 | 97.90 | 103.41 | 16.10 |

Source: 1982 Census; Ten Percent Sample, Table 2A.

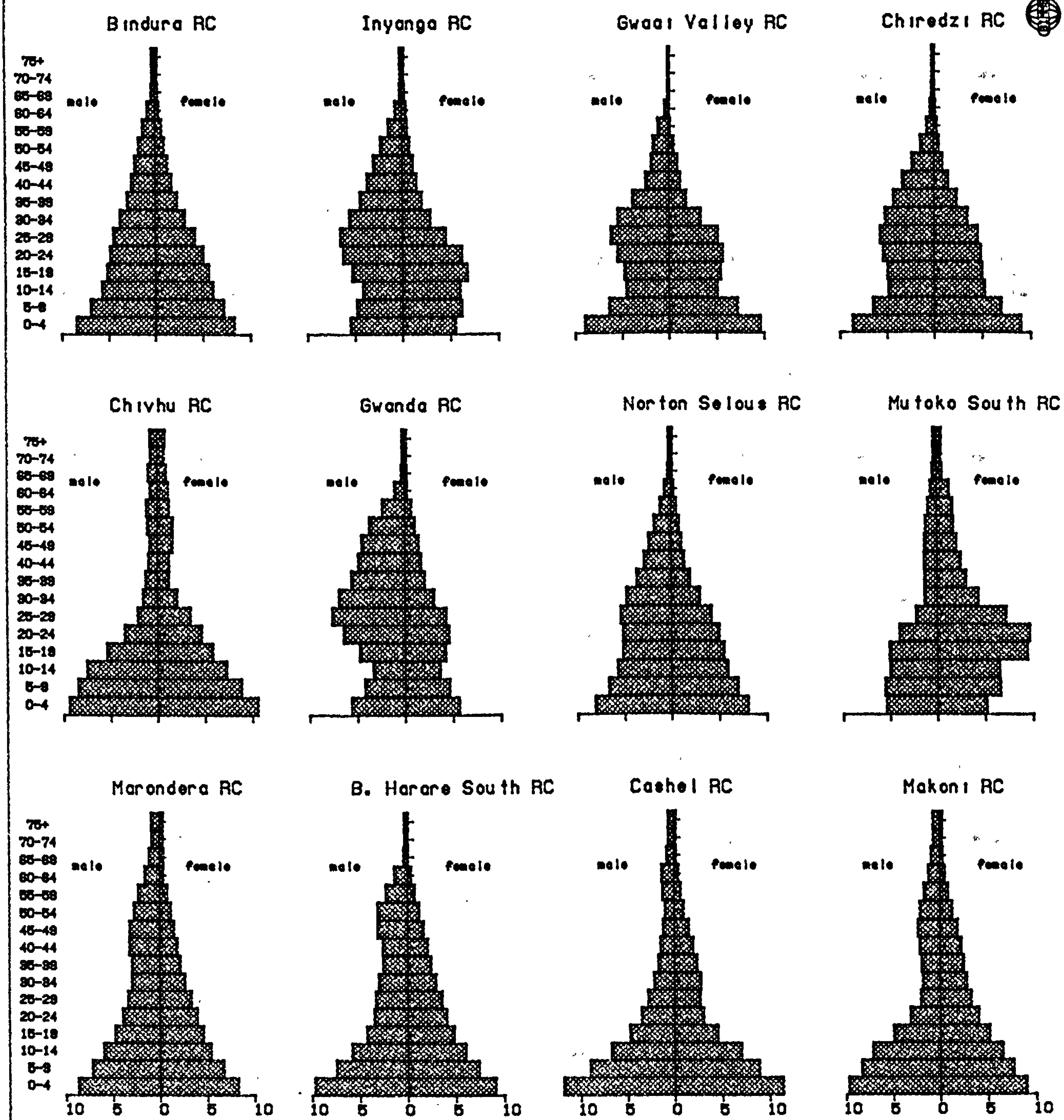


Fig. 3.5: Examples of age-sex pyramids: RCs with small towns

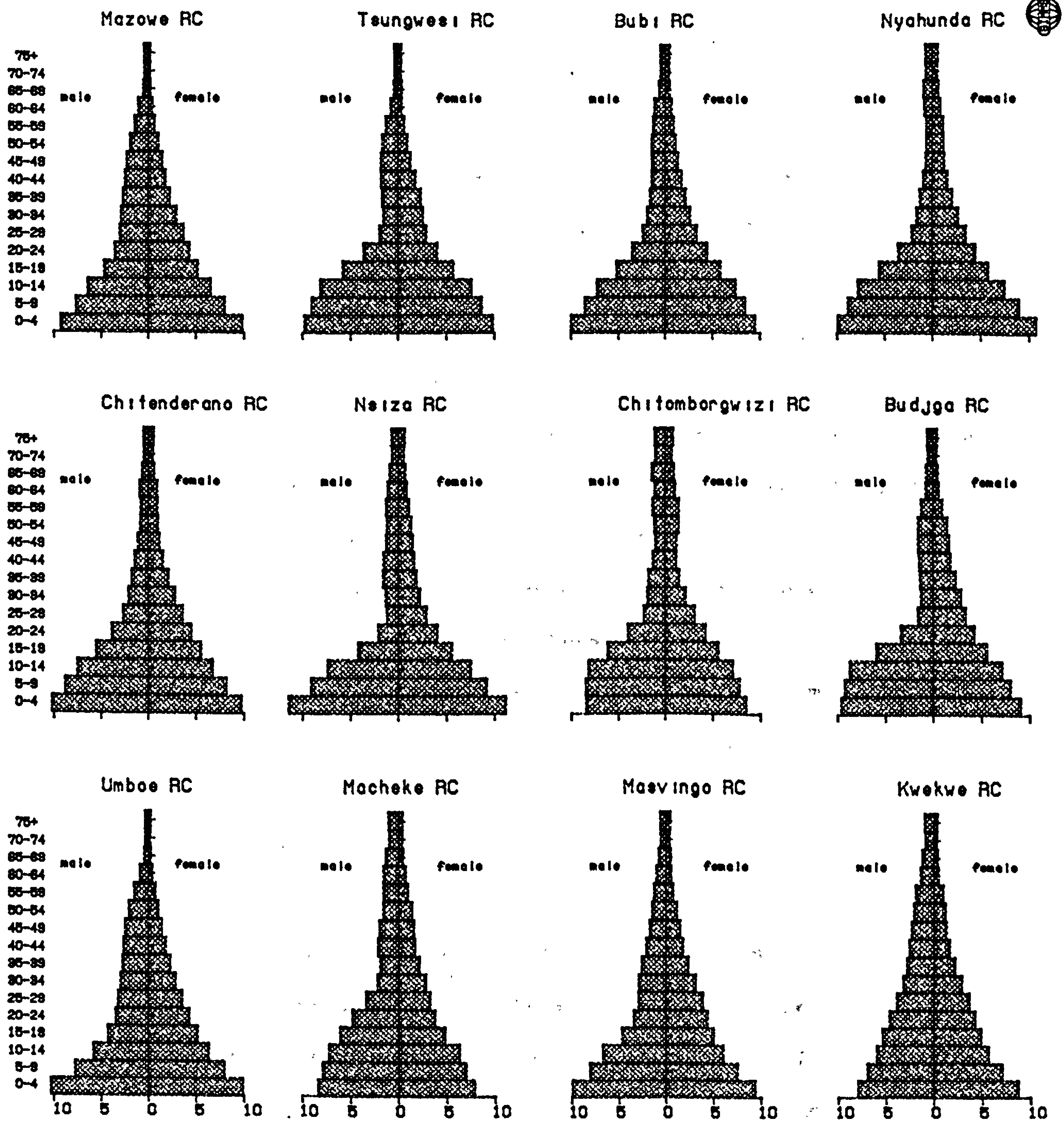


Fig. 3.6: Examples of age-sex pyramids: RCs with no small towns

contain more people in the older age groups than either the district council areas or the urban ones. Some of the highest median ages are found within the rural council areas, for example, 28.56 years for Gwanda RC. This would seem to support the suggestion that probably the population in the working age only seek employment in the rural council areas as a last resort. The overall effect of such a selective approach to the search for employment would be to make the populations in rural council areas appear older than in the rest of the administrative areas of the country.

Overall, both types of rural council occupy an intermediate position, in respect of all demographic variables, between the district councils and the urban councils. Their ratios are generally more favourable than those of district council areas but are worse than those of urban areas with a few exceptions here and there. The same applies to the proportions of population in broad age groups. Thus they can be viewed as a probable path of demographic development from the very high ratios of the district council areas towards the more favourable ones found in urban areas, discussed above.

### 3.5 IMPLICATIONS OF THE VARIOUS AGE AND SEX STRUCTURES

Various inferences can be drawn from the age and sex structures discussed above. Mention has been made of the effects of migration on these structures. These show district council areas and to a lesser extent, some rural council areas as major sources for migrants in the economically active age groups. Rural council areas and urban areas are the receiving areas for these migrants and a link is maintained between source and destination through the process of remittances. In fact, the ZNHSCP (1985) observed that between 35 and 40% of district council households receive some form of remittance from working members of the household in rural and urban council areas. A significant pool of children, women and old people is also a dominant feature of the district councils, which explains the continued strong ties between migrant and origin.

The age and sex structure of the district council areas are a major cause of concern for the government. The extent of outmigration from these areas show that they are generally devoid of any significant employment opportunities. The ZNHSCP (1985) reported that persons who were economically active found in these areas were mainly public sector employees. These worked in professions such as teaching, nursing, extension services and so on. They formed a very small proportion of the population. The rest of the population was engaged in agriculture and this, for the most part, was of the subsistence type. The cause of concern is, therefore, the effect of the deprivation of these areas that result from the absence of the young adult population. This has had adverse effects on schemes designed to improve the district council areas, as the young who are both vigorous and quick to adapt to new ideas migrate to the bright lights of the city.

Further, while the district council areas contain a large proportion of women and children, the distribution of health and education facilities shows a distinct urban bias (Zanamwe 1988, Chapter Seven). This reflects the relative political weight of these areas as well as their neglect during the colonial period. The government is attempting to redress the imbalance in the share of the public sector cake between the urban and rural areas as outlined in its national development plans (GoZ 1986). However, the extent of its success will only become evident in the next decade.

While the comparison between the 1969 and 1982 censuses seems to indicate a decline in fertility, the structure of the national population is still a cause for concern. The expanding pyramid structure shows that the population still has a tremendous potential for further growth. It also means that for the foreseable future, at least, the national and local governments will have to battle with the problem of providing health and educational facilities to large cohorts of people under the age of 15 years. Investment in the public sector will continue to grow and this implies that the government will spend less on capital investment programmes which generate employment opportunities for the population. By expanding the health and educational opportunities while the investment in industry is falling the government might be putting itself into a Catch 22 type of situation. The greatest hope is that the decline in fertility can be accelarated so as to achieve a transition to both low rates of fertility and mortality within a short period of time. Otherwise the problems of providing public facilities for the growing population and employment for those coming out of the educational system will continue for some time to come. Already the system is generating a high number of school leavers every year, about 100,000 annual for the next few years, while the number of new jobs being created are growing slowly and in some industries they are falling (Moto 1987; GoZ 1986).

# CHAPTER 4

# FERTILITY ANALYSIS IN ZIMBABWE

## 4.1 GENERAL INTRODUCTION

As reviewed in Chapter 2, one of the main foci of research in Zimbabwe has been the theme of population and socio-economic development. The debate begun in the early 1970s has intensified in the post-independence period (after April 18th 1980) as researchers began to investigate the implications of the development strategies introduced by the new government and how these could be adversely affected by rapid population growth. The debates have highlighted the lack of a population policy in Zimbabwe (Whitsun Foundation 1984:153, Moyo 1986:36-39, Moto 1988:6), though documenting the official support given by government to family planning organisations.

The chapter is not directly concerned with the pros and cons of the population and socio-economic development debate in Zimbabwe. Instead, it seeks to investigate one of the main weaknesses which has been highlighted by the debate. This is the lack of statistics that relate fertility or for that matter mortality or migration to socio-economic development. As shall be argued, most of the debate centres on the use of the population growth rate which is derived from the use of crude measures of population change. More refined measures such as will be discussed and derived in this chapter might lead to greater clarity on the whole issue, and if the government so wishes, the formation of a better population policy.

The rest of the chapter is divided into four sections. Section 4.2 describes how fertility is measured and defined by demographers. It indicates the detail of data required to be able to measure each fertility indicator as well as indicating the levels of vital registration within Zimbabwe. Finally, it considers the data sources used in the investigation for this particular chapter. Section 4.3 examines direct estimates of fertility in Zimbabwe and investigates past and current fertility levels in the country. The major limitations of present fertility analysis in the country are noted, leading to Section 4.4. Section 4.4 explores methods by which fertility can be estimated, especially at the sub-national level while Section 4.5 is a comparative overview of the results obtained in Sections 4.3 and 4.4 and indicates their application in future fertility discussions.

## 4.2 FERTILITY: MEASUREMENT, VITAL REGISTRATION, ESTIMATION

The measurement of fertility can be approached in one of two ways. The first is to view fertility as a period event whilst the second would view it as a cohort event. There is a clear distinction between these two approaches, both in conceptually and in terms of the data required to fulfill the measurements.

Period fertility provides a measure of fertility in a cross-section of time. Normally, period fertility measures births occurring during a specified period of time, say one year. In direct contrast, cohort fertility is a longitudinal measure of fertility. The focus is on births occurring to a specific group of women linked by some common event such as date of marriage (Benjamin 1968:62, Woods 1979:96, Yaukey 1985:145-151, Newell 1988:36). The chapter is concerned with the measurement of period fertility, the most commonly used approach in studies of population.

Five measures of fertility are discussed and defined. They will be in the order of their complexity, i.e., in terms of the data required to calculate them. The five measures are; the child-woman ratio, the crude birth rate, the general fertility rate, the age-specific fertility rates and the total fertility rate. It is possible to estimate other more specific measures of fertility but the chapter will ignore these as they do not feature prominently in the debate on population and development and often require more detailed data to estimate or measure.

4.2.1 The Child-Woman Ratio (CWR)

The child-woman ratio is a very crude measure of fertility that expresses the number of children aged 0-4 years as a ratio of the total female population aged 15-44 or 49 years. This can be represented mathematically as:

$$CWR = \frac{\text{Children aged 0-4}}{\text{Women aged 15-44 or 49}} \quad \text{or} \quad \frac{{}_4C_0}{{}_{49}F_{15}} \qquad (4.1)$$

where ${}_4C_0$ are the children aged 0-4 and
${}_{49}F_{15}$ are the females aged 15-49 years.

The child-woman ratio is most useful where population data by age and sex only are available, as for instance, from a census. Woods (1979:111) cites Robson as having applied the CWR in research on urban social area analysis. The reason for applying the CWR was that, the urban level of spatial analysis, did not have any fertility data except for the age and sex structure of the population. De Vany and Sanchez (1979) found it useful to apply the CWR in their study of the relationship between fertility and socio-economic development in Mexico due to the lack of data on fertility. Roughly speaking, if fertility in an area is high then the child woman ratio, which is expressed per thousand women, is also high and vice versa. Bogue (1969) has argued that the CWR varies in direct proportion to the more refined measures of fertility, especially the general fertility rate. Due to this, the CWR can be used to estimate refined measures of fertility in conjuction with other socio-economic data. In Section

4.4 one such method is applied to the estimation of the general fertility rate.

Newell (1988:36) points out that the CWR is quite sensitive to errors in age data (such as under-reporting of young children; See Chapter 3) as well as the level of infant and child mortality. Caution is therefore advised in the use and interpretation of the measure, especially where comparison are being carried out between populations with different infant and child mortality levels or where under-reporting of young children is a known problem. Otherwise, the CWR can be viewed as a useful indicator of fertility in a population in the absence of other data. Its utility is enhanced by the fact that it can be used to estimate other measures of fertility.

4.2.2 <u>The Crude Birth Rate (CBR)</u>

Another crude indicator of fertility is the crude birth rate. Woods (1979:106) argues that the use of the term rate is a misnomer. In reality, the crude birth rate is a ratio that expresses the number of births in a given year over the total mid-year population. This can be written as:

$$CBR = \frac{\text{Births in year}}{\text{Total mid-year population}} .1000 \text{ or } \frac{B}{TP} .1000 \qquad (4.2)$$

where B is the number of births in the year and
TP is the total mid-year population

The crude birth rate is viewed as a ratio because the denominator includes the whole population regardless of sex or age. The inclusion of all ages and both sexes and other characteristics of the population affects the CBR measure. As a result, its usefulness in comparative population studies is impaired because populations with different characteristics can not be compared or even the same population over widely differing times. However, the CBR is still a useful and widely used measure because of three features. First, it is very easy to understand and use. Secondly, it requires few data (births and total mid-year population) and is therefore very easy to compute. Thirdly, if estimates of the Crude Death Rate (CDR) are available, then the Crude Natural Increase Rate can be calculated by subtracting the CDR from the CBR. The Crude Natural Increase Rate together with the Crude Net Migration Rate give the overall rate of population growth (Newell 1988:37). Indeed, the debates on population growth often use the population growth rate derived from the crude measures outline above. However, to overcome the limitations of lack of comparability, it is necessary to look beyond the crude measures of fertility to more specific ones.

4.2.3 The General Fertility Rate (GFR)

The general fertility rate expresses births in a given period of time to the number of women in the reproductive age span. It relates births in a given year to women at risk of giving a birth and, is therefore a more specific measure of fertility than the crude birth rate or the child-woman ratio. It can be written thus:

$$GFR = \frac{\text{Births during the year}}{\text{Women aged 15-44 or 49 at mid-year}} \text{ or } \frac{B}{{}_{49}F_{15}} .1000 \qquad (4.3)$$

where the terms are defined as in Equation 4.1 and 4.2 above.

The GFR is very sensitive to the denominator used. The denominator must be stated clearly if meaningful comparisons are to be made between different populations. Comparing a 15-44 GFR with a 15-49 GFR can be misleading and can lead to a wrong interpretation of the fertility levels of a given population. Newell (1988:38) illustrates the difference the denominator makes with regards to data from the United States. The 15-44 GFR was found to be 66.1 children per thousand women as opposed to 57.8 children/1000 women when the 15-49 GFR was applied. The difference in the results is of the order of 13 per cent.

Like the CBR, data used in the computation of the GFR can be derived from vital registration systems. This is especially true of the data on births. However, the data on the age of women will come from estimates of mid-year populations, since in most cases the age of women might not be recorded when the births are registered. Indeed, Newell points out that recording of the age of the mother was not carried out in England and Wales until 1937.

Unlike the CBR, the GFR controls for age and sex structure by relating births to the women at risk of giving a birth. However, control for age structure is only partial, as they may be substantial differences between populations within the reproductive age ranges. Some populations have more females in the 15-19 age group than others. Further, births are not spread evenly across the childbearing age ranges, with ages 20-34 being more productive than the 15-19 or 35-49 age groups. If comparative analysis is the goal, then a more specific measure of fertility, which controls for both age and sex, is required.

4.2.4 Age-Specific Fertility Rates (ASFRs)

The age specific fertility rate expresses the relationship between the number of births and the age of the mother as a function of the fertility experience of a given population (Woods 1979:108). The definition hints at the rigorous data requirements for the computation of the ASFRs. The data required are of births in a given year classified by the age of mother. The vital registration systems of developed nations can provide such data, as the age of mother is recorded when the child's birth is registered. For developing nations, such vital registration systems are still in the developmental stage and are far from being complete,which reduces their utility. The ASFRs are derived as:

$$\text{ASFRs} = \frac{\text{Births in year to women aged x}}{\text{Women aged x at mid-year}} \quad \text{or} \quad {}_nf_x = \frac{{}_nB_x}{{}_nF_x} \qquad (4.4)$$

where n is the age interval of the age groups (usually 5 years)
x takes the values 15, 20, ...45.
${}_nF_x$ is the age specific fertility rate for females F, aged x to x+n

Because there are normally seven ASFRs in all, it is easier to apply an index i instead of x. The i is used to refer to the seven ASFRs associated with the seven age groups of the women in the childbearing years ages (15-19, 20-24, ...45-49), as 1,2,...7 (Pressat 1972:38-42, Woods 1979:108, Yaukey 1985:148, Newell 1988:39-41)

Data obtained from vital registration systems make it possible to calculate ASFRs as single year rates. If such a system is adpoted, then 35 ASFRs will be generated. The ASFRs can be expressed as part of a thousand or per thousand. It is also convention to added the births to females below the age of 15 to the 15-19 age group and those to females above the age of 50 to the 45-49 age group. The reason is that there are fewer births at the extreme ends of the reproductive age ranges to warrant separate treatment.

The ASFRs are most useful in terms of modelling as they are free from age structure biases. Further, they are of greater accuracy than the general fertility rate because the population at risk is more clearly defined. Their disadvantage lies in the fact that they are not a single number indicator like the GFR or the CBR. This makes them more complex and tedious to apply in comparative analysis (Woods 1979:108, Newell 1988:41). To utilise their age-sex bias free advantage, it is necessary to take them a step further and use them to calculate the total fertility rate, which is a single number indicator of fertility.

4.2.5 The Total Fertility Rate

Known too, as the Period Total Fertility Rate, the TFR is the sum of the age specific fertility rates, adjusted for the width of the age classification of women. Thus, where n (the width of the age group of women) equals five, it becomes the average of each of the ASFRs, for each of the five years. To adjust the TFR, it has to be multiplied by five.

The convention is to express the TFR as the number of children a woman would have if she bore children at the current ASFRs throughout her childbearing life-span. In contrast, the age specific fertility rates are normally expressed as a rate per 1000 women. To bring the different expressions into line, the TFR can be written as:

$$TFR = \frac{\text{Sum of ASFRs}}{1000} . n \quad \text{or} \quad n.\left(\sum_{i=1}^{7} \frac{B_i}{F_i}\right) / 1000 \qquad (4.5)$$

where n = 5
i = index of the five year age groups of the reproductive age span (15-19,20-24,...45-49)

The total fertility rate is a measure that is totally free of age and sex biases and is therefore of great use in comparative analysis of different populations as well as in modelling.

4.2.6 Registration of vital events and data used

Sub-sections 4.2.1 to 4.2.5 have discussed the common measures of fertility and indicated roughly, the data required for their computation. Most measures relate births in a year to the mid-year female population. Most of the births, especially in developed nations are derived from vital registration systems or sample surveys (Woods 1979:19-25, Newell 1988:19-21). Since the measurement of fertility requires data from vital registration systems, one is forced to address the question, what is the extent of vital registration in Zimbabwe?

There is no explicit treatment of vital registration in the literature on Zimbabwe. However, the extent of registration has been estimated by some official sources. The Minstry of Health (MoH, 1985:2, 1986:2) has indicated that the analysis of births recorded in the 1982 Census with those in the register show birth registration as being under-estimated by approximately 25%. UNICEF (1985:17) argues for extensive variations in the extent of registration across the country. The urban centres have a more complete registration system than the rural areas. Harare's register of vital events is supposed to be complete, as opposed to the rural districts where variation is by margins greater than the national average (UNICEF 1985:11-18).

The lack of complete registration requires that at subnational levels some form of estimation be carried out if the whole fertility picture of the country is to be ascertained. It is necessary to utilise some of the available crude measures of fertility such as the child-woman ratio in estimation procedures that can arrive at the more refined measures of fertility such as the general fertility rate. The overall aim of such estimation is to enhance the overall demographic picture of the nation as well as devising means of continuing to update the demographic data of the country's sub-national units.

The data used in the chapter are drawn from two main sources. The first is the 1982 Census, used in the discussion of age structure in Chapter Three. The second source are reports on the demographic and socio-economic surveys carried out between 1983 and 1984 in the district council areas of the country. Only data on five provinces were gathered in these surveys though at the time of writing only three of the reports were available to the researcher. Other minor sources will include the National Reproductive Health Survey carried out by the Zimbabwe National Family Planning Council in 1983/84 and, for comparative purposes, the 1969 Census.

## 4.3 FERTILITY LEVELS IN ZIMBABWE

Woods (1979:156-157) has argued that the apparent homogeneity of national statistics mask some important spatial and at times temporal variations in fertility within a single country or region. The level of fertility displayed at the national scale is by no means uniform at lower levels. The problem faced by researchers working in developing nations is the lack of suitable data at the sub-national level, making it difficult to examine fertility variations at such levels. It is, therefore, necessary to establish the pattern of fertility at the national level. Once this is accomplished, further investigation should lead to the exploration of possible temporal and spatial variations at the sub-national levels. From this point, one can proceed to provide estimates for other sub-national units enabling the full examination of the fertility patterns of the nation.

The questions to address are: what are the levels of fertility in Zimbabwe, both current and in the recent past? What are the spatial and temporal variations in fertility, if any? Is it possible to utilise the available statistics to fill in the gaps at the sub-national level? The last question being a pointer to the need for estimation as discussed in Section 4.2.

The section discusses past and current fertility levels in Zimbabwe based on the fertility measures discussed in Section 4.2. Table 4.1 presents the raw data on women by age group, births by age group of women, and the total population from various sources and for various time periods. Subsequent fertility measures discussed are derived chiefly from these data.

Table 4.1: Female population by age group, births by age group of mother and total population; Zimbabwe 1969-1985, Manicaland and Masvingo 1982, District Councils of Manicaland, Mashonaland Central and East 1983/84

| Age Group of Mother | Rhodesia 1969 F | Rhodesia 1969 B | Zimbabwe 1982 F | Zimbabwe 1982 B | Zimbabwe 1985* F | Zimbabwe 1985* B | Manicaland 1982 F | Manicaland 1982 B |
|---|---|---|---|---|---|---|---|---|
| 15-19 | 240,110 | 28,549 | 410,929 | 37,818 | 505 | 66 | 62,073 | 4,621 |
| 20-24 | 208,460 | 57,014 | 362,716 | 93,598 | 566 | 164 | 49,043 | 12,723 |
| 25-29 | 174,944 | 50,506 | 279,915 | 70,874 | 489 | 146 | 39,762 | 10,674 |
| 30-34 | 144,519 | 36,000 | 205,918 | 46,291 | 359 | 94 | 29,989 | 7,212 |
| 35-39 | 119,914 | 23,851 | 169,477 | 27,915 | 306 | 67 | 24,411 | 4,436 |
| 40-44 | 85,791 | 11,058 | 138,961 | 12,933 | 185 | 17 | 20,692 | 2,236 |
| 45-49 | 76,964 | 4,995 | 109,856 | 5,586 | 163 | 2 | 16,066 | 960 |
| TOTAL | 1,050,702 | 211,973 | 1,677,856 | 295,015 | 2,574 | 556 | 242,036 | 42,862 |
| Popul. | - | - | 7,546,071 | - | - | - | 1,102,104 | - |

| Age Group of Mother | Masvingo 1982 F | Masvingo 1982 B | Manicaland** DCs F | Manicaland** DCs B | Mashonaland DCs** Central F | Mashonaland DCs** Central B | Mashonaland DCs** East F | Mashonaland DCs** East B |
|---|---|---|---|---|---|---|---|---|
| 15-19 | 34,608 | 2,831 | 40,512 | 2,563 | 18,005 | 945 | 25,238 | 1,919 |
| 20-24 | 29,911 | 7,287 | 32,402 | 9,258 | 13,525 | 3,576 | 19,334 | 4,944 |
| 25-29 | 25,176 | 6,020 | 27,773 | 7,460 | 11,593 | 3,412 | 16,567 | 4,465 |
| 30-34 | 18,869 | 4,301 | 21,996 | 6,120 | 10,318 | 2,425 | 12,360 | 2,767 |
| 35-39 | 14,200 | 2,475 | 17,597 | 3,136 | 8,057 | 1,398 | 9,340 | 1,881 |
| 40-44 | 12,898 | 1,398 | 13,657 | 1,225 | 7,194 | 532 | 7,822 | 812 |
| 45-49 | 9,753 | 740 | 12,012 | 1,034 | 5,139 | 369 | 8,634 | 699 |
| TOTAL | 145,415 | 25,052 | 165,949 | 30,796 | 73,831 | 12,660 | 99,385 | 17,487 |
| Popul | 1,028,147 | - | 768,883 | - | 339,759 | - | 466,067 | - |

Notes: * Reproductive Health Survey 1985
** Household Capability Survey 1983-1984
F. Female population; B. Births; Popul. Total population

Sources: Mzite(1981: Table 3.11:41 & Appendix 4:78)
CSO(1985a: Table VI.4:138 & Census 1982:Table 2A & 33A)
ZNFPC(1985: Table 4.10:57)
PSSU(1985: Table 1:2 & Table 3:3)

### 4.3.1 Levels of crude birth rate and general fertility rate

The most commonly available statistic on the fertility of Zimbabwe is the crude birth rate. This is due to its ease of computation and its minimum data requirements. Table 4.2 gives a summary of the CBR and

GFR estimates available for Zimbabwe at different time periods and spatial scales.

Table 4.2: Crude Birth Rate and General Fertility Rate: Zimbabwe 1948-1985, Manicaland and Masvingo 1982, District Councils of Manicaland and Mashonaland Central and East 1983/84.

| Area | Date | CBR / 1000 | GFR / 1000 |
|---|---|---|---|
| Southern Rhodesia | (1948) | 46.6 | - |
| Southern Rhodesia | (1953/55) | 44.8 | - |
| Southern Rhodesia | (1962) | 48.0 | - |
| Rhodesia | (1969) | 52.0 | 202.0 |
| Zimbabwe | (1982) | 39.4 | 175.8 |
| Zimbabwe | (1985) | - | 216.0 |
| Manicaland | (1982) | 38.9 | 177.1 |
| Masvingo | (1982) | 24.7 | 172.2 |
| Five District Councils | (1983/84) | 39.0 | 178.2 |
| Manicaland DCs | (1983/84) | 40.1 | 185.6 |
| Mashonaland Central DCs | (1983/84) | 37.5 | 176.0 |
| Mashonaland East DCs | (1983/84) | 37.3 | 171.5 |

Sources: Mzite(1981: Table 3.5:29)
CSO(1985a: Table VI.1:132)
ZNFPC(1985:57)
PSSU(1985: Table 1:2 & Table 3:3)
Census 1982: Table 2A & Table 33A

The table indicates that fertility has been relatively high in the recent past (Mzite 1981:36-37; Kay 1976:148-150; CSO 1985b:15; ZNFPC 1985:50-53). Fertility in the country rose after the Second World War, up to the time of the 1969 Census. After the 1969 Census, a fertility decline must have started. The precise point of the start of the decline cannot be pinpointed. However, both the CBR and the GFR show a decline in fertility, at the national level, of between 14% and 16% by 1982 (CSO 1985a:133-136).

The GFR estimate for 1985 seems to be higher than the estimate for both censuses. The reason for this, lies in the character of the sample that the ZNFPC used. This was heavily biased in favour of the rural population, where fertility is suspected to be higher than of urban populations (ZNFPC 1985). Further, the small size of the sample involved mean that errors are likely to be of greater magnitude than in the full census count.

Table 4.3 can be used to compare the CBR and GFR of Zimbabwe to other countries within the East African region. The estimates show

Table 4.3: Crude Birth Rate and General Fertility Rate estimated by the United Nations for Eastern African Countries 1980-1985

| Region/ Country | CBR | GFR | Country | CBR | GFR |
|---|---|---|---|---|---|
| EASTERN AFRICA | 47.9 | 215 | Mauritius | 26.1 | 98 |
| Burundi | 46.8 | 198 | Mozambique | 44.6 | 196 |
| Comoros | 46.0 | 201 | Rwanda | 49.4 | 223 |
| Ethiopia | 49.7 | 218 | Somalia | 46.3 | 192 |
| Kenya | 53.5 | 264 | Uganda | 44.6 | 199 |
| Madagascar | 44.8 | 196 | Zambia | 49.0 | 224 |
| Malawi | 50.8 | 231 | Zimbabwe | 47.2 | 215 |

Source: CSO(1985a: Table VI.2:134)

that, according to the 1982 census, Zimbabwe had fertility levels that were lower than the Eastern Africa average. Indeed, of the countries in the table, only Mauritius had lower fertility levels than Zimbabwe in 1982. However, it is important to point out that the degree of comparability between the Zimbabwean statistics and those in Table 4.3 is very limited. The limitation is imposed by the fact that the statistics shown are by products of indirect estimates by the United Nations, based mostly on Censuses taken in the 1960s or the early 1970s. The figure for Zimbabwe is based on projections from 1969, which rested on the assumption that the countries in Africa were experiencing the smallest decline in fertility (Woods 1979:153).

The sub-national level affords very little temporal comparison. However, there is some spatial variation as indicated by the figures for Masvingo and Manicaland in Table 4.2. In terms of the CBR, Manicaland operates much closer to the national average than Masvingo (38.9 versus 24.7). The evidence would seem to indicate that Masvingo has the lowest crude birth rate in the country. Statistics available from the City of Harare (1987:2) indicate that in 1985 Harare had a CBR of 47 live births per 1000 of population which by 1986 had fallen to 43 live births per 1000 population. These figures, coming three years later, are both higher than the 1982 Masvingo CBR figure. However, there is need to take the Masvingo figure with caution for it might be indicating a degree of underenumeration in the population there. It is noted by the CSO (1984:38) that in the Gaza Komanani District Council (in south-eastern Masvingo):

> "there was an army contact with South Africans during the enumeration in Sengwe. It was reported that people fled but later returned when they were enumerated. In such circumstances underenumeration is likely".

In fact, the figures based on the GFR, show Masvingo as being quite close to the national average. The CBR might have been affected by the age and sex structure of the population of Masvingo, compounded by a certain degree of underenumeration.

The figures for the district councils refer to two years later and are the result of a sample survey (see Chapter 1.4). Even though they come two years after the census, the figures are quite close to the national average for 1982. This confirms the assertion that fertility is much higher in the district council areas than elsewhere in the country. The average CBR for the five out of eight provinces (Manicaland, Mashonaland Central and East, Midlands and Masvingo) stood at 39 live births per 1000 population (CSO 1985a:132). Of the available data from this survey, Manicaland DCs had CBR figures that were above the average for both the province and the nation in 1982.

Indeed, only Manicaland can afford a comparison with the 1982 Census. The rest of the figures hint at small spatial variations in the fertility levels within the country.

4.3.2 Levels of age specific fertility and total fertility rates

Table 4.4 provides a summary of age specific fertility rates as well as the total fertility rates for various time periods and spatial units within Zimbabwe. The ASFRs show that the most fertile age

Table 4.4: Age Specific Fertility Rates and Total Fertility Rates: Zimbabwe 1953-1985, Manicaland and Masvingo 1982, District Councils of Manicaland and Mashonaland Central and East 1983/84.

| Age Group of Women | Southern Rhodesia 1953-55 | Rhodesia 1969 | Zimbabwe 1982 | Zimbabwe 1985 | Manicaland 1982 |
|---|---|---|---|---|---|
| 15-19 | 0.260 | 0.119 | 0.092 | 0.131 | 0.074 |
| 20-24 | 0.340 | 0.274 | 0.258 | 0.290 | 0.259 |
| 25-29 | 0.230 | 0.289 | 0.253 | 0.299 | 0.268 |
| 30-34 | 0.160 | 0.249 | 0.225 | 0.262 | 0.241 |
| 35-39 | 0.100 | 0.199 | 0.165 | 0.219 | 0.182 |
| 40-44 | 0.040 | 0.129 | 0.093 | 0.092 | 0.108 |
| 45-49 | 0.010 | 0.065 | 0.051 | 0.012 | 0.043 |
| Total | 1.140 | 1.323 | 1.137 | 1.304 | 1.192 |
| TFR | 5.700 | 6.620 | 5.685 | 6.520 | 5.960 |

| Age Group of Women | Masvingo 1982 | District Councils of: Manicaland 1983-1983 | Mashonaland Central | Mashonaland East |
|---|---|---|---|---|
| 15-19 | 0.082 | 0.063 | 0.053 | 0.076 |
| 20-24 | 0.244 | 0.286 | 0.264 | 0.256 |
| 25-29 | 0.239 | 0.269 | 0.294 | 0.270 |
| 30-34 | 0.228 | 0.278 | 0.235 | 0.224 |
| 35-39 | 0.174 | 0.178 | 0.174 | 0.200 |
| 40-44 | 0.108 | 0.090 | 0.074 | 0.104 |
| 45-49 | 0.076 | 0.086 | 0.072 | 0.081 |
| Total | 1.151 | 1.250 | 1.166 | 1.209 |
| TFR | 5.755 | 6.250 | 5.830 | 6.045 |

Sources: Mzite(1981: Table 3.11:41 & Appendix 4:78)
CSO(1985a: Table VI.4:138)
ZNFPC(1985: Table 4.10:57)

groups are in the 20-34 age ranges. On average, these age ranges have fertility levels of above 200 live births per 1000 women in each age group. The contribution of the age group 15-19 seems to have diminished since 1953 though the weighting of the population in 1985 makes its contribution bigger than that found in the 1982 Census. The trend of fewer and fewer births from the 15-19 age group is in keeping with the long observed fact that where fertility is declining, the age groups at the extremes of the child bearing age ranges reduce their fertility most (Woods 1979:153). Indeed the contribution of the age groups 40-44 and 45-49 has been declining too. For example, in 1969, the 40-44 age group had an age specific fertility rate of more than 120 live births per 1000 women. By 1982, the age group's rate had fallen to 93 per 1000. Even the 1985 data which are weighted in favour of the rural population show the group's rate at 91.9 live births per 1000 women. In this regard, the indication of falling fertility is strongly confirmed.

The falls, though, are not reflected uniformly at the sub-national level. For example, both Manicaland and Masvingo had rates of above 100 live births in 1982 in the 40-44 age group. The evidence from the district council areas also shows a degree of spatial variation. Manicaland DCs and those of Mashonaland Central show rates that are below 90 live births in contrast to Mashonaland East which had a rate of 103.8 live births per 1000 women. Due to the lack of data from other time periods for use in comparison, all that can be said is that there is evidence for assuming that fertility varies across space and time.

The total fertility rate, also shown in Table 4.4, strengthens the argument for falling fertility across time as well as variation across space. The TFR show a rise in fertility through to the 1960s.

After that a decline is evident which is in keeping with the evidence from the CBR and the GFR. Variations at the sub-national level is also evident. For example, Manicaland's 1982, 5.96 children per woman which is close to the average for less developed countries of 5.94 children per woman in the 1970-1975 period (Woods 1979:153) can be contrasted to the average for its own district councils in the 1983-84 period which stood at 6.25. The latter figure is closer to the national average for 1985 from the ZNFPC of 6.52 children per woman. Interestingly enough, Masvingo's TFR or even its ASFRs do not differ greatly from the rest of the sub-national figures. This is probably another illustration of the greater accuracy of fertility measures which are totally free from biases introduced by age and sex structure.

The section has tried to establish the levels and trends of fertility in Zimbabwe. It is evident that the picture at the sub-national level is incomplete. The limited nature of the data makes full scale comparisons of the patterns of fertility less practical. Thus, to fulfill the aim of trying to provide a full description of fertility development, at the sub-national level, it is necessary to estimate some of the measures of fertility from the partial data available. Section 4.4 below discusses techniques of estimation and illustrates how they can be applied in the description of fertility at the sub-national levels where data are not available.

## 4.4 INDIRECT PROCEDURES FOR ESTIMATING FERTILITY MEASURES

A number of notable demographers have evolved procedures of estimating fertility levels from limited or defective data. The procedures are termed "indirect" because they rely on some aspect of the social or demographic characteristics of the population under study to arrive at an estimate of its fertility. Two such procedures are discussed briefy below and a third procedure, more suitable for our purpose, is described in detail.

4.4.1 Brass procedures and the Bogue-Palmore methods

The work of William Brass on fertility and mortality estimation from defective data is probably the most widely known and applied, especially in developing countries. The Brass type estimation procedures are based on the recognised relationship between the number of children ever borne by women in the child bearing age ranges and those that survive (see Brass 1975:11-29, Mzite 1981:36-39, UN 1983:27-37). From the children ever borne, parity ratios can be calculated which are then compared to the cumulative fertility rates based on births in the year prior to the survey or census. The comparison is based on the knowledge that children who are born alive but die in infancy, are only partially reported by their mothers. The closer to the time of the survey the death is, the greater the likelihood of parents not wanting to report it. Thus, data on births in the last year is likely to be incomplete because some children borne alive who die later in the year are not reported. Indeed, UNICEF (1985:17) report that the application of the Brass techniques to the data from the 1982 census revealed that as much as one third of deaths occurring in the first year of life were not reported by parents to census enumerators.

The Brass type procedures is useful for checking the consistency of census data. They do not lend themselves readily to use in situations were one is required to estimate fertility of areas without data, at all. For this reason, the method was dropped in search of one that would enable the estimation of fertility at the sub-national level.

The Bogue-Palmore regression techniques presented a possible means of estimating data at the sub-national level. The techniques were based on socio-demographic characteristics of the population derived from a census or survey. These included such indices as the child woman ratio, the median age of marriage, child mortality, the index of fertility age composition and so on (Bogue & Palmore 1964:317,325-326). The indices were developed through regression techniques based on data from developed countries, i.e. those whose data were known to be reliable. Cho (1964:359-374) provided the classifications of countries according to the reliability of their data, utilised by Bogue and Palmore in their regressions. The regression equations and coefficients obtained were then applied to estimating fertility measures for countries with very little or defective data. The results obtained from applying the techniques seemed reasonable enough based on the known demographic, social and economic development of the countries with the defective data.

The Bogue-Palmore regression technique seemed to provide a means of estimating fertility at the sub-national level based on the 1982 Census for Zimbabwe. However, not all the data necessary to calculate the indices Bogue and Palmore used were available. Indeed, the available statistic which covered the whole of the country, was the child to woman ratio. It was therefore decided to use the child woman ratio to estimate other fertility measures, especially the general fertility rate.

4.4.2 <u>Child woman ratio and indirect estimates of fertility</u>

A comparison of equations 4.1 and 4.3 reveals that the child woman ratio is a special case of the general fertility rate. The difference lies in the enumerators. The GFR enumerator is concerned with births in the year prior to the survey whereas that for the CWR is concerned with the births in the previous five years who survive as the population in the 0-4 age group. Bogue (1969:662-663) and Rees (1987) argue that the application of reverse survival techniques can convert the children aged 0 to 4 years to their births in the five years prior to the census. The female population aged 15 to 49 years can also be reverse survived to obtained the women in the child bearing age ranges. If reverse survival for both the children and the women are done successfully, then estimates of the GFR can be derived and the births implied by the GFR computed for the population or area under consideration. Once, the births are computed, it is also possible to arrive at the estimates of the crude birth rate, provided the total population for the areas under consideration are known.

Both Bogue and Rees point out that, for the reverse survival technique to work properly, it is necessary to have an estimate of both child and maternal mortality for the period under observation. Since in most cases such information is not available, it is necessary to utilise life tables in the estimation of child and maternal mortality. If a national life table does not exist then a model life table, which embodes the mortality conditions of the population under study, can be used (Brass 1969:663, Rees 1987).

Life tables exist for both the male and female populations of Zimbabwe based on the 1982 Census (CSO 1985a:178-179). The female population aged 15-49, the children aged 0-4, the child to woman ratios and the total population are presented in Table 4.5 by districts and provinces within the country. The district is the third rung in the administrative structure of the country (see Chapter 1). A step by step discussion of the technique of estimating fertility measures from the child woman ratio through the reverse survival technique follows.

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Table 4.5: Children aged 0-4, Women aged 15-49, Child Women Ratios, Total Population by Ditricts; Zimbabwe 1982.

| Province/ District | Children 0-4 | Women 15-49 | Child Woman Ratio | Total Population |
|---|---|---|---|---|
| MANICALAND | 194,310 | 228,250 | 850.6 | 1,054,890 |
| Buhera | 42,160 | 44,520 | 947.0 | 205,660 |
| Chipinge | 41,810 | 52,840 | 791.3 | 224,610 |
| Chimanimani | 11,930 | 14,630 | 815.4 | 66,150 |
| Mutasa | 15,970 | 19,100 | 836.1 | 85,020 |
| Makoni | 27,320 | 25,070 | 1089.7 | 152,840 |
| Mutare | 38,730 | 49,240 | 786.6 | 222,700 |
| Nyanga | 16,390 | 23,050 | 711.1 | 97,910 |
| MASHONALAND CENTRAL | 121,040 | 150,400 | 804.8 | 677,290 |
| Bindura | 31,040 | 40,780 | 761.2 | 180,150 |
| Centenary | 16,000 | 19,360 | 826.4 | 87,560 |
| Darwin | 14,120 | 17,410 | 811.0 | 76,890 |
| Mazowe | 22,530 | 27,540 | 814.5 | 125,950 |
| Guruve | 11,830 | 15,560 | 760.3 | 69,100 |
| Rushinga | 8,750 | 9,740 | 879.9 | 45,570 |
| Shamva | 16,950 | 20,010 | 847.1 | 92,070 |
| MASHONALAND EAST | 101,770 | 130,620 | 779.1 | 589,870 |
| Marondera | 18,430 | 22,490 | 819.5 | 106,720 |
| Mudzi | 11,000 | 13,460 | 817.2 | 89,030 |
| Mutoko | 16,680 | 24,140 | 691.0 | 67,310 |
| Murewa | 28,240 | 34,300 | 823.3 | 165,350 |
| Wedza | 7,910 | 9,400 | 841.5 | 45,300 |
| Goromonzi | 15,820 | 20,930 | 755.9 | 94,000 |
| Seke | 3,690 | 5,820 | 634.0 | 22,160 |
| MASHONALAND WEST | 160,230 | 202,430 | 791.5 | 929,010 |
| Chegutu | 24,870 | 32,450 | 766.4 | 149,010 |
| Hurungwe | 52,510 | 62,620 | 838.5 | 292,680 |
| Kadoma | 21,760 | 29,430 | 739.4 | 129,770 |
| Kariba | 4,320 | 5,980 | 722.4 | 25,970 |
| Lomagundi | 56,770 | 71,950 | 789.0 | 331,580 |
| MATABELELAND NORTH | 79,250 | 95,300 | 831.6 | 452,960 |
| Binga | 9,310 | 11,750 | 792.3 | 47,670 |
| Bubi | 4,890 | 5,770 | 847.5 | 26,650 |
| Lupane | 18,370 | 20,880 | 879.8 | 99,180 |
| Hwange | 15,890 | 21,410 | 742.2 | 96,820 |
| Nkayi | 16,500 | 19,540 | 844.4 | 92,110 |
| Nyamandhlovu | 14,290 | 15,950 | 895.9 | 90,530 |

Table 4.5 contd.

| Province/ District | Children 0-4 | Women 15-49 | Child Woman Ratio | Total Population |
|---|---|---|---|---|
| MATABELELAND SOUTH | 103,360 | 124,300 | 831.5 | 587,950 |
| Beitbridge | 13,290 | 17,540 | 757.7 | 77,070 |
| Bulalima Mangwe | 28,550 | 36,910 | 773.5 | 165,720 |
| Gwanda | 17,270 | 21,910 | 788.2 | 107,120 |
| Insiza | 16,420 | 16,370 | 1003.1 | 84,420 |
| Matobo | 14,670 | 16,100 | 911.2 | 78,790 |
| Umzingwane | 13,160 | 15,470 | 831.5 | 74,830 |
| MIDLANDS | 199,620 | 244,580 | 816.2 | 1,101,700 |
| Charter | 24,050 | 29,670 | 810.6 | 141,240 |
| Chilimanzi | 8,590 | 10,080 | 852.2 | 49,880 |
| Gokwe | 53,230 | 57,210 | 930.4 | 268,130 |
| Gweru | 22,980 | 31,250 | 735.4 | 134,290 |
| Kwekwe | 32,820 | 40,490 | 810.6 | 183,530 |
| Mberengwa | 36,120 | 49,270 | 733.1 | 204,430 |
| Shurugwi | 10,570 | 13,590 | 777.8 | 62,860 |
| Zvishavane | 11,260 | 13,020 | 864.8 | 57,340 |
| MASVINGO | 178,450 | 210,330 | 848.4 | 976,460 |
| Bikita | 34,950 | 38,230 | 914.2 | 179,700 |
| Chiredzi | 40,130 | 49,430 | 811.9 | 218,340 |
| Ndanga | 24,590 | 28,010 | 877.9 | 131,600 |
| Gutu | 30,030 | 36,560 | 821.4 | 169,640 |
| Masvingo | 19,710 | 23,750 | 829.9 | 110,570 |
| Mwenezi | 6,190 | 7,070 | 875.5 | 32,450 |
| Chivi | 22,850 | 27,280 | 837.6 | 125,160 |
| HARARE | 87,040 | 153,430 | 567.3 | 605,890 |
| BULAWAYO | 60,300 | 106,040 | 568.7 | 413,500 |
| CHITUNGWIZA | 23,310 | 29,060 | 802.1 | 120,950 |
| ZIMBABWE | 1,308,680 | 1,684,720 | 776.8 | 7,510,470 |

Source: 1982 Census: Ten Percent Sample, Table 2A

The first step is to estimate the GFR implied by each district or provincial CWR as follows:

$$GFR_1 = CWR/5 \qquad (4.6)$$

The estimate is not adjusted for the mortality of the children nor the women. It is therefore an underestimate of the actual fertility. The second step is to adjust for mortality conditions. The children are adjusted first, using the survival rate computed by using the Zimbabwe male and female life tables for children aged 0-4 years:

$$S_{birth\ 0-4} = \frac{{}_5L_{0(m)} + {}_5L_{0(f)}}{{}_5l_{0(m)} + {}_5l_{0(f)}} \qquad (4.7)$$

where $S_{birth\ 0-4}$ = survival from birth during a 5 year period to being age 0 to 4 years at end of period;
$L_{0(m\ or\ f)}$ = stationary population between ages 0 and 5 for males and females respectively;
$l_{0(m\ or\ f)}$ = size of the hypothetical cohort in a life table at birth (age 0) for males and females respectively.

The survival rate is used to derive a reverse survival ratio for the population 0-4 years to the births in the previous five years thus:

$$BSRc_{(t-5)} = P_{0-4}(t)\ 1/S_{birth\ 0-4} \qquad (4.8)$$

where $BSRc_{(t-5)}$ = the back survival ratio for births in the 5 years prior to the census (August 1977);
$P_{0-4}(t)$ = the population aged 0 to 4 at the time of the survey (August 1982);
$S_{birth\ 0-4}$ = the survival rate worked out in equation 4.7 above.

The back survival ratio gives the number of children alive today to their births in the five year period. For every child alive aged 0-4 in 1982, there were 1.1008 births in the previous five year period. The back survival ratio can be used to adjust the first estimate of the general fertility rate in Equation 4.6 for child mortality thus:

$$GFR_2 = (CWR/5)BSRc \qquad (4.9)$$

The second estimate does not represent the true level of the GFR because it has not been adjusted for the mortality of females in the childbearing ages. The fourth step therefore, involves adjusting the female population at risk of giving birth, for mortality during the five years prior to the census. This is achieved by calculating a back survival ratio for females in the 15-49 age group in a similar fashion to that of the children shown in Equation 4.8. The Zimbabwean female life table is used to calculate the survival rate of the women from age 10-44 to 15 to 49 at the time of the census before the calculation of the back survival ratio thus:

$$S_{10-44\ 15-49} = \frac{\sum_{x=15}^{45} {}_5L_xF}{\sum_{x=10}^{40} {}_5L_{xF}} \qquad (4.10)$$

where $S_{10-44\ 15-49}$ = survival from age 10 to 44 years during a 5 year period to being aged 15 to 49 years at the end of the period by females (Census 1982);
$L_{xF}$ = stationary population or life years lived between ages 10 and 45 and ages 15 and 50 by females.

The survival rate from Equation 4.10 is applied in the same way as in Equation 4.8 with only a slight difference. Normally, the population at risk is taken as the mid-year estimate. In this case, the female population at risk can be taken as the average of the population implied by the back survival ratio (1.023) and those alive (1.0) divided by two. The back survival ratio of the female populaton (BSRf) is applied to the second estimate of the general fertility rate to arrive at an estimate that is adjusted for both child and maternal mortality thus:

$$GFR_3 = GFR_2 \ / \ BSRf \qquad (4.11)$$

Like the estimates of adjusted populations in Chapter 3, it is necessary to adjust the estimates of fertility to the known national fertility level. This can be achieved by calculating the births implied by the national estimate of the GFR. Because of the existence of total births from the census, it was felt that using them instead of those from the indirect estimate of the Zimbabwe GFR would yield estimates at the sub-national level which were of greater consistency and accuracy. The estimates of births for the provinces based on the third estimate of the GFR were constrained so that they would add up to the Zimbabwean census births thus:

$$\sum_{p=1}^{11} GFR_3{}^{p}\, P^{p}{}_{15-49}(F) = B^{z} \qquad (4.12)$$

where $GFR_3{}^{p}$ = the general fertility rate estimate for province p as derived in Equation 4.11 above
$P^{p}{}_{15-49}(F)$ = the female population in each province p aged 15-49 years
$B^{z}$ = total births in the 1982 Census of Zimbabwe.

The ratio of provincial births to total births which is required to adjust the GFR estimates is then calculated and used to arrive at the final adjusted GFR thus:

$$GFR_4{}^{p} = GFR_3{}^{p} \cdot \frac{B^{z}}{\sum_{p=1}^{11} GFR_3{}^{p}\, P^{p}{}_{15-49}(F)} \qquad (4.13)$$

where definitions are similar to Equation 4.12 above and 4 denotes the final adjusted GFR estimate.

The exercise was repeated for district general fertility rate estimates to bring them in line with those of the provinces. The final estimate of the GFR was used to calculate estimates of births for the provinces and districts. The new set of births were used to arrive at estimates of the crude birth rate for each province and district using the total population in Table 4.5. The full results of the estimation procedure described so far are shown in Table 4.6, while discussion of results is deferred to Section 4.5.

4.4.3 <u>Indirect estimation of TFR and ASFRs from GFR</u>

Bogue and Palmore(1964:318-321) have shown that an empirical relationship exists between the various measures of fertility which justify their use in linear regressions. Basing their arguments on data from fifty nations with the most reliable data between 1955 and 1960, they conclude that "the basic measures of fertility are good

Table 4.6: General fertility rate estimates, estimates of births, crude birth rates and total fertility rates by districts: Zimbabwe 1982.

| Province/ District | General Fert. Rate Per 1000 Women 1 | 2 | 3 | Births a | GFR 4 | Births b | CBR Per 1000 Popn | TFR Per Woman |
|---|---|---|---|---|---|---|---|---|
| MANICALAND | 170.1 | 187.3 | 183.1 | 41,820 | 191.8 | 43,806 | 41.5 | 6.19 |
| Buhera | 189.4 | 208.5 | 203.8 | 9,073 | 213.5 | 9,505 | 46.2 | 6.64 |
| Chipinge | 158.3 | 174.2 | 170.3 | 8,999 | 178.4 | 9,426 | 42.0 | 5.91 |
| Chimanimani | 163.1 | 180.0 | 175.6 | 2,568 | 183.9 | 2,690 | 40.7 | 6.03 |
| Mutasa | 167.2 | 184.1 | 179.9 | 3,437 | 188.5 | 3,600 | 42.3 | 6.12 |
| Makoni | 217.9 | 240.0 | 234.5 | 5,878 | 245.6 | 6,157 | 40.3 | 7.30 |
| Mutare | 157.3 | 173.2 | 169.3 | 8,335 | 177.3 | 8,732 | 39.2 | 5.89 |
| Nyanga | 142.2 | 156.7 | 153.1 | 3,528 | 160.3 | 3,696 | 37.8 | 5.53 |
| MASH. CENTRAL | 161.0 | 177.2 | 173.2 | 26,049 | 181.4 | 27,286 | 40.3 | 5.97 |
| Bindura | 152.2 | 167.6 | 163.8 | 6,681 | 171.6 | 6,998 | 38.9 | 5.77 |
| Centenary | 165.3 | 181.9 | 177.9 | 3,443 | 186.3 | 3,607 | 41.2 | 6.08 |
| Darwin | 162.2 | 178.6 | 174.5 | 3,039 | 182.8 | 3,183 | 41.4 | 6.00 |
| Mazowe | 162.9 | 179.3 | 175.3 | 4,828 | 183.6 | 5,057 | 40.2 | 6.02 |
| Guruve | 152.1 | 167.4 | 163.6 | 2,546 | 171.4 | 2,667 | 38.6 | 5.77 |
| Rushinga | 176.0 | 193.7 | 189.4 | 1,844 | 198.4 | 1,932 | 42.4 | 6.32 |
| Shamva | 169.4 | 186.5 | 182.3 | 3,648 | 191.0 | 3,821 | 41.5 | 6.17 |
| MASH. EAST | 155.8 | 171.5 | 167.7 | 21,904 | 175.7 | 22,944 | 38.9 | 5.85 |
| Marondera | 163.9 | 180.4 | 176.4 | 3,966 | 184.7 | 4,154 | 38.9 | 6.04 |
| Mudzi | 163.4 | 180.0 | 175.9 | 2,367 | 184.2 | 2,479 | 42.2 | 6.03 |
| Mutoko | 138.2 | 152.1 | 148.7 | 3,590 | 155.7 | 3,759 | 36.8 | 5.44 |
| Murewa | 164.7 | 181.3 | 177.2 | 6,077 | 185.5 | 6,364 | 38.5 | 6.06 |
| Wedza | 168.3 | 185.3 | 182.0 | 1,711 | 190.6 | 1,791 | 39.5 | 6.16 |
| Goromonzi | 151.2 | 166.4 | 162.7 | 3,405 | 170.4 | 3,566 | 37.9 | 5.74 |
| Seke | 126.8 | 139.6 | 136.4 | 794 | 142.8 | 832 | 37.6 | 5.18 |
| MASH. WEST | 158.8 | 174.3 | 170.3 | 34,482 | 178.4 | 36,119 | 38.9 | 5.91 |
| Chegutu | 153.3 | 168.7 | 164.9 | 5,352 | 172.8 | 5,606 | 37.6 | 5.80 |
| Hurungwe | 167.7 | 184.6 | 180.5 | 11,300 | 189.0 | 11,836 | 40.4 | 6.13 |
| Kadoma | 147.9 | 162.8 | 159.1 | 4,683 | 166.7 | 4,906 | 37.8 | 5.67 |
| Kariba | 144.5 | 159.0 | 155.5 | 930 | 162.9 | 974 | 37.5 | 5.59 |
| Lomagundi | 157.8 | 173.7 | 169.8 | 12,217 | 177.9 | 12,797 | 38.6 | 5.90 |
| MAT. NORTH | 166.3 | 183.1 | 179.0 | 17,056 | 187.5 | 17,866 | 39.4 | 6.10 |
| Binga | 158.5 | 174.4 | 170.5 | 2,004 | 178.6 | 2,099 | 44.0 | 5.92 |
| Bubi | 169.5 | 186.6 | 182.4 | 1,052 | 191.1 | 1,102 | 41.4 | 6.17 |
| Lupane | 176.0 | 193.7 | 189.3 | 3,953 | 198.3 | 4,141 | 41.8 | 6.33 |
| Hwange | 148.4 | 163.4 | 159.7 | 3,420 | 167.3 | 3,582 | 37.0 | 5.68 |
| Nkayi | 168.9 | 185.9 | 181.7 | 3,551 | 190.4 | 3,720 | 40.4 | 6.16 |
| Nyamandhlovu | 179.2 | 197.2 | 192.8 | 3,075 | 202.0 | 3,222 | 35.6 | 6.40 |

Table 4.6 contd.

| Province/ District | General Fert. Rate Per 1000 Women 1 | 2 | 3 | Births a | GFR 4 | Births b | CBR Per 1000 Popn | TFR Per Woman |
|---|---|---|---|---|---|---|---|---|
| MAT. SOUTH | 166.3 | 183.1 | 179.0 | 22,243 | 187.5 | 23,300 | 39.6 | 6.10 |
| Beitbridge | 151.5 | 166.8 | 163.1 | 2,860 | 170.8 | 2,996 | 38.9 | 5.76 |
| B. Mangwe | 154.7 | 170.3 | 166.5 | 6,144 | 174.4 | 6,436 | 38.8 | 5.83 |
| Gwanda | 157.6 | 173.5 | 169.6 | 3,717 | 177.7 | 3,893 | 36.3 | 5.90 |
| Insiza | 200.6 | 220.8 | 215.9 | 3,534 | 226.1 | 3,702 | 43.9 | 6.90 |
| Matobo | 182.2 | 200.6 | 196.1 | 3,157 | 205.4 | 3,308 | 42.0 | 6.47 |
| Umzingwane | 170.1 | 187.3 | 183.1 | 2,832 | 191.8 | 2,967 | 39.7 | 6.19 |
| | | | | | | | | |
| MIDLANDS | 163.2 | 179.7 | 175.7 | 42,960 | 184.0 | 45,000 | 40.9 | 6.03 |
| Charter | 162.1 | 178.5 | 174.5 | 5,176 | 182.8 | 5,423 | 38.4 | 6.00 |
| Chilimanzi | 170.4 | 187.6 | 183.4 | 1,849 | 182.8 | 1,937 | 38.8 | 6.20 |
| Gokwe | 186.1 | 204.8 | 200.0 | 11,443 | 209.6 | 11,990 | 44.7 | 6.56 |
| Gweru | 147.1 | 161.9 | 158.3 | 4,946 | 165.8 | 5,182 | 38.6 | 5.65 |
| Kwekwe | 162.1 | 178.5 | 174.5 | 7,063 | 182.8 | 7,401 | 40.3 | 6.00 |
| Mberengwa | 146.6 | 161.4 | 157.8 | 7,774 | 165.5 | 8,145 | 39.8 | 5.64 |
| Shurugwi | 155.6 | 171.2 | 167.4 | 2,275 | 175.4 | 2,383 | 37.9 | 5.85 |
| Zvishavane | 173.0 | 190.4 | 183.1 | 2,423 | 195.0 | 2,539 | 44.3 | 6.26 |
| | | | | | | | | |
| MASVINGO | 169.7 | 186.8 | 182.6 | 38,402 | 191.3 | 40,225 | 41.2 | 6.18 |
| Bikita | 182.8 | 201.3 | 196.8 | 7,522 | 206.3 | 7,886 | 43.9 | 6.49 |
| Chiredzi | 162.4 | 178.8 | 174.7 | 8,637 | 183.2 | 9,056 | 41.5 | 6.01 |
| Ndanga | 175.6 | 193.3 | 188.9 | 5,292 | 198.1 | 5,548 | 42.2 | 6.32 |
| Gutu | 164.3 | 180.8 | 176.8 | 6,423 | 185.3 | 6,776 | 39.9 | 6.06 |
| Masvingo | 166.0 | 182.7 | 178.6 | 4,242 | 187.3 | 4,447 | 40.2 | 6.10 |
| Mwenezi | 175.1 | 192.8 | 188.4 | 1,332 | 197.6 | 1,397 | 43.1 | 6.31 |
| Chivi | 167.5 | 184.4 | 180.3 | 4,917 | 189.0 | 5,156 | 41.2 | 6.13 |
| | | | | | | | | |
| HARARE | 113.5 | 124.9 | 122.1 | 18,732 | 127.9 | 19,622 | 32.4 | 4.87 |
| BULAWAYO | 113.7 | 125.2 | 122.4 | 12,978 | 128.2 | 13,595 | 32.9 | 4.87 |
| CHITUNGWIZA | 160.4 | 176.6 | 182.6 | 5,016 | 180.8 | 5,255 | 43.5 | 5.96 |
| ZIMBABWE | 155.4 | 171.0 | 175.8 | 295,015 | 176.1 | 295,018 | 39.3 | 5.86 |

Notes: 1. 1st GFR estimate (unadjusted for mortality)
2. 2nd GFR estimate (adjusted for child mortality)
3. 3rd GFR estimate (adjusted for mortality)
4. 4th GFR estimate (adjusted to national estimate)
a. 1st estimate of births based on 3rd GFR estimate
b. final estimate of births based on 4th GFR
See Table 4.5 for explanation of abbreviated names

estimators of one another" (p.318). They show that the total fertility rate can be estimated from the general fertility rate thus:

$$TFR = 2.21728 + 0.02072(GFR); \quad R^2 = 0.82436 \qquad (4.14)$$

However, they stipulate that only the linear regression of measures directly derived from census or survey data is most likely to give satisfactory results when used for estimation in indirect procedures. The use of regressions derived from direct estimation of fertility measures is recommended because it minimises the degree of error involved in each step of estimation, though the measures derived from direct estimation are themselves not absolutely free from errors. The most significant of these errors is associated with the population data itself and some have been highlighted in Chapter Three.

Bearing in mind the weaknesses noted by Bogue and Palmore, it was decided to subject the direct measures of fertility from Section 4.3 to linear regression. The purpose was to fit a regression model to the indirect estimates of the general fertility rate for use in the prediction of the TFR and ASFRs. The statistical package MICROTAB (Higginbottom 1985) for the BBC micro-computer was used to carry out the regressions.

The results of the regression of the total fertility rate against the general fertility rate were quite good. Bogue and Palmore had suggested a range of coefficients of correlation of between 0.425 and 0.999 (p.318). The R derived was 0.908 with an $R^2$ of 0.824. Other intervening variables exist which help explain the relationship between TFR and GFR but the degree of correlation observed in the present case makes it possible to use the resulting regression equation in the estimation of total fertility rates for the districts and provinces of the country as in Equation 4.14 above.

The set of TFRs derived for the districts are then used to estimate age specific fertility rates. First, the ASFRs obtained from direct estimation are regressed thus:

$$
\begin{aligned}
ASFR15\text{-}19 &= -0.22156 + 0.05058(TFR);\ R^2 = 0.43533 \\
ASFR20\text{-}24 &= 0.05307 + 0.03505(TFR);\ R^2 = 0.60421 \\
ASFR25\text{-}29 &= 0.03590 + 0.03891(TFR);\ R^2 = 0.43645 \\
ASFR30\text{-}34 &= 0.00949 + 0.03833(TFR);\ R^2 = 0.47614 \\
ASFR35\text{-}39 &= -0.06829 + 0.04184(TFR);\ R^2 = 0.65749 \\
ASFR40\text{-}44 &= -0.01214 + 0.01839(TFR);\ R^2 = 0.15292 \\
ASFR45\text{-}49 &= 0.19991 - 0.02254(TFR);\ R^2 = 0.11260
\end{aligned}
\tag{4.15}
$$

The coefficients of correlation in this case were not as good as those of the total fertility rate. They varied from 0.391 in age group 40-44 to .881 for the 35-39 age group, with the age group 45-49 recording a negative coefficient (-0.336). Bogue and Palmore (1964:336) point out that the last age group is extremely difficult to handle because of the small number of births involved at the extreme end of the childbearing years as well as the greater variation in the ASFRs. The degree of correlation overall is disappointingly low and this is reflected in the levels of $R^2$. These vary from a mere 0.113 for age group 45-49 to a high of 0.657 in age group 35-39. The ASFRs resulting from the application of the regressions shown in Equation 4.15 need to be treated and interpreted with caution.

The ASFRs need to be adjusted so that they too are consistent with the predicted total fertility rates from Equation 4.14. To do this, the ASFRs are summed to give their total fertility rates. The ratio of the sum of the total fertility rates to the predicted total fertility rate can be used for this purpose thus:

$$ASFR_2 = ASFR_1 \cdot \frac{\text{TFR predicted}}{\text{TFR found by summing } ASFR_1} \tag{4.16}$$

where $ASFR_1$ = unadjusted ASFR from Equation 4.15
$ASFR_2$ = adjusted ASFR that sums up to the predicted TFR

A summary of the results of the regression and adjustment are provided in Table 4.7.

Table 4.7: Estimates of age specific fertility rates and total fertility rates by districts: Zimbabwe 1982

| Province/ District | Age Specific Fertility Rate | | | | | | | TFR |
|---|---|---|---|---|---|---|---|---|
| | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | |
| MANICALAND | .0915 | .2700 | .2768 | .2467 | .1907 | .1017 | .0604 | 6.19 |
| Buhera | .1143 | .2858 | .2942 | .2640 | .2095 | .1100 | .0503 | 6.64 |
| Chipinge | .0755 | .2604 | .2660 | .2362 | .1791 | .0966 | .0667 | 5.92 |
| Chimanimani | .0833 | .2644 | .2704 | .2405 | .1839 | .0987 | .0641 | 6.03 |
| Mutasa | .0881 | .2677 | .2741 | .2442 | .1879 | .1005 | .0619 | 6.12 |
| Makoni | .1479 | .3090 | .3200 | .2894 | .2373 | .1222 | .0353 | 7.30 |
| Mutare | .0764 | .2596 | .2652 | .2353 | .1782 | .0962 | .0672 | 5.89 |
| Nyanga | .0586 | .2473 | .2515 | .2219 | .1635 | .0898 | .0751 | 5.54 |
| MASH. CENT. | .0805 | .2625 | .2683 | .2385 | .1816 | .0977 | .0653 | 5.97 |
| Bindura | .0704 | .2555 | .2606 | .2308 | .1733 | .0940 | .0698 | 5.77 |
| Centenary | .0858 | .2661 | .2724 | .2424 | .1860 | .0996 | .0630 | 6.08 |
| Darwin | .0821 | .2636 | .2696 | .2397 | .1830 | .0983 | .0646 | 6.00 |
| Mazowe | .0830 | .2641 | .2702 | .2403 | .1836 | .0986 | .0642 | 6.02 |
| Guruve | .0702 | .2553 | .2604 | .2306 | .1731 | .0940 | .0699 | 5.77 |
| Rushinga | .0984 | .2748 | .2821 | .2520 | .1964 | .1042 | .0573 | 6.33 |
| Shamva | .0907 | .2695 | .2761 | .2461 | .1900 | .1014 | .0608 | 6.17 |
| MASH. EAST | .0745 | .2583 | .2637 | .2339 | .1766 | .0955 | .0680 | 5.85 |
| Marondera | .0841 | .2649 | .2711 | .2412 | .1846 | .0990 | .0637 | 6.04 |
| Mutoko | .0538 | .2440 | .2478 | .2182 | .1595 | .0880 | .0773 | 5.44 |
| Mudzi | .0836 | .2645 | .2707 | .2407 | .1841 | .0988 | .0640 | 6.03 |
| Murewa | .0850 | .2655 | .2718 | .2418 | .1853 | .0933 | .0633 | 6.06 |
| Wedza | .0903 | .2692 | .2758 | .2458 | .1897 | .1012 | .0610 | 6.16 |
| Goromonzi | .0691 | .2546 | .2596 | .2298 | .1722 | .0936 | .0704 | 5.75 |
| Seke | .0403 | .2347 | .2375 | .2081 | .1484 | .0833 | .0831 | 5.18 |
| MASH. WEST | .0775 | .2604 | .2661 | .2362 | .1792 | .0966 | .0666 | 5.91 |
| Chegutu | .0716 | .2563 | .2615 | .2317 | .1743 | .0945 | .0693 | 5.80 |
| Hurungwe | .0886 | .2681 | .2746 | .2446 | .1883 | .1007 | .0617 | 6.13 |
| Kadoma | .0653 | .2519 | .2566 | .2269 | .1690 | .0922 | .0721 | 5.67 |
| Kariba | .0612 | .2491 | .2535 | .2239 | .1657 | .0907 | .0739 | 5.59 |
| Lomangundi | .0770 | .2600 | .2656 | .2358 | .1787 | .0964 | .0669 | 5.90 |
| MAT. NORTH | .0870 | .2669 | .2734 | .2433 | .1870 | .1001 | .0624 | 6.10 |
| Binga | .0777 | .2605 | .2662 | .2364 | .1793 | .0967 | .0665 | 5.92 |
| Bubi | .0908 | .2695 | .2762 | .2462 | .1901 | .1014 | .0607 | 6.17 |
| Lupane | .0984 | .2748 | .2820 | .2520 | .1964 | .1042 | .0573 | 6.33 |
| Hwange | .0659 | .2524 | .2571 | .2274 | .1696 | .0924 | .0718 | 5.68 |
| Nkayi | .0900 | .2690 | .2756 | .2456 | .1895 | .1012 | .0611 | 6.16 |
| Tsholotsho | .1022 | .2774 | .2850 | .2548 | .1995 | .1056 | .0556 | 6.40 |

| Province/ District | Age Specific Fertility Rate | | | | | | | TFR |
|---|---|---|---|---|---|---|---|---|
| | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | |
| MAT. SOUTH | .0870 | .2669 | .2733 | .2434 | .1870 | .1001 | .0624 | 6.10 |
| Beitbridge | .0696 | .2599 | .2599 | .2302 | .1726 | .1726 | .0937 | 5.76 |
| B. Mangwe | .0733 | .2575 | .2628 | .2330 | .1757 | .0951 | .0685 | 5.83 |
| Gwanda | .0768 | .2599 | .2654 | .2356 | .1785 | .0963 | .0670 | 5.90 |
| Insiza | .1275 | .2949 | .3044 | .2740 | .2204 | .1148 | .0443 | 6.90 |
| Matobo | .1058 | .2799 | .2877 | .2576 | .2025 | .1069 | .0540 | 6.47 |
| Umzingwane | .0915 | .2700 | .2768 | .2468 | .1907 | .1017 | .0604 | 6.19 |
| MIDLANDS | .0834 | .2644 | .2705 | .2406 | .1840 | .0987 | .0640 | 6.03 |
| Charter | .0821 | .2635 | .2695 | .2396 | .1829 | .0983 | .0646 | 6.00 |
| Chilimanzi | .0919 | .2703 | .2771 | .2471 | .1910 | .1018 | .0602 | 6.20 |
| Gokwe | .1102 | .2829 | .2911 | .2609 | .2061 | .1085 | .0521 | 6.56 |
| Gweru | .0643 | .2513 | .2559 | .2262 | .1683 | .0918 | .0725 | 5.65 |
| Kwekwe | .0821 | .2635 | .2695 | .2396 | .1829 | .0983 | .0646 | 6.00 |
| Mberengwa | .0640 | .2511 | .2557 | .2260 | .1680 | .0917 | .0727 | 5.65 |
| Shurugwi | .0744 | .2582 | .2636 | .2338 | .1765 | .0954 | .0681 | 5.85 |
| Zvishavane | .0949 | .2724 | .2794 | .2493 | .1935 | .1029 | .0589 | 6.26 |
| MASVINGO | .0912 | .2698 | .2765 | .2465 | .1904 | .1016 | .0606 | 6.18 |
| Bikita | .1067 | .2806 | .2884 | .2583 | .2033 | .1072 | .0536 | 6.49 |
| Chiredzi | .0825 | .2638 | .2966 | .2400 | .1833 | .0984 | .0644 | 6.01 |
| Ndanga | .0981 | .2746 | .2818 | .2518 | .1962 | .1041 | .0575 | 6.32 |
| Gutu | .0848 | .2654 | .2716 | .2417 | .1851 | .0933 | .0634 | 6.06 |
| Masvingo | .0868 | .2668 | .2731 | .2432 | .1868 | .1000 | .0325 | 6.10 |
| Mwenezi | .0976 | .2742 | .2814 | .2513 | .1957 | .1039 | .0577 | 6.31 |
| Chivi | .0886 | .2680 | .2745 | .2446 | .1883 | .1006 | .0617 | 6.13 |
| HARARE | .0246 | .2238 | .2255 | .1962 | .1354 | .0903 | .0774 | 4.86 |
| BULAWAYO | .0249 | .2241 | .2257 | .1964 | .1357 | .0902 | .0775 | 4.87 |
| CHITUNGWIZA | .0801 | .2621 | .2680 | .2381 | .1812 | .0975 | .0655 | 5.96 |
| ZIMBABWE | .0748 | .2585 | .2639 | .2341 | .1769 | .0956 | .0679 | 5.86 |

Notes: Totals might not add up due to rounding
Mashonaland East excludes Harare
Matebeleland North excludes Bulawayo.

### 4.5 DISCUSSION OF RESULTS AND COMMENTS

The chapter began by pointing out the need for developing methods for estimating fertility as well as viewing fertility levels in the country which were seen as being relatively high even though on a decline. The sections begins by passing a few critical comments on the methods of estimation employed before discussing the results.

4.5.1 Comments on techniques

The technique upon which the indirect estimation of fertility rests is based on the ratio of children to women. Two main criticisms can be levelled at the technique. The first lies in the fact that, the technique assumes a stationary population in order to calculate the survival rates which are then employed in calculating the reverse survival ratio for the children aged 0 to 4 years and the women aged 15-49 years. The evidence of falling fertility as well as mortality (see Chapter 5) across the country would suggest that the population is far from being stationary. The application of the survival rates and reverse survival ratios based on the national life tables to all populations (provincial and district) might not capture fully the variation of mortality across the country. In certain instances, the children and women derived from the reverse survival ratios are an overestimate whilst in others they are an underestimate. It is assumed that the degree of overestimation is cancelled by that of underestimation. Indeed the use of the Zimbabwe life table instead of a model life table makes the estimates more accurate because at least the Zimbabwe life table embodes all the mortality conditions of the country.

The second criticism to raise is the crudity of the estimation procedure. While it provides an indication of the fertility patterns in the country, it is still a crude approximation, especially when the first criticism is taken into consideration. Bogue and Palmore (1964) strongly recommend the use of other social and demographic characteristics of the population in order to improve accuracy and reliability of the estimates. Such characteristics include age at first marriage, percent married in each child bearing age group and so on. The absence of the data for the provinces and districts makes that level of estimation impossible, in the present study. It is therefore necessary to point out the need for caution when the results are being used or interpreted.

The regression techniqueshave the weakness of having been based on a very small sample of direct fertility measures from Zimbabwe itself. These measures will embode any errors in the population data thus affecting the overall accuracy of the results. This is probably most manifest in the regression of the age specific fertility rates. Both the degree of correlation and the goodness of fit where extremely low, indicating other intervening variables in action. Probably, the inclusion of the social-demographic characteristics mentioned by Bogue and Palmore would improve the degree of correlation and goodness of fit. Further research in this area is invisaged as more data becomes available in the future.

Despite these criticisms, the methods show how it is possible to utilise raw population data through models to arrive at better estimates of fertility. As pointed out in Chapter 2, studies in Zimbabwean population have suffered from the lack of such techniques leading to most concentrating on the national picture to the exclusion of the sub-national one. Future research should take advantage of techniques as discussed in this chapter to arrive at estimates that contribute to the overall knowledge of developments at the sub-national level.

4.5.2 Comments on results

The results of fertility measures derived from both the direct and indirect techniques would seem to support the contention that fertility levels in Zimbabwe are still relatively high. Direct estimates of the CBR vary from 39.4 to 24.7 in 1982 (see Table 4.2).

Estimates from the district council areas in the 1984/84 period also show high levels as they vary from 37.3 to 40.1. However, these estimates are based on a limited number of provinces. The indirect estimates based on the child to woman ratio for 1982 show CBRs varying between 46.22 in Buhera, close to the UN average for the period 1980-1985, to 32.39 in the metropolis of Harare, which is slightly above the Mauritius average for the same period (cf. Table 4.3 & 4.6).

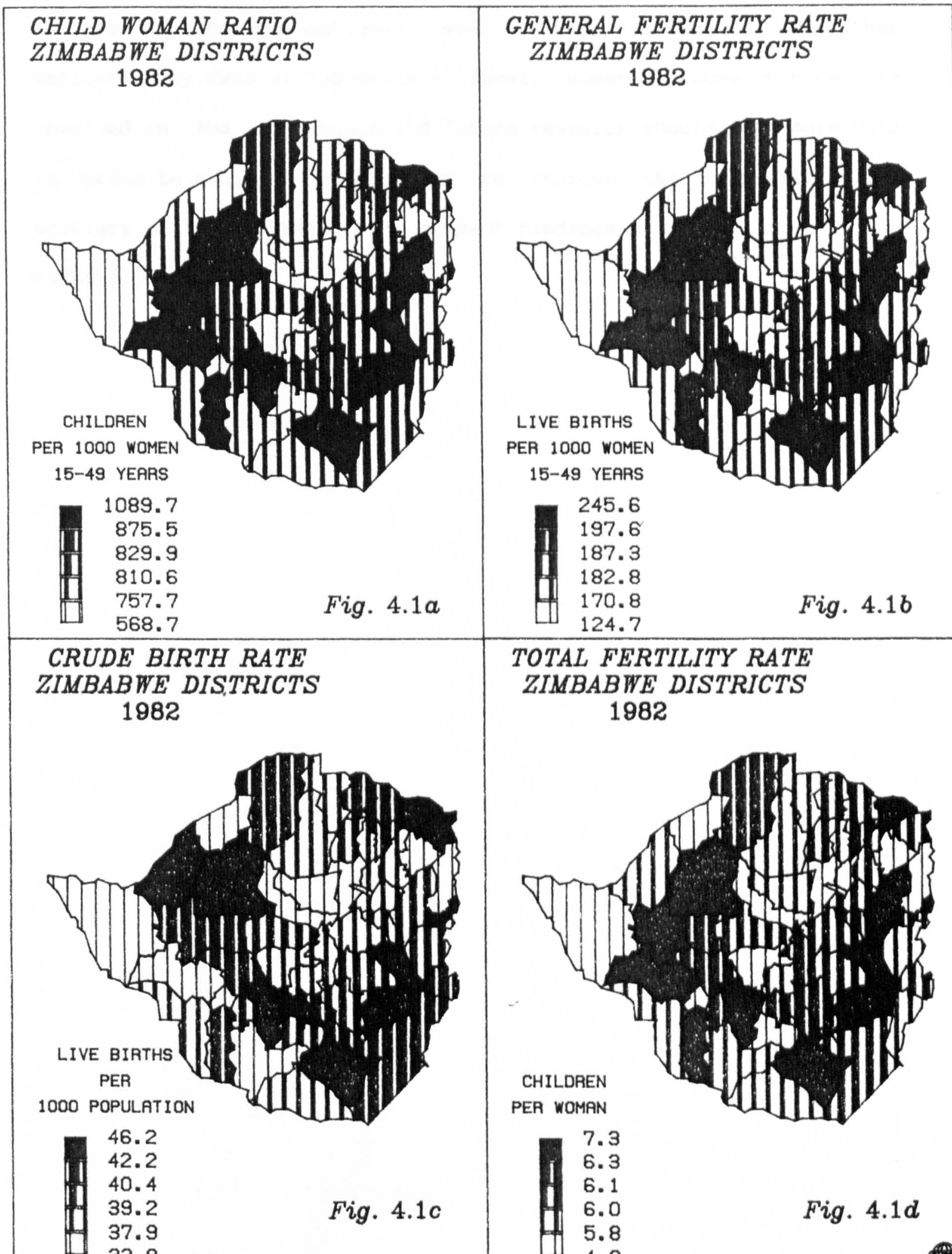
The general fertility rate estimates as well as the total fertility rates reflect the same trend. Here, the variation based on the adjusted GFR estimate ($GFR_4$), ranges from 245.6 live births per 1000 women in Makoni, second to Kenya's in the East African region, to Harare's 127.9, with a national average of 176.14 (cf. Table 4.3 and 4.6). As already pointed out, the estimates based on the Census are lower than those of the United Nations which were based on projections.

The ASFRs also reflect high fertility as well as the method by which they were derived. The peak of the national fertility schedule is in the age group 20-24. However, when it comes to the estimated schedule, the peak is shifted to the 25-29 age group (cf. Table 4.4 & 4.7). The 20-34 age group is still the most productive, with birth rates which are generally over 200 and in a few cases over 300 live births per 1000 women. The child bearing span seems also to begin early and last till late in some of the districts (e.g. Burera) with births of over 100 at both the 15-19 and 40-44 age groups. The last age group (45-49) generally contributes births that are below 80 live births per 1000 women.

Not suprisingly, the TFRs are also quite high. These vary from Makoni's 7.3 children per women, which is nearer to the average for the 1960's to Harare's 4.7 (Table 4.7). The national average based on indirect estimation is 5.86 which lies between the 1982 Census estimate of 5.69 and the 1985 Zimbabwe Reproductive Health Survey estimate of 6.52 (cf. Table 4.4 & Table 4.7). Bogue and Palmore (1964) point out that an important test for the reliability of the estimates based on regression techniques is that they lie close or between two known estimates for a given period. The result above would seem to fulfill this criteria despite the weakness of the regressions in the last age group. Overall, one can conclude that the fertility of the nation as measured by the TFR lies between 5.69 and 6.52 children per women in the 1980-1985 period with wide variations at the sub-national level.

Fig. 4.1 show the variations in fertility rate across the country. Note the high belt of fertility associated with the western and southern provinces, especially Masvingo. The total fertility rate, Fig. 4.1d illustrates this belt most clearly. It can be recalled that the census estimate of the CBR for Masvingo was a mere 24.7 (Table 4.3) for 1982, which was the lowest of the available estimates, giving the illusion that Masvingo had the lowest fertility levels in the country, at the provincial level. The view that emerges from the indirect estimation shows Masvingo as having some of the highest levels of fertility in the country both at the provincial and district levels. Indeed, it is the only province were the total fertility rate at the district level, is consistenly above 6.0 children per woman, giving a provincial average of 6.18 children per woman. The finer measure, shorn of biases introduced by age and sex structure would seem to suggest that Masvingo is after all an area of high fertility. The finding supports the concern of other researchers about over population in this province (see Whitlow 1980; Kay 1976 & 1980).

The chapter has been able to describe fertility patterns in


CHILD WOMAN RATIO
ZIMBABWE DISTRICTS
1982
CHILDREN
PER 1000 WOMEN
15-49 YEARS
1089.7
875.5
829.9
810.6
757.7
568.7
Fig. 4.1a
GENERAL FERTILITY RATE
ZIMBABWE DISTRICTS
1982
LIVE BIRTHS
PER 1000 WOMEN
15-49 YEARS
245.6
197.6
187.3
182.8
170.8
124.7
Fig. 4.1b
CRUDE BIRTH RATE
ZIMBABWE DISTRICTS
1982
LIVE BIRTHS
PER
1000 POPULATION
46.2
42.2
40.4
39.2
37.9
32.9
Fig. 4.1c
TOTAL FERTILITY RATE
ZIMBABWE DISTRICTS
1982
CHILDREN
PER WOMAN
7.3
6.3
6.1
6.0
5.8
4.9
Fig. 4.1d

Zimbabwe at the provincial and district level, by developing techniques that utilise available data to estimate unavailable measures at the sub-national levels. Wide variations exist than indicated by data at the national level. However, some errors are involved in the estimation and future research should seek more data in order to minimise errors and to improve the reliability and accuracy of the estimates. The present findings are only a step in the right direction.

# CHAPTER 5

# ANALYSIS OF MORTALITY

## 5.1 INTRODUCTION

The chapter gives consideration to mortality levels and estimates within the country. The major aims of the chapter can be summarised as: providing a descriptive account of mortality patterns within the country, dealing with both infant, child and adult mortality. Lack of complete registration of mortality points to the need for estimation, the second aim of the chapter. Estimates of mortality are attempted at the provincial level by utilising data from the provinces of Manicaland and Masvingo. The mortality indicators derived from such estimation will be used in the analysis of the relationship between mortality and socio-economic development.

Two methods are used in mortality estimation. The first uses data on children ever born and children surviving (CEB/CS) to estimate childhood mortality. The data are classsfied by the age of the mother (CSO 1985a:154). From this information mortality in the recent past can be determined for children up to an average age of 20. The estimated mortality can then be applied to the construction of life tables and the description of the patterns of mortality changes over time.

The second method uses the orphanhood status of respondents to estimate adult mortality. The orphanhood method asks about the survival status of the parents of the respondent (CSO 1985a:173). The data collected are of respondents of either sex with surviving or dead parents. The data on orphanhood are classified by the age of the respondent.

The estimates of child and adult mortality, will be used to generate infant, child and adult mortality rates. Estimates of life expectancy at birth will be generated for life tables of Zimbabwe, Manicaland, Masvingo and the remainder of Zimbabwe based on the Brass two-parameter logit model.

The remainder of the chapter is divided into five sections. Section 5.2 discusses mortality change in Zimbabwe both past and current, to achieve the descriptive aim, while Section 5.3 estimates childhood mortality from data on children ever born and children surviving. Section 5.4 concentrates on estimation of adult mortality based on orphanhood data. The results, both child and adult, will be used as the basis for estimating mortality rates. Section 5.5 examines the Brass two-parameter model and utilises it in the generation of life tables. Section 5.6 provides a few concluding comments on the methodology and the results.

**5.2 PAST AND CURRENT MORTALITY IN ZIMBABWE**

Lack of vital registration data is probably most keenly felt when discussing mortality in developing countries. The data on mortality, collected from censuses and surveys, are usually of such poor quality that little attempt is made to provide detailed estimates from them. In most cases, only broad trends in mortality levels (i.e. whether declining, rising or static) are made. Indeed, the lack of registration data promoted Ominde (1975), quoted in Mzite(1981:26), to argue that "estimates of mortality levels in Africa are the least reliable of the vital rates". Thus, the discussion of mortality levels for Zimbabwe should be read with such limitations in mind.

5.2.1 Mortality in the pre-independence period

Estimates of infant and child mortality before independence (1980) vary considerably. Mzite(1981:26) points out that while registration of deaths was complusory for all racial groups in urban areas, the same can not be said of rural areas. Registration of deaths in urban areas was more complete than in rural areas. This meant that the most reliable estimates of mortality were available at the level of the nation and the urban area though local studies did provide estimates of rural mortality.

Gilmurray et al (1979) quoted in UNICEF(1985:11) estimated infant mortality rates for the African population in Zimbabwe to be between 120 and 140 per thousand live births in the mid-seventies. A UNDP/SIDA study quoted in the same source gave an average estimate of 140/1000 live births for the 1970s. Mzite (1981:32) gave an estimate of 101/1000 live births for the entire African population using the 1969 Census while Zvobgo (1987:359) gave estimates of 120-220 against a European average of 17. The differential according to race reflected both the area of residence as well as social and economic status of the races. The European population was concentrated in urban areas and also enjoyed a higher standard of living than that of the African population with its predominantly rural distribution.

The rural-urban differential in infant mortality can be illustrated from certain situation specific studies. For example, in 1963 the IMR for urban areas was estimated at 31 per thousand compared to a national average of 122 (Mzite 1981:29, UNICEF 1985:12). A study in one of the residential areas of Harare (then known as Salisbury) in 1970-71 recorded an IMR of 17.6 per thousand when the national average was estimated to be between 100-120/1000. Overall, the average infant mortality rate for urban areas in the 1970s ranged between 17-25 per thousand, way below the national average.

In comparison, rural mortality recorded in situation specific studies is much higher. Stoughton (1975) studying infant mortality in the district of Bikita gave estimates of IMR of 68/1000 while the Provincial Medical Officer of Health for Matabeleland gave estimates of 300/1000 for Binga, one of the most deprived districts in the country (UNICEF 1985:13). This compares to an estimate of 21/1000 for Harare during the same period (Saunders 1980:40). Thus, there are indications of wide contextural and regional variations in the level of infant mortality in pre-independent Zimbabwe.

Childhood mortality estimates are less available for the pre-independence period. UNICEF (1985:13) quoted figures of 12 to 15/1000 from the World Bank and 11/1000 from UNICEF but no firm basis for the estimates is given nor a precise period to which the estimates refer. This means that considerably less was known about child mortality in pre-independent Zimbabwe than about infant mortality. All that can be said is that both infant and child mortality must have been fairly high during the pre-independence period. Rural areas had worse mortality than urban areas though indications are that mortality had begun to decline even then.

Regarding adult mortality, only figures for the crude death rate (CDR) exist. Estimates have existed since the late 1940s. Table 5.1 gives a summary of estimates of national infant and adult mortality prior to 1980. These estimates indicate a general fall in the mortality of the population. However, the estimates include deaths of children under one year. Thus, there are no accurate estimates of adult mortality prior to independence. The CDR is not a good indicator of the overall mortality level because it is influenced by the age structure of the population. Newell (1988:63-64) argues that developing nations show lower CDRs than developed countries because their age structure is youthful. He compares Mexico's CDR of 7.1 against that of England and Wales of 11.7 in 1983, despite the known fact that Mexico has a worse mortality level than England and Wales. Based on such observations all that can be argued is that adult mortality in Zimbabwe is likely to have been higher than the CDR would seem to indicate.

Table 5.1: Estimates of Mortality, Zimbabwe: 1948-1969

| Date | IMR/1000 | CDR/1000 |
|---|---|---|
| 1948 | 131 | 18.0 |
| 1955 | 122 | 14.4 |
| 1962 | - | 14.0 |
| 1969 | 101 | 16.0 |

Source: Mzite (1981:29 Table 3.5)

### 5.2.1 Post-independence mortality estimates

The dearth of data on mortality is somewhat alleviated in the post-independence period beginning with the census in 1982. However, estimates are mostly available as national averages. Preliminary IMR estimates based on the 1982 census give male rates of 93/1000 and female rates of 73/1000 with a national mean of 83/1000 (CSO 1985b:170-173). A study based on a sample by the Zimbabwe National Family Planning Council furnishes further evidence on infant mortality in the country. The study, carried out in 1983/84, gave estimates of infant mortality five years prior to the survey of 79/1000. The study showed that infant mortality was higher in rural areas, 93/1000, than in urban areas, 51/1000 (ZNFPC 1985:73). These figures seem to indicate that there have been a remarkable decline in infant mortality since the 1970s, despite the Liberation War (1971-1979) and the onset of a period of droughts in 1981 (UNICEF 1985:13).

With regards to child mortality (1-4), the 1982 Census showed this to be very low varying from 8.3/1000 for boys to 6.5/1000 for girls with a national average of 7.4/1000 (CSO 1985b:183-184). No further disaggregation by province or district existed. However, other studies have provided estimates of child mortality for sub-national units.

Table 5.2 gives a summary of some of these. The estimates of child mortality are for children under five. For Mashonaland Central and East, female mortality seems to be higher than male mortality. This might be due to the fact that there are more female children than male ones in district council areas. The figures do not necessarily reflect higher female mortality but the process of male migration into the urban areas (see Chapter 3). Indeed, the CDR does show higher male mortality than female mortality, maintaining the observed national trend.

Table 5.2: Estimates of mortality: Zimbabwe 1982-1985

| Province | Infant Mort. Rate / 1000 | | | Child Mortality Rate / 1000 | | | Crude Death Rate/1000 | | |
|---|---|---|---|---|---|---|---|---|---|
| | M | F | T | M | F | T | M | F | T |
| Zimbabwe(1982) | 93 | 73 | 83 | 8.3 | 6.5 | 7.4 | 11.6 | 10.1 | 10.8 |
| Zimbabwe(1985) | - | - | 79 | - | - | - | - | - | - |
| Rural | - | - | 91 | - | - | - | - | - | - |
| Urban | - | - | 51 | - | - | - | - | - | - |
| Manica(1983/4) | - | - | - | 30.2 | 23.3 | 26.7 | 12.2 | 8.3 | 10.1 |
| Mash.Cent " | - | - | - | 7.9 | 10.6 | 9.1 | 7.9 | 6.7 | 7.3 |
| Mash.East " | - | - | - | 13.8 | 14.4 | 14.1 | 7.2 | 5.8 | 6.4 |
| Harare(1986) | - | - | 18.5 | - | - | - | - | - | 3.9 |

Notes: 1. The figures for the three provinces are based on district councils only.
2. The child mortality rates shown for the provinces are for children under five.
M.: male; F.: female; T.; total.

Source: CSO (1985a:4, Reports 1,2,5); CSO (1985b:167-168,185) City of Harare(1986:2)

The estimates child mortality for Mashonaland Central and East DCs seem to have suffered from degree of under-reporting. With the inclusion of infant deaths, one would have expected them to be much higher than shown. However, there is no way of checking their accuracy since there are no other independent estimates of infant and child mortality for these provinces. At the present moment, all one can say is that they should be treated with a bit of caution until better estimates are available.

The estimates of the CDR for the DCs seems to be low though they fall within the margins of the national means. It is possible that the survey under reported the amount of adult deaths. However, the youthful structure of district council areas, illustrated in Chapter Three, might be responsible for these low CDR estimates as pointed out in Section 5.2.1.

The above description illustrated past and current mortality levels within Zimbabwe. A fact that emerges clearly is the inadequacy of mortality statistics in the country, especially in the pre-1980 period. While the situation improved after the 1982 Census and the round of surveys in 1983/84, there is still a need to provide such statistics at the sub-national level to enable a fuller description of the mortality experience of the nation. However, the limited amount of statistics available do point to a decline in mortality since the 1950s though there are also indications of regional variations in those declines as well as socio-economic factors coming into play.

## 5.3 ESTIMATION OF CHILD MORTALITY LEVELS

The method of estimating child mortality from data on children ever born and children surviving was developed by Brass in 1964. It was based on the realisation that one fifth of all deaths in most populations occur to children under the age of 5 years. Brass (1964) and those who came after him (like Sullivan 1972; Trussel 1975) sought a relationship between those children who died and those who survived that could be converted into the life table function q(x), the estimated probability of dying between birth and age x. Brass sought to convert the proportion dead of children ever born (CEB) to women in successive five-year age-groups (i.e. 15-19,20-24, etc), denoted as D(i), into the estimates of q(x) by applying a series of multipliers. The multipliers, k(i), are meant to adjust for non-mortality factors that determine the value of D(i) (UN 1983; Sullivan 1972; Trussell 1975).

Brass discovered that the relationship between corresponding pairs of D(i) and q(x) is primarily influenced by the age pattern of fertility, and in particular, by the age at the onset of the childbearing years. The earlier the age in a population when childbearing occurs, the older the children of the women in each successive age interval and hence the longer their exposure to the risk of dying. From this Brass developed a set of multipliers which would convert the D(i) values into estimates of q(x), depending on the value of P(1)/P(2) - a good indicator of fertility in the younger age groups of women. P(i) is the average parity or average number of CEB reported by women in age group i.

The assumptions made by Brass have remained virtually unchanged. The most crucial assumption is that the risk of dying of a child is a function of the age of the child and not of other factors, such as the mother's age or the child's birth order. In reality this is not so. For example, the children of women aged 15-19 are subjected to heavier mortality because of the complications that arise from first births (ZNFPC 1985). Thus, when the estimates of q(1) are made, they are found to be subjected to heavier mortality than expected or allowed for by this assumption. The end result is that the estimates of q(1) are normally ignored as they are both small and fail to satisfy this assumption.

The second assumption was that of stable or static conditions. Age specific fertility rates, infant and child mortality are assumed to have been static or constant in the recent past. If, for example, fertility has been changing, the ratios of average parities obtained from a cross section of the survey will not replicate accurately the fertility experience of any cohort of women and will not provide a good index of the distribution, in time, of the births to the women of each age group (UN 1983:73-75).

Two mathematical assumptions were also made. The first was that empirical mortality can be closely approximated by an analytic function of age and a scalor. The second was that empirical fertility schedules can be approximated by an analytic function of age plus a single parameter, the onset of childbearing, and a scale factor (Sullivan 1972; Trussell 1975). The role of the parameter, age at the onset of childbearing, is to slide the fertility function along the age axis (i.e. a linear translation) without altering the relative magnitude of age specific rates which are a fixed number of years removed from the age at the onset of childbearing.

Sullivan (1972) sought to test these mathematical assumptions so as to increase the flexibility of the original Brass model. Using observed fertility schedules and the Coale-Demeny life tables, he generated fresh sets of multipliers based on least-squares regressions. The regressions were used to fit the data generated from the fertility schedules and life tables to the equation that Brass had developed:

$$q(x) = k(i)D(i) \qquad (5.1)$$

This created two sets of multipliers instead of the single set used by Brass. Trussell then took the Sullivan multipliers a stage further by generating a third set. The difference between Sullivan's and Trussell's approaches is that the former used observed fertility schedules in developing his multipliers, whereas the latter used model fertility schedules which he and Coale had developed. While the logic behind the methods is the same, they derive different sets of multipliers because the data bases used are not the same. The Trussell set of multipliers are felt to be generally superior or perform better than the original Brass or the Sullivan set of multipliers and are therefore used more and more in estimation.

5.3.1 Data required for estimation using the CEB/CS method

The data required for the estimation of childhood mortality are: children ever born classified by the age of mother (five-year age groups); children surviving also classified by five-year age groups of mother and all women classified by five-year age groups, regardless of marital status. Classification by sex of CEB/CS is desirable though not essential as it makes possible child mortality for each sex to be estimated separately making easier the creation of life tables for either sex.

Data classified by sex also enables consistency checks to be made on the survey or census information. This is achieved through the calculation of sex ratios of CEB/CS by the age of the mother. These should not vary in a systematic fashion by age and should generally fall between 1.02 and 1.07. Sex ratios at birth for most countries have a value of 1.05 except for sub-Saharan African countries where it averages 1.03. For populations other than those in the sub-Saharan region, sex ratios of over 1.07 and those under 1.02 show differential age reporting of males or females or misreporting of the sex of the reported children.

5.3.2 Computational procedures

To illustrate the CEB/CS method, data from the Zimbabwe 1982 Census are utilised. Table 5.3 presents the basic data required to start the computations. The first step is to calculate the proportion of children dead for each age group of mother. The proportion of the children dead, D(i), is defined as the ratio of reported children dead to reported children ever born, i.e.:

$$D(i) = CD(i) / CEB(i) \qquad (5.2)$$

where CEB(i) are the children ever born to women in age group i
CD(i) are the children dead by the age group of mother, i

The proportions are presented in the last two columns of Table 5.3. A comparison of these proportions with those of the 1969 Census reveal a trend of falling childhood mortality (see CSO 1985a). The proportions for Masvingo seem to reveal a degree of differential under reporting of children by women in the 15-19 age group. The reported proportions of female children who die is higher than that of the male children. This would seem to imply that male deaths are being under reported compared to female death.

The next step is the calculation of average parity per woman. Parity is denoted by P(i) where i is the index for the age group of the women (15-19, 20-24, etc). So the formula:

$$P(i) = CEB(i) / FP(i) \qquad (5.3)$$

where CEB(i) denotes the number of children ever born to women in age

group i;
FP(i) is the total number of women in age group i regardless of marital status;

Table 5.3: Female population aged 15-49; children ever born and children dead by age group of mother and sex; sex ratio for children ever born by region

Zimbabwe

| Age Group | Women | Children Ever Born Male | Children Ever Born Female | Children Dead Male | Children Dead Female | Sex Ratio | Proportions Dead M | Proportions Dead F |
|---|---|---|---|---|---|---|---|---|
| 15-19 | 412,610 | 47,720 | 46,340 | 4,990 | 3,850 | 1.03 | 0.105 | 0.083 |
| 20-24 | 364,200 | 267,500 | 266,540 | 29,980 | 25,390 | 1.00 | 0.112 | 0.095 |
| 25-29 | 281,060 | 430,050 | 431,270 | 57,310 | 49,580 | 1.00 | 0.133 | 0.115 |
| 30-34 | 206,760 | 483,610 | 478,410 | 73,500 | 63,620 | 1.01 | 0.152 | 0.133 |
| 35-39 | 170,170 | 502,940 | 497,320 | 82,970 | 75,410 | 1.01 | 0.165 | 0.152 |
| 40-44 | 139,530 | 479,840 | 469,280 | 88,570 | 79,810 | 1.02 | 0.185 | 0.170 |
| 45-49 | 110,390 | 400,580 | 392,940 | 83,950 | 76,160 | 1.02 | 0.210 | 0.194 |
| Tot. | 1,684,720 | 2,612,240 | 2,582,100 | 420,710 | 373,820 | 1.01 | 0.161 | 0.145 |
| Manicaland | | | | | | | | |
| 15-19 | 62,073 | 5,822 | 5,671 | 661 | 618 | 1.03 | 0.114 | 0.109 |
| 20-24 | 49,043 | 33,286 | 33,202 | 4,644 | 4,254 | 1.00 | 0.140 | 0.128 |
| 25-29 | 39,762 | 55,594 | 56,111 | 9,509 | 8,249 | 0.99 | 0.171 | 0.147 |
| 30-34 | 29,989 | 62,321 | 62,766 | 11,903 | 10,372 | 0.99 | 0.191 | 0.165 |
| 35-39 | 24,411 | 63,973 | 62,934 | 13,827 | 12,234 | 1.02 | 0.216 | 0.194 |
| 40-44 | 20,692 | 60,393 | 60,180 | 14,462 | 12,697 | 1.00 | 0.240 | 0.211 |
| 45-49 | 16,066 | 48,239 | 48,009 | 13,336 | 11,482 | 1.00 | 0.277 | 0.239 |
| TOTAL | 242,036 | 329,628 | 328,873 | 68,342 | 599,060 | 1.00 | 0.207 | 0.182 |
| Masvingo | | | | | | | | |
| 15-19 | 34,608 | 3,782 | 3,703 | 433 | 461 | 1.02 | 0.115 | 0.125 |
| 20-24 | 29,911 | 21,077 | 20,542 | 3,207 | 2,988 | 1.03 | 0.152 | 0.146 |
| 25-29 | 25,176 | 34,514 | 34,057 | 6,390 | 5,713 | 1.01 | 0.185 | 0.168 |
| 30-34 | 18,869 | 38,217 | 38,243 | 8,663 | 7,685 | 1.00 | 0.227 | 0.201 |
| 35-39 | 14,200 | 35,885 | 35,791 | 9,408 | 8,142 | 1.00 | 0.262 | 0.228 |
| 40-44 | 12,898 | 35,892 | 36,094 | 10,906 | 9,626 | 0.99 | 0.304 | 0.267 |
| 45-49 | 9,753 | 27,722 | 27,735 | 9,794 | 8,902 | 1.00 | 0.353 | 0.321 |
| TOTAL | 145,415 | 197,089 | 196,165 | 48,801 | 43,517 | 1.00 | 0.248 | 0.222 |

Source: 1982 Census, Tables 2A and 31AF
Notes: 1. The data for Zimbabwe is from the 10% Sample of the 1982 Census
2. The data for Manicaland and Masvingo are from the full census count of the 1982 Census

gives the average parities required for the calculations. Subscripts such as m or f or t can be added to distinguish the sexes being dealt with. The average parities can be calculated for either sex and the total population. The average parities for the women of Zimbabwe, Manicaland and Masvingo are shown in Table 5.4. Thus, by the age 45-49 a woman in Zimbabwe would expect to have had 3.63 male and 3.56 female children, on average, if the fertility and mortality levels of 1982 remained constant.

Table 5.4: Estimated probability of dying between birth and age x, and estimated life table survivors by region

Zimbabwe

| Age Group of Women | Average Parities M | F | Age x | Probability of Dying Male | Female | Probability of Surviving Male | Female | Reference Date Male | Female |
|---|---|---|---|---|---|---|---|---|---|
| 15-19 | 0.12 | 0.11 | 1 | 0.0359 | 0.0298 | 0.9641 | 0.9702 | 1981.62 | 1981.63 |
| 20-24 | 0.73 | 0.73 | 2 | 0.0925 | 0.0786 | 0.9075 | 0.9214 | 1980.30 | 1980.33 |
| 25-29 | 1.53 | 1.53 | 3 | 0.1256 | 0.1079 | 0.8744 | 0.8921 | 1978.35 | 1978.37 |
| 30-34 | 2.34 | 2.31 | 5 | 0.1527 | 0.1330 | 0.8473 | 0.8670 | 1976.01 | 1976.03 |
| 35-39 | 2.96 | 2.92 | 10 | 0.1721 | 0.1574 | 0.8279 | 0.8426 | 1973.42 | 1973.44 |
| 40-44 | 3.44 | 3.36 | 15 | 0.1914 | 0.1755 | 0.8086 | 0.8245 | 1970.67 | 1970.68 |
| 45-49 | 3.63 | 3.56 | 20 | 0.2152 | 0.1981 | 0.7848 | 0.8019 | 1967.73 | 1967.74 |
| Manicaland | | | | | | | | | |
| 15-19 | 0.09 | 0.09 | 1 | 0.1294 | 0.1246 | 0.8706 | 0.8754 | 1981.73 | 1981.74 |
| 20-24 | 0.68 | 0.68 | 2 | 0.1470 | 0.1355 | 0.8530 | 0.8645 | 1980.41 | 1980.43 |
| 25-29 | 1.40 | 1.41 | 3 | 0.1695 | 0.1460 | 0.8305 | 0.8540 | 1978.37 | 1978.41 |
| 30-34 | 2.08 | 2.09 | 5 | 0.1904 | 0.1650 | 0.8096 | 0.8350 | 1975.90 | 1975.96 |
| 35-39 | 2.62 | 2.58 | 10 | 0.2189 | 0.1972 | 0.7811 | 0.8028 | 1973.17 | 1973.24 |
| 40-44 | 2.92 | 2.91 | 15 | 0.2395 | 0.2113 | 0.7605 | 0.7887 | 1970.31 | 1970.38 |
| 45-49 | 3.00 | 2.99 | 20 | 0.2744 | 0.2378 | 0.7256 | 0.7622 | 1967.35 | 1967.42 |
| Masvingo | | | | | | | | | |
| 15-19 | 0.11 | 0.11 | 1 | 0.1277 | 0.1380 | 0.8723 | 0.8620 | 1981.70 | 1981.68 |
| 20-24 | 0.70 | 0.69 | 2 | 0.1578 | 0.1511 | 0.8422 | 0.8489 | 1980.31 | 1980.31 |
| 25-29 | 1.37 | 1.35 | 3 | 0.1815 | 0.1649 | 0.8185 | 0.8351 | 1978.19 | 1978.22 |
| 30-34 | 2.03 | 2.03 | 5 | 0.2241 | 0.1993 | 0.7759 | 0.8007 | 1975.65 | 1975.71 |
| 35-39 | 2.53 | 2.52 | 10 | 0.2636 | 0.2294 | 0.7364 | 0.7706 | 1972.85 | 1972.96 |
| 40-44 | 2.78 | 2.80 | 15 | 0.3017 | 0.2656 | 0.6983 | 0.7344 | 1969.95 | 1970.09 |
| 45-49 | 2.84 | 2.84 | 20 | 0.3481 | 0.3173 | 0.6519 | 0.6827 | 1967.02 | 1967.16 |

Source: Table 5.3 above.

The multipliers that convert the proportions of children dead, D(i), to their q(x) estimates are estimated next. In this instance, the multipliers developed by Trussell (1975) for the West Model life tables are used. This is because they are the more general type and are thought to represent mortality in the developing nations better than the rest of the family of the Coale-Demeny model life tables. Equation 5.4 is used to calculate the multipliers.

$$k(i) = a(i) + b(i)(P(1)/P(2)) + c(i)(P(2)/P(3)) \qquad (5.4)$$

where a(i), b(i) and c(i) are the coefficients developed by Trussell for the West Mortality model. The multipliers, k(i), are then substituted into equation 5.1, to obtain the values of q(x). The multipliers actually describe a mortality ratio of the probability of dying to the proportion of children dead. It is this mortality ratio which when substituted into equation 5.1 enable us to derive the life table function q(x), the probability of dying between birth and exact age x.

Note that the value of x is not generally equal to that of i, because x is related, in general terms, to the average age of the children of women in age group i. Once q(x) has been obtained, l(x), the estimated life table survivors from birth to age x is obtained as:

$$l(x) = 1.0 - q(x) \qquad (5.5)$$

The l(x)s obtained describe mortality in a life table with a radix of 1.0. However, there is need to recompute the q(x) values for this life table. The reason for recalculating the life table lies in the fact that the results obtained are averages pertaining to periods five to ten years before the survey date. Thus, to obtain estimates which are nearer to the time of the census there is a need to recompute the life table as shall be done in Section 5.5. The easiest way of obtaining such a life table is to regress the l(x) values starting at l(2).

The final step in this computation is to calculate the reference period to which the estimates refer. This is essential because the mortality pattern for males and females is different. Where mortality is changing smoothly, the reference period, t(x), is an estimate of the number of years before the survey date to which the child mortality estimates refer. The value of t(x) is also estimated by means of a regression equation whose coefficients were calculated from simulated cases. Table 5.4 presents the reference periods for Zimbabwe and the two provinces. Note the differences in the reference period of the male and female mortality estimates which are due to the differences in their susceptibility to mortality. The effect is as though the males have been exposed to the risk of death longer than female children of the same age.

To interpret fully the q(x)s and l(x)s obtained, we need to refer to model life table survival probabilities and the levels of mortality associated with them. These survival probabilities are presented in the Coale-Demeny West Mortality model life tables. The survival probabilities are used to determine the level associated with each l(x) for Zimbabwe through linear interpolation. Table 5.5 presents the mortality levels associated with the data on Zimbabwe. These are shown to be in close agreement with those arrived at by the CSO (1985a:171-173). This suggests that the steps have been replicated closely with minor differences here and there, probably generated through rounding off techniques. The reference dates are based on August 18th, 1982 as the mean date of the census.

When the results of the first age group are ignored as recommended by the UN(1983) it can be shown that mortality in Zimbabwe has been falling steadily since the last census. This is because the higher the mortality level, the higher the survival chances. Thus, the children of the women aged 20-24 have better survival chances than those of the women aged 45-49. The findings confirm the trend of falling mortality revealed by the proportions of children dead indicating that the data are of good quality.

Table 5.5: Mortality levels in the West Model Life Tables consistent with the childhood mortality estimates and reference dates: Zimbabwe 1982

| Age | Males | | Females | | Total | |
|---|---|---|---|---|---|---|
| x | West M. Level | Ref. Date | West M. Level | Ref. Date | West M. Level | Ref. Date |
| 1 | 14.9 | 1981.62 | 15.2 | 1981.63 | 15.1 | 1981.62 |
| 2 | 16.1 | 1980.30 | 16.1 | 1980.33 | 16.1 | 1980.32 |
| 3 | 15.7 | 1978.38 | 15.7 | 1978.39 | 15.7 | 1978.38 |
| 5 | 15.2 | 1976.01 | 15.3 | 1976.03 | 15.3 | 1976.02 |
| 10 | 15.1 | 1973.42 | 14.9 | 1973.44 | 15.0 | 1973.43 |
| 15 | 14.7 | 1970.67 | 14.6 | 1970.68 | 14.7 | 1970.68 |
| 20 | 14.4 | 1967.73 | 14.3 | 1967.74 | 14.4 | 1967.74 |

Source: Table 5.4
Notes: M. mortality: Ref. Reference

## 5.4 ESTIMATION OF ADULT MORTALITY

Adult mortality in a population can be estimated using orphanhood data. The questions for soliciting such data are simple to answer as they only require a "yes" or "do not know" answer. Orphanhood is used in a special sense as it is specific to the sex of the parent.

### 5.4.1 Nature and use of information on adult mortality

Preston (cited in UN 1983) noted that data collected on children surviving from all women provide information about the overall proportions of persons in a given population with a surviving mother. Information on survival of parents is an indicator of adult mortality only, since the exposure to risk of dying of the target person begins in adulthood, i.e. at birth, or conception of the respondent.

The data should be used to estimate mortality from one adult age group to the next. Such estimates are termed "conditional" as they do not describe a full life table. They are conditional upon survival from an unspecified childhood mortality experience, to the age at which the first set of estimates are made. If the estimate of childhood mortality is available, especially l(2), and some assumption can be made about the form of the relationship between child and adult mortality, as through the logit system, then unconditional survivorship probability estimates can be made from birth to some adult age. The estimates of mortality obtained from data on orphanhood represent averages of the mortality experience over the period during which the parents were exposed to the risk of dying. In this respect they are similar to the estimates of child mortality.

5.4.2 Estimation of adult survivorship: proportions not orphaned

There are several ways of utilising the data on orphanhood to estimate adult mortality. The method developed by Brass and improved upon by Trussell and Hill (1977) is discussed briefly below. The reason being that it is the most commonly used and has been applied to Zimbabwean data.

Brass developed a method of estimating adult mortality based on data from proportions of respondents with mother or father alive. These proportions for Zimbabwe and the two provinces are shown in Table 5.6. As expected, the respondents reported more female parents alive than male ones. This is constistent with the expectation of lighter female mortality and would seem to indicate that the responses solicited were reliable.

Table 5.6: Proportions of respondents reporting survival status of a parents

Zimbabwe

| Age Group | Alive Father Male | Alive Father Female | Alive Mother Male | Alive Mother Female | Dead Father Male | Dead Father Female | Dead Mother Male | Dead Mother Female |
|---|---|---|---|---|---|---|---|---|
| 0-4 | 0.97347 | 0.97383 | 0.99370 | 0.99298 | 0.02653 | 0.02617 | 0.00630 | 0.00702 |
| 5-9 | 0.94321 | 0.94137 | 0.98428 | 0.98372 | 0.05679 | 0.05863 | 0.01572 | 0.01628 |
| 10-14 | 0.90670 | 0.91023 | 0.97341 | 0.97331 | 0.09330 | 0.08977 | 0.02659 | 0.02669 |
| 15-19 | 0.86230 | 0.85442 | 0.95428 | 0.95101 | 0.13770 | 0.14558 | 0.04572 | 0.04899 |
| 20-24 | 0.78867 | 0.76632 | 0.92321 | 0.91337 | 0.21133 | 0.23368 | 0.07679 | 0.08663 |
| 25-29 | 0.68707 | 0.66825 | 0.87622 | 0.86405 | 0.31293 | 0.33175 | 0.12378 | 0.13595 |
| 30-34 | 0.57842 | 0.55372 | 0.81376 | 0.79630 | 0.42158 | 0.44628 | 0.18624 | 0.20370 |
| 35-39 | 0.46584 | 0.43104 | 0.72453 | 0.70809 | 0.53416 | 0.56896 | 0.27547 | 0.29191 |
| 40-44 | 0.34638 | 0.32159 | 0.61485 | 0.60538 | 0.65362 | 0.67841 | 0.38515 | 0.39462 |
| 45-49 | 0.26842 | 0.23373 | 0.52321 | 0.50947 | 0.73158 | 0.76627 | 0.47679 | 0.49053 |
| 50-54 | 0.18394 | 0.15340 | 0.41570 | 0.38910 | 0.81606 | 0.84660 | 0.58430 | 0.61090 |
| 55-59 | 0.12922 | 0.10025 | 0.31800 | 0.29594 | 0.87078 | 0.89975 | 0.68200 | 0.70406 |
| 60-64 | 0.07721 | 0.05999 | 0.20864 | 0.18828 | 0.92279 | 0.94001 | 0.79136 | 0.81172 |
| 65-69 | 0.06065 | 0.04659 | 0.14990 | 0.12172 | 0.93935 | 0.95341 | 0.85010 | 0.87828 |
| 70-74 | 0.04803 | 0.04759 | 0.09782 | 0.09849 | 0.95197 | 0.95241 | 0.90218 | 0.90151 |
| 75 + | 0.04699 | 0.05051 | 0.07724 | 0.07556 | 0.95301 | 0.94949 | 0.92276 | 0.92444 |
| TOTAL | 0.74071 | 0.73551 | 0.84961 | 0.84935 | 0.25929 | 0.26449 | 0.15039 | 0.15065 |

Manicaland

| Age Group | Alive Father Male | Alive Father Female | Alive Mother Male | Alive Mother Female | Dead Father Male | Dead Father Female | Dead Mother Male | Dead Mother Female |
|---|---|---|---|---|---|---|---|---|
| 0-4 | 0.97029 | 0.96952 | 0.99324 | 0.99308 | 0.02971 | 0.03048 | 0.00676 | 0.00692 |
| 5-9 | 0.93749 | 0.93529 | 0.98337 | 0.98267 | 0.06251 | 0.06471 | 0.01663 | 0.01733 |
| 10-14 | 0.90041 | 0.90037 | 0.97052 | 0.97066 | 0.09959 | 0.09963 | 0.02948 | 0.02934 |
| 15-19 | 0.85677 | 0.84649 | 0.95012 | 0.94700 | 0.14323 | 0.15351 | 0.04988 | 0.05300 |
| 20-24 | 0.77606 | 0.76178 | 0.91228 | 0.90428 | 0.22394 | 0.23822 | 0.08772 | 0.09572 |
| 25-29 | 0.67904 | 0.66484 | 0.86588 | 0.85564 | 0.32096 | 0.33516 | 0.13412 | 0.14436 |
| 30-34 | 0.56882 | 0.55467 | 0.79727 | 0.78998 | 0.43118 | 0.44533 | 0.20273 | 0.21002 |
| 35-39 | 0.45263 | 0.44839 | 0.71962 | 0.70658 | 0.54737 | 0.55161 | 0.28038 | 0.29342 |
| 40-44 | 0.35075 | 0.34241 | 0.61703 | 0.61531 | 0.64925 | 0.65759 | 0.38297 | 0.38469 |
| 45-49 | 0.27659 | 0.25339 | 0.52037 | 0.52024 | 0.72341 | 0.74661 | 0.47963 | 0.47976 |
| 50-54 | 0.18699 | 0.17017 | 0.42024 | 0.40800 | 0.81301 | 0.82983 | 0.57976 | 0.59200 |
| 55-59 | 0.13365 | 0.11771 | 0.32971 | 0.31378 | 0.86635 | 0.88229 | 0.67029 | 0.68622 |
| 60-64 | 0.08672 | 0.07554 | 0.23368 | 0.21413 | 0.91328 | 0.92446 | 0.76632 | 0.78587 |
| 65-69 | 0.06453 | 0.06481 | 0.15569 | 0.14875 | 0.93547 | 0.93519 | 0.84431 | 0.85125 |
| 70-74 | 0.05548 | 0.05894 | 0.11551 | 0.10862 | 0.94452 | 0.94106 | 0.88449 | 0.89138 |
| 75 + | 0.04577 | 0.05209 | 0.07959 | 0.08221 | 0.95423 | 0.94791 | 0.92041 | 0.91779 |
| TOTAL | 0.76000 | 0.73933 | 0.86143 | 0.85100 | 0.24000 | 0.26067 | 0.13857 | 0.14900 |

Table 5.6: (contd)

Masvingo

| Age Group | Alive: Father Male | Alive: Father Female | Alive: Mother Male | Alive: Mother Female | Dead: Father Male | Dead: Father Female | Dead: Mother Male | Dead: Mother Female |
|---|---|---|---|---|---|---|---|---|
| 0-4 | 0.96976 | 0.96898 | 0.99465 | 0.99404 | 0.03024 | 0.03102 | 0.00535 | 0.00596 |
| 5-9 | 0.93254 | 0.93153 | 0.98493 | 0.98361 | 0.06746 | 0.06847 | 0.01507 | 0.01639 |
| 10-14 | 0.89356 | 0.89581 | 0.97417 | 0.97441 | 0.10644 | 0.10419 | 0.02583 | 0.02559 |
| 15-19 | 0.84738 | 0.83804 | 0.95715 | 0.95155 | 0.15262 | 0.16196 | 0.04285 | 0.04845 |
| 20-24 | 0.76404 | 0.74941 | 0.92459 | 0.91418 | 0.23596 | 0.25059 | 0.07541 | 0.08582 |
| 25-29 | 0.66443 | 0.65642 | 0.88106 | 0.87026 | 0.33557 | 0.34358 | 0.11894 | 0.12974 |
| 30-34 | 0.54709 | 0.54358 | 0.81399 | 0.80541 | 0.45291 | 0.45642 | 0.18601 | 0.19459 |
| 35-39 | 0.44388 | 0.42098 | 0.74202 | 0.71447 | 0.55612 | 0.57902 | 0.25798 | 0.28553 |
| 40-44 | 0.34150 | 0.30996 | 0.63637 | 0.61718 | 0.65850 | 0.69004 | 0.36363 | 0.38282 |
| 45-49 | 0.25488 | 0.22952 | 0.55233 | 0.51042 | 0.74512 | 0.77048 | 0.44767 | 0.48958 |
| 50-54 | 0.16028 | 0.14661 | 0.42363 | 0.39431 | 0.83972 | 0.85339 | 0.57637 | 0.60569 |
| 55-59 | 0.11276 | 0.10063 | 0.33066 | 0.29731 | 0.88724 | 0.89937 | 0.66934 | 0.70269 |
| 60-64 | 0.07101 | 0.06953 | 0.23189 | 0.19362 | 0.92899 | 0.93047 | 0.76811 | 0.80638 |
| 65-69 | 0.04682 | 0.05253 | 0.15505 | 0.14579 | 0.95318 | 0.94747 | 0.84495 | 0.85421 |
| 70-74 | 0.05294 | 0.04814 | 0.11891 | 0.10797 | 0.94706 | 0.95186 | 0.88109 | 0.89203 |
| 75 + | 0.03604 | 0.04613 | 0.08191 | 0.07861 | 0.96396 | 0.95387 | 0.91802 | 0.92139 |
| TOTAL | 0.75239 | 0.73038 | 0.87032 | 0.85406 | 0.24761 | 0.26962 | 0.12968 | 0.14594 |

Source: 1982 Census, Table 26

Brass used female data to illustrate his method. He tried to relate female probability of surviving from age n to age 25 + n, to the proportions in two contiguous five-year age groups whose mother was still alive at the time of the interview. The equation had the form:

$$l(25+n)/l(25) = W(n)S(n-5) + (1-W(n)S(n) \qquad (5.6)$$

where $S(n)$ is the proportion of respondents aged from n to n+4 with mother alive;
$W(n)$ is a weighting factor to make allowance for typical age patterns of fertility and mortality.

The set of weights was simulated by using a single mortality pattern (the African Standard) and model fertility schedules with variable age locations and fixed shape. Each age location of the fertility schedule is associated with a particular value of M, the mean age of women at the birth of their children. The weights, W(n), depend on n, the central point of the age group being considered and upon M.

Hill and Trussell (1977) after considering the Brass technique sought a better method of estimating adult mortality from the proportions of respondents with a living parent. Their estimation is based on a regression model of the form:

$$l(25+n)/l(25) = a(n) + b(n)M + c(n)S(n-5) \qquad (5.7)$$

where a(n), b(n), c(n) are coefficients estimated by linear regression to fit to data for 900 simulated cases derived from several fertility schedules generated by the Coale-Trussell model and a variety of mortality schedules generated by the logit system with the four Coale-Demeny mortality patterns as standard. Thus, the Hill and Trussell method replaces the set of weights in the Brass method by a series of synthetically generated coefficients which are supposed to perform better than the weights. Comparison of the methods revealed that the Brass method performed fairly well for n not exceeding 30 years while the regression method of Hill and Trussell performed better at higher values of n.

### 5.4.3 Computational procedures

Because the performance of the two methods is not significantly different, the Brass method will be used to illustrate the estimation of adult mortality from orphanhood data. The data required are: proportion of repondents with a surviving mother/father in each five year age group from n to n+4. This proportion is denoted by S(n). S(n) values are calculated when any two of the following items are available; the number of respondents with mother/father alive, the number of respondents with father/mother dead and the total number of respondents whose mother's/father's survival status is known. The not stated category should be excluded. All data are classified by the age group of the respondents.

The number of births in a given year classified by the five-year age group of mother/father are also required. The information is required for the calculation of M, the mean age of mothers/fathers at the birth of their children. This M is not the mean age of childbearing but rather, the mean age of the fertility schedule weighted by the age distribution of the female population. It may be regarded as the average age difference between parents and their children, thus being an indicator of the average age at which the target persons (parents) begin their exposure to the risk of dying.

The first step is to compute the proportions of respondents with a mother alive. This is achieved by dividing the number of respondents reporting a mother alive by the total number of respondents reporting the survival status of the female parent. The form of the equation is as shown below:

$$S(n) = Fa(n)/(Fa(n) + Fd(n)) \qquad (5.8)$$

where Fa(n) is the number of respondents reporting a mother alive and;
Fd(n) is the number of respondents reporting a mother dead

The proportions with mother alive have been presented in Table 5.6.

The next step involves calculating M, the mean age at maternity or paternity. To illustrate the use of the method, only the data on female survivorship for Zimbabwe will be considered. Note that there are slight variations when paternal data is used, as births are not normally classified by the age of the father. Detailed equations will not be presented here. Interested readers can consult the United Nations Manual X - Indirect Techniques for Demographic Estimation (see bibliography for full reference). The data on the female population and the births have been presented in Table 5.3 above. For the value of M calculated above and for each value of n, a set of weights are computed. The weights, W(n), are arrived at by linear interpolation. Table 5.7 provides values of M for Zimbabwe.

Table 5.7: Estimates of reference period for survivorship estimates derived from maternal orphanhood data: Zimbabwe 1982

| Age n | Proportion with moth. surviving 10Sn-5 | Survivor-ship prob lf(25+n)/ lf(n) | Length expo-sure M+n | Stand-ard function Z(M+n) | Correc-tion u(n) | Reference period t(n) | Reference date | West Mort. Level |
|---|---|---|---|---|---|---|---|---|
| 20 | 0.9369 | 0.9464 | 46.8 | 0.1578 | 0.1368 | 8.63 | 1974.0 | 20.2 |
| 25 | 0.8964 | 0.9125 | 51.8 | 0.2284 | 0.1927 | 10.09 | 1972.5 | 19.5 |
| 30 | 0.8418 | 0.8653 | 56.8 | 0.2860 | 0.2293 | 11.56 | 1971.1 | 19.0 |
| 35 | 0.7648 | 0.8008 | 61.8 | 0.3704 | 0.2833 | 12.54 | 1970.1 | 18.5 |
| 40 | 0.6664 | 0.7071 | 66.8 | 0.4904 | 0.3561 | 12.88 | 1969.8 | 17.9 |
| 45 | 0.5684 | 0.5961 | 71.8 | 0.5896 | 0.4020 | 13.46 | 1969.2 | 17.9 |
| M = 26.8 | | | | | | | | |

The basic data obtained in the two steps above are now applied in the calculation of the survivorship probabilities for adult mortality. The Brass form of the equation for estimating adult survivorship probabilities is applied. This is given by equation 5.6 above. Table 5.7 gives the survival probabilities obtained by applying the Brass equation and the mortality levels associated with them. The conditional probabilities shown in the table are for values of n equals or greater than 20 years. Thus, the probability of survival is conditional in the sense that a female child has to attain the age of 20 in order for these probabilities to apply. They do not describe a complete life table experience of mortality from birth to death at some final adult age group. The West mortality level is calculated to enable interpretation of the female survivorship probabilities in terms of the mortality experience of the female population aged 20 and above.

The final step involves the calculation of reference dates. The

UN(1983:107) argue that if mortality is declining linearly over time then, it can be shown that the survivorship estimates for the females are equal to those prevalent at specific time periods prior to the survey. The location of these time periods are largely independent of the rate of mortality change. When the female mortality in adulthood is similar to that embodied by the general standard, the number of years before the survey can be calculated by:

$$t(n) = n(1.0 - u(n)) / 2.0 \qquad (5.9)$$

where

$$u(n) = 0.3333\ln(10Sn-5) + Z(M+n) + 0.0037(27-M) \qquad (5.10)$$

u(n) is a correction factor that adjusts the midpoint of age group n. Note that 10Sn-5 is the proportion of respondents aged from n-5 to n + 5 whose mother was alive at the time of the interview or survey. These proportions are obtained by dividing the number of respondents with surviving mother in the two adjacent age groups from n-5 to n-1 and from n to n+5 by the sum of respondents in both age groups who provided information on mother's survival. In this instance n refers to the midpoint of the ten year period under consideration.

When the values of 10Sn-5 are corrected by equation 5.9 only then can the substitution for the time period be made. However, before this can be done values of Z(M+n) needed to be obtained. The values are obtained by interpolating in the appropriate tables (UN 1983: 104). The values of Z(M+n) range from 46.8 for n=20 to 76.8 for n=50. With the values of Z(M+n) calculated the substitution of the correction formula can be carried out and the references dates worked out. The reference dates enable an assessment of the rate of improvement in female adult mortality as well as the consistency of the survivorship probabilities to be made. These can reveal any underlying weaknesses in the data under consideration i.e. the orphanhood data from which the mortality estimates are based.

The UN(1983) suggests that estimates obtained from female survivorship probabilities should on average refer to periods 8 to 15 years before the census or survey. The Zimbabwean results obtained are within this range. The West mortality level indicates a general decline between 1969 and 1974 in adult mortality for females in Zimbabwe. The declines seem to have progressed at a slow pace as the mortality level rises from 17.9 to 20.2 in fifteen years. Such rises have been achieved by some other countries in 5 years. However, the slow rise indicates consistency in the data, as it has been often found that, where reported gains appear to be very rapid, the data are actually defective. Further, the estimates of 1972 to 1974 might be biased upwards through the adoption effect. This is the situation where respondents report a parent alive who is actually not the biological parent. But when this has been noted, the estimates seem on the whole to perform in a satisfactory manner.

## 5.5 LIFE TABLES AND MORTALITY PATTERNS

There are several ways in which the partial survivorship probabilities generated in Sections 5.3 and 5.4 above, can be used in the creation of complete life tables. The most widely used method in the African context is the logit method (see Brass 1975:85-105). The type of model life table generated from the use of partial survivorship data is known as a relational life table (Newell 1988:151-166) because it is linked to a "standard life table" unlike empirical life tables which are generated from registered deaths. The logit method is only described briefly as there is an extensive literature on it.

5.5.1 The logit system

Briefly, the logit system relates the logits YS(x) of a standard or model life table l(x) values to the logits Y(x) of the derived life table l(x) values as follows:

$$Y(x) = a + b\ YS(x) \qquad (5.11)$$

where Y(x) is defined as:

$$Y(x) = 0.5 \ln (1-l(x))/l(x) \qquad (5.12)$$

The parameter alpha (a) defines the general level of mortality in the population whilst beta (b) describes the relationship between child and adult mortality (Brass 1975:85; Newell 1988:156-157; CSO 1985b:202). The logits of various l(x) values are plotted against the logits of the corresponding model life table values and then the alpha (a) and beta (b) parameters can be estimated using linear regression or the group average method (Newell 1988; UN 1983; CSO 1985). The entire range of l(x) values for the estimated life table can be derived from equation 5.10 above and the following equation:

$$l(x) = 1 / (1+ \exp 2Y(x)) \qquad (5.12)$$

With this set of l(x) values a complete life table for the population under consideration can be determined.

It must be noted that the values of alpha and beta are the crucial determinants of the resulting life table. Newell points out that altering the level of alpha will affect the overall level of mortality embodied in the life table while varying the level of beta will affect the relationship between child and adult mortality. In most cases, it is necessary to smooth the resulting life table according to the known mortality characteristics of the population.

The United Nations (1983) highlights the problem encountered when the orphanhood data are applied linked to child mortality estimates. The fact that orphanhood data might suffer from a large degree of underenumeration means that the resulting life table shows higher survival chances in the adult ages than are current in the population. In such cases, it is recommended that only the data from the childhood estimates be used in the creation of the life table. As the data on Zimbabwe seemed to suffer from the same problem, the life tables shown in Table 5.8 are based on childhood estimates with beta fixed at 1.0. Use of the group average method to link the partial child and adult survivorship probabilities (from Section 5.3 & 5.4) gave females survivors at age 85 of nearly 30%. This is a figure that is too high given the currently known mortality conditions of Zimbabwe, thus the orphanhood estimates were discarded because they seemed unreliable.

5.5.2 <u>The life tables and other mortality measures</u>

A few observations can be made from examination of the life tables. Table 5.8 forms the basis of these observations. However, before these are made a comment on the derivation of the life tables relating to the rest of Zimbabwe.

The life tables relating to the rest of Zimbabwe were generated by using the deaths in Manicaland and Masvingo provinces taken away from those of Zimbabwe. These deaths and the population of the rest of Zimbabwe were fed into the program LIFE (School of Geography, University of Leeds) to generate the life tables. So the life tables are generated in a more conventional sense than those for Manicaland, Masvingo and Zimbabwe. The program was also used to provide an independent check on the accuracy of the life tables relating to the two provinces and Zimbabwe. Except for minor differences in the first year of life, (0), the life tables were the same.

A comment relating to the Zimbabwe life tables is that the mortality experience embodied in them is slightly higher than found by the CSO (1985*a*:175-182). The differences arise from the fact that the

Table 5.8: Male and female life tables by regions

*Manicaland Males*

| Age | Population | Deaths | d(x) | M(x) | p(x) | s(x) | q(x) | l(x) | L(x) | T(x) | e(x) | Age |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 22803. | 2727. | 11285. | 0.11960 | 0.88715 | 0.88279 | 0.11285 | 100000. | 94357. | 5054907. | 50.55 | 0 |
| 1 | 85340. | 962. | 3911. | 0.01127 | 0.95592 | 0.94845 | 0.04408 | 88715. | 347038. | 4960550. | 55.92 | 1 |
| 5 | 83461. | 429. | 2151. | 0.00514 | 0.97464 | 0.98016 | 0.02536 | 84804. | 418643. | 4613512. | 54.40 | 5 |
| 10 | 80349. | 229. | 1171. | 0.00285 | 0.98583 | 0.98094 | 0.01417 | 82653. | 410337. | 4194869. | 50.75 | 10 |
| 15 | 58559. | 285. | 1957. | 0.00486 | 0.97598 | 0.97160 | 0.02402 | 81482. | 402517. | 3784532. | 46.45 | 15 |
| 20 | 40530. | 271. | 2615. | 0.00669 | 0.96712 | 0.96642 | 0.03288 | 79525. | 391087. | 3382014. | 42.53 | 20 |
| 25 | 27749. | 194. | 2638. | 0.00698 | 0.96570 | 0.96472 | 0.03430 | 76910. | 377955. | 2990927. | 38.89 | 25 |
| 30 | 21444. | 159. | 2696. | 0.00739 | 0.96370 | 0.96127 | 0.03630 | 74272. | 364620. | 2612972. | 35.18 | 30 |
| 35 | 18062. | 152. | 2953. | 0.00843 | 0.95874 | 0.95482 | 0.04126 | 71576. | 350497. | 2248352. | 31.41 | 35 |
| 40 | 15981. | 161. | 3381. | 0.01010 | 0.95073 | 0.94422 | 0.04927 | 68623. | 334662. | 1897854. | 27.66 | 40 |
| 45 | 14238. | 184. | 4086. | 0.01293 | 0.93737 | 0.92756 | 0.06263 | 65242. | 315995. | 1563192. | 23.96 | 45 |
| 50 | 12243. | 212. | 5070. | 0.01730 | 0.91710 | 0.90230 | 0.08290 | 61156. | 293105. | 1247197. | 20.39 | 50 |
| 55 | 10143. | 245. | 6384. | 0.02414 | 0.88617 | 0.86442 | 0.11383 | 56086. | 264470. | 954092. | 17.01 | 55 |
| 60 | 7494. | 261. | 7959. | 0.03481 | 0.83987 | 0.80911 | 0.16013 | 49702. | 228612. | 689622. | 13.88 | 60 |
| 65 | 6929. | 356. | 9497. | 0.05134 | 0.77249 | 0.73223 | 0.22751 | 41743. | 184972. | 461009. | 11.04 | 65 |
| 70 | 5130. | 391. | 10315. | 0.07616 | 0.68012 | 0.63481 | 0.31988 | 32246. | 135442. | 276037. | 8.56 | 70 |
| 75 | 3215. | 354. | 9470. | 0.11014 | 0.56819 | 0.47441 | 0.43181 | 21931. | 85980. | 140594. | 6.41 | 75 |
| 80 | 1556. | 328. | 8606. | 0.21098 | 0.30937 | 0.33891 | 0.69063 | 12461. | 40790. | 54614. | 4.38 | 80 |
| 85 | 624. | 174. | 3855. | 0.27886 | 0.00000 | 0.00000 | 1.00000 | 3855. | 13824. | 13824. | 3.59 | 85 |
| TOTAL | 515850. | 8073. | | | | | | | | | | |

*Manicaland Females*

| Age | Population | Deaths | d(x) | M(x) | p(x) | s(x) | q(x) | l(x) | L(x) | T(x) | e(x) | Age |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 23012. | 2517. | 10370. | 0.10937 | 0.89630 | 0.89439 | 0.10370 | 100000. | 94815. | 5294847. | 52.95 | 0 |
| 1 | 85866. | 748. | 3071. | 0.00872 | 0.96574 | 0.95959 | 0.03426 | 89630. | 352378. | 5200032. | 58.02 | 1 |
| 5 | 93418. | 320. | 1470. | 0.00343 | 0.98302 | 0.98500 | 0.01698 | 86559. | 429120. | 4847654. | 56.00 | 5 |
| 10 | 79702. | 208. | 1105. | 0.00261 | 0.98701 | 0.98252 | 0.01299 | 85089. | 422682. | 4418534. | 51.93 | 10 |
| 15 | 63341. | 282. | 1850. | 0.00445 | 0.97797 | 0.97390 | 0.02203 | 83984. | 415295. | 3995851. | 47.58 | 15 |
| 20 | 49791. | 306. | 2485. | 0.00614 | 0.96974 | 0.96908 | 0.03026 | 82134. | 404457. | 3580556. | 43.59 | 20 |
| 25 | 39172. | 252. | 2518. | 0.00642 | 0.96839 | 0.96744 | 0.03161 | 79649. | 391950. | 3176099. | 39.88 | 25 |
| 30 | 31133. | 212. | 2586. | 0.00682 | 0.96647 | 0.96417 | 0.03353 | 77131. | 379190. | 2784149. | 36.10 | 30 |
| 35 | 24856. | 194. | 2848. | 0.00779 | 0.96179 | 0.95810 | 0.03821 | 74545. | 365605. | 2404959. | 32.26 | 35 |
| 40 | 20005. | 187. | 3280. | 0.00936 | 0.95425 | 0.94810 | 0.04575 | 71697. | 350285. | 2039354. | 28.44 | 40 |
| 45 | 16132. | 194. | 3992. | 0.01202 | 0.94165 | 0.93234 | 0.05835 | 68417. | 332105. | 1689069. | 24.69 | 45 |
| 50 | 12867. | 208. | 4996. | 0.01614 | 0.92245 | 0.90832 | 0.07755 | 64425. | 309635. | 1356964. | 21.06 | 50 |
| 55 | 10241. | 232. | 6359. | 0.02261 | 0.89300 | 0.87203 | 0.10700 | 59429. | 281247. | 1047329. | 17.62 | 55 |
| 60 | 7654. | 251. | 8037. | 0.03277 | 0.84856 | 0.81869 | 0.15144 | 53070. | 245257. | 766081. | 14.44 | 60 |
| 65 | 7150. | 347. | 9750. | 0.04856 | 0.78349 | 0.74419 | 0.21651 | 45033. | 200790. | 520824. | 11.57 | 65 |
| 70 | 5516. | 399. | 10796. | 0.07225 | 0.69402 | 0.66706 | 0.30598 | 35283. | 149425. | 320034. | 9.07 | 70 |
| 75 | 3665. | 335. | 9104. | 0.09134 | 0.62821 | 0.51683 | 0.37179 | 24487. | 99675. | 170609. | 6.97 | 75 |
| 80 | 1898. | 374. | 10160. | 0.19722 | 0.33953 | 0.37695 | 0.66047 | 15383. | 51515. | 70934. | 4.61 | 80 |
| 85 | 836. | 225. | 5223. | 0.26897 | 0.00000 | 0.00000 | 1.00000 | 5223. | 19419. | 19419. | 3.72 | 85 |
| TOTAL | 576255. | 7790. | | | | | | | | | | |

Table 5.8 contd: *Masvingo Males*

| Age | Population | Deaths | d(x) | M(x) | p(x) | s(x) | q(x) | l(x) | L(x) | T(x) | e(x) | Age |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 21582. | 2792. | 12150. | 0.12936 | 0.87850 | 0.87108 | 0.12150 | 100000. | 93925. | 4916555. | 49.17 | 0 |
| 1 | 80128. | 1147. | 4892. | 0.01432 | 0.94431 | 0.94291 | 0.05569 | 87850. | 341616. | 4822630. | 54.90 | 1 |
| 5 | 86215. | 345. | 1645. | 0.00401 | 0.98017 | 0.98249 | 0.01983 | 82958. | 410677. | 4481014. | 54.02 | 5 |
| 10 | 73040. | 223. | 1231. | 0.00305 | 0.98486 | 0.97968 | 0.01514 | 81313. | 403487. | 4070336. | 50.06 | 10 |
| 15 | 53274. | 276. | 2049. | 0.00518 | 0.97441 | 0.96978 | 0.02559 | 80082. | 395287. | 3666849. | 45.79 | 15 |
| 20 | 37862. | 270. | 2729. | 0.00712 | 0.96503 | 0.96433 | 0.03497 | 78033. | 383342. | 3271561. | 41.93 | 20 |
| 25 | 27579. | 204. | 2740. | 0.00741 | 0.96361 | 0.96262 | 0.03639 | 75304. | 369670. | 2888219. | 38.35 | 25 |
| 30 | 22037. | 173. | 2788. | 0.00783 | 0.96158 | 0.95906 | 0.03842 | 72564. | 355850. | 2518549. | 34.71 | 30 |
| 35 | 18236. | 162. | 3039. | 0.00890 | 0.95645 | 0.95238 | 0.04355 | 69776. | 341282. | 2162699. | 30.99 | 35 |
| 40 | 15362. | 164. | 3462. | 0.01065 | 0.94812 | 0.94140 | 0.05188 | 66737. | 325030. | 1821416. | 27.29 | 40 |
| 45 | 12986. | 176. | 4157. | 0.01359 | 0.93430 | 0.92423 | 0.06570 | 63275. | 305982. | 1496386. | 23.65 | 45 |
| 50 | 10690. | 193. | 5117. | 0.01809 | 0.91344 | 0.89834 | 0.08656 | 59118. | 282797. | 1190404. | 20.14 | 50 |
| 55 | 8653. | 217. | 6383. | 0.02513 | 0.88180 | 0.85982 | 0.11820 | 54001. | 254047. | 907606. | 16.81 | 55 |
| 60 | 6638. | 239. | 7862. | 0.03599 | 0.83489 | 0.80420 | 0.16511 | 47618. | 218435. | 653559. | 13.73 | 60 |
| 65 | 6016. | 317. | 9246. | 0.05263 | 0.76743 | 0.72779 | 0.23257 | 39756. | 175665. | 435124. | 10.94 | 65 |
| 70 | 4454. | 344. | 9881. | 0.07729 | 0.67614 | 0.63224 | 0.32386 | 30510. | 127847. | 259459. | 8.50 | 70 |
| 75 | 2791. | 308. | 8926. | 0.11043 | 0.56731 | 0.47198 | 0.43269 | 20629. | 80830. | 131611. | 6.38 | 75 |
| 80 | 1531. | 327. | 8146. | 0.21353 | 0.30394 | 0.33109 | 0.69606 | 11703. | 38150. | 50781. | 4.34 | 80 |
| 85 | 542. | 153. | 3557. | 0.28160 | 0.00000 | 0.00000 | 1.00000 | 3557. | 12631. | 12631. | 3.55 | 85 |
| TOTAL | 489616. | 8031. | | | | | | | | | | |

*Masvingo Females*

| Age | Population | Deaths | d(x) | M(x) | p(x) | s(x) | q(x) | l(x) | L(x) | T(x) | e(x) | Age |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 21829. | 2691. | 11613. | 0.12329 | 0.88387 | 0.88088 | 0.11613 | 100000. | 94193. | 5082692. | 50.83 | 0 |
| 1 | 80987. | 854. | 3650. | 0.01054 | 0.95870 | 0.95290 | 0.04130 | 88387. | 346248. | 4988499. | 56.44 | 1 |
| 5 | 87000. | 331. | 1595. | 0.00380 | 0.98118 | 0.98339 | 0.01882 | 84737. | 419697. | 4642251. | 54.78 | 5 |
| 10 | 73388. | 212. | 1194. | 0.00289 | 0.98564 | 0.97670 | 0.01436 | 83142. | 412725. | 4222553. | 50.79 | 10 |
| 15 | 58387. | 384. | 2652. | 0.00658 | 0.96764 | 0.97115 | 0.03236 | 81948. | 403110. | 3809828. | 46.49 | 15 |
| 20 | 46601. | 238. | 2000. | 0.00511 | 0.97478 | 0.97013 | 0.02522 | 79296. | 391480. | 3406718. | 42.96 | 20 |
| 25 | 37576. | 265. | 2678. | 0.00705 | 0.96535 | 0.96439 | 0.03465 | 77296. | 379785. | 3015238. | 39.01 | 25 |
| 30 | 29922. | 223. | 2732. | 0.00746 | 0.96339 | 0.96096 | 0.03661 | 74618. | 366260. | 2635453. | 35.32 | 30 |
| 35 | 23527. | 200. | 2987. | 0.00849 | 0.95845 | 0.95453 | 0.04155 | 71886. | 351962. | 2269193. | 31.57 | 35 |
| 40 | 18533. | 188. | 3414. | 0.01016 | 0.95045 | 0.94397 | 0.04955 | 68899. | 335960. | 1917231. | 27.83 | 40 |
| 45 | 14718. | 191. | 4115. | 0.01298 | 0.93716 | 0.92744 | 0.06284 | 65485. | 317137. | 1581271. | 24.15 | 45 |
| 50 | 11800. | 204. | 5090. | 0.01731 | 0.91706 | 0.90246 | 0.08294 | 61370. | 294125. | 1264133. | 20.60 | 50 |
| 55 | 9494. | 228. | 6386. | 0.02406 | 0.88653 | 0.86521 | 0.11347 | 56280. | 265435. | 970008. | 17.24 | 55 |
| 60 | 6954. | 240. | 7925. | 0.03451 | 0.84116 | 0.81138 | 0.15884 | 49894. | 229657. | 704573. | 14.12 | 60 |
| 65 | 6749. | 341. | 9402. | 0.05046 | 0.77598 | 0.73771 | 0.22402 | 41969. | 186340. | 474916. | 11.32 | 65 |
| 70 | 5206. | 384. | 10148. | 0.07382 | 0.68840 | 0.64709 | 0.31160 | 32567. | 137465. | 288576. | 8.86 | 70 |
| 75 | 3459. | 360. | 9257. | 0.10407 | 0.58709 | 0.50305 | 0.41291 | 22419. | 88952. | 151111. | 6.74 | 75 |
| 80 | 1791. | 337. | 8425. | 0.18828 | 0.35990 | 0.38909 | 0.64010 | 13162. | 44747. | 62158. | 4.72 | 80 |
| 85 | 789. | 215. | 4737. | 0.27207 | 0.00000 | 0.00000 | 1.00000 | 4737. | 17411. | 17411. | 3.68 | 85 |
| TOTAL | 538710. | 8087. | | | | | | | | | | |

Table 5.8 contd: *Rest of Zimbabwe Males*

| Age | Population | Deaths | d(x) | M(x) | p(x) | s(x) | q(x) | l(x) | L(x) | T(x) | e(x) | Age |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 100310. | 8414. | 8050. | 0.08388 | 0.91950 | 0.91490 | 0.08050 | 100000. | 95975. | 5561506. | 55.62 | 0 |
| 1 | 374695. | 3278. | 3162. | 0.00875 | 0.96561 | 0.96428 | 0.03439 | 91950. | 361476. | 5465531. | 59.44 | 1 |
| 5 | 418639. | 1074. | 1132. | 0.00257 | 0.98725 | 0.98825 | 0.01275 | 88788. | 441110. | 5104055. | 57.49 | 5 |
| 10 | 351031. | 759. | 942. | 0.00216 | 0.98925 | 0.98532 | 0.01075 | 87656. | 435925. | 4662945. | 53.20 | 10 |
| 15 | 281177. | 1059. | 1617. | 0.00376 | 0.98135 | 0.97774 | 0.01865 | 86714. | 429527. | 4227020. | 48.75 | 15 |
| 20 | 225664. | 1186. | 2208. | 0.00526 | 0.97405 | 0.97330 | 0.02595 | 85097. | 419965. | 3797493. | 44.63 | 20 |
| 25 | 183164. | 1021. | 2278. | 0.00557 | 0.97252 | 0.97160 | 0.02748 | 82889. | 408750. | 3377528. | 40.75 | 25 |
| 30 | 147566. | 879. | 2366. | 0.00596 | 0.97065 | 0.96851 | 0.02935 | 80611. | 397140. | 2968778. | 36.83 | 30 |
| 35 | 119318. | 818. | 2637. | 0.00686 | 0.96630 | 0.96287 | 0.03370 | 78245. | 384632. | 2571638. | 32.87 | 35 |
| 40 | 102538. | 851. | 3075. | 0.00830 | 0.95933 | 0.95356 | 0.04067 | 75608. | 370352. | 2187005. | 28.93 | 40 |
| 45 | 91055. | 981. | 3805. | 0.01077 | 0.94754 | 0.93868 | 0.05246 | 72533. | 353152. | 1816653. | 25.05 | 45 |
| 50 | 77139. | 1130. | 4857. | 0.01465 | 0.92933 | 0.91565 | 0.07067 | 68728. | 331497. | 1463500. | 21.29 | 50 |
| 55 | 60782. | 1267. | 6328. | 0.02085 | 0.90093 | 0.88018 | 0.09907 | 63871. | 303535. | 1132003. | 17.72 | 55 |
| 60 | 43267. | 1331. | 8220. | 0.03077 | 0.85715 | 0.82700 | 0.14285 | 57543. | 267165. | 828468. | 14.40 | 60 |
| 65 | 33387. | 1552. | 10268. | 0.04647 | 0.79182 | 0.73121 | 0.20818 | 49323. | 220945. | 561303. | 11.38 | 65 |
| 70 | 24718. | 2063. | 13487. | 0.08348 | 0.65467 | 0.62430 | 0.34533 | 39055. | 161557. | 340358. | 8.71 | 70 |
| 75 | 15491. | 1658. | 10792. | 0.10700 | 0.57791 | 0.52724 | 0.42209 | 25568. | 100860. | 178800. | 6.99 | 75 |
| 80 | 7316. | 1139. | 8281. | 0.15572 | 0.43956 | 0.46566 | 0.56044 | 14776. | 53177. | 77940. | 5.27 | 80 |
| 85 | 3008. | 789. | 6495. | 0.26229 | 0.00000 | 0.00000 | 1.00000 | 6495. | 24763. | 24763. | 3.81 | 85 |
| TOTAL | 2660265. | 31249. | | | | | | | | | | |

*Rest of Zimbabwe Females*

| Age | Population | Deaths | d(x) | M(x) | p(x) | s(x) | q(x) | l(x) | L(x) | T(x) | e(x) | Age |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 99240. | 5999. | 5868. | 0.06045 | 0.94132 | 0.94384 | 0.05868 | 100000. | 97066. | 6120342. | 61.20 | 0 |
| 1 | 373789. | 835. | 837. | 0.00223 | 0.99111 | 0.98331 | 0.00889 | 94132. | 374854. | 6023276. | 63.99 | 1 |
| 5 | 415105. | 870. | 973. | 0.00210 | 0.98957 | 0.99073 | 0.01043 | 93295. | 464042. | 5648422. | 60.54 | 5 |
| 10 | 358186. | 582. | 747. | 0.00162 | 0.99191 | 0.98967 | 0.00809 | 92322. | 459742. | 5184379. | 56.16 | 10 |
| 15 | 308346. | 781. | 1153. | 0.00253 | 0.98741 | 0.98308 | 0.01259 | 91575. | 454992. | 4724637. | 51.59 | 15 |
| 20 | 258477. | 1113. | 1926. | 0.00431 | 0.97870 | 0.97888 | 0.02130 | 90422. | 447295. | 4269644. | 47.22 | 20 |
| 25 | 206647. | 874. | 1852. | 0.00423 | 0.97907 | 0.97833 | 0.02093 | 88496. | 437850. | 3822349. | 43.19 | 25 |
| 30 | 157330. | 714. | 1944. | 0.00454 | 0.97756 | 0.97586 | 0.02244 | 86644. | 428360. | 3384499. | 39.06 | 30 |
| 35 | 121623. | 638. | 2192. | 0.00524 | 0.97412 | 0.97122 | 0.02588 | 84700. | 418020. | 2956139. | 34.90 | 35 |
| 40 | 97555. | 630. | 2620. | 0.00645 | 0.96825 | 0.96347 | 0.03175 | 82508. | 405990. | 2538119. | 30.76 | 40 |
| 45 | 78366. | 664. | 3312. | 0.00847 | 0.95854 | 0.95109 | 0.04146 | 79888. | 391160. | 2132129. | 26.69 | 45 |
| 50 | 61530. | 718. | 4340. | 0.01167 | 0.94332 | 0.93145 | 0.05668 | 76576. | 372030. | 1740969. | 22.74 | 50 |
| 55 | 48056. | 813. | 5861. | 0.01691 | 0.91886 | 0.89995 | 0.08114 | 72236. | 346528. | 1368939. | 18.95 | 55 |
| 60 | 36330. | 933. | 8007. | 0.02568 | 0.87937 | 0.85067 | 0.12063 | 66375. | 311857. | 1022412. | 15.40 | 60 |
| 65 | 32114. | 1286. | 10621. | 0.04004 | 0.81803 | 0.77548 | 0.18197 | 58368. | 265287. | 710554. | 12.17 | 65 |
| 70 | 24774. | 1590. | 13204. | 0.06418 | 0.72346 | 0.66713 | 0.27654 | 47747. | 205725. | 445267. | 9.33 | 70 |
| 75 | 16461. | 1702. | 14188. | 0.10338 | 0.58927 | 0.51700 | 0.41073 | 34543. | 137245. | 239542. | 6.93 | 75 |
| 80 | 8524. | 1481. | 12328. | 0.17374 | 0.39435 | 0.44171 | 0.60565 | 20355. | 70955. | 102297. | 5.03 | 80 |
| 85 | 3753. | 961. | 8027. | 0.25611 | 0.00000 | 0.00000 | 1.00000 | 8027. | 31342. | 31342. | 3.90 | 85 |
| TOTAL | 2706206. | 23183. | | | | | | | | | | |

Table 5.8 contd: *Zimbabwe Males*

| Age | Population | Deaths | d(x) | M(x) | p(x) | s(x) | q(x) | l(x) | L(x) | T(x) | e(x) | Age |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 144695. | 14138. | 9316. | 0.09771 | 0.90684 | 0.90193 | 0.09316 | 100000. | 95342. | 5396620. | 53.97 | 0 |
| 1 | 540163. | 5401. | 3556. | 0.01000 | 0.96079 | 0.95849 | 0.03921 | 90684. | 355624. | 5301278. | 58.46 | 1 |
| 5 | 588315. | 1848. | 1358. | 0.00314 | 0.98441 | 0.98623 | 0.01559 | 87128. | 432245. | 4945654. | 56.76 | 5 |
| 10 | 504420. | 1209. | 1022. | 0.00240 | 0.98808 | 0.98392 | 0.01192 | 85770. | 426295. | 4513409. | 52.62 | 10 |
| 15 | 393010. | 1612. | 1720. | 0.00410 | 0.97970 | 0.97592 | 0.02030 | 84748. | 419440. | 4087114. | 48.23 | 15 |
| 20 | 304056. | 1723. | 2320. | 0.00567 | 0.97206 | 0.97139 | 0.02794 | 83028. | 409340. | 3667674. | 44.17 | 20 |
| 25 | 238492. | 1418. | 2364. | 0.00595 | 0.97071 | 0.96978 | 0.02929 | 80708. | 397630. | 3258334. | 40.37 | 25 |
| 30 | 191047. | 1210. | 2443. | 0.00634 | 0.96882 | 0.96661 | 0.03118 | 78344. | 385613. | 2860704. | 36.51 | 30 |
| 35 | 155616. | 1130. | 2707. | 0.00726 | 0.96434 | 0.96078 | 0.03566 | 75901. | 372737. | 2475092. | 32.61 | 35 |
| 40 | 133881. | 1174. | 3140. | 0.00877 | 0.95710 | 0.95118 | 0.04290 | 73194. | 358120. | 2102354. | 28.72 | 40 |
| 45 | 118279. | 1338. | 3854. | 0.01131 | 0.94499 | 0.93594 | 0.05501 | 70054. | 340635. | 1744234. | 24.90 | 45 |
| 50 | 100072. | 1530. | 4874. | 0.01529 | 0.92637 | 0.91246 | 0.07363 | 66200. | 318815. | 1403599. | 21.20 | 50 |
| 55 | 79578. | 1720. | 6289. | 0.02162 | 0.89745 | 0.87648 | 0.10255 | 61326. | 290907. | 1084784. | 17.69 | 55 |
| 60 | 57399. | 1820. | 8084. | 0.03171 | 0.85312 | 0.82250 | 0.14688 | 55037. | 254975. | 793877. | 14.42 | 60 |
| 65 | 46332. | 2213. | 10019. | 0.04777 | 0.78662 | 0.74498 | 0.21338 | 46953. | 209717. | 538902. | 11.48 | 65 |
| 70 | 34302. | 2497. | 11374. | 0.07280 | 0.69205 | 0.64323 | 0.30795 | 36934. | 156235. | 329184. | 8.91 | 70 |
| 75 | 21497. | 2336. | 10922. | 0.10868 | 0.57269 | 0.50669 | 0.42731 | 25560. | 100495. | 172949. | 6.77 | 75 |
| 80 | 10403. | 1820. | 8908. | 0.17494 | 0.39145 | 0.42290 | 0.60855 | 14638. | 50920. | 72454. | 4.95 | 80 |
| 85 | 4174. | 1111. | 5730. | 0.26609 | 0.00000 | 0.00000 | 1.00000 | 5730. | 21534. | 21534. | 3.76 | 85 |
| TOTAL | 3665731. | 47250. | | | | | | | | | | |

*Zimbabwe Females*

| Age | Population | Deaths | d(x) | M(x) | p(x) | s(x) | q(x) | l(x) | L(x) | T(x) | e(x) | Age |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 144081. | 11328. | 7565. | 0.07862 | 0.92435 | 0.92531 | 0.07565 | 100000. | 96217. | 5819616. | 58.20 | 0 |
| 1 | 540642. | 2437. | 1652. | 0.00451 | 0.98213 | 0.97488 | 0.01787 | 92435. | 366436. | 5723398. | 61.92 | 1 |
| 5 | 595523. | 1522. | 1153. | 0.00256 | 0.98730 | 0.98877 | 0.01270 | 90783. | 451032. | 5356962. | 59.01 | 5 |
| 10 | 511276. | 1001. | 873. | 0.00196 | 0.99026 | 0.98683 | 0.00974 | 89630. | 445967. | 4905930. | 54.74 | 10 |
| 15 | 430074. | 1443. | 1477. | 0.00336 | 0.98336 | 0.98020 | 0.01664 | 88757. | 440093. | 4459962. | 50.25 | 15 |
| 20 | 354869. | 1653. | 2009. | 0.00466 | 0.97698 | 0.97637 | 0.02302 | 87280. | 431377. | 4019870. | 46.06 | 20 |
| 25 | 283395. | 1391. | 2068. | 0.00491 | 0.97575 | 0.97491 | 0.02425 | 85271. | 421185. | 3588492. | 42.08 | 25 |
| 30 | 218385. | 1148. | 2159. | 0.00526 | 0.97405 | 0.97213 | 0.02595 | 83203. | 410617. | 3167307. | 38.07 | 30 |
| 35 | 170006. | 1030. | 2419. | 0.00606 | 0.97015 | 0.96705 | 0.02985 | 81044. | 399172. | 2756690. | 34.01 | 35 |
| 40 | 136093. | 1002. | 2842. | 0.00736 | 0.96385 | 0.95866 | 0.03615 | 78625. | 386020. | 2357517. | 29.98 | 40 |
| 45 | 109216. | 1045. | 3541. | 0.00957 | 0.95327 | 0.94523 | 0.04673 | 75783. | 370062. | 1971497. | 26.02 | 45 |
| 50 | 86197. | 1125. | 4566. | 0.01305 | 0.93680 | 0.92421 | 0.06320 | 72242. | 349795. | 1601435. | 22.17 | 50 |
| 55 | 67791. | 1266. | 6038. | 0.01868 | 0.91078 | 0.89131 | 0.08922 | 67676. | 323285. | 1251640. | 18.49 | 55 |
| 60 | 50938. | 1417. | 8017. | 0.02782 | 0.86993 | 0.84057 | 0.13007 | 61638. | 288147. | 928355. | 15.06 | 60 |
| 65 | 46013. | 1968. | 10359. | 0.04277 | 0.80681 | 0.76545 | 0.19319 | 53621. | 242208. | 640207. | 11.94 | 65 |
| 70 | 35496. | 2367. | 12365. | 0.06669 | 0.71418 | 0.66433 | 0.28582 | 43262. | 185397. | 398000. | 9.20 | 70 |
| 75 | 23585. | 2399. | 12528. | 0.10172 | 0.59452 | 0.51224 | 0.40548 | 30897. | 123165. | 212602. | 6.88 | 75 |
| 80 | 12213. | 2227. | 11502. | 0.18231 | 0.37384 | 0.41761 | 0.62616 | 18369. | 63090. | 89437. | 4.87 | 80 |
| 85 | 5378. | 1402. | 6867. | 0.26064 | 0.00000 | 0.00000 | 1.00000 | 6867. | 26347. | 26347. | 3.84 | 85 |
| TOTAL | 3821171. | 39173. | | | | | | | | | | |

Central Statistical Office were able to project the alpha and beta values to refer to 1982 whereas in the case of the tables presented in this study, it is better to say that there are an average for the period 1977-1982. This, plus differing interpretation of the methodology, might explain the observed differences.

The male and female q(x)s converge around the age of 10 years before diverging again. This can be explained by the fact that at birth, mortality is heavier for males than for females. As the children survive and adapt to their environment mortality becomes light though it is still slightly heavier for males than females and the survival chances for both sexes approach each other. After age 10 both sexes are subjected to rising mortality, the causes of which are discussed later.

Manicaland and Masvingo show higher mortality levels than the national average for both sexes. As expected the rest of Zimbabwe has lower mortality levels than the national average because it incorporates the three largest cities (Harare, Bulawayo, Chitungwiza) where the survival chances of children are highest. In all cases though, male mortality is always higher than female mortality.

The most commonly used statistic in the life table is e(0), i.e. the life expectancy at birth. For example, a male child born in Masvingo can expect to live for 49.17 years at birth. If the child survives the first year of life, then its expectation of life improves considerably, by about five years. In general, a male child born in Zimbabwe, who survives the first year of life, will improve his life expectancy by about five years. The female improvement after the first year of life is more varied - between three and six years.

The differential in expectations of life at birth are quite large in Zimbabwe, showing significant mortality variations. Female life expectancy varies from 50.83 years at birth in Masvingo to about 61.20 years in the rest of Zimbabwe, a range of about 10.37 years. The male equivalent is 6.45 years for the same regional units. The inference drawn from this observation is that, there is a need to improve the survival chances of children born in provinces like Masvingo in order to reduce the differentials in mortality levels to acceptable levels.

The differential noted in the expectaction of life at birth is better understood by examining the infant and child mortality rates presented in Table 5.9.

Table 5.9: Infant and child mortality rates by age, sex and region

| Province | Infant Mortality Rate | | Child Mortality Rate | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| Manicaland | 112.85 | 103.70 | 11.27 | 8.72 |
| Masvingo | 121.50 | 116.13 | 14.32 | 10.54 |
| RoZimbabwe | 83.88 | 60.45 | 8.75 | 2.23 |
| Zimbabwe | 93.16 | 75.65 | 10.00 | 4.51 |

Notes: RoZimbabwe - Rest of Zimbabwe
Source: Table 5.8

These vary from as high as 121.5 infant deaths per 1000 live births for Masvingo male infants to about 60.45 for female infants in the rest of Zimbabwe. The child mortality rate exhibits similar variations. The range is again from 14.32 for male children aged 1-4 years to a mere 2.23 for female children in the rest of Zimbabwe. The figures for the rest of Zimbabwe emphasize the considerable influence of the three biggest urban centres.

The crude death rates shows the influence of the youthful age structure of the population. These, shown in Table 5.10 vary from 16.4 for males in Masvingo to 8.57 for females in the rest of Zimbabwe. The crude death rate for Masvingo province is nearer to the level of Zimbabwe in 1969. Indeed, the IMR for Masvingo is higher than that for Zimbabwe in 1969. It is true to argue that Masvingo's mortality experience, in terms of crude death rates is nearer to that of Zimbabwe in the late sixties and in terms of infant mortality rates, to the national averages of the mid-fifties. Manicaland is only slightly better.

Table 5.10: Crude death rates by sex, age and region

| Province | Crude Death Rate per 1000 population Male | Female | Total |
|---|---|---|---|
| Manicaland | 15.65 | 13.52 | 14.53 |
| Masvingo | 16.40 | 15.01 | 15.67 |
| RoZimbabwe | 11.75 | 8.75 | 10.14 |
| Zimbabwe | 12.89 | 10.25 | 11.54 |

Further light is shed by an examination of the percentage distribution of deaths by age groups presented in Table 5.11. Roughly, over 25% of all deaths occur to children in the first year of life (i.e. 26.92% to 34.76% male and 25.88% to 33.28% female deaths in Masvingo and the rest of Zimbabwe, respectively). The child age group (1-4 years) accounts for a significant number of deaths (10.49% to 14.29% male and 3.60% to 10.56% female deaths for Masvingo and rest of Zimbabwe). This means that over 35% of all deaths in Zimbabwe occur to children under the age of five. This is similar to findings in the rest of sub-Saharan Africa where deaths in the first five years of life are extremely high. Tawaiah (1979:79-80) found that roughly 52% of all deaths in Ghana in 1971 occurred to children under five years. While this is worse than the percentages for the regions of Zimbabwe, it compares with the percentages for Manicaland district council areas shown in Table 5.12.

Table 5.11: Population by province, age and sex, deaths, age specific deaths rates and deaths as % of total deaths

*Manicaland*

| Age | Male Population | Male Deaths | Male M(x) | Male Deaths (%) | Female Population | Female Deaths | Female M(x) | Female Deaths (%) | Age Group |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 22803 | 2727 | 0.11960 | 33.78 | 23012 | 2517 | 0.10937 | 32.31 | 0 |
| 1 | 85340 | 962 | 0.01127 | 11.91 | 85866 | 748 | 0.00872 | 9.61 | 1 |
| 5 | 83461 | 429 | 0.00514 | 5.31 | 93418 | 320 | 0.00343 | 4.11 | 5 |
| 10 | 80349 | 229 | 0.00285 | 2.84 | 79702 | 208 | 0.00261 | 2.67 | 10 |
| 15 | 58559 | 285 | 0.00486 | 3.53 | 63341 | 282 | 0.00445 | 3.62 | 15 |
| 20 | 40530 | 271 | 0.00669 | 3.36 | 49791 | 306 | 0.00614 | 3.93 | 20 |
| 25 | 27749 | 194 | 0.00698 | 2.40 | 39172 | 252 | 0.00642 | 3.23 | 25 |
| 30 | 21444 | 159 | 0.00739 | 1.96 | 31133 | 212 | 0.00682 | 2.73 | 30 |
| 35 | 18062 | 152 | 0.00843 | 1.88 | 24856 | 194 | 0.00779 | 2.49 | 35 |
| 40 | 15981 | 161 | 0.01010 | 2.00 | 20005 | 187 | 0.00936 | 2.40 | 40 |
| 45 | 14238 | 184 | 0.01293 | 2.28 | 16132 | 194 | 0.01202 | 2.49 | 45 |
| 50 | 12243 | 212 | 0.01730 | 2.62 | 12867 | 208 | 0.01614 | 2.67 | 50 |
| 55 | 10143 | 245 | 0.02414 | 3.03 | 10241 | 232 | 0.02261 | 2.97 | 55 |
| 60 | 7494 | 261 | 0.03481 | 3.23 | 7654 | 251 | 0.03277 | 3.22 | 60 |
| 65 | 6929 | 356 | 0.05134 | 4.41 | 7150 | 347 | 0.04856 | 4.46 | 65 |
| 70 | 5130 | 391 | 0.07616 | 4.84 | 5516 | 399 | 0.07225 | 5.12 | 70 |
| 75 | 3215 | 354 | 0.11014 | 4.39 | 3665 | 335 | 0.09134 | 4.30 | 75 |
| 80 | 1556 | 328 | 0.21098 | 4.07 | 1898 | 374 | 0.19722 | 4.81 | 80 |
| 85 | 624 | 174 | 0.27886 | 2.16 | 836 | 225 | 0.26897 | 2.89 | 85 |
| T. | 515850 | 8073 | 1.00000 | 100.00 | 576255 | 7790 | 1.00000 | 100.00 | TOTAL |

*Masvingo*

| Age | Male Population | Male Deaths | Male M(x) | Male Deaths (%) | Female Population | Female Deaths | Female M(x) | Female Deaths (%) | Age Group |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 21582 | 2792 | 0.12936 | 34.76 | 21829 | 2691 | 0.12329 | 33.28 | 0 |
| 1 | 80128 | 1147 | 0.01432 | 14.29 | 80987 | 854 | 0.01054 | 10.56 | 1 |
| 5 | 86215 | 345 | 0.00401 | 4.30 | 87000 | 331 | 0.00380 | 4.09 | 5 |
| 10 | 73040 | 223 | 0.00305 | 2.77 | 73388 | 212 | 0.00289 | 2.63 | 10 |
| 15 | 53274 | 276 | 0.00518 | 3.44 | 58387 | 384 | 0.00658 | 4.75 | 15 |
| 20 | 37862 | 270 | 0.00712 | 3.36 | 46601 | 238 | 0.00511 | 2.94 | 20 |
| 25 | 27579 | 204 | 0.00741 | 2.55 | 37576 | 265 | 0.00705 | 3.28 | 25 |
| 30 | 22037 | 173 | 0.00783 | 2.15 | 29922 | 223 | 0.00746 | 2.76 | 30 |
| 35 | 18236 | 162 | 0.00890 | 2.02 | 23527 | 200 | 0.00849 | 2.47 | 35 |
| 40 | 15362 | 164 | 0.01065 | 2.04 | 18533 | 188 | 0.01016 | 2.33 | 40 |
| 45 | 12986 | 176 | 0.01359 | 2.20 | 14718 | 191 | 0.01298 | 2.36 | 45 |
| 50 | 10690 | 193 | 0.01809 | 2.41 | 11800 | 204 | 0.01731 | 2.53 | 50 |
| 55 | 8653 | 217 | 0.02513 | 2.71 | 9494 | 228 | 0.02406 | 2.82 | 55 |
| 60 | 6638 | 239 | 0.03599 | 2.97 | 6954 | 240 | 0.03451 | 2.97 | 60 |
| 65 | 6016 | 317 | 0.05263 | 3.94 | 6749 | 341 | 0.05046 | 4.21 | 65 |
| 70 | 4454 | 344 | 0.07729 | 4.29 | 5206 | 384 | 0.07382 | 4.75 | 70 |
| 75 | 2791 | 308 | 0.11043 | 3.84 | 3459 | 360 | 0.10407 | 4.45 | 75 |
| 80 | 1531 | 327 | 0.21353 | 4.07 | 1791 | 337 | 0.18828 | 4.17 | 80 |
| 85 | 542 | 153 | 0.28160 | 1.90 | 789 | 215 | 0.27207 | 2.65 | 85 |
| T. | 489616 | 8031 | 1.00000 | 100.00 | 538710 | 8087 | 1.00000 | 100.00 | TOTAL |

Table 5.11 contd: *Rest of Zimbabwe*

| | Male | | | | Female | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Age | Population | Deaths | M(x) | Deaths (%) | Population | Deaths | M(x) | Deaths (%) | Age Group |
| 0 | 100310 | 8414 | 0.08388 | 26.92 | 99240 | 5999 | 0.06045 | 25.88 | 0 |
| 1 | 374695 | 3278 | 0.00875 | 10.49 | 373789 | 835 | 0.00223 | 3.60 | 1 |
| 5 | 418639 | 1074 | 0.00257 | 3.44 | 415105 | 870 | 0.00210 | 3.75 | 5 |
| 10 | 351031 | 759 | 0.00216 | 2.43 | 358186 | 582 | 0.00162 | 2.51 | 10 |
| 15 | 281177 | 1059 | 0.00376 | 3.39 | 308346 | 781 | 0.00253 | 3.37 | 15 |
| 20 | 225664 | 1186 | 0.00526 | 3.80 | 258477 | 1113 | 0.00431 | 4.80 | 20 |
| 25 | 183164 | 1021 | 0.00557 | 3.27 | 206647 | 874 | 0.00423 | 3.77 | 25 |
| 30 | 147566 | 879 | 0.00596 | 2.81 | 157330 | 714 | 0.00454 | 3.08 | 30 |
| 35 | 119318 | 818 | 0.00686 | 2.62 | 121623 | 638 | 0.00524 | 2.75 | 35 |
| 40 | 102538 | 851 | 0.00830 | 2.72 | 97555 | 630 | 0.00645 | 2.72 | 40 |
| 45 | 91055 | 981 | 0.01077 | 3.14 | 78366 | 664 | 0.00847 | 2.86 | 45 |
| 50 | 77139 | 1130 | 0.01465 | 3.62 | 61530 | 718 | 0.01167 | 3.10 | 50 |
| 55 | 60782 | 1267 | 0.02085 | 4.06 | 48056 | 813 | 0.01691 | 3.51 | 55 |
| 60 | 43267 | 1331 | 0.03077 | 4.26 | 36330 | 933 | 0.02568 | 4.02 | 60 |
| 65 | 33387 | 1552 | 0.04647 | 4.97 | 32114 | 1286 | 0.04004 | 5.55 | 65 |
| 70 | 24718 | 2063 | 0.08348 | 6.60 | 24774 | 1590 | 0.06418 | 6.86 | 70 |
| 75 | 15491 | 1658 | 0.10700 | 5.30 | 16461 | 1702 | 0.10338 | 7.39 | 75 |
| 80 | 7316 | 1139 | 0.15572 | 3.65 | 8524 | 1481 | 0.17374 | 6.39 | 80 |
| 85 | 3008 | 789 | 0.26229 | 2.52 | 3753 | 961 | 0.25611 | 4.15 | 85 |
| T. | 2660265 | 31249 | 1.00000 | 100.00 | 2706206 | 23183 | 1.00000 | 100.00 | TOTAL |

*ZIMBABWE*

| | Male | | | | Female | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Age | Population | Deaths | M(x) | Deaths (%) | Population | Deaths | M(x) | Deaths (%) | Age Group |
| 0 | 144695 | 14138 | 0.09771 | 29.92 | 144081 | 11328 | 0.07862 | 28.92 | 0 |
| 1 | 540163 | 5401 | 0.01000 | 11.43 | 540642 | 2437 | 0.00451 | 6.22 | 1 |
| 5 | 588315 | 1848 | 0.00314 | 3.91 | 595523 | 1522 | 0.00256 | 3.89 | 5 |
| 10 | 504420 | 1209 | 0.00240 | 2.56 | 511276 | 1001 | 0.00196 | 2.55 | 10 |
| 15 | 393010 | 1612 | 0.00410 | 3.41 | 430074 | 1443 | 0.00336 | 3.68 | 15 |
| 20 | 304056 | 1723 | 0.00567 | 3.65 | 354869 | 1653 | 0.00466 | 4.22 | 20 |
| 25 | 238492 | 1418 | 0.00595 | 3.00 | 283395 | 1391 | 0.00491 | 3.55 | 25 |
| 30 | 191047 | 1210 | 0.00634 | 2.56 | 218385 | 1148 | 0.00526 | 2.93 | 30 |
| 35 | 155616 | 1130 | 0.00726 | 2.39 | 170006 | 1030 | 0.00606 | 2.63 | 35 |
| 40 | 133881 | 1174 | 0.00877 | 2.48 | 136093 | 1002 | 0.00736 | 2.56 | 40 |
| 45 | 118279 | 1338 | 0.01131 | 2.83 | 109216 | 1045 | 0.00957 | 2.67 | 45 |
| 50 | 100072 | 1530 | 0.01529 | 3.24 | 86197 | 1125 | 0.01305 | 2.87 | 50 |
| 55 | 79578 | 1720 | 0.02162 | 3.64 | 67791 | 1266 | 0.01868 | 3.23 | 55 |
| 60 | 57399 | 1820 | 0.03171 | 3.85 | 50938 | 1417 | 0.02782 | 3.62 | 60 |
| 65 | 46332 | 2213 | 0.04777 | 4.68 | 46013 | 1968 | 0.04277 | 5.02 | 65 |
| 70 | 34302 | 2497 | 0.07280 | 5.29 | 35496 | 2367 | 0.06669 | 6.04 | 70 |
| 75 | 21497 | 2336 | 0.10868 | 4.94 | 23585 | 2399 | 0.10172 | 6.12 | 75 |
| 80 | 10403 | 1820 | 0.17494 | 3.85 | 12213 | 2227 | 0.18231 | 5.68 | 80 |
| 85 | 4174 | 1111 | 0.26609 | 2.35 | 5378 | 1402 | 0.26064 | 3.58 | 85 |
| T. | 3665731 | 47250 | 1.00000 | 100.00 | 3821171 | 39173 | 1.00000 | 100.00 | TOTAL |

Table 5.12: Percent deaths under the age of five by sex and region District Councils of Zimbabwe

| Province | Percent deaths under age five Male | Female | Total |
|---|---|---|---|
| Manicaland DCs | 52.2 | 48.9 | 50.7 |
| Mashonaland Central DCs | 20.0 | 27.0 | 23.0 |
| Mashonaland East DCs | 37.0 | 42.0 | 40.0 |

Source: PSSU (1984); Table 4:3-4

Of note is the rise in the percent of deaths to the population in age group 15 to under 30 years. This rise is constant for all the populations under consideration. Statistics of cause of death might shade more light on this rise. These are not available for the provinces under consideration. Harare City, however, does have statistics on cause of death for 1985. These are presented in Table 5.13. They show that the major cause of death in this age group is mainly accidents (road traffic accidents, misadventure i.e. falls, poisoning, fires, etc, and assault). Thus, the rise in deaths in the early adult ages is attributable more to human forces than those of disease. Indeed, from age 5 to age 45 the leading causes of death in Harare City are connected to accidents whereas among infants prematurity, respiratory failure and pneumonia are the leading causes of death and among children aged 1-4 years pneumonia, respiratory failure, gastro-enteritis and malnutrition are the major killers. These are what are known as diseases of poverty (Moto 1989) which can be easily overcome through the adoption of appropriate socio-economic development policies. If the pattern of causes of death in the young adult age groups is replicated at the provincial and national level, then this would explain the rise in the mortality of the early adult age groups where the population is least suspectible to disease. It also shows a need for policies designed to teach the population about road safety and how to avoid accidents in the home and the work place.

Table 5.13: Cause of death by broad age group: Harare City 1986

| Cause of Death | Broad age group Infants | 1-4 | 5-14 | 15-24 | 25-44 | 45 plus |
|---|---|---|---|---|---|---|
| Prematurity | 28.0 | - | - | - | - | - |
| Respiratory failure | 15.7 | 9.0 | - | - | - | - |
| Pneumonia | 8.1 | 15.0 | 8.8 | - | - | 4.9 |
| Gastro-enteritis | 6.3 | 9.0 | - | - | - | - |
| Meningitis | 5.7 | - | 7.5 | - | - | - |
| Septicaemia | 5.7 | - | - | - | - | - |
| Malnutrition | - | 12.0 | - | - | - | - |
| Road traffic accident/ Misadventure/ assault | - | 7.8 | 16.3 | 21.9 | 29.1 | 4.2 |
| Cardiac failure | - | 7.2 | 7.5 | 7.5 | 4.9 | - |
| Suicide | - | - | - | 8.9 | - | - |
| Hepatitis | - | - | - | 6.2 | - | - |
| Renal failure | - | - | - | 5.5 | 5.4 | - |
| Rheumatic heart disease | - | - | 5.0 | 8.9 | - | - |
| Cardio vascular | - | - | - | - | - | 37.1 |
| Malgnancies | - | - | - | - | 12.6 | 18.8 |
| Hypertension | - | - | - | - | 4.9 | - |
| Cirrhosis/alcohol | - | - | - | - | - | 3.7 |
| Obstructive airways | - | - | - | - | - | 3.1 |
| Others | 30.5 | 40.0 | 54.9 | 41.1 | 43.1 | 28.2 |
| TOTAL | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Compiled from City of Harare (1987:116-124)

To conclude the analysis of mortality, it is illustrative to compare the mortality experience of Zimbabwe to other countries of Africa and the world. Table 5.14 compares the percent dead before the age of five for selected African and European countries. The table shows that in most African countries, with the exception of a few island nations, over 10% of children die before the age of 5. The data are dated for most African countries but, even in countries like Algeria and Botswana with information which covers the same period as that of Zimbabwe, the percent dead before the age of five is still over 10%. In Europe, on the other hand, barely three percent of children die before the age of five. Indeed in countries like Sweden and Finland almost all children survive to age five. This shows a great mortality gap between Europe and Africa.

Table 5.14: Percent dead by age of five for selected countries

| African Countries | Percent Dead Male | Female | European Countries | Percent Dead Male | Female |
|---|---|---|---|---|---|
| Algeria (1982) | 13.2 | 12.7 | Belgium (1982) | 1.58 | 1.29 |
| Botswana (1980-81) | 13.9 | 11.2 | Bulgaria (1980) | 2.90 | 2.31 |
| Cape Verde (1979-81) | 8.4 | 7.2 | Denmark (1982-83) | 1.09 | 0.85 |
| Liberia (1971) | 20.2 | 25.7 | Finland (1983) | 0.96 | 0.79 |
| Madagascar (1974-75) | 14.5 | 15.2 | France (1980-82) | 1.38 | 1.03 |
| Malawi (1977) | 30.6 | 27.7 | West Ger.(1981-83) | 1.45 | 1.16 |
| Mali (1976) | 27.9 | 24.9 | Hungary (1983) | 2.55 | 1.99 |
| Mauritius (1982-84) | 3.2 | 2.7 | Netherlands (1982-83) | 1.17 | 0.90 |
| Rwanda (1978) | 23.1 | 21.0 | Norway (1981-82) | 1.10 | 0.85 |
| Swaziland (1976) | 24.0 | 20.9 | Sweden (1983) | 0.82 | 0.79 |
| Zimbabwe (1982) | 12.9 | 9.2 | U. Kingdom (1981-83) | 1.40 | 1.08 |

Source: UN (1987) Demographic Yearbook, Table 36:1004, 1018-1022

The size of the gap can be emphasized if one considers that the mortality experience of children under the age of five in Africa is only approached or equalled in Europe at ages around 55 years for males and 60 years for females. In fact, the mortality experience of European populations at ages 45-65 is much better than that of children under the age of fifteen in most African countries (UN 1987). Mortality conditions in Africa are similar to levels experienced by Europe between 1900 and 1930. The inference is that there is a gap of some 50 to 80 years, which is an improvement on the mid-seventies when the gap was over 110 years (Tawaiah 1979:133-137). All that can be said is that the gap is staggering though socio-economic development in Africa might mean that it will narrow rapidly.

## 5.6 CONCULDING COMMENTS

### 5.6.1 Comment on methods

The method of estimating adult mortality from orphanhood data provides probabilities of survivorship which do not refer to the entire population, since they reflect the mortality experience of parents with surviving children. So the parents whose children and themselves are dead in the years before the survey are not represented. This will tend either to inflate the mortality experience of the population or deflate it depending upon the direction and change in the survival chances of the population.

If the questions on orphanhood are asked of the entire population, then parents with several surviving children will tend to be over-represented. Filter questions should be used to overcome this problem, for example by soliciting information from the oldest surviving child or the first born child. However, misreporting of family order status has led to some gross errors which mean that, in the final analysis, there is no significant difference in the estimates yielded by the latter method when compared to the former. Filter questions were not used in the Zimbabwe census which implies that some degree of bias might be inherent in the data.

The survivorship estimates based on reports by young respondents and thus, corresponding to small values of n (under 20) tend to be affected by misreporting of orphanhood status. Young children adopted by relatives report them as they own parents. This has the effect of inflating upward the survivorship probabilities based on these age groups.

The appropriateness of the West Mortality level to represent the mortality experience of Zimbabwe can also be raised. Tawaiah (1979:142) raised a similar query regarding Ghana. He went so far as to state that none of the families of model life tables or stable populations represented the mortality of Ghana adequately. The UN makes similar observations and recommends that interpretation of the results be taken with caution. The child mortality estimates have been shown to be fairly reliable, given the limitations of the methods used to derive them. It is with this in mind that they were used to derive the life tables while data on adult mortality, based on the orphanhood, technique were discarded. However, while the approximations might not be of a hundred percent accuracy, there are probably the best that can be provided until death registration in the country is complete.

### 5.6.2 Comment on results

Based on the CDRs, Zimbabwe enjoys a reasonably level of mortality compared to many other African countries. However, the national figures mask regional variations. These are quite substantial as comparison of Masvingo Province with Harare City shows. These variations will need to be addressed by the policy makers in the country, if the twins goals of equity and improving life standards for the entire population are to be achieved.

There have been declines in mortality since 1969. If present government policies of wider access to health and education for as many people as possible continue, then further inroads into mortality will be made. Future policy should aim at raising infant and child survival in provinces like Masvingo while maintaining the gains made in the better off provinces like Mashonaland East.

The major diseases that cause death to children under five are mainly a result of poverty and ignorance (UNICEF 1985:3). This points to a need to improve social and economic conditions of the population, especially for rural areas and low income urban families. In other words, the government policy of "growth with equity" must be targeted at the populations that will benefit most from it.

There is also a need for campaigns to improve safety standards on roads, at work and in the home, in order to reduce the unnecessary deaths in the young adult age groups. The population dying from accidents is the most productive and innovative in any country. The deaths therefore represent a total waste of educational, health and manpower resources. In older age groups (45 years plus) disease re-asserts itself as the leading cause of death. Heart disease and malgnancies are the main killers, though cirrhosis is also a problem. These are hard core diseases, which are much more difficult to control, even for developed nations. As the soft core diseases are brought more and more under control, these diseases will assume greater significance in causing deaths in these age groups. Policy makers must begin to promote awareness of causes of heart disease, such as over-indulgence, and promote healthy diets. Such preventative policies, rightly targeted, will save the country from the huge costs of developing the infrastructure required for the treatment of hard core diseases.

In conclusion one can argue that the right type of government policy, socio-economic development and public effort will aid the controlling of the major causes of death in the country leading to further declines in mortality levels. These will lead to better survival chances for infants and hence to higher life expectancies and, if accidents are reduced to reasonable proportions, a long productive life.

# CHAPTER SIX

# MIGRATION

## 6.1 INTRODUCTION

The description and analysis of the demographic characteristics of the population of Zimbabwe, begun in Chapter 3, is concluded by examining the last component of population change, namely migration. Migration is the process that redistributes population within an area. Clark (1986:25) argues that migration changes the structure of society. Initially, migration is responsible for transforming society from a traditional one to a modern one. All societies begin as rural communities and through the process of migration i.e. rural to urban migration, they get transformed into urbanised ones. The process can still be observed in most developing countries. Indeed, Brunn and Thomas (1971:63) studying migration in Honduras found that rural to urban and urban to urban migration were most responsible for the growth of the cities than natural increase. In other words, the overall contribution of migration to the growth of cities was greater than that of natural increase. In such circumstances, it is crucial to understand the process of migration and its impacts on both sending and receiving regions (Brunn & Thomas 1971; Clark 1986:24-26; White and Woods 1980:21).

Mutizwa-Mangiza (1986:149) has demonstrated that urban centres, in Zimbabwe, have annual growth rates above the national average of 3.1% because of the process of migration (e.g. Chitungwiza 20.7% and the average for all urban areas of 5.4% between 1969 and 1982). Table 6.1 compares average annual growth rates of urban areas with those of district and rural council areas between 1969 and 1982. The growth rates of municipalities i.e. the sixteen largest urban areas are

Table 6.1: Average annual population increase 1969-1982 and population density by major administrative units

| Administrative division/ Province | Average annual growth rate % 1969-82 | Density per sq. km |
|---|---|---|
| ZIMBABWE | 3.1 | 19.3 |
| District Councils | 2.7 | 25.2 |
| Rural Councils | 1.9 | 9.1 |
| Municipalities | 5.4 | 870.9 |
| Other | 5.0 | 0.5 |
| MANICALAND PROVINCE | 2.8 | 31.5 |
| District Councils | 2.6 | 38.9 |
| Rural Councils | 3.0 | 16.4 |
| Municipalities | 4.0 | 440.6 |
| Other areas | 45.3 | 9.9 |
| MASHONALAND CENTRAL PROVINCE | 3.2 | 20.6 |
| District Councils | 3.8 | 21.4 |
| Rural Councils | 2.3 | 20.5 |
| MASHONALAND EAST PROVINCE | 4.2 | 60.0 |
| District Councils | 2.2 | 35.2 |
| Rural Councils | 2.2 | 15.2 |
| Municipalities | 6.2 | 1270.7 |
| MASHONALAND WEST PROVINCE | 2.6 | 14.2 |
| District Councils | 2.6 | 21.4 |
| Rural Councils | 2.1 | 15.5 |
| Municipalities | 5.4 | 608.1 |
| Other areas | 4.3 | 0.3 |
| MATABELELAND NORTH PROVINCE | 3.3 | 12.0 |
| District Councils | 2.3 | 11.6 |
| Rural Councils | 1.6 | 3.6 |
| Municipalities | 4.5 | 829.4 |
| Other areas | 4.1 | 0.6 |
| MATABELELAND SOUTH PROVINCE | 1.9 | 7.8 |
| District Councils | 2.7 | 16.3 |
| Rural Councils | -0.5 | 2.6 |
| Other areas | 6.3 | 0.3 |
| MIDLANDS PROVINCE | 2.9 | 18.5 |
| District Councils | 3.2 | 27.8 |
| Rural Councils | 0.6 | 5.4 |
| Municipalities | 4.2 | 530.8 |
| MASVINGO PROVINCE | 2.8 | 23.3 |
| District Councils | 2.6 | 36.1 |
| Rural Councils | 2.9 | 10.1 |
| Municipalities | 7.9 | 450.6 |
| Other areas | -0.5 | 0.1 |

Source: CSO 1984: Table 1:13

consistently higher than those of the rural and district council areas. This means that urban areas are receiving population from the surrounding countryside with all the political and social problems such massive moves of population into the cities entail. Thus, migration redistributes population in certain favoured locations (Clark 1986:26), leading to the process of urbanisation or if the migration is rural to rural, as a significant proportion of migration within developing countries is, land pressure results as land is subdivided to accommodate the expanding population.

Before proceeding further, there is a need to define the terms migration and migrant. As usual with demographic events, there are several definitions of the same process. Newell (1988:82-83) poses several questions and definitions of who is a migrant and what is migration. A migration can be viewed as a permanent relocation of usual residence i.e. it is more than a visit or short term sojourn. It can also be viewed as an event that happens to a person, who can make more than one move or relocation. In this respect, migration and fertility or marriage are similar whereas mortality can be posed in contrast to them, because it is a one off experience. A migrant is the person who is making a migration.

White and Woods (1980:21) argue that two approaches are used in the analysis of migration. The first method of analysis is the inductive approach which seeks to identify, describe or even model the process and pattern of migration as a preliminary to enquiries of a more explanatory nature. Masser and Gould (1975) provide an illuminating application of this approach with their study of inter-regional migration in tropical Africa, with Uganda as the case study. The method takes information on actual migrations as its starting point. In contrast, the second method of analysis, the deductive approach, seeks to establish logical and internal consistent theories to be tested empirically against observed data. Lipton (1980), Simmons (1982) and Findley (1983) provide a broad view of the application as well as a review of literature on the deductive approach in the study of migration. The starting point in this case is the development of theory which when tested against the observed data can help in explaining the process and patterns of migration. White and Woods (1980) point out that in most studies, the maximum benefit is derived from combining both methods.

Migration, is measured in many different ways. In most cases, the data collection process might determine the way in which migration is finally measured and defined. In most third world countries and even some developed countries, migration data are collected through a retrospective question in a census or survey. In this case, what is being counted are the number of migrants rather than the number of migrations they make. The other approach, used mostly in socialist countries like the Soviet Union, is based on a count of the number of moves migrants make which are recorded in a population register (Newell 1988:85-87). Obviously, the two approaches to data collection give different pictures of the migration process within a country.

The data on migration, collected in the 1982 Census, are of the retrospective type and lend themselves more easily to the adoption of the inductive approach in their analysis. The data were based on two types of questions. One question was concerned with the individual's "place of residence one year prior to the census date" and the second, with the "place of birth" (CSO 1985a:58). The first question could provide evidence of in and out migration within an area in the year preceding the census. However, the data collected for this question has not been tabulated by the Central Statistical Office. The reason advanced was that the second question, which provides information on life time migration, was felt to be more appropriate for the study of internal migration. Thus, the data available are for the study of life time migration and as such are not very amenable to the deductive approach. However, this does not mean that the deductive approach will be precluded but that the analysis will mainly be of an inductive nature.

The remainder of the chapter is divided into five sections. Section 6.2 examines the limitations inherent in the use of life time migration data. Section 6.3 gives an account of the migration process at the provincial level while Section 6.4 examines the process at district level. Because similar life time migration data exist from the 1969 Census, Section 6.4 compares the different patterns of life time migration between the two censuses. Section 6.5 provides the concluding comments, with pointers for future research work.

## 6.2 LIFE TIME MIGRATION DATA

### 6.2.1 The nature of life time migration data

Chapter Two provided a survey of literature on migration. It highlighted some of the major concerns of researchers in this field. These are chiefly to do with the formulation of migration theory as well as the appropriate tools of measurement and definition. The section will therefore not attempt to el ucidate further on these concepts. It will try to examine the nature, use and limitations of life time migration data.

George(1971:123-139) provides a useful synthesis on the nature and problems of life time migration data. Life time migration data impose the view of migration as a process taking place between the place of birth and the place of residence, at the time of the census. The following migration measures are derived from the data:

i). the life time in-migrants into a region

ii). the life time out-migrants from a region and

iii). the life time net migration in the region or what George terms the "birth-residence index". (p. 124)

While these measures are similar to those derived from annual estimates of migration, there are several important limitations to note.

6.2.2 <u>The limitations of life time migration data</u>

The life time migration measures do not refer to a specific time period. There are a measure over the average life time of the population under consideration. This is in direct contrast to the concept of migration as taking place in time and space (Rees 1977; UN 1970; Rogers and Castro 1986). While the process still takes place in space, it is difficult to assign a proper time to it. This is especially evident if life time migration is considered as a process of transition, equivalent to marriage or entry into the labour market. The time for transition into marriage or the labour market can easily be estimated or determined but, in the case of life time migration data, this is not easily done. Morrison (1970) argues that as migration changes over time, it is useful to adopt a cohort approach in its study. With life time migration data, the whole population is the cohort and therefore the historical experience of the cohort which might be useful to explain current patterns of migration behaviour cannot be brought out.

Life time migration indicators measure the survivors who migrated out of a region and those who returned into the region prior to the census. What is being recorded in the census survey is life time migration and not gross migration. For example, non-survivors are not counted. Non-survivors are always an error term in most migration measures, but in the case of life time migration, the error term is of a greater magnitude than where consideration is being given to annual migration or even five-year migration. Further, return migrants are not shown as having moved because their place of birth and residence at the time of enumeration are the same. Multiple moves are not reported and therefore, the level of internal migration reported is lower than the reality. Even international migration is affected as those migrants who moved in and out of the country before the census do not show in the statistics. This is especially true of countries in the third world were censuses are infrequent and census intervals are often greater than ten years and inter-censal surveys are mostly non-existent.

Thus, while life time migration data can be used to derive the measures outlined above, it is fraught with problems. Some of these problems can be overcome if there are successive censuses which ask the same question. From such censuses, partial estimates of net migration can be made. For example, George (1971) estimates inter-provincial migration in Canada between 1951 and 1961 using data on life time migration.

While life time migration data are full of problems, they do provide a useful indicator of migration within a country. For example, it is possible to designate areas which are losing population and those that are gaining population even if the source of those migrants can not be ascertained with an degree of accuracy.

### 6.3 ANALYSIS OF INTER-PROVINCIAL LIFE TIME MIGRATION IN ZIMBABWE

Shaw (1975:3.6), White and Woods (1980:22-24) and Newell (1988:88) argue that there are a variety of methods by which migration data are analysed though these methods are not as standardised as those for fertility or mortality analysis. White and Woods describe some of the methods of representation used in migration analysis. These include the use of straight lines or arrows to link the origins and destinations of migrants in two-dimensional space. The width of the lines are proportional to the volume or size of movement between the two places with the arrow showing the direction of movement. Further areal classification can be used which result in what is termed the "migration or flow matrix". The migration matrix is useful for analysing patterns of inmigration, outmigration and net migration. Its nature also enables the identification of what are termed nodal flows i.e. first order flows and the study of the numerical impact of the flows in origin and destination regions. Finally, the migration matrix can be used for prediction of migration flows through the use of simple gravity or spatial interaction models. Several of the presentation and analysis methods outlined here will be utilised in the explanation of the migration matrix shown in Table 6.2.

#### 6.3.1 <u>The analysis of the migration flow matrices</u>

The flow matrix, shown in Table 6.2, gives the population moving from each province to every other province. The marginals give the total population moving into and out of each province. The leading diagonal gives the population in each province which did not move or only moved within the province in the period under consideration, which in this case, is a life time. Net migration can be calculated by subtracting gross flows. The row labelled "Other" takes into consideration the population moving from the rest of the world into the province i.e.

population born outside Zimbabwe. Indeed, there should have been a column for those moving into the rest of the world but this is always difficult to compute, the problem here being similar to that posed by non-survival.

Table 6.2: Population by province of birth and province enumerated, 1982 Census (tens)

| Province of Birth | Province of Enumeration 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Total Born |
|---|---|---|---|---|---|---|---|---|---|
| Manicaland | 89904 | 1078 | 13100 | 1758 | 2511 | 78 | 2732 | 2322 | 113483 |
| Central | 599 | 49628 | 6050 | 4279 | 423 | 38 | 681 | 210 | 61908 |
| East | 3705 | 5666 | 84924 | 5074 | 1385 | 214 | 3055 | 866 | 104889 |
| West | 584 | 2489 | 6472 | 56116 | 962 | 248 | 3106 | 365 | 70342 |
| North | 727 | 504 | 1813 | 1101 | 58985 | 2213 | 3210 | 568 | 69121 |
| South | 107 | 110 | 1800 | 320 | 10099 | 49400 | 2210 | 509 | 64555 |
| Midlands | 1436 | 1020 | 6404 | 4166 | 4483 | 867 | 82029 | 3890 | 104295 |
| Masvingo | 2988 | 1482 | 5100 | 2238 | 2384 | 229 | 9208 | 87050 | 110679 |
| Others | 5186 | 5821 | 7924 | 7298 | 2890 | 527 | 1643 | 1556 | 32845 |
| Total Enumerated | 105236 | 67798 | 133587 | 82350 | 84122 | 53814 | 107874 | 97336 | 732117 |

Notes: Central, East, West:- Mashonaland; North, South:- Matabeleland.
Source: CSO (1985a:Table III.5:60)

Zuiches (1980:6) suggests that the flow matrix showing gross populations can be more effectively used if outflow proportions to each destination are calculated. This outflow proportions matrix is very instructive in revealing both origins and destination of migrants as well as the differential rates of migration between them. Table 6.3 presents such a matrix of outflow proportions. Considering the diagonal first, it can be seen that more than 76.5% of the population has remained within the province, if the limitations of life time migration data outlined above are ignored. This figure is probably lower than that which could be arrived at using annual migration data. However, it does show that over a life time, Matabeleland South has lost 23.5% of its population to the rest of the country, while

Matebeleland North has lost only 14.7%.

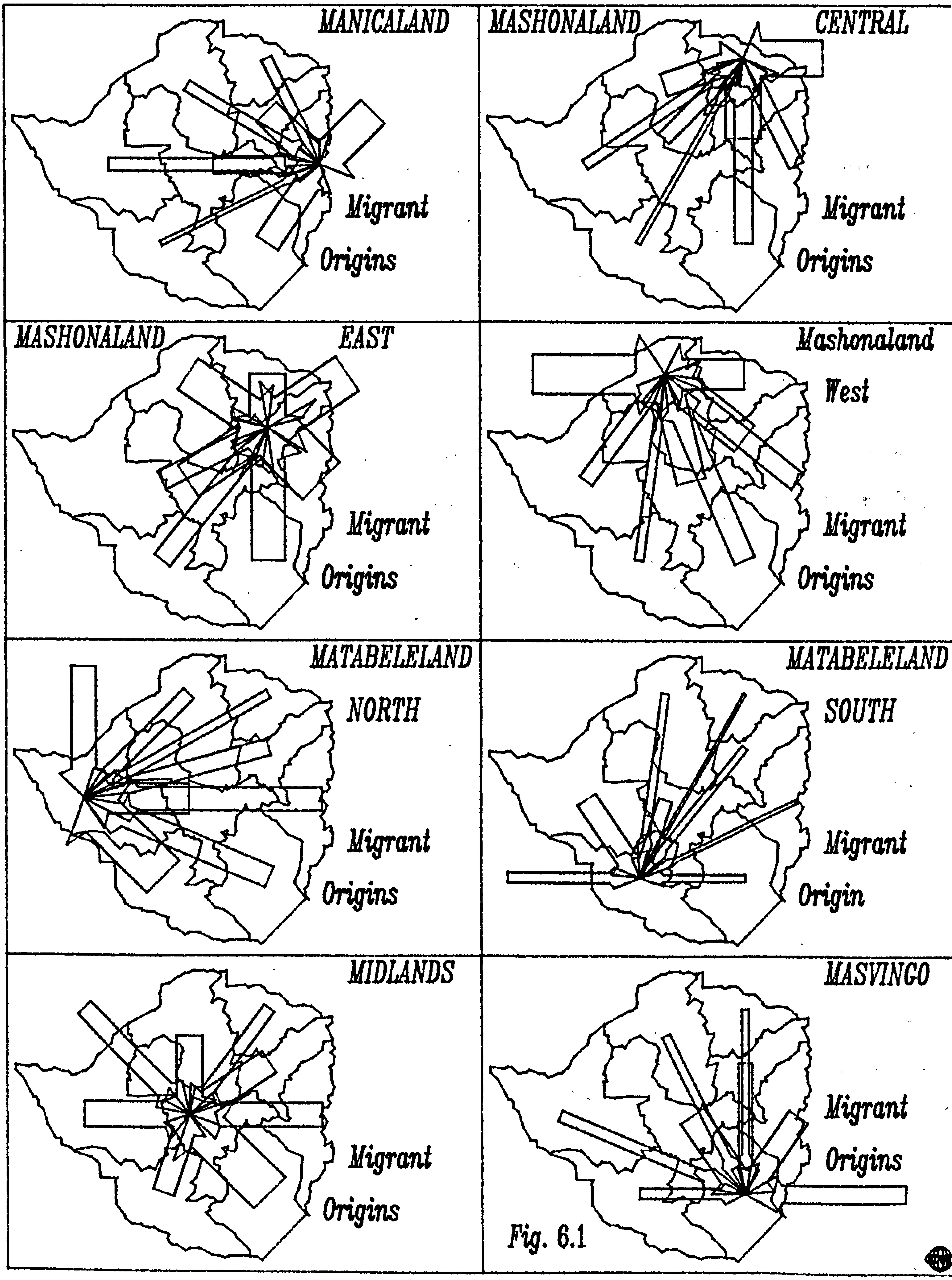
Table 6.3: Origin-destination proportion matrix for life time migrants: 1982 Census

| Province of Birth | Province of Enumaration | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Born |
| Manicaland | .7922 | .0095 | .1154 | .0155 | .0221 | .0007 | .0241 | .0205 | 0.1550 |
| Central | .0097 | .8016 | .0977 | .0691 | .0068 | .0006 | .0110 | .0034 | 0.0846 |
| East | .0353 | .0540 | .8097 | .0484 | .0132 | .0020 | .0291 | .0083 | 0.1433 |
| West | .0083 | .0354 | .0920 | .7978 | .0137 | .0035 | .0442 | .0052 | 0.0961 |
| North | .0105 | .0073 | .0262 | .0159 | .8534 | .0320 | .0464 | .0082 | 0.0944 |
| South | .0017 | .0017 | .0279 | .0050 | .1564 | .7652 | .0342 | .0079 | 0.0882 |
| Midlands | .0138 | .0098 | .0614 | .0399 | .0430 | .0083 | .7865 | .0373 | 0.1425 |
| Masvingo | .0270 | .0134 | .0461 | .0202 | .0215 | .0021 | .0832 | .7865 | 0.1512 |
| Others | .1579 | .1772 | .2413 | .2222 | .0880 | .0160 | .0500 | .0474 | 0.0449 |
| Enumerated | .1437 | .0926 | .1825 | .1125 | .1149 | .0735 | .1473 | .1330 | 1.0000 |

Notes: Central, East, West:- Mashonaland; North, South:- Matabeleland
Source: CSO (1985a) Table III.5:60

Secondly, considering migration streams for each province, it can be seen that the largest flow from Manicaland (11.54%) went into Mashonaland East while Mashonaland Central sent 9.77% into the same province. Mashonaland East is the province with the most equitable transmission rate, especially to the provinces surrounding it. Its largest migration flow is into Mashonaland Central (5.4%). Mashonaland East is still the favoured destination for those coming from Mashonaland West (9.2%), Midlands (6.14%) and the rest of the world (24.13%). Migrants from Matabeleland North are also distributed more equitably with Midlands taking 4.64% of the migration flow. The largest migration flow is that between Matabeleland South and Matabeleland North. 15.64% of the population from the former province has moved into the later over the life time period.

Figure 6.1 and 6.2 show the flows into and from each province, graphically while Figure 6.3 maps the net life time migration. Note


MANICALAND
Migrant
Origins
MASHONALAND
CENTRAL
Migrant
Origins
MASHONALAND
EAST
Migrant
Origins
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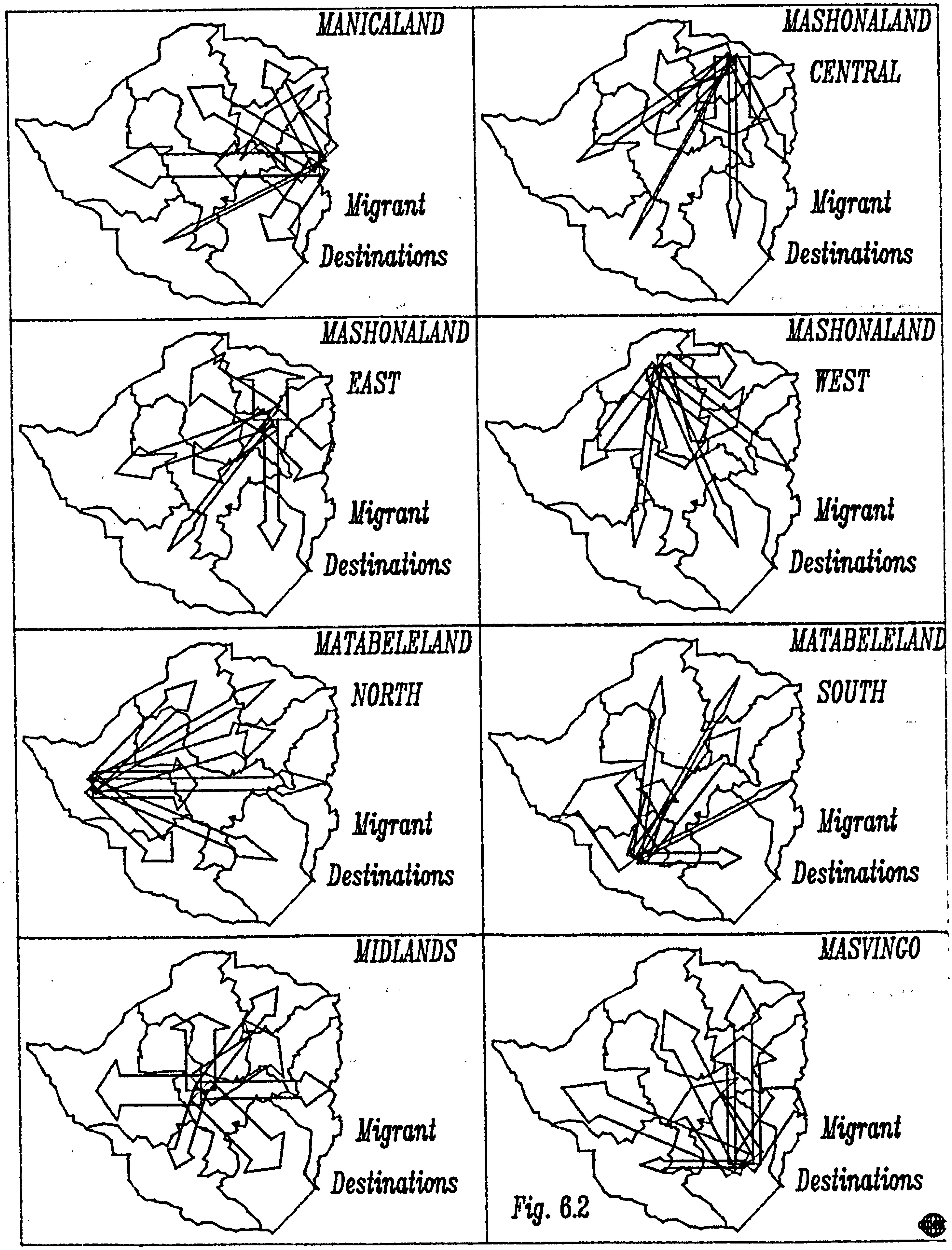
West
Migrant
Origins
MATABELELAND
NORTH
Migrant
Origins
MATABELELAND
SOUTH
Migrant
Origin
MIDLANDS
Migrant
Origins
MASVINGO
Migrant
Origins

Fig. 6.1


MANICALAND
Migrant
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MASHONALAND
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EAST
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Migrant
Destinations
MATABELELAND
NORTH
Migrant
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MATABELELAND
SOUTH
Migrant
Destinations
MIDLANDS
Migrant
Destinations
MASVINGO
Migrant
Destinations

Fig. 6.2

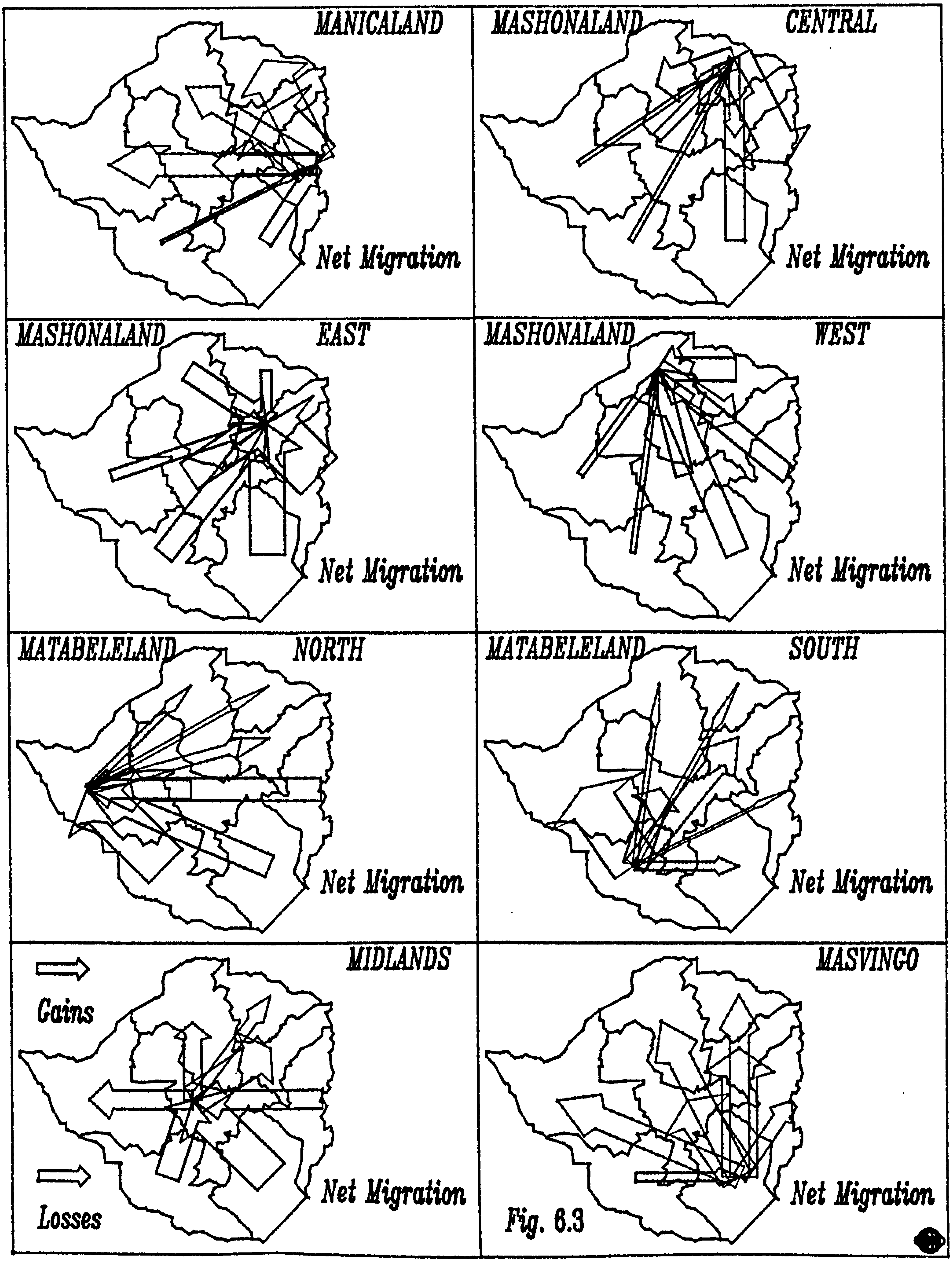

MANICALAND
Net Migration
MASHONALAND CENTRAL
Net Migration
MASHONALAND EAST
Net Migration
MASHONALAND WEST
Net Migration
MATABELELAND NORTH
Net Migration
MATABELELAND SOUTH
Net Migration
MIDLANDS
Gains
Losses
Net Migration
MASVINGO
Net Migration

Fig. 6.3

that the population of non-movers is not considered in the flow maps. Only actually migrants from each province are considered. What the maps reveal is that distance plays a part in the strength of flow between provinces. Other factors which come into consideration are economic and social forces. For example, the large flow of population from Matabeleland South to Matabeleland North province can be explained by the lack of significant economic development in the former province as well as a common language and culture with the later province. Shaw (1975) has outlined in greater detail the existence of economic and social explanations for migration streams (see Chapters 4 & 5:54-116), which would seem to operate in the context of Zimbabwe.

Probably the net migration flows shown in Figure 6.3 and Table 6.3 help to strengthen the argument above, at least for the economic aspect of migration. Table 6.4 uses urbanisation as an attractiveness

Table 6.4: Percent urban and rural population by provinces, 1982

| Province | Percentage of Population | |
|---|---|---|
| | Urban | Rural |
| Manicaland | 8.54 | 91.47 |
| Mashonaland Central | 8.16 | 91.84 |
| Mashonaland East | 57.46 | 42.54 |
| Mashonaland West | 21.34 | 78.66 |
| Matabeleland North | 53.80 | 46.20 |
| Matabeleland South | 2.58 | 97.42 |
| Midlands | 18.97 | 81.03 |
| Masvingo | 6.73 | 93.27 |
| Zimbabwe | 27.73 | 74.27 |

Source: CSO (1985b: Table III.3, p. 55)

index to explain the net migration flows shown in Fig. 6.3. Matabeleland South, being the least urbanised province (2.58%) is also the least attractive destination for migrants. Indeed, it is the only province that records a net loss of population to all the other provinces. Masvingo is the next with a net loss of population to seven provinces and only gaining from Matabeleland South. Manicaland shows a net loss of population though it is more urbanised than Mashonaland Central. The reasons here are associated mainly with the Liberation War (1971-1980) and the closure of the Zimbabwe-Mozambique border in 1975 leading to the consequent decline of Mutare and the movement away from the town, both as a response to the war situation and the decline in employment opportunities.

In the final analysis, it is possible to use the net flows to propose a hierarchy or ranking of the provinces such that each province gains from those below it and loses to those above it. The hierarchy would look like this:

1. Mashonaland East
2. Mashonaland West
3. Mashonaland Central
4. Matabeleland North
5. Midlands
6. Manicaland
7. Masvingo
8. Matabeleland South.

The ordering predicts the pattern of net flows perfectly, reflecting the patterns of development within the country. The Mashonaland provinces, with several urban centres and, a large proportion of all commercial farms, provide most of the country's employment. The availability of that employment is the major reason for the perfect prediction of net migration flows into these provinces.

6.3.2 The numerical impact flows matrices

Table 6.5 uses the concept of numerical impact flows to examine migration between provinces further. White and Woods (1980:25-26) explain the concept of impact flows as a means of trying to assess the numerical significance of the migration stream on the immobile or the population of non-movers within the origin or destination region.

Dividing the elements in each row of the matrix in Table 6.2 by the elements in the principal diagonal provides a measure of the numerical impact of each migration flow on each particular destination province. The arriving migrants are compared to the population of their destinations who have not made an inter-provincial move. The higher the resulting figure, the greater the numerical impact of the arriving migrants in terms of their addition to the population of non-movers. Considering Table 6.5a, the flows from Manicaland (0.1457), Mashonaland Central (0.1219) and Mashonaland West (0.1153) have the greatest numerical impact on the population of non-movers within Mashonaland East. These also represent the nodal flows (first order or primary or dominant flows) between these provinces and Mashonaland East. Their second order flows (the second largest flow or impact) go into different provinces, for example, Manicaland into Midlands, Mashonaland Central into Mashonaland West and vice versa. Matabeleland North receives its greatest impact from Matabeleland South (.2044) while Masvingo (.1058) has the greatest impact on Midlands.

Considering origin impacts, the elements in the columns (Table 6.2) are divided by the elements in the principal diagonal to provide the impact proportions shown in Table 6.5b. In this case, migration flows are viewed as depleting the population of particular regions or provinces. Again, the higher the impact proportion, the more significant is that particular migration flow in depleting the provincial population. Thus, the origin impact of migration between Mashonaland Central and Mashonaland East is 0.1142 on Mashonaland Central but only 0.0712 on Mashonaland East. In other words, the population in Mashonaland Central is being depleted by addition into the population of Mashonaland East. Other depletions include the addition of the population of Matabeleland South into Matabeleland North, that of Masvingo into Midlands, of Manicaland into Mashonaland East and of Mashonaland West into Mashonaland East. The overall picture provided by the impact analysis is that the population of Zimbabwe, has over a life time been concentrated into three provinces i.e. Mashonaland East, Matabeleland North and Midlands. This concentration is in keeping with the concept of "axial development" outlined in Chapters 1 and 2, which, in turn, supports the view of migration as a response to differential economic development.

Table 6.5: Relative numerical impact flows between provinces of Zimbabwe, 1982 census

(a) Impacts on destination provinces

| Province of Birth | Province of Enumaration | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Manicaland | - | 0.0120 | 0.1457 | 0.0196 | 0.0279 | 0.0009 | 0.0304 | 0.0258 |
| Central | 0.0121 | - | 0.1219 | 0.0862 | 0.0085 | 0.0008 | 0.0137 | 0.0042 |
| East | 0.0436 | 0.0667 | - | 0.0597 | 0.0163 | 0.0025 | 0.0360 | 0.0102 |
| West | 0.0104 | 0.0443 | 0.1153 | - | 0.0171 | 0.0044 | 0.0553 | 0.0065 |
| North | 0.0123 | 0.0085 | 0.0307 | 0.0187 | - | 0.0375 | 0.0544 | 0.0096 |
| South | 0.0022 | 0.0022 | 0.0364 | 0.0065 | 0.2044 | - | 0.0447 | 0.0103 |
| Midlands | 0.0175 | 0.0124 | 0.0781 | 0.0508 | 0.0547 | 0.0106 | - | 0.0474 |
| Masvingo | 0.0343 | 0.0170 | 0.0586 | 0.0257 | 0.0274 | 0.0026 | 0.1058 | - |

(b) Impacts on origin provinces

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Manicaland | - | 0.0217 | 0.1543 | 0.0313 | 0.0426 | 0.0016 | 0.0333 | 0.0267 |
| Central | 0.0067 | - | 0.0712 | 0.0763 | 0.0072 | 0.0008 | 0.0083 | 0.0024 |
| East | 0.0412 | 0.1142 | - | 0.0904 | 0.0235 | 0.0043 | 0.0372 | 0.0099 |
| West | 0.0065 | 0.0502 | 0.0762 | - | 0.0163 | 0.0050 | 0.0379 | 0.0042 |
| North | 0.0081 | 0.0102 | 0.0213 | 0.0196 | - | 0.0448 | 0.0391 | 0.0065 |
| South | 0.0012 | 0.0022 | 0.0212 | 0.0057 | 0.1712 | - | 0.0269 | 0.0058 |
| Midlands | 0.0160 | 0.0206 | 0.0754 | 0.0742 | 0.0760 | 0.0176 | - | 0.0447 |
| Masvingo | 0.0332 | 0.0299 | 0.0601 | 0.0399 | 0.0404 | 0.0046 | 0.1123 | - |

Notes: Central, East, West:- Mashonaland; North, South:- Matabeleland
Source: CSO (1985a:Table III.5:60)

6.3.3 Spatial interaction model analysis

Migration, however, is not entirely an economic process as some researchers have highlighted (Woods 1982). To measure or analyse the extent to which migration flows are a response to economic and other social factors, one can resort to the use of gravity models. Wilson (1971) has described a family of gravity models which he termed "spatial interaction models". These try to model, in either deterministic or probabilistic terms, the observed migration behaviour and to explain the causal influences of the observed flow matrix (Stillwell 1984:1). These causal influencesinclude the distance or the cost of relocation, economic opportunities at origins and destinations and information available to migrants before the move is made. Masser and Gould (1975:75-76) try to predict migration in Uganda in both social and economic terms. Their model includes the effects of distance on migration flows, differential income, urbanization, education as well as other social factors which govern the propensity to migrate within or between regions. These models predict the size of migration flows in relation to the socio-economic causal influence.

Spatial interaction models postulate that the size of the migration flow between province i and province j is a function of pull and push factors between the two provinces as well as the cost of relocation. The pull or destination factors are termed "attractiveness factors" will the origin or push factors capture the propensity to migrate from the origin area. As noted, there are several of these models which can be applied, but for the purpose of this study, the doubly-constrained model will be used, as the information provided in Table 6.2 is of sufficient detail for its application. The hypothesis to be tested is that the size of migration flows between the provinces of Zimbabwe is a function of the attractiveness factors and the cost of movement between them.

Migration in a spatial interaction model is represented by the following terms:

a). *a production factor*:- the propensity of an origin area to export migrants, which is dependent on its population characteristics (age structure), its economic character (economic growth that creates new employment opportunities) and its socio-political stability;

b). *an attraction factor*:- the attractiveness of a destination area for migrants (i.e. the propensity to import migrants from other areas), dependent on employment being generated, housing opportunities and socio-political stability;

c). *an impedance factor*:- representing the distance (geographical, information, social) between the origin and the destination, which is usually fixed; and

d). *a propensity to overcome impedance function*:- the function applied to impedance which may vary from origin to origin and from destination to destination as well as from one time period to another.

The inputs into the model are: the observed migration matrix shown in Table 6.2, representing the attractiveness factors, and the propensity to migrate from origins, and a distance matrix, based on the shortest bus route between the main centres within each province, to represent the friction of distance or the cost of relocation between provinces. The model described is a shortened form of the Masser-Gould model because social and economic forces are not modelled explicitly. They are only implicit in the attractiveness factors $O_i$ and $D_j$ described below. The equation applied is given by Equation 6.1.

The model was tested using the program IMP available in the

School of Geography, University of Leeds, developed by Stillwell (see Stillwell 1984). The values of $A_i$ and $B_j$ as well as *b* are determined endogenously i.e. within the model while the attractiveness factors and the distance matrices are supplied exogenously i.e. as input into the model. The beta parameter was entered as a negative power

$$M_{ij} = A_i B_j O_i D_j d_{ij}^{\ -b} \qquad 6.1$$

where $M_{ij}$ = is the predicted migration between i and j
$A_i$ & $B_j$ = are balance factors ensuring internal consistency in the migration matrix of i and j
$O_i$ & $D_j$ = are attractiveness factors related to the origins and destination province and
$d_{ij}^{\ -b}$ = is the cost of relocating between i and j
b or beta measures the propensity to overcome the impedance factors between i and j.

function. This follows the convention of using the negative power function when the distance is used rather than the negative exponential function which is based on cost (Masser and Gould 1975:90) Several useful statistics, which aid the understanding and interpretation of the migration process are produced by the model.

The first statistics produced are the mean migration length, i.e. the average distance over which migration flows take place, and the values of beta which represent, in this case, the deterrent effect of distance shown in Table 6.6 (Stillwell 1978:1190; Masser and Gould 1975:90). The mean migration distance for the whole system was found to be 265 kilometres with a generalized beta of -1.37. The average mean migration length can be viewed as quite large. This is because the province is the geographical unit used in the measurement of distance for the model. Masser and Gould have pointed out that spatial interaction models are sensitive to the size of geographical unit used in the study. A migration matrix based on the districts would probably yield a smaller value for the mean migration distance because it would capture more short and medium distance migrations which, in the present case, are part of the intra-provincial migration.

Table 6.6: Mean migration lengths and beta values (negative-power function): Zimbabwe provinces 1982.

| Province | Origin-specific Outmigration | | Destination-specific Inmigration | |
|---|---|---|---|---|
| | MML | Beta | MML | Beta |
| Manicaland | 338.7 | -2.08 | 342.2 | -2.64 |
| Mash. Central | 178.7 | -1.23 | 215.9 | -1.61 |
| Mash. East | 195.4 | -1.09 | 242.8 | -1.09 |
| Mash. West | 250.7 | -0.89 | 291.9 | -1.36 |
| Mat. North | 312.4 | -1.05 | 268.1 | -1.24 |
| Mat. South | 271.9 | -2.21 | 290.9 | -2.36 |
| Midlands | 279.1 | -0.86 | 272.1 | -1.32 |
| Masvingo | 266.7 | -1.60 | 253.4 | -2.33 |
| | R = 0.953 | $R^2$ = 0.908 | R = 0.918 | $R^2$ = 0.842 |

Notes: MML:- mean migration length.

The generalised beta on its own is a meaningless statistic. It can be used for comparative purposes with other national studies, to show which society is more mobile than the other. However, the degree of comparability is always limited by the size of geographical units used for the study of migration. The beta value has its greatest value when regions within the same system are compared as well as the effects of origins or destinations on migration streams. In general, it can be assumed, as Stillwell (1978:1190) argued, that beta represents an index of the revealed propensity to migrate over distance. With a given mean migration length, a higher negative value of beta is associated with a greater rigidity towards migration. If over time beta values are rising, then the mean migration field will fall.

Regional variations in both mean migration lengths and beta values are shown in Table 6.6. The negative-power function beta values, for origin specific migration, vary from -0.86 in Midlands to

-2.21 in Matabeleland South, while mean migration lengths vary from 178.7 in Mashonaland Central to 338.7 in Manicaland. The population of Midlands and Mashonaland West seem to be the least affected by distance, while those of Matabeleland South and Manicaland seem to migrate within or over short distances. The ability for a region to recruit migrants is shown by the destination-specific parameters. These range from -1.09 in Mashonaland East to -2.64 in Manicaland. Thus, Mashonaland East and Matabeleland North attract migrants from longer distances than Manicaland and Matabeleland South. Indeed, the ordering of provinces discussed above is validated by these findings. Most of the migration from Matabeleland South goes into nearby Matabeleland North while that from Manicaland goes into nearby Mashonaland East. This would help in explain why these provinces have both poor transmission and recruitment abilities.

Secondly, the program computes a coefficients of determination and correlation. The values for the whole system are 0.80248 and 0.89581 respectively, which are considered low for a doubly constrained model because the doubly constrained model attempts to predict the distribution of known outflows and inflows so that high R and $R^2$ values would be expected. However, Brunn and Thomas (1971:65) studying migration in Honduras using a similar model, found an $R^2$ of 68%. Masser and Gould (1975:84,90) found an $R^2$ of 0.74 for both their regression model using socio-economic variables as well as the doubly constrained model for Uganda. The above result can be treated as being reasonable for $R^2$ shows that about 80% of the variance in the observed migration flow can be explained, more than in the studies cited, in terms of the hypothesis posited above, for the whole system. However, there is about 20% of the variance left to explain in the system which shall be attempted below.

Table 6.6 shows that separating the migration into origin and destination specific streams improves the overall explanation of the model. Indeed, as far as the origin specific model is concerned, only 10% of variance remains to be explained while 16% is left for the destination specific one. Thus, the model seems to fit best, the origin data and least, the full system.

The program also provides a residual table which is the difference between the observed migration flow and the predicted flow. The residual table can be used to identify areas where the model prediction deviate the greatest from the observed pattern. Similar to the residual table is the table giving the ratio of the observed flow to the predicted flow which is presented in Table 6.7. Both are used to highlight the difference between observed flow and the predicted. The residual table, which is not presented here, has positive and negative values which show areas in which the migration flows are greater or lesser than the model prediction (Brunn and Thomas 1971:76). The ratio table does the same and is easier to interpret and hence its application. In Table 6.7 ratio values that are greater than 1 mean that there is more migration than predicted by the spatial interaction model. Those that are below 1 mean that there is less migration than the model predicts and those equal to 1 represent a perfect prediction of the migration flow by the model. Brunn and Thomas argue that all things being equal, one expects certain migration streams to be over-predicted and other to be over-predicted. Useful insights into the migration patterns are therefore gained by concentrating on those streams where over-prediction is very large (values above 1.5 for the ratio of predicted migration to observed) or very small (values below 0.5 for the ratio).

Table 6.7: Ratio of observed to predicted migration flows, Zimbabwe 1982

| Province of Birth | Province of Enumeration 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Manicaland | - | 0.51 | 1.38 | 0.47 | 1.20 | 0.13 | 0.83 | 1.04 |
| Central | 0.83 | - | 0.74 | 2.54 | 0.93 | 0.42 | 0.73 | 0.69 |
| East | 1.72 | 1.04 | - | 0.69 | 1.18 | 0.97 | 1.13 | 0.99 |
| West | 0.54 | 1.78 | 0.71 | - | 1.39 | 1.75 | 2.27 | 0.80 |
| North | 1.15 | 1.25 | 1.17 | 1.48 | - | 2.00 | 0.66 | 0.69 |
| South | 0.10 | 0.23 | 1.03 | 0.35 | 1.54 | - | 0.69 | 0.42 |
| Midlands | 0.91 | 0.78 | 1.13 | 1.79 | 0.58 | 1.02 | - | 1.37 |
| Masvingo | 1.02 | 1.25 | 1.00 | 1.05 | 0.67 | 0.26 | 1.17 | - |

Notes: Central, East, West:- Mashonaland; North, South:- Matabeleland

In Table 6.7, provinces with more migration than predicted, which are above 1.5 of the ratio, include the flows between the two Matabeleland provinces, Mashonaland Central and West provinces, flows from Mashonaland East into Manicaland, those from Mashonaland West into Matabeleland South and Midlands and from Midlands into Mashonaland West. Under-prediction involves one main province i.e. Matabeleland South. Flows to and from this province are almost under predicted in every case except for Mashonaland East and Matabeleland North. In other words, Matabeleland South does not interact much outside of Matabeleland, a fact supported by the beta parameter in Table 6.6 above. The major reason for this might be a greater language and cultural affinity between the two Matabeleland provinces facilitating interaction between them. Further, it is possible that Bulawayo, which is the second largest city in the country and the largest in Matabeleland, acts as an intervening opportunity for migrants from Matabeleland South, over and above the degree of intervening opportunity already captured in the model. This would have the effect of strengthening the ties between the two provinces vis-a-vis the rest of the country.

However, what other reasons can be advanced for the over or under prediction captured in Table 6.7, besides those of language or cultural barriers? It is possible, that the way in which distance was measured might be in error. If distance represents a barrier to movement then its accurate measurement is crucial. The study by Brunn and Thomas cited above used highway distance as a measure of the cost of relocating in the capital of Honduras. This is similar in concept to the measure of distance used in this study and, by Masser and Gould in Uganda, where the shortest bus route distance was applied, the bus being the chief means of movement between rural areas and urban centres and within rural areas themselves. In more mobile or advanced societies like the United States airline distance has been used to represent the cost of relocation (see for example Lowry 1966). Use of these various conceptions of distance will affect the outcome of the prediction and hence the size of the residuals or ratios left to explain.

Other social factors affecting the pattern of residual or ratios include, the history of migration (see Hagerstrand 1957) and government policy. In brief, the study of the history of migration shows that migrants will move into areas where other migrants from the same origin have already gone. This reduces the social and economic cost of relocating as well as the uncertainty associated with moving into a new area. Government policy chiefly involves the resettlement of population e.g. as a means of reducing land pressure or moving the population out of disaster prone areas as the case in Ethiopia. In Zimbabwe, large scale movements of population have been associated with the colonial and settler governments in conjuction with legislation such as the Land Apportionment Act (1931), the Land

Husbandry Act (1952) and the Land Tenure Act (1969). After Independence in 1980, the Zimbabwe government enacted a policy of resettlement which would redistribute the population from the district council areas into the rural councils which are mainly concentrated in the Mashonaland provinces. These changes were still in the early stages so that they could not have been picked up by the 1982 Census.

The section has tried to analyse the migration matrix in various ways as a means of trying to understand the migration process within Zimbabwe. The analysis was hampered by the nature of the data, which is based on life time migration. In future, it is hoped that the Central Statistical Office will collect data with a shorter time duration. The analysis turns to the examination of migration rates both at the provincial and district level.

## 6.4 MIGRATION AT THE DISTRICT SCALE

The data for use in the description of migration at the district scale are presented in Tables 6.8 to 6.10 for the 1969 and 1982 censuses, respectively. Inter-provincial migration rates are also provided.

### 6.4.1 Some differences between the two censuses

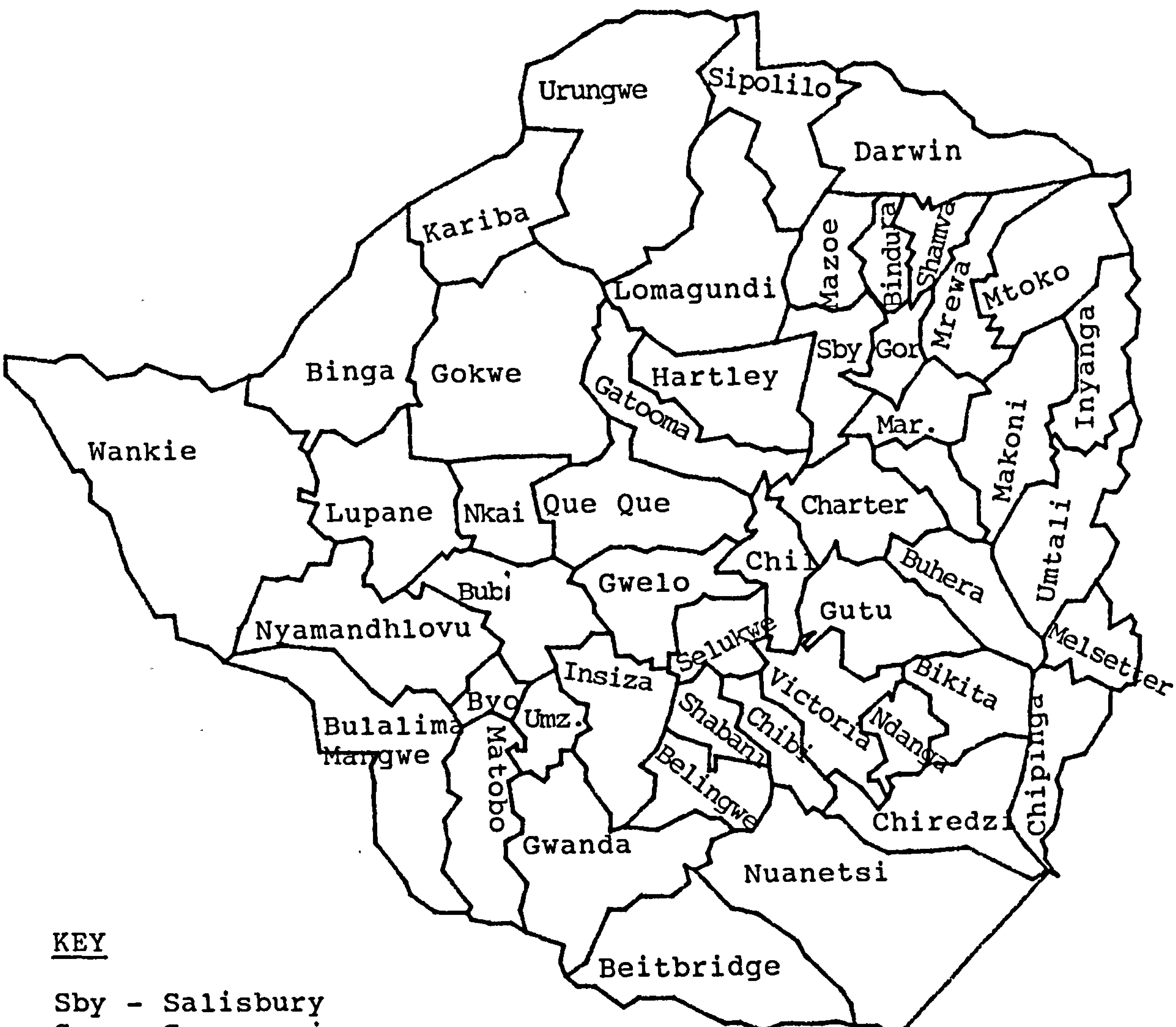
It has been pointed out that both the 1969 and 1982 censuses collected information on the district of birth and district of enumeration of the population. This information can be used to compare and contrast the patterns of migration at the time of the two censuses. The 1969 census only deals with the African population. It is not clear to what extent the 1982 census followed the same convention. If it did not, then there is a small error generated by the inclusion of other racial groups in the 1982 census. However, since the population is pre-dominantly African (97.6%), the migration pattern will be dominated by the movements of this racial group (CSO 1985a:10).

Another point to emphasize is that there have been changes in both district and provincial boundaries since the 1969 Census. For example, there were seven provinces and fifty districts for the 1969 census. In the 1982 census there were eight province and fifty-five districts (Fig 1.4). This means that certain areas within the country are not directly comparably due to the creation of new districts. For example, the district of Mutasa was created out of what were the northern communal lands of Mutare in 1969, both districts being in eastern-central Manicaland. Errors to do with these district changes will be inherent in the 1982 census data though the Central Statistical Office strove to make the two censuses as comparably as possible. The 1969 census provinces and districts are shown in Fig. 6.4 below. The 1969 census also classified the migrants by sex. This was not done in the 1982 census. It would have been highly instructive to see if there have been any changes in the migration behaviour of the sexes between the two censuses.

6.4.2 Migration patterns of the sexes: 1969 Census

Table 6.8 and 6.9 summarise the data on migration by district and sex from the 1969 census. Migration is generally dominated by the male population. This is shown by the population enumerated in the district compared to that still living within the district at the time of the census, as well as the percent of the population which does not migrate or rather moves within the district. Taking Buhera in Manicaland as an example, the population enumerated in the district is 67,110 females compared to 59,680 males. Further, the population born and living within the district is 58,900 females versus 53,840 males giving rates of none migration of 88.0% to 84.1%, respectively. This can be demonstrated for almost all districts, though in a few cases there is a slight female dominance e.g. Umzingwane District

*Fig. 6.4: 1969 Census: provincial and district names*




KEY

Sby - Salisbury
Gor - Goromonzi
Mar - Marandellas
Chi - Chilimanzi
Byo - Bulawayo
Umz - Umzingwane

(Matabeleland South) 64.0% versus 66.4% and Bulawayo (Matabeleland North) 59.9% versus 63.1%. This is also true at the provincial level except for Matabeleland South. It would appear that women in Matabeleland South were more active in the migration process than their male counterparts. However, why this should be so, is not clear and would bear further investigation outside the current research.

While, it might be true that males participate more in the migration process than females, examination of the rates of migration reveal some interesting differences. For example, the sex ratio of migrants reveal in which areas and which migration direction males or females are dominant. For example, in Buhera District, for every 100 females who are inmigrants into the district there are only 71 males moving in. This is in contrast with the outmigration where for every 100 females moving out about 127 males leave (Table 6.9). Indeed, females seem to dominate the inmigration streams into the districts. Out of the fifty districts, only eighteen have males dominating the inmigration. Most of these either contain urban centres, for example, Salisbury (Mashonaland South), Bulawayo and Wankie (Matabeleland North) or are commercial farming regions such as Lomagundi, Urungwe (Mashonaland North) and Gwanda (Matabeleland South) (Fig. 6.5a; O'Connor 1983:86).

In contrast, most outmigration from the districts is dominated by males. Out of the fifty districts, only twelve exhibit a female dominance in the outmigration and of these five are in Matabeleland South, strengthening the argument that males in this region tend to have lower migration rates than females. Binga (Matabeleland North) exhibits the highest outflow of males with a ratio of 348.8 males for every 100 females (Fig. 6.5b). The obvious question to ask is why the difference in the male and female migration patterns?

Table 6.8: Population enumerated, born and living, total born and life time migration, 1969 census (tens)

| District/ Province | Population | | | | | | | | | Migration | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Enumerated | | | Born and living | | | Total born in dist | | | In-migration | | | Out-migration | | | Net-migration | | |
| | M | F | T | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total |
| Buhera | 5968 | 6711 | 12679 | 5384 | 5890 | 11274 | 6402 | 6693 | 13095 | 584 | 821 | 1405 | 1018 | 803 | 1821 | -434 | 18 | -416 |
| Chipinga | 5331 | 5582 | 10913 | 5098 | 5391 | 10489 | 6517 | 6192 | 12709 | 233 | 191 | 424 | 1419 | 801 | 2220 | -1186 | -610 | -1796 |
| Inyanga | 4142 | 5102 | 9244 | 3714 | 4657 | 8371 | 4902 | 5298 | 10200 | 428 | 445 | 873 | 1188 | 641 | 1829 | -760 | -196 | -956 |
| Makoni | 6802 | 7896 | 14698 | 5897 | 6769 | 12666 | 7933 | 8383 | 16316 | 905 | 1127 | 2032 | 2036 | 1614 | 3650 | -1131 | -487 | -1618 |
| Melsetter | 2703 | 2683 | 5386 | 2256 | 2317 | 4573 | 2705 | 2637 | 5342 | 447 | 366 | 813 | 449 | 320 | 769 | -2 | 46 | 44 |
| Umtali | 9196 | 9366 | 18562 | 7842 | 8271 | 16113 | 10019 | 9991 | 20010 | 1354 | 1095 | 2449 | 2177 | 1720 | 3897 | -823 | -625 | -1448 |
| MANICALAND | 34142 | 37340 | 71482 | 30191 | 33295 | 63486 | 38478 | 39194 | 77672 | 3951 | 4045 | 7996 | 8287 | 5899 | 14186 | -4336 | -1854 | -6190 |
| Bindura | 2321 | 2457 | 4778 | 1203 | 1232 | 2435 | 1909 | 1864 | 3773 | 1118 | 1225 | 2343 | 706 | 632 | 1338 | 412 | 593 | 1005 |
| Darwin | 5561 | 6283 | 11844 | 4425 | 5191 | 9616 | 5864 | 6203 | 12067 | 1136 | 1092 | 2228 | 1439 | 1012 | 2451 | -303 | 80 | -223 |
| Kariba | 552 | 601 | 1153 | 323 | 445 | 768 | 451 | 538 | 989 | 229 | 156 | 385 | 128 | 93 | 221 | 101 | 63 | 164 |
| Lomagundi | 8776 | 8848 | 17624 | 6228 | 6503 | 12731 | 7956 | 8080 | 16036 | 2548 | 2345 | 4893 | 1728 | 1577 | 3305 | 820 | 768 | 1588 |
| Mazoe | 3749 | 4110 | 7859 | 2921 | 3137 | 6058 | 4215 | 4313 | 8528 | 828 | 973 | 1801 | 1294 | 1176 | 2470 | -466 | -203 | -669 |
| Shamva | 1648 | 1682 | 3330 | 1074 | 1124 | 2198 | 1482 | 1488 | 2970 | 574 | 558 | 1132 | 408 | 364 | 772 | 166 | 194 | 360 |
| Sipolilo | 2567 | 2904 | 5471 | 2179 | 2483 | 4662 | 3485 | 3569 | 7054 | 388 | 421 | 809 | 1306 | 1086 | 2392 | -918 | -665 | -1583 |
| Urungwe | 4990 | 5133 | 10123 | 3402 | 3702 | 7104 | 4094 | 4178 | 8272 | 1588 | 1431 | 3019 | 692 | 476 | 1168 | 896 | 955 | 1851 |
| MAS. NORTH | 30164 | 32018 | 62182 | 21755 | 23817 | 45572 | 29456 | 30233 | 59689 | 8409 | 8201 | 16610 | 7701 | 6416 | 14117 | 708 | 1785 | 2493 |
| Gatooma | 3256 | 3205 | 6461 | 1769 | 1972 | 3741 | 2528 | 2766 | 5294 | 1487 | 1233 | 2720 | 759 | 794 | 1553 | 728 | 439 | 1167 |
| Goromonzi | 3862 | 4579 | 8441 | 2928 | 3332 | 6260 | 4257 | 4713 | 8970 | 934 | 1247 | 2181 | 1329 | 1381 | 2710 | -395 | -134 | -529 |
| Hartley | 4923 | 5361 | 10284 | 3184 | 3399 | 6583 | 4639 | 4752 | 9391 | 1739 | 1962 | 3701 | 1455 | 1353 | 2808 | 284 | 609 | 893 |
| Marandellas | 3177 | 3479 | 6656 | 2165 | 2340 | 4505 | 3428 | 3717 | 7145 | 1012 | 1139 | 2151 | 1263 | 1377 | 2640 | -251 | -238 | -489 |
| Mrewa | 6075 | 7333 | 13408 | 4943 | 5704 | 10647 | 6875 | 7164 | 14039 | 1132 | 1629 | 2761 | 1932 | 1460 | 3392 | -800 | 169 | -631 |
| Mtoko | 5575 | 6588 | 12163 | 5242 | 6209 | 11451 | 7311 | 7546 | 14857 | 333 | 379 | 712 | 2069 | 1337 | 3406 | -1736 | -958 | -2694 |
| Salisbury | 16163 | 10997 | 27160 | 4940 | 4931 | 9871 | 7288 | 7154 | 14442 | 11223 | 6066 | 17289 | 2348 | 2223 | 4571 | 8875 | 3843 | 12718 |
| Wedza | 2099 | 2388 | 4487 | 1542 | 1702 | 3244 | 2311 | 2439 | 4750 | 557 | 686 | 1243 | 769 | 737 | 1506 | -212 | -51 | -263 |
| MAS. SOUTH | 45130 | 43930 | 89060 | 26713 | 29589 | 56302 | 38637 | 40251 | 78888 | 18417 | 14341 | 32758 | 11924 | 10662 | 22586 | 6493 | 3679 | 10172 |
| Binga | 2026 | 2488 | 4514 | 1831 | 2272 | 4103 | 2124 | 2356 | 4480 | 195 | 216 | 411 | 293 | 84 | 377 | -98 | 132 | 34 |
| Bubi | 1546 | 1656 | 3202 | 1219 | 1314 | 2533 | 2175 | 2422 | 4597 | 327 | 342 | 669 | 956 | 1108 | 2064 | -629 | -766 | -1395 |
| Bulawayo | 9981 | 7309 | 17290 | 3219 | 3152 | 6371 | 5104 | 5262 | 10366 | 6762 | 4157 | 10919 | 1885 | 2110 | 3995 | 4877 | 2047 | 6924 |
| Lupane | 2398 | 2855 | 5253 | 1594 | 1735 | 3329 | 2150 | 2143 | 4293 | 804 | 1120 | 1924 | 556 | 408 | 964 | 248 | 712 | 960 |
| Nkai | 2925 | 3532 | 6457 | 2090 | 2280 | 4370 | 2692 | 2788 | 5480 | 835 | 1252 | 2087 | 602 | 508 | 1110 | 233 | 744 | 977 |
| Nyamandlovu | 3480 | 4145 | 7625 | 2870 | 3284 | 6154 | 3895 | 4289 | 8184 | 610 | 861 | 1471 | 1025 | 1005 | 2030 | -415 | -144 | -559 |
| Wankie | 2757 | 2515 | 5272 | 1758 | 1825 | 3583 | 2008 | 2025 | 4033 | 999 | 690 | 1689 | 250 | 200 | 450 | 749 | 490 | 1239 |
| MAT. NORTH | 25113 | 24500 | 49613 | 14581 | 15862 | 30443 | 20148 | 21285 | 41433 | 10532 | 8638 | 19170 | 5567 | 5423 | 10990 | 4965 | 3215 | 8180 |
| Beitbridge | 2248 | 2185 | 4433 | 2043 | 2037 | 4080 | 2246 | 2211 | 4457 | 205 | 148 | 353 | 203 | 174 | 377 | 2 | -26 | -24 |
| B. Mangwe | 4162 | 5077 | 9239 | 3967 | 4898 | 8865 | 5064 | 6271 | 11335 | 195 | 179 | 374 | 1097 | 1373 | 2470 | -902 | -1194 | -2096 |
| Gwanda | 3796 | 3900 | 7696 | 3169 | 3332 | 6501 | 4191 | 4370 | 8561 | 627 | 568 | 1195 | 1022 | 1038 | 2060 | -395 | -470 | -865 |
| Insiza | 2374 | 2621 | 4995 | 1926 | 2150 | 4076 | 3450 | 3907 | 7357 | 448 | 471 | 919 | 1524 | 1757 | 3281 | -1076 | -1286 | -2362 |
| Matobo | 2540 | 2916 | 5456 | 2376 | 2692 | 5068 | 3198 | 3622 | 6820 | 164 | 224 | 388 | 822 | 930 | 1752 | -658 | -706 | -1364 |
| Umzingwane | 1559 | 1750 | 3309 | 1184 | 1316 | 2500 | 1784 | 2055 | 3839 | 375 | 434 | 809 | 600 | 739 | 1339 | -225 | -305 | -530 |
| MAT. SOUTH | 16679 | 18449 | 35128 | 14665 | 16425 | 31090 | 19933 | 22436 | 42369 | 2014 | 2024 | 4038 | 5268 | 6011 | 11279 | -3254 | -3987 | -7241 |

Table 6.8: contd.

| District/ Province | Population | | | | | | | | | Migration | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Enumerated | | | Born and living | | | Total born in dist | | | In-migration | | | Out-migration | | | Net-migration | | |
| | M | F | T | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total |
| Belingwe | 4965 | 5922 | 10887 | 4677 | 5451 | 10128 | 6134 | 6772 | 12906 | 288 | 471 | 759 | 1457 | 1321 | 2778 | -1169 | -850 | -2019 |
| Charter | 4473 | 5258 | 9731 | 3681 | 4249 | 7930 | 5425 | 5847 | 11272 | 792 | 1009 | 1801 | 1744 | 1598 | 3342 | -952 | -589 | -1541 |
| Chilimanzi | 2366 | 2965 | 5331 | 2028 | 2492 | 4520 | 3524 | 3962 | 7486 | 338 | 473 | 811 | 1496 | 1470 | 2966 | -1158 | -997 | -2155 |
| Gokwe | 6265 | 6986 | 13251 | 3371 | 3707 | 7078 | 4160 | 4172 | 8332 | 2894 | 3279 | 6173 | 789 | 465 | 1254 | 2105 | 2814 | 4919 |
| Gwelo | 4603 | 4245 | 8848 | 2498 | 2673 | 5171 | 4301 | 4476 | 8777 | 2105 | 1572 | 3677 | 1803 | 1803 | 3606 | 302 | -231 | 71 |
| Que Que | 6024 | 5525 | 11549 | 3038 | 3002 | 6040 | 4019 | 3988 | 8007 | 2986 | 2523 | 5509 | 981 | 986 | 1967 | 2005 | 1537 | 3542 |
| Selukwe | 2467 | 2753 | 5220 | 1974 | 2195 | 4169 | 3716 | 3920 | 7636 | 493 | 558 | 1051 | 1742 | 1725 | 3467 | -1249 | -1167 | -2416 |
| Shabani | 2551 | 2677 | 5228 | 1841 | 1933 | 3774 | 2577 | 2642 | 5219 | 710 | 744 | 1454 | 736 | 709 | 1445 | -26 | 35 | 9 |
| MIDLANDS | 33714 | 36331 | 70045 | 23108 | 25702 | 48810 | 33856 | 35779 | 69635 | 10606 | 10629 | 21235 | 10748 | 10077 | 20825 | -142 | 552 | 410 |
| Bikita | 4514 | 5578 | 10092 | 4158 | 5004 | 9162 | 5510 | 6171 | 11681 | 356 | 574 | 930 | 1352 | 1167 | 2519 | -996 | -593 | -1589 |
| Chibi | 4293 | 5089 | 9382 | 3987 | 4516 | 8503 | 5544 | 5898 | 11442 | 306 | 573 | 879 | 1557 | 1382 | 2939 | -1251 | -809 | -2060 |
| Chiredzi | 4889 | 3742 | 8631 | 1894 | 1922 | 3816 | 2017 | 2035 | 4052 | 2995 | 1820 | 4815 | 123 | 113 | 236 | 2872 | 1707 | 4579 |
| Gutu | 7026 | 8016 | 15042 | 6669 | 7337 | 14006 | 9357 | 9786 | 19143 | 357 | 679 | 1036 | 2688 | 2449 | 5137 | -2331 | -1770 | -4101 |
| Ndanga | 5061 | 6061 | 11122 | 4714 | 5436 | 10150 | 6364 | 6743 | 13107 | 347 | 625 | 972 | 1650 | 1307 | 2957 | -1303 | -682 | -1985 |
| Nuanetsi | 3616 | 4081 | 7697 | 3095 | 3454 | 6549 | 3566 | 3792 | 7358 | 521 | 627 | 1148 | 471 | 338 | 809 | 50 | 289 | 339 |
| Victoria | 4403 | 4530 | 8933 | 3223 | 3473 | 6696 | 5504 | 5774 | 11278 | 1180 | 1057 | 2237 | 2281 | 2301 | 4582 | -1101 | -1244 | -2345 |
| VICTORIA | 33802 | 37097 | 70899 | 27740 | 31142 | 58882 | 37862 | 40199 | 78061 | 6062 | 5955 | 12017 | 10122 | 9057 | 19179 | -4060 | -3102 | -7162 |

Notes: Mas:- Mashonaland; Mat:- Matabeleland; B:- Bulalima
Source: CSO (1976) Table 19:75

Table 6.9: Provincial and district migration rates, 1969 census

| District/ Province | Sex ratio of migrants | | Migration rates | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Non-migration rates | | | In-migration rates | | | Out-migration rates | | | Net-migration rates | | |
| | Inflow | Outflow | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total |
| Buhera | 71.1 | 126.8 | 84.1 | 88.0 | 86.1 | 9.8 | 12.2 | 11.1 | 15.9 | 12.0 | 13.9 | -6.8 | 0.3 | -3.2 |
| Chipinga | 122.0 | 177.2 | 78.2 | 87.1 | 82.5 | 4.4 | 3.4 | 3.9 | 21.8 | 12.9 | 17.5 | -18.2 | -9.9 | -14.1 |
| Inyanga | 96.2 | 185.3 | 75.8 | 87.9 | 82.1 | 10.3 | 8.7 | 9.4 | 24.2 | 12.1 | 17.9 | -15.5 | -3.7 | -9.4 |
| Makoni | 80.3 | 126.1 | 74.3 | 80.7 | 77.6 | 13.3 | 14.3 | 13.8 | 25.7 | 19.3 | 22.4 | -14.3 | -5.8 | -9.9 |
| Melsetter | 122.1 | 140.3 | 83.4 | 87.9 | 85.6 | 16.5 | 13.6 | 15.1 | 16.6 | 12.1 | 14.4 | -0.1 | 1.7 | 0.8 |
| Umtali | 123.7 | 126.6 | 78.3 | 82.8 | 80.5 | 14.7 | 11.7 | 13.2 | 21.7 | 17.2 | 19.5 | -8.2 | -6.3 | -7.2 |
| MANICALAND | 97.7 | 140.5 | 78.5 | 84.9 | 81.7 | 11.6 | 10.8 | 11.2 | 21.5 | 15.1 | 18.3 | -11.3 | -4.7 | -8.0 |
| Bindura | 91.3 | 111.7 | 63.0 | 66.1 | 64.5 | 48.2 | 49.9 | 49.0 | 37.0 | 33.9 | 35.5 | 21.6 | 31.8 | 26.6 |
| Darwin | 104.0 | 142.2 | 75.5 | 83.7 | 79.7 | 20.4 | 17.4 | 18.8 | 24.5 | 16.3 | 20.3 | -5.2 | 1.3 | -1.8 |
| Kariba | 146.8 | 137.6 | 71.6 | 82.7 | 77.7 | 41.5 | 26.0 | 33.4 | 28.4 | 17.3 | 22.3 | 22.4 | 11.7 | 16.6 |
| Lomagundi | 108.7 | 109.6 | 78.3 | 80.5 | 79.4 | 29.0 | 26.5 | 27.8 | 21.7 | 19.5 | 20.6 | 10.3 | 9.5 | 9.9 |
| Mazoe | 85.1 | 110.0 | 69.3 | 72.7 | 71.0 | 22.1 | 23.7 | 22.9 | 30.7 | 27.3 | 29.0 | -11.1 | -4.7 | -7.8 |
| Shamva | 102.9 | 112.1 | 72.5 | 75.5 | 74.0 | 34.8 | 33.2 | 34.0 | 27.5 | 24.5 | 26.0 | 11.2 | 13.0 | 12.1 |
| Sipolilo | 92.2 | 120.3 | 62.5 | 69.6 | 66.1 | 15.1 | 14.5 | 14.8 | 37.5 | 30.4 | 33.9 | -26.3 | -18.6 | -22.4 |
| Urungwe | 111.0 | 145.4 | 83.1 | 88.6 | 85.9 | 31.8 | 27.9 | 29.8 | 16.9 | 11.4 | 14.1 | 21.9 | 22.9 | 22.4 |
| MASHONALAND NORTH | 102.5 | 120.0 | 73.9 | 78.8 | 76.3 | 27.9 | 25.6 | 26.7 | 26.1 | 21.2 | 23.7 | 2.4 | 5.9 | 4.2 |
| Gatooma | 120.6 | 95.6 | 70.0 | 71.3 | 70.7 | 45.7 | 38.5 | 42.1 | 30.0 | 28.7 | 29.3 | 28.8 | 15.9 | 22.0 |
| Goromonzi | 74.9 | 96.2 | 68.8 | 70.7 | 69.8 | 24.2 | 27.2 | 25.8 | 31.2 | 29.3 | 30.2 | -9.3 | -2.8 | -5.9 |
| Hartley | 88.6 | 107.5 | 68.6 | 71.5 | 70.1 | 35.3 | 36.6 | 36.0 | 31.4 | 28.5 | 29.9 | 6.1 | 12.8 | 9.5 |
| Marandellas | 88.8 | 91.7 | 63.2 | 63.0 | 63.1 | 31.9 | 32.7 | 32.3 | 36.8 | 37.0 | 36.9 | -7.3 | -6.4 | -6.8 |
| Mrewa | 69.5 | 132.3 | 71.9 | 79.6 | 75.8 | 18.6 | 22.2 | 20.6 | 28.1 | 20.4 | 24.2 | -11.6 | 2.4 | -4.5 |
| Mtoko | 87.9 | 154.7 | 71.7 | 82.3 | 77.1 | 6.0 | 5.8 | 5.9 | 28.3 | 17.7 | 22.9 | -23.7 | -12.7 | -18.1 |
| Salisbury | 185.0 | 105.6 | 67.8 | 68.9 | 68.3 | 69.4 | 55.2 | 63.7 | 32.2 | 31.1 | 31.7 | 121.8 | 53.7 | 88.1 |
| Wedza | 81.2 | 104.3 | 66.7 | 69.8 | 68.3 | 26.5 | 28.7 | 27.7 | 33.3 | 30.2 | 31.7 | -9.2 | -2.1 | -5.5 |
| MASHONALAND SOUTH | 128.4 | 111.8 | 69.1 | 73.5 | 71.4 | 40.8 | 32.6 | 36.8 | 30.9 | 26.5 | 28.6 | 16.8 | 9.1 | 12.9 |
| Binga | 90.3 | 348.8 | 86.2 | 96.4 | 91.6 | 9.6 | 8.7 | 9.1 | 13.8 | 3.6 | 8.4 | -4.6 | 5.6 | 0.8 |
| Bubi | 95.6 | 86.3 | 56.0 | 54.3 | 55.1 | 21.2 | 20.7 | 20.9 | 44.0 | 45.7 | 44.9 | -28.9 | -31.6 | -30.3 |
| Bulawayo | 162.7 | 89.3 | 63.1 | 59.9 | 61.5 | 67.7 | 56.9 | 63.2 | 36.9 | 40.1 | 38.5 | 95.6 | 38.9 | 66.8 |
| Lupane | 71.8 | 136.3 | 74.1 | 81.0 | 77.5 | 33.5 | 39.2 | 36.6 | 25.9 | 19.0 | 22.5 | 11.5 | 33.2 | 22.4 |
| Nkai | 66.7 | 118.5 | 77.6 | 81.8 | 79.7 | 28.5 | 35.4 | 32.3 | 22.4 | 18.2 | 20.3 | 8.7 | 26.7 | 17.8 |
| Nyamandhlovu | 70.8 | 102.0 | 73.7 | 76.6 | 75.2 | 17.5 | 20.8 | 19.3 | 26.3 | 23.4 | 24.8 | -10.7 | -3.4 | -6.8 |
| Wankie | 144.8 | 125.0 | 87.5 | 90.1 | 88.8 | 36.2 | 27.4 | 32.0 | 12.5 | 9.9 | 11.2 | 37.3 | 24.2 | 30.7 |
| MATABELELAND NORTH | 121.9 | 102.7 | 72.4 | 74.5 | 73.5 | 41.9 | 35.3 | 38.6 | 27.6 | 25.5 | 26.5 | 24.6 | 15.1 | 19.7 |
| Beitbridge | 138.5 | 116.7 | 91.0 | 92.1 | 91.5 | 9.1 | 6.8 | 8.0 | 9.0 | 7.9 | 8.5 | 0.1 | -1.2 | -0.5 |
| Bulalima Mangwe | 108.9 | 79.9 | 78.3 | 78.1 | 78.2 | 4.7 | 3.5 | 4.0 | 21.7 | 21.9 | 21.8 | -17.8 | -19.0 | -18.5 |
| Gwanda | 110.4 | 98.5 | 75.6 | 76.2 | 75.9 | 16.5 | 14.6 | 15.5 | 24.4 | 23.8 | 24.1 | -9.4 | -10.8 | -10.1 |
| Insiza | 95.1 | 86.7 | 55.8 | 55.0 | 55.4 | 18.9 | 18.0 | 18.4 | 44.2 | 45.0 | 44.6 | -31.2 | -32.9 | -32.1 |
| Matobo | 73.2 | 88.4 | 74.3 | 74.3 | 74.3 | 6.5 | 7.7 | 7.1 | 25.7 | 25.7 | 25.7 | -20.6 | -19.5 | -20.0 |
| Umzingwane | 86.4 | 81.2 | 66.4 | 64.0 | 65.1 | 24.1 | 24.8 | 24.4 | 33.6 | 36.0 | 34.9 | -12.6 | -14.8 | -13.8 |
| MATABELELAND SOUTH | 99.5 | 87.6 | 73.6 | 73.2 | 73.4 | 12.1 | 11.0 | 11.5 | 26.4 | 26.8 | 26.6 | -16.3 | -17.8 | -17.1 |

Table 6.9: contd.

| District/ Province | Sex ratio of migrants Inflow | Outflow | Non-migration rates Male | Female | Total | In-migration rates Male | Female | Total | Out-migration rates Male | Female | Total | Net-migration rates Male | Female | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Belingwe | 61.1 | 110.3 | 76.2 | 80.5 | 78.5 | 5.8 | 8.0 | 7.0 | 23.8 | 19.5 | 21.5 | -19.1 | -12.6 | -15.6 |
| Charter | 78.5 | 109.1 | 67.9 | 72.7 | 70.4 | 17.7 | 19.2 | 18.5 | 32.1 | 27.3 | 29.6 | -17.5 | -10.1 | -13.7 |
| Chilimanzi | 71.5 | 101.8 | 57.5 | 62.9 | 60.4 | 14.3 | 16.0 | 15.2 | 42.5 | 37.1 | 39.6 | -32.9 | -25.2 | -28.8 |
| Gokwe | 88.3 | 169.7 | 81.0 | 88.9 | 84.9 | 46.2 | 46.9 | 46.6 | 19.0 | 11.1 | 15.1 | 50.6 | 67.4 | 59.0 |
| Gwelo | 133.9 | 100.0 | 58.1 | 59.7 | 58.9 | 45.7 | 37.0 | 41.6 | 41.9 | 40.3 | 41.1 | 7.0 | -5.2 | 0.8 |
| Que Que | 118.4 | 99.5 | 75.6 | 75.3 | 75.4 | 49.6 | 45.7 | 47.7 | 24.4 | 24.7 | 24.6 | 49.9 | 38.5 | 44.2 |
| Selukwe | 88.4 | 101.0 | 53.1 | 56.0 | 54.6 | 20.0 | 20.3 | 20.1 | 46.9 | 44.0 | 45.4 | -33.6 | -29.8 | -31.6 |
| Shabani | 95.4 | 103.8 | 71.4 | 73.2 | 72.3 | 27.8 | 27.8 | 27.8 | 28.6 | 26.8 | 27.7 | -1.0 | 1.3 | 0.2 |
| MIDLANDS | 99.8 | 106.7 | 68.3 | 71.8 | 70.1 | 31.5 | 29.3 | 30.3 | 31.7 | 28.2 | 29.9 | -0.4 | 1.5 | 0.6 |
| | | | | | | | | | | | | | | |
| Bikita | 62.0 | 115.9 | 75.5 | 81.1 | 78.4 | 7.9 | 10.3 | 9.2 | 24.5 | 18.9 | 21.6 | -18.1 | -9.6 | -13.6 |
| Chibi | 53.4 | 112.7 | 71.9 | 76.6 | 74.3 | 7.1 | 11.3 | 9.4 | 28.1 | 23.4 | 25.7 | -22.6 | -13.7 | -18.0 |
| Chiredzi | 164.6 | 108.8 | 93.9 | 94.4 | 94.2 | 61.3 | 48.6 | 55.8 | 6.1 | 5.6 | 5.8 | 142.4 | 83.9 | 113.0 |
| Gutu | 52.6 | 109.8 | 71.3 | 75.0 | 73.2 | 5.1 | 8.5 | 6.9 | 28.7 | 25.0 | 26.8 | -24.9 | -18.1 | -21.4 |
| Ndanga | 55.5 | 126.2 | 74.1 | 80.6 | 77.4 | 6.9 | 10.3 | 8.7 | 25.9 | 19.4 | 22.6 | -20.5 | -10.1 | -15.1 |
| Nuanetsi | 83.1 | 139.3 | 86.8 | 91.1 | 89.0 | 14.4 | 15.4 | 14.9 | 13.2 | 8.9 | 11.0 | 1.4 | 7.6 | 4.6 |
| Victoria | 111.6 | 99.1 | 58.6 | 60.1 | 59.4 | 26.8 | 23.3 | 25.0 | 41.4 | 39.9 | 40.6 | -20.0 | -21.5 | -20.8 |
| VICTORIA | 101.8 | 111.8 | 73.3 | 77.5 | 75.4 | 17.9 | 16.1 | 16.9 | 26.7 | 22.5 | 24.6 | -10.7 | -7.7 | -9.2 |

Source: CSO (1976) Table 19:75

Fig. 6.5a: Sex Ratio of Inmigrants: 1969

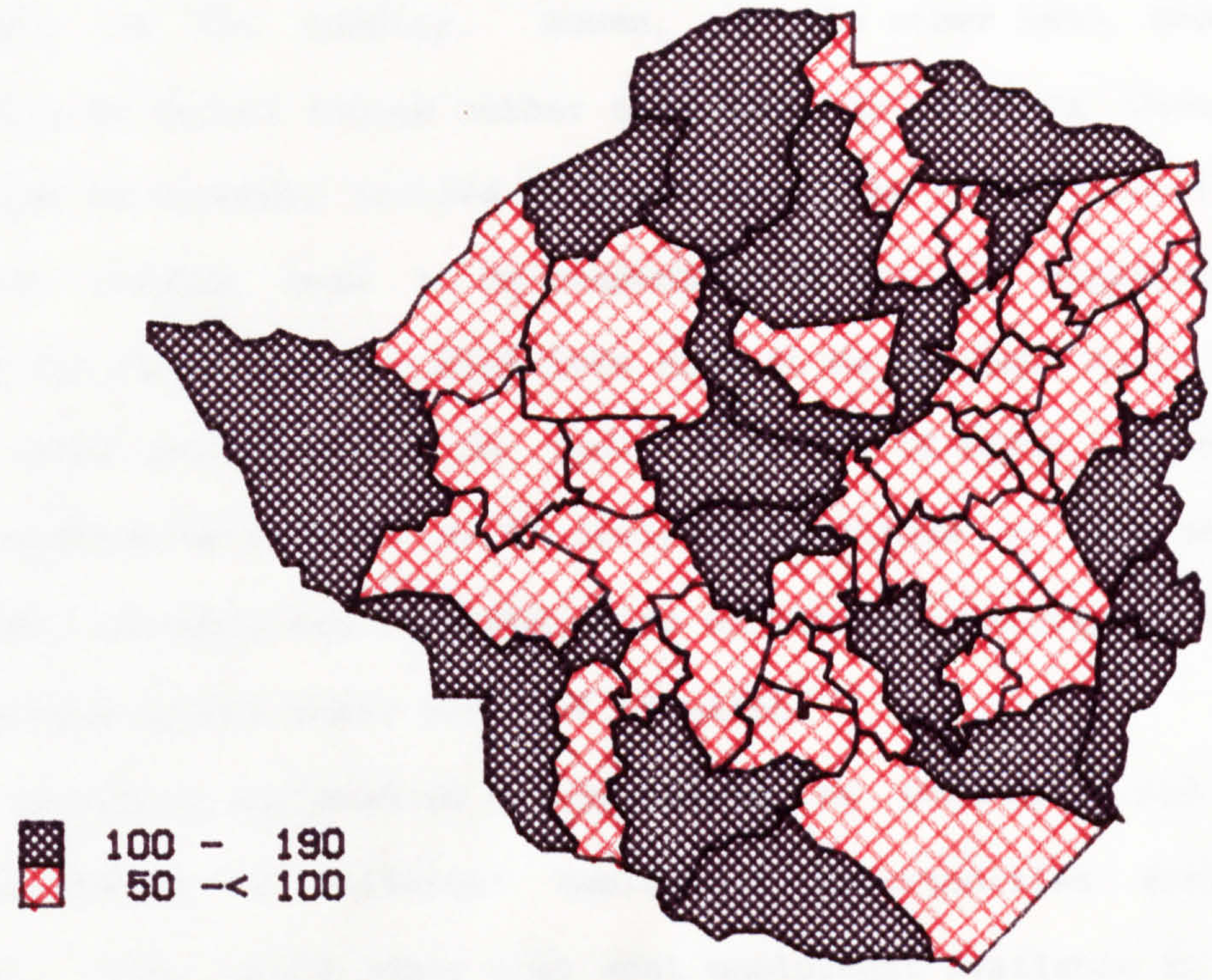
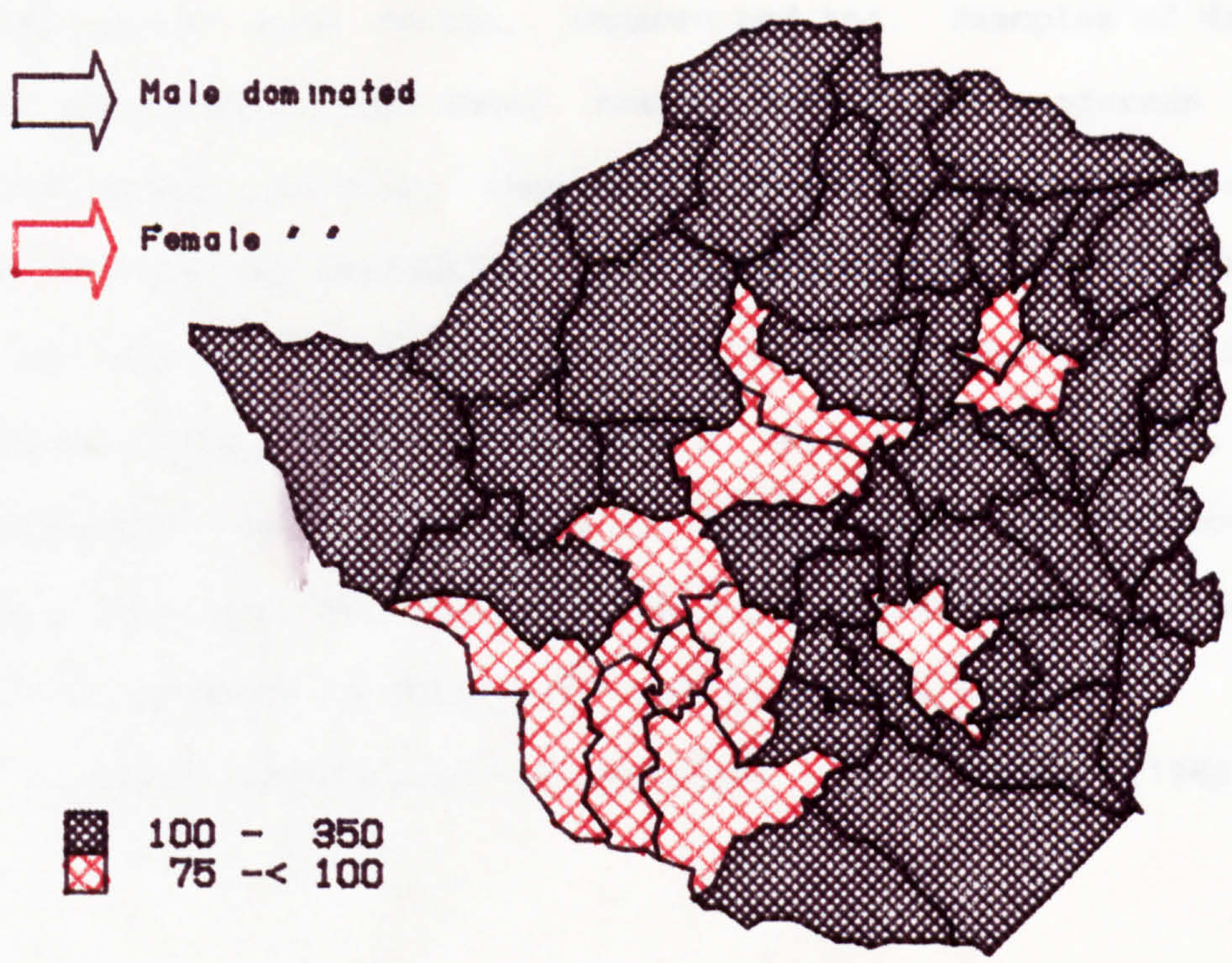



Fig. 6.5b: Sex Ratio of Outmigrants: 1969



The answer is not immediately obvious. The main explanation or hypothesis is that these migration streams are a result of a response to different processes. The outflow of males from the districts seems to be a response to economic forces. This is the major reasons why males dominate inmigration into districts which dominate the employment in the country. Women, on the other hand, seem to be responding to social forces rather than economic factors though they do respond to economic factors of migration. The chief social factor to which females seem to be responding is that of marriage. The inmigration flows into the districts seem to be of women being married by the males working out side their district of birth. These women will therefore be recorded as an inmigration stream at the same time that their husbands are recorded as an outmigration stream as they are not employed within their district of birth.

A secondary explanation or hypothesis is that males and females are responding to different employment opportunities within the country. This would imply that most employment available to females within the country, at least around the 1969 time period was mainly rural based. This is true of female employment in such sector of farming which grow cotton, tobacco and tea. Examples of districts which mainly grow crops where female labour is preferred include Bindura, Mazoe, Hartley, Lomagundi, (Mashonaland North and South) Gokwe and Que Que (Midlands). Within Matabeleland South, the main form of economic activity is commercial cattle ranching. This is an extensive farming sector which mostly employs male labour. Fewer opportunities exist for female employment within the province. This would explain why the province has a preponderance of females moving out of it compared to other provinces within the country.

A third explanation is provided by O'Connor (1983:86-88).

O'Connor argues that the pattern of inmigration observed or reflected in the sex ratios is a response to the historical patterns of migration linked to colonial legislation which tried to limit the flow of Africans into the cities. As he argues, urban centres were viewed and developed as "White Man's Country" to which Africans were offered temporary sojourn because the growth of the European cities was dependent largely on the use of African labour. The result was the setting up of a pattern of migration known as "labour circulation" (see also Chapter Two). To function properly, the system of labour circulation depended on not providing permanent homes for the African labour force. Instead, the male migrants into the cities were housed in hostels instead of family units and paid wages that were not sufficient to maintain a family within the city. Job security was not guaranteed and loss of a job meant a return into the rural areas as the accommodation was tied to having a job. Thus, this insecurity meant that the males had to leave their families behind, within the rural areas and hence the sex ratios which are observed. However, this said, further investigation of the reasons why people leave their districts would shade more light on differential male and female migration.

### 6.4.3 Comparison of the 1969 and 1982 migration

Beginning with the provincial migration rates only, it can be seen that in 1969 about 70.1% (Midlands, Table 6.9 & Fig. 6.6) of the population did not cross a provincial boundary compared to 76.5% (Matabeleland South, Table 6.10 & Fig. 6.7) in 1982. This would seem to imply that the rate of inter-provincial migration has fallen some between the two censuses, though in terms of absolute numbers moving, there are more in 1982 through the existence of a larger population.

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### 6.4.3 <u>Comparison of the 1969 and 1982 migration</u>

Beginning with the provincial migration rates only, it can be seen that in 1969 about 70.1% (Midlands, Table 6.9 & Fig. 6.6) of the population did not cross a provincial boundary compared to 76.5% (Matabeleland South, Table 6.10 & Fig. 6.7) in 1982. This would seem to imply that the rate of inter-provincial migration has fallen some between the two censuses, though in terms of absolute numbers moving, there are more in 1982 through the existence of a larger population.

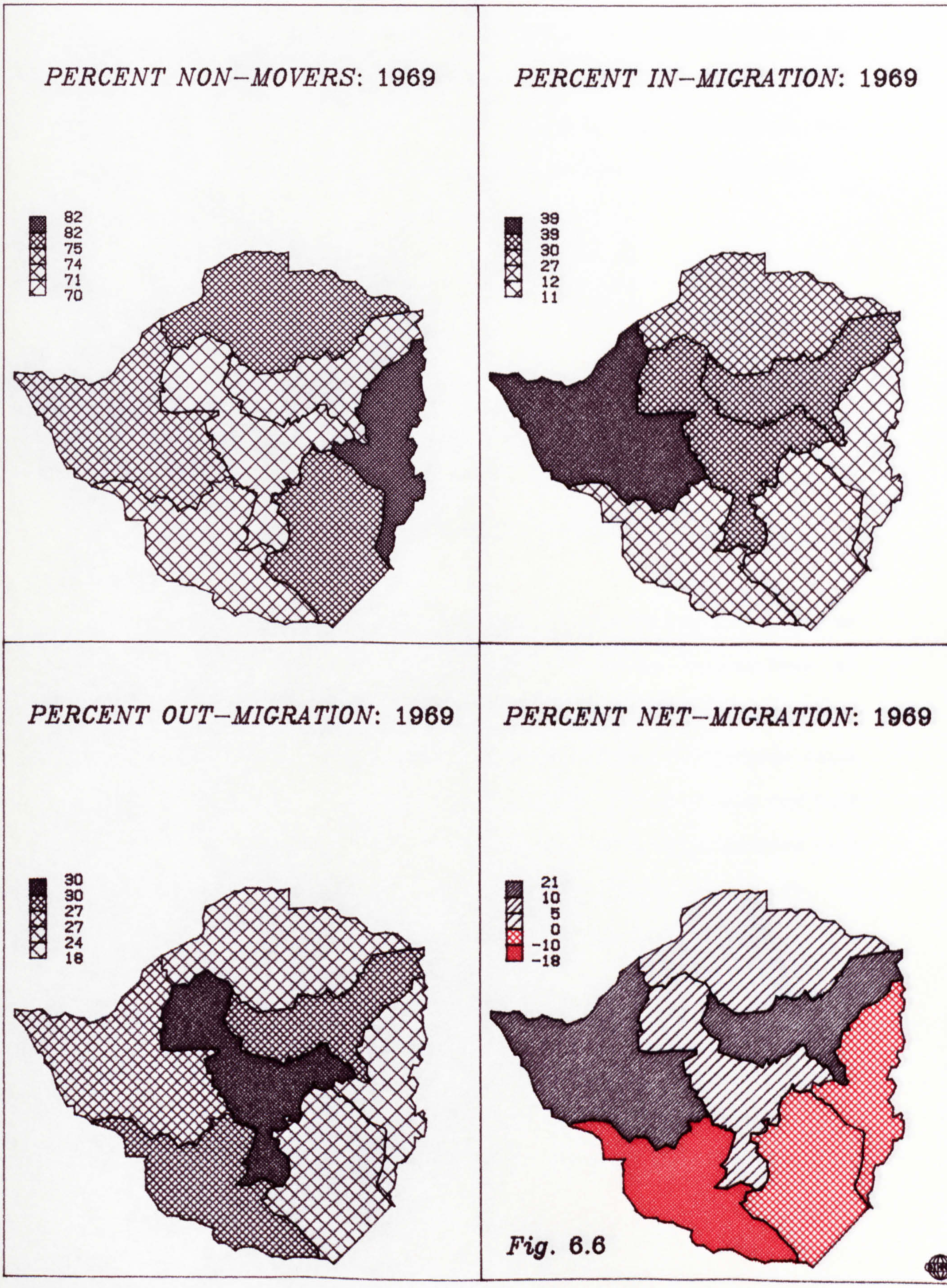

PERCENT NON-MOVERS: 1969
82
82
75
74
71
70
PERCENT IN-MIGRATION: 1969
39
39
30
27
12
11
PERCENT OUT-MIGRATION: 1969
30
30
27
27
24
18
PERCENT NET-MIGRATION: 1969
21
10
5
0
-10
-18

*Fig.* 6.6

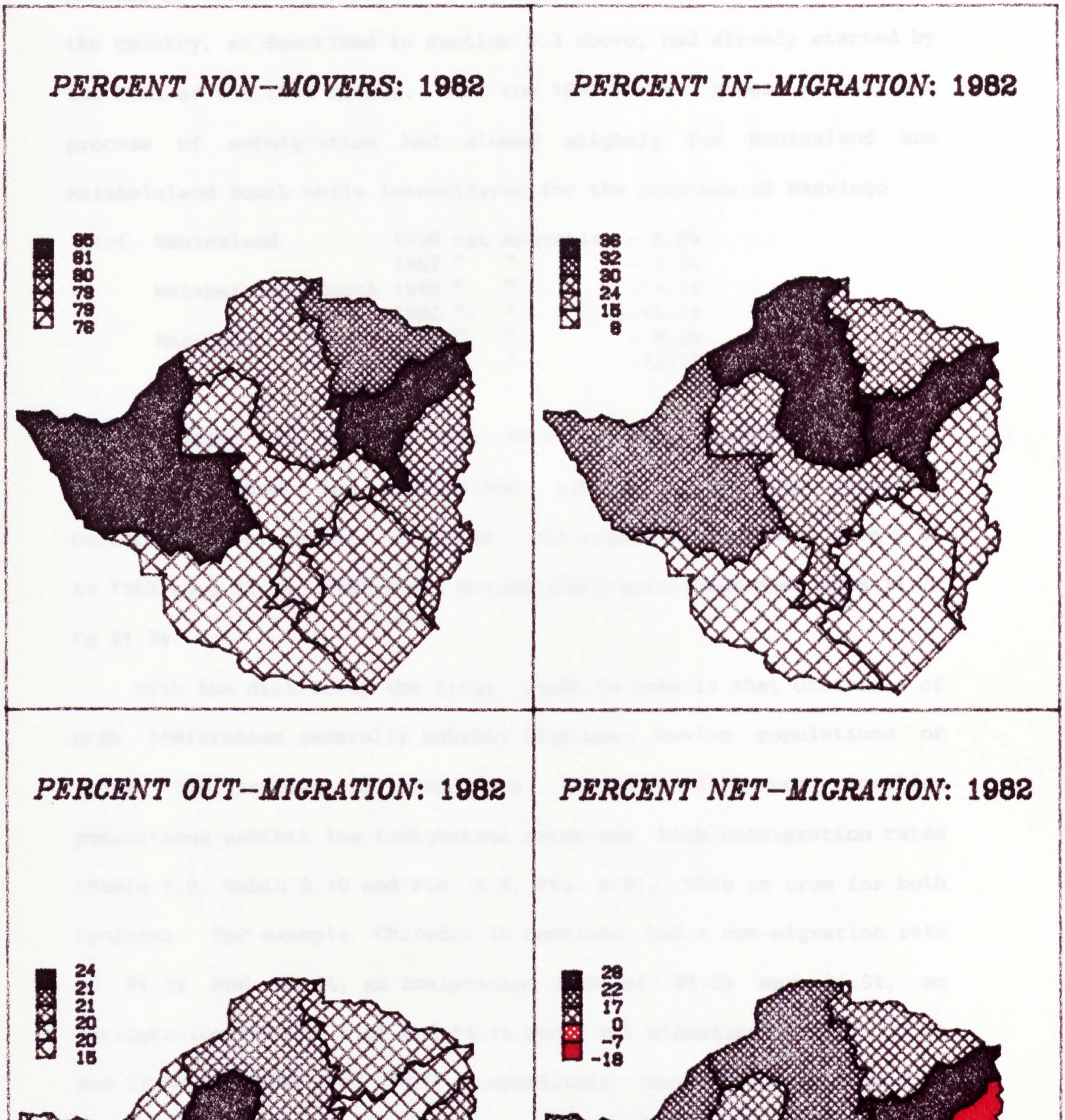

PERCENT NON-MOVERS: 1982
85
81
80
79
79
76
PERCENT IN-MIGRATION: 1982
36
32
30
24
15
8
PERCENT OUT-MIGRATION: 1982
24
21
21
20
20
15
PERCENT NET-MIGRATION: 1982
28
22
17
0
-7
-18

Fig. 6.7

The provinces of Manicaland, Masvingo and Matabeleland South are regions of net outmigration in both censuses. In other words, the process by which the population was slowly shifting into the middle of the country, as described in Section 6.3 above, had already started by the time of the 1969 census. What the 1982 census shows is that the process of outmigration had slowed slightly for Manicaland and Matabeleland South while intensifying for the province of Masvingo

| | | | |
|---|---|---|---|
| (cf. Manicaland | 1969 | net migration | - 8.0% |
| | 1982 | " " | - 7.3% |
| Matabeleland South | 1969 | " " | -17.1% |
| | 1982 | " " | -16.6% |
| Masvingo | 1969 | " " | - 9.2% |
| | 1982 | " " | -12.1%). |

The remainder of the provinces seem to have continued to gain population though the Mashonaland provinces are not directly comparable. For example, Midlands' net migration increases from 0.6% in 1969 to 3.4% in 1982 while Matabeleland North increases from 19.7% to 21.7%.

With the districts, the first point to note is that districts of high inmigration generally exhibit high non moving populations or rates. The reverse is also true. Districts of low non migrating populations exhibit low inmigration rates and high outmigration rates (Table 6.9, Table 6.10 and Fig. 6.8, Fig. 6.9). This is true for both censuses. For example, Chiredzi in Masvingo, had a non-migration rate of 94.2% and 85.6%, an inmigration rate of 55.8% and 51.9%, an outmigration rate of 5.8% and 14.4% and a net migration rate of 113.0% and 77.8% for 1969 and 1982 respectively, thus exhibiting high non- and inmigration rates and low outmigration rates with high net gains in population. In contrast, Charter District (Midlands) had a non-migration rate of 70.4% and 61.8%, an inmigration rate of 18.5% and 23.7%, an outmigration rate of 29.6% and 38.2% and a net migration

Table 6.10: Provincial and district population by province/district of birth and enumeration and life time migration rates, Zimbabwe 1982 Census

| District | Population | | | Migration | | | Migration Rate (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Enumerated | Staying | Born | In | Out | Net | Non | In | Out | Net |
| Buhera | 211,790 | 165,740 | 226,130 | 46,050 | 60,390 | -14,340 | 73.3 | 21.7 | 26.7 | - 6.3 |
| Chipinge | 220,260 | 165,220 | 220,970 | 55,040 | 55,750 | - 710 | 74.8 | 25.0 | 25.2 | - 0.3 |
| Nyanga | 94,280 | 70,240 | 103,610 | 24,040 | 33,370 | - 9,330 | 67.8 | 25.5 | 32.2 | - 9.0 |
| Makoni | 170,940 | 125,390 | 201,160 | 45,550 | 75,770 | -30,220 | 62.3 | 26.6 | 37.7 | -15.0 |
| Chimanimani | 67,430 | 49,410 | 66,880 | 18,020 | 17,470 | 550 | 73.9 | 26.7 | 26.1 | 0.8 |
| Mutasa | 85,010 | 57,830 | 71,710 | 27,180 | 13,880 | 13,330 | 80.6 | 32.0 | 19.4 | 18.5 |
| Mutare | 202,650 | 157,120 | 244,370 | 45,530 | 87,250 | -41,720 | 64.3 | 22.5 | 35.7 | -17.1 |
| MANICALAND | 1,052,360 | 899,040 | 1,134,830 | 153,320 | 235,790 | -82,470 | 79.2 | 14.6 | 20.8 | - 7.3 |
| | | | | | | | | | | |
| Bindura | 174,930 | 75,730 | 104,520 | 99,200 | 28,790 | 70,410 | 72.5 | 56.7 | 27.5 | 67.4 |
| Centenary | 28,100 | 11,720 | 21,680 | 16,380 | 9,960 | 6,420 | 54.1 | 58.3 | 45.9 | 29.6 |
| Mazowe | 168,020 | 98,460 | 151,000 | 65,560 | 52,540 | 13,020 | 65.2 | 40.0 | 34.8 | 8.6 |
| Darwin | 78,340 | 64,370 | 128,020 | 13,970 | 63,650 | -49,680 | 50.3 | 17.8 | 49.7 | -38.8 |
| Rushinga | 44,200 | 29,040 | 33,330 | 15,160 | 4,290 | 10,870 | 87.1 | 34.3 | 12.9 | 32.6 |
| Shamva | 97,690 | 51,550 | 69,350 | 46,140 | 17,800 | 28,340 | 74.3 | 47.2 | 25.7 | 40.9 |
| Guruve | 90,700 | 70,080 | 111,180 | 20,620 | 41,100 | -20,480 | 63.0 | 22.7 | 37.0 | -18.4 |
| MASH. CENTRAL | 677,980 | 496,280 | 619,080 | 181,700 | 122,800 | 58,900 | 80.2 | 26.8 | 19.8 | 9.5 |
| | | | | | | | | | | |
| Goromonzi | 94,320 | 51,530 | 87,000 | 42,790 | 35,470 | 7,320 | 59.2 | 45.4 | 40.8 | 8.4 |
| Marondera | 96,080 | 50,770 | 100,380 | 45,310 | 49,610 | - 4,300 | 50.6 | 47.2 | 49.4 | - 4.3 |
| Murewa | 164,670 | 112,700 | 187,700 | 51,970 | 75,000 | -23,030 | 60.0 | 31.6 | 40.0 | -12.3 |
| Mutoko | 89,630 | 75,010 | 147,420 | 14,620 | 72,410 | -57,790 | 50.9 | 16.3 | 49.1 | -39.2 |
| Mudzi | 67,370 | 40,380 | 43,210 | 26,990 | 2,830 | 24,160 | 93.5 | 40.1 | 6.5 | 55.9 |
| Seke | 22,160 | 15,870 | 27,980 | 6,290 | 12,110 | - 5,820 | 56.7 | 28.4 | 43.3 | -20.8 |
| Wedza | 52,630 | 36,830 | 71,230 | 15,800 | 34,400 | -18,600 | 51.7 | 30.0 | 48.3 | -26.1 |
| Harare | 621,100 | 203,910 | 374,420 | 417,190 | 170,510 | 246,680 | 54.5 | 67.2 | 45.5 | 65.9 |
| Chitungwiza | 127,910 | 7,150 | 9,550 | 120,760 | 2,400 | 118,360 | 74.9 | 94.4 | 25.1 | 1,239.4 |
| MASH. EAST | 1,335,870 | 849,240 | 1,048,890 | 486,630 | 199,650 | 286,980 | 81.0 | 36.4 | 19.0 | 27.4 |
| | | | | | | | | | | |
| Kadoma | 111,960 | 43,700 | 85,400 | 68,260 | 41,700 | 26,560 | 51.2 | 61.0 | 48.8 | 31.1 |
| Chegutu | 147,790 | 74,590 | 134,730 | 73,200 | 60,140 | 13,060 | 55.4 | 49.5 | 44.6 | 9.7 |
| Kariba | 25,920 | 12,880 | 22,190 | 13,040 | 9,310 | 3,730 | 58.0 | 50.3 | 42.0 | 16.8 |
| Lomagundi | 319,940 | 211,320 | 287,520 | 108,620 | 76,200 | 32,420 | 73.5 | 34.0 | 26.5 | 11.3 |
| Hurungwe | 217,890 | 142,020 | 173,580 | 75,870 | 31,560 | 44,310 | 81.8 | 34.8 | 18.2 | 25.5 |
| MASH. WEST | 823,500 | 561,160 | 703,420 | 262,340 | 142,260 | 120,080 | 79.8 | 31.9 | 20.2 | 17.1 |
| | | | | | | | | | | |
| Binga | 47,670 | 45,320 | 63,190 | 2,350 | 17,870 | -15,520 | 71.7 | 4.9 | 28.3 | -24.6 |
| Bubi | 6,310 | 4,530 | 26,760 | 1,780 | 22,230 | -20,450 | 16.9 | 28.2 | 83.1 | -76.4 |
| Lupane | 71,930 | 5,180 | 70,360 | 66,750 | 65,180 | 1,570 | 7.4 | 92.8 | 92.6 | 2.2 |
| Nkayi | 112,190 | 83,630 | 111,760 | 28,560 | 28,130 | 430 | 74.8 | 25.5 | 25.2 | 0.4 |
| Nyamandhlovu | 90,780 | 78,510 | 113,930 | 12,270 | 35,420 | -23,150 | 68.9 | 13.5 | 31.1 | -20.3 |
| Hwange | 115,840 | 72,880 | 83,300 | 42,960 | 10,420 | 32,540 | 87.5 | 37.1 | 12.5 | 39.1 |
| Bulawayo | 396,500 | 138,770 | 221,910 | 257,730 | 83,140 | 174,590 | 62.5 | 65.0 | 37.5 | 78.7 |
| MAT. NORTH | 841,220 | 589,850 | 691,210 | 251,370 | 101,360 | 150,010 | 85.3 | 29.9 | 14.7 | 21.7 |

Table 6.10: contd.

| District | Population | | | Migration | | | Migration Rate (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Enumerated | Staying | Born | In | Out | Net | Non | In | Out | Net |
| Beitbridge | 61,950 | 50,970 | 60,220 | 10,980 | 9,250 | 1,730 | 84.6 | 17.7 | 15.4 | 2.9 |
| B. Mangwe | 158,180 | 152,190 | 189,190 | 5,990 | 37,000 | -31,010 | 80.4 | 3.8 | 19.6 | -16.4 |
| Gwanda | 103,060 | 83,810 | 124,960 | 19,250 | 41,150 | -21,900 | 67.1 | 18.7 | 32.9 | -17.5 |
| Insiza | 82,140 | 67,470 | 112,720 | 14,670 | 45,250 | -30,580 | 59.9 | 17.9 | 40.1 | -27.1 |
| Matobo | 82,440 | 70,110 | 102,260 | 12,330 | 32,150 | -19,820 | 68.6 | 15.0 | 31.4 | -19.4 |
| Umzingwane | 50,370 | 38,380 | 56,200 | 11,990 | 17,820 | - 5,830 | 68.3 | 23.8 | 31.7 | -10.4 |
| MAT. SOUTH | 538,140 | 494,000 | 645,550 | 44,140 | 151,550 | -107,410 | 76.5 | 8.2 | 23.5 | -16.6 |
| | | | | | | | | | | |
| Mberengwa | 161,310 | 125,910 | 175,300 | 35,400 | 49,390 | -13,990 | 71.8 | 21.9 | 28.2 | - 8.0 |
| Charter | 144,340 | 110,070 | 178,150 | 34,270 | 68,080 | -33,810 | 61.8 | 23.7 | 38.2 | -19.0 |
| Chilimanzi | 44,520 | 33,960 | 79,910 | 10,560 | 45,950 | -35,390 | 42.5 | 23.7 | 57.5 | -44.3 |
| Gokwe | 268,060 | 157,950 | 185,220 | 110,110 | 27,270 | 82,840 | 85.3 | 41.1 | 14.7 | 44.7 |
| Gweru | 118,620 | 61,100 | 114,390 | 57,520 | 53,290 | 4,230 | 53.4 | 48.5 | 46.6 | 3.7 |
| Kwekwe | 179,330 | 86,550 | 125,120 | 92,780 | 38,570 | 57,210 | 69.2 | 51.7 | 30.8 | 43.3 |
| Shurugwi | 70,010 | 46,790 | 88,640 | 23,220 | 41,850 | -18,630 | 52.8 | 31.2 | 47.2 | -21.0 |
| Zvishavane | 92,550 | 61,070 | 96,220 | 31,480 | 35,150 | - 3,670 | 63.5 | 34.0 | 36.5 | - 3.8 |
| MIDLANDS | 1,178,740 | 820,290 | 1,042,950 | 258,450 | 222,660 | 35,790 | 78.7 | 24.0 | 21.3 | 3.4 |
| | | | | | | | | | | |
| Bikita | 179,700 | 112,430 | 159,690 | 62,270 | 47,260 | 20,010 | 70.4 | 37.4 | 29.6 | 12.5 |
| Chibi | 124,200 | 98,780 | 144,180 | 25,420 | 45,400 | -19,980 | 68.5 | 20.5 | 31.5 | -13.9 |
| Chiredzi | 214,440 | 103,240 | 120,620 | 111,200 | 17,380 | 93,820 | 85.6 | 51.9 | 14.4 | 77.8 |
| Masvingo | 105,990 | 73,210 | 171,390 | 32,780 | 98,180 | -65,400 | 42.7 | 30.9 | 57.3 | -38.2 |
| Gutu | 167,740 | 151,890 | 246,640 | 15,850 | 94,750 | -78,900 | 61.6 | 9.4 | 38.4 | -32.0 |
| Ndanga | 131,650 | 110,740 | 210,490 | 20,910 | 99,750 | -78,840 | 52.6 | 15.9 | 47.4 | -37.5 |
| Mwenezi | 49,640 | 35,590 | 53,780 | 14,050 | 18,190 | - 4,140 | 66.2 | 28.3 | 33.8 | - 7.7 |
| MASVINGO | 973,360 | 870,500 | 1,106,790 | 102,860 | 236,290 | -133,430 | 78.7 | 10.6 | 21.3 | -12.1 |

Source: CSO (1985b:) Tables III.6-III.14 pp. 62-78.

rate of -13.7% and 19.0% in 1969 and 1982, exhibiting low non- and inmigration rates and high outmigration rates with a negative gain in population.

While the provinces of Manicaland, Matabeleland South and Masvingo have a net loss in population, certain districts within them are areas of high positive gains in population. This is true of districts like Chiredzi and Chimanimani (formerly Melsetter) which gain population in either census and others like Beitbridge which only gain population in the 1982 Census (Fig. 6.8 & 6.9). The other provinces, which generally gain in population also have districts of high negative growth. Examples are Bubi, Chilimanzi and Guruve (formerly Sipolilo). This means that within the province, certain areas are favoured destinations while others are not. Thus, there is greater variation in the migration patterns within the districts than at the provincial level. This reveals the need for the tabulation of migration at the district level by district of birth and district of enumeration to give a migration matrix similar to that of the provinces presented above.

What are the reasons for the patterns of in-, out- and net-migration shown in Tables 6.9 and 6.10 and their accompanying maps (Figs. 6.8 & 6.9)? The CSO (1984:7-10) explain some of the observed patterns of population gains. First, movement into urban areas means that districts which contain urban centres generally have high rates of net migration. Examples already cited include Harare and Bulawayo. Chitungwiza is easily the urban centre that had the most rapid growth due mainly to inmigration as the centre was virtually non-existent in the 1969 Census but grew to be the third largest urban centre in 1982 (cf. 1969 population of 14,970 versus 1982 population of 172,556). This growth is explained by its main function i.e. acting as a

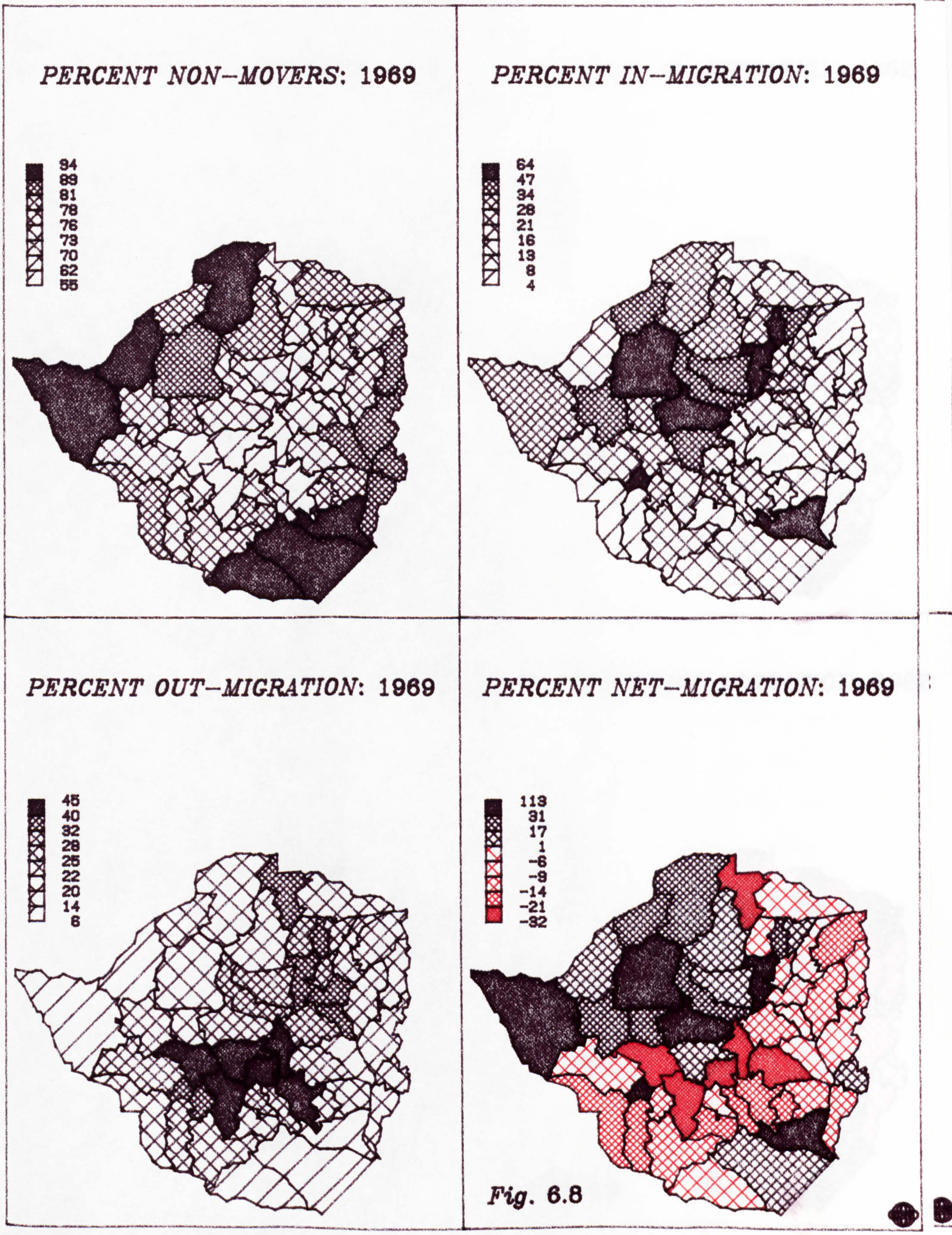

PERCENT NON-MOVERS: 1969
94
89
81
78
76
73
70
62
55
PERCENT IN-MIGRATION: 1969
64
47
34
28
21
16
13
8
4
PERCENT OUT-MIGRATION: 1969
45
40
32
28
25
22
20
14
6
PERCENT NET-MIGRATION: 1969
113
31
17
1
-6
-9
-14
-21
-32

Fig. 6.8

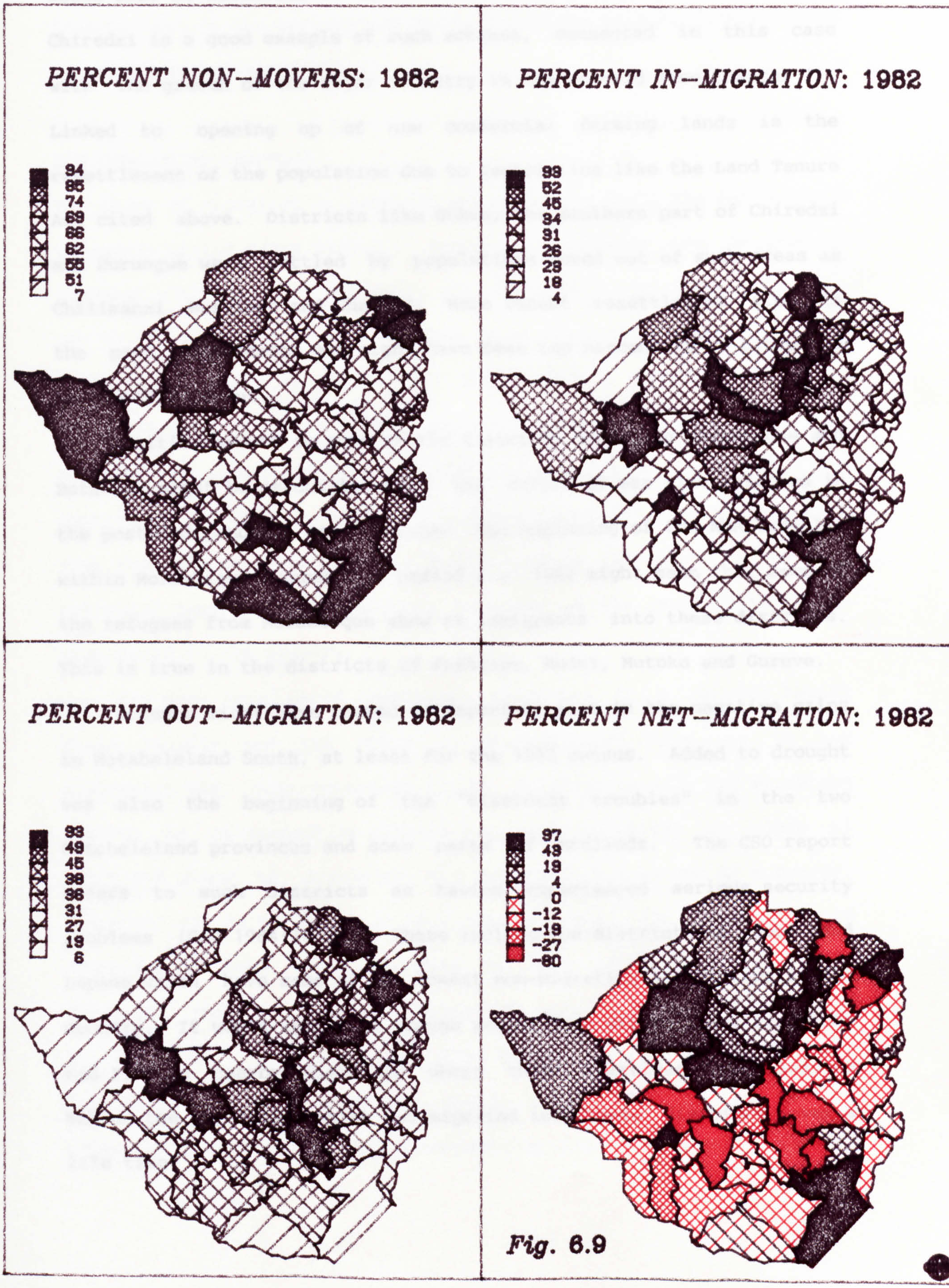

PERCENT NON-MOVERS: 1982
94
85
74
69
66
62
55
51
7
PERCENT IN-MIGRATION: 1982
99
52
45
34
31
26
23
18
4
PERCENT OUT-MIGRATION: 1982
93
49
45
38
36
31
27
19
6
PERCENT NET-MIGRATION: 1982
97
49
19
4
0
-12
-19
-27
-80

*Fig.* 6.9

domitory town to Harare.

The opening up of new commercial farming lands in the early 1960s would also be reflected in districts where such schemes took place. Chiredzi is a good example of such schemes, connected in this case with the growth of the sugar industry in the Lowveld (see Chapter 1). Linked to opening up of new commercial farming lands is the resettlement of the population due to legislation like the Land Tenure Act cited above. Districts like Gokwe, the southern part of Chiredzi and Hurungwe were settled by populations moved out of such areas as Chilimanzi, Masvingo and Charter. More recent resettlement i.e. in the post independence era, might have been too nascent to be picked up in the 1982 Census.

Positive growth in some of the districts bordering Mozambique and Botswana might be associated with the return of war time refugees in the post-independence era. Further, the beginning of the MNR troubles within Mozambique around this period i.e. 1982 might mean that some of the refugees from Mozambique show as inmigrants into these districts. This is true in the districts of Rushinga, Mudzi, Mutoko and Guruve.

Drought might have played an important part in the negative gains in Matabeleland South, at least for the 1982 census. Added to drought was also the beginning of the "dissident troubles" in the two Matabeleland provinces and some parts of Midlands. The CSO report refers to such districts as having experienced serious security problems (CSO 1984:36-37). These include the districts of Bubi and Lupane which have some of the lowest non-migrating populations in the country. It would appear as though people born within these districts had fled to nearby districts where their relatives lived, leaving behind the population which had migrated into these districts over a life time.

The above have been an attempt to examine some of the migration patterns shown in Tables 6.9 and 6.10 and mapped in Fig. 6.8 and 6.9. Not all possible explanations for these patterns have been advanced. Indeed, most of the explanation will only emerge as more detailed data on migration becomes available.

## 6.5 CONCLUDING COMMENTS

The study of migration is vital in understanding fully the demographic processes taking place within a country. Migration can be grouped together with fertility and entry into marriage as it is an event that can be repeated several times. This is in contrast to mortality which is a one off event and once it has taken place it cannot be repeated. The collection of migration data is complicated by the fact that the process can take place several times and at different locations. The migrant is difficult to define as different agencies that collect data view the migrant differently. In the long run the nature of the data collected determines the migrant as well as the level of migration registered in the country.

For most third world countries, migration is a process taking place rapidly and yet which is not documented fully nor in any systematic way. Most countries in the third world only get migration figures by retrospective methods i.e. using questions on place of birth and place of residence at the time of a census or a survey. Zimbabwe is no exception in this regard. Thus, the discussion of migration has been based on data on life time migration. It is fortunate that at least a migration matrix existed for the eight provinces of Zimbabwe for the 1982 census. This was helpful in analysing the major migration trends within the country at the inter-provincial scale. While comparisons could not be drawn with the

1969 census, the analysis is useful as a starting point for mapping as well as interpreting and predicting migration patterns within the country in the last decade or so.

As was expected, at the district level, those districts which contain urban centres show up as the areas of net gains in population. This is the process of urbanisation which in the coming years should transform Zimbabwe from being a mainly rural agrarian society into an urban one with all the demographic, social and economic changes this entails. Control of movement of the African population in the pre-1980 era meant that the process was rather slow and dominated by the male population which was allowed into the urban centres and on the white commercial farms as labour but with no right of permanent residence. This legacy is still evident in the 1982 census (see Chapter Three) though new policies mean that changes will have taken place by the next census. How far these will move to obliterate the previous patterns can only be a matter of conjecture at this point.

While it is possible to identify patterns of migration, the study of the process is still at a nascent stage within Zimbabwe. More data of both the retrospective kind as well as that based on a population register need to be collected and analysed. The analysis also needs a shorter time period than the current life time one so that inter-census comparisons and inter-censal migration rates can be compared effectively. Thus, one can only conclude by saying that the study of migration in Zimbabwe is a field that will profit from more research.

# CHAPTER 7

# SOCIAL AND ECONOMIC DEVELOPMENT

## 7.1 INTRODUCTION

The chapter attempts to describe social and economic indicators of development within Zimbabwe. Chapter Two has provided a detailed definition and description of development both in a global and national sense. It is therefore not necessary to recap on the definitions in this chapter. The statistical analysis of the indicators will be performed in the first section of Chapter 8. The chapter's main aim is to provide a descriptive background of social and economic development within Zimbabwe to complement the description and analysis of the demographic forces presented in Chapters 3 to 6. The social and economic description provides a firm background for the analysis in Chapter Eight.

The data are available at various spatial scales and are of variable quantity as well. For example, data on the village health worker scheme are only available at the provincial scale for all provinces while those on marriage and education are available for two provinces only but at the district level. Indeed the data might be classified into three categories. The first would be data available for all districts within the country. The second would be data available only at the provincial level for all the provinces and the third would be data available for only some of the provinces. Detailed descriptions of the nature of the data used will be given within the appropriate sections.

The remainder of the chapter is divided into seven sections. Section 7.2 examines the provision of health services and gives some background on the development of these facilities within the country.

Variations in the provision of health services at the provincial and district levels are analysed. Section 7.3 describes the population of Zimbabwe according to its urban/rural distribution. Here the focus is on residence as being an important element in indicating the extent of socio-economic development. In Section 7.4, emphasis is placed on household attributes such as average size of the household, the availability of such facilities as toilets and running water and the type of cooking fuel used within the house. These attributes can be seen as measuring the quality of life enjoyed by the household. Section 7.5 then examines the marriage behaviour of the population by sex. The focus is on the age at entry into marriage as this is responsible for the duration of childbearing, which in turn is partly responsible for the level of fertility. Entry and participation in the labour force is examined in Section 7.6 through comparison of male and female labour force participation rates and formal employment versus subsistence farming activity. Section 7.7 examines the educational levels of the population with Section 7.8 providing the concluding comments.

## 7.2 HEALTH

### 7.2.1 Some background information

Health services in Zimbabwe are provided by five main organisations or institutions. The main provider and supporter of health services is the Ministry of Health (MoH), which runs most government owned hospitals and clinics. It is the policy maker for the health service, setting the standards to be followed by the other organisations providing health services. Closely associated with the MoH are the local authorities, such as municipalities, district and rural councils, which provide health services at the community level. These local authorities are partly financed by MoH through grants and partly by their own funds raised as fees and taxes from those who consume the services they provide (MoH 1985; CSO 1985b; Agere 1986).

Mission churches are the traditional providers of health services for the rural communities. They fill an important gap between provision from the MoH and the local authorities, at the rural community level. In recognition, of the importance of mission churches in the provision of health services for rural areas, the MoH provide a more comprehensive grant aid package to them. Some of them are financed wholly by the MoH (CSO 1985b; Agere 1986).

Certain industrial organisations also provide health services, mainly for their workers and their dependants. The funding of these services come from the industrial organisations concerned. Their location is therefore mainly urban except for those located on huge estates like Triangle and Hippo Valley in the south-eastern part of the country. The estate hospitals tend to serve their workers and their families but patients from non-estate workers can be handled through the referral system. Mission churches and local authorities can refer patients to the industrial hospitals (MoH 1985). Industrial health services are also located in mining areas.

Private medical services exist in most urban centres in the country for those who can afford them. These are mainly funded by private individuals and organisations. They tend to charge high rates of fees for treatment and are seen as a serious obstacle to the development of a National Health Service. This is because their higher rates of pay attract most of the qualified doctors and nurses leaving the public sector poorly serviced. Private medical services carter for a small clientele of high income families within the urban centres and therefore do not fit well into the egalitarian concept of a national health service accessible to all regardless of income.

The implications of the various organisations that provide health care to the nation can be evaluated in terms of the long term goals of government with regards to health care. Reference has already been made to the government's goal of establishing a national health system. The other objective of government is to provide health for all by the year 2000 or within the foreseeable future (CSO 1985b; MoH 1985; GoZ 1982 & 1986). It is with these goals in mind that the government of Zimbabwe enabled free access to health facilities for all those whose income is below Z$150 per month since 1981 (Riddell 1984). How then, will government be able to reconcile all the various organisations that provided health services into a single coherent national health service? This is a question that cannot be answered currently, but which will tax the minds of planners within Zimbabwe, and which deserves research in the future.

7.2.2 <u>The concept of health and conventional indicators</u>

Health is a difficult concept to define. Two main approaches to health have been used in determining its definition. Agere (1986:355) classified the first approach as "contagionism". The approach views health as "the absence of disease". Baylies (1986) identifies this approach to health and agrees with Agere that it is inadequate. It seeks to confine health to only a biological or physical condition without due regard to the social, economic and political factors under which the health care delivery system operates. For example, Anker (1978) analysing factors influencing the decline in fertility rates, identified the date of independence as a significant factor. The main reason for this was that colonial regimes were notorious for promoting health policies that were not directed at the masses of the population, a factor relevant to Zimbabwe (see Agere 1986).

The second approach Agere terms "anticontagionism" (p. 355). The approach places emphasis on improving the social, economic and political conditions of the masses of the people as a means of improving the total well-being of the nation. This approach, adopted by the World Health Organisation in 1977, defines health as "a state of complete physical, mental and social well-being" (Baylies 1986:65; Agere 1986). The definition escapes the narrow confines of the first. The core of its argument is that health is more than merely the absence of disease or illness. The social and economic conditions play a vital role in determining the health status of a population. Improvements in these spheres will therefore enhance the health status of the whole nation.

The second approach calls for indicators that are different from the conventional measures of health currently in operation, which are still dependent on the first definition. These include such measures as infant and child mortality rates, life expectancy at birth (See Chapter 5 for the analysis of these measures in Zimbabwe), and nutritional status (measured in intake of calories). Other measures, discussed below, include the ratios of doctors per head of population or nurses per head of population. These conventional indicators suffer from data defiencies, especially in the developing parts of the world (Baylies 1986). They often are national aggregates and mask regional variations. In this respect they are viewed as only partial measures of health status. Despite the criticism leveled at these conventional indicators, the second approach has found it hard to break away from them. This is because some of them are very sensitive indicators of improvements in the social and economic spheres. Chief among these is the infant and child mortality rate which responds readily to improvements in things like wholesome water supplies and sanitation.

The chapter utilises the ratio of population per physician and of population per village health worker as indicators of development in the field of health. The World Bank has used the ratio of population per physician in measuring the development and quality of services provided within given countries (World Bank 1986). A similar approach will be adopted in examining the provision of health services in Zimbabwe. These should be tied together with the discussion of infant, child and adult mortality as well as life expectancy at birth presented in Chapter Five.

Two types of health personnel are considered. These are medical doctors and village health workers. Because of the lack of appropriately disaggregated data, the ratio of population per nurse can not be used. The use of the ratio of population per village health worker is substituted.

Village health workers are at the grassroots of the primary health care delivery system. They are an important element of the government's preventive primary health care approach. The success of the primary health care system depends on the ability of the village health workers in combating disease at the grassroots. It also depends upon their ability to motivate people to improve their water supply and sanitation systems. The primary duty of the village health worker is to ensure that social conditions in the villages are improved, as a means of preventing disease and improving the health status of the villages under them (Agere 1986).

National ratios of health personnel are worked out and presented in Table 7.1. This facilitates a comparison of provincial and district ratios with national averages providing a means of assessing regional variations. This also enables some judgement of the extent to which national ratios conceal regional imbalances. The national ratio of medical practitioners seems to have improved between 1982 and 1983 when the ratio dropped by some 600 people. It must be borne in mind that the higher the ratio, the worst the health status of the population under consideration. Between 1983 and 1984 there seems to have been a general increase of the population per medical practitioner. This might be a result of differences in the data sources used or the classification of what constitutes a medical practitioner. The ratio of population per nurse behaves in a similar manner again as a result of the use of two different data sources (CSO 1985b).

Table 7.1: Ratios of health personnel to population, 1982-1984

| Health personnel | 1982 | Ratio | 1983 | Ratio | 1984 | Ratio |
|---|---|---|---|---|---|---|
| Medical practioners | 1,511 | 4,900 | 1,733 | 4,300 | 1,250+ | 6,000 |
| Medical doctors* | | | | | 705 | 11,000 |
| Nurses (SRN only) | 5,672 | 1,300 | 6,179 | 1,200 | 5,079+ | 1,400 |
| Village health workr. | | | 2,859 | 1,600* | | |

Notes: Medical, Dental and Allied Professions Council figures
* Ministry of Health figures
\+ Health Professional Council figures
SRN: State Registered Nurse.
Source: CSO 1985b: Tables 3.2, 3.3, 3.4 & 3.6

The different organisations providing the data were interested in different aspects of health personnel. For example, the Medical, Dental and Allied Professions Council data relate to personnel registered with them as opposed to the data provided by the Health Professional Council which relate to staff in post in 1984. The MoH (1985) gives 1:8,000 as the ratio for medical doctors to population which would indicate continued improvement in the ratio from 1984. The ratio for medical doctors for 1984 will be applied in this analysis as it is consistent with the data available. A contributory factor to a worsening of ratios is possibly due to the increase in population outstripping the increase in the training of medical personnel. The migration of white medical personnel out of the country might also have had an impact on these ratios as in the pre-independence era, most medical personnel trained, especially in the practitioner and doctor categories, were white.

7.2.3 Village health workers

The training of village health workers (VHWs) is a post-independence phenomenon in Zimbabwe occasioned by the government's policy of providing preventive rather than curative health care at the community level. VHWs are the first rung in the provision of health services to the rural community. They are selected by a group of villages to undergo training at the provincial training centre, on the understanding that later they will be assigned to work in the villages that chose them (MoH 1985; CSO 1985b; GoZ 1982; Agere 1986). Once back in the villages, they are supplied with a bicycle. On this they are expected to visit each village and distribute anti-malarial tablets, help in the immunisation programmes, through the teaching and distribution of awareness literature, supervise the construction of ventilated pit latrines and protected wells for cleaner water supplies. They teach women about improved care for children, especially infants. Because they were chosen by the villagers, their message is likely to be accepted instead of that provided by persons from outside the villages. The planned target ratio of population per village health worker given by the MoH (1985) is 500 persons per VHW by the year 1993.

The data for the village health worker are only available at the provincial level. They therefore fall into the second catagory of data outlined in Section 7.1. Further, village health workers work mainly with rural populations. The indicator (of population per village health worker) only applies to the rural segment of the provincial population as inclusion of the urban population would distort it.

The population per village health worker at the national level in 1982 was 3936:1. Table 7.2 and Fig. 7.1 produce inter-provincial comparisons of ratios of VHWs and their distribution in 1982 and 1983.

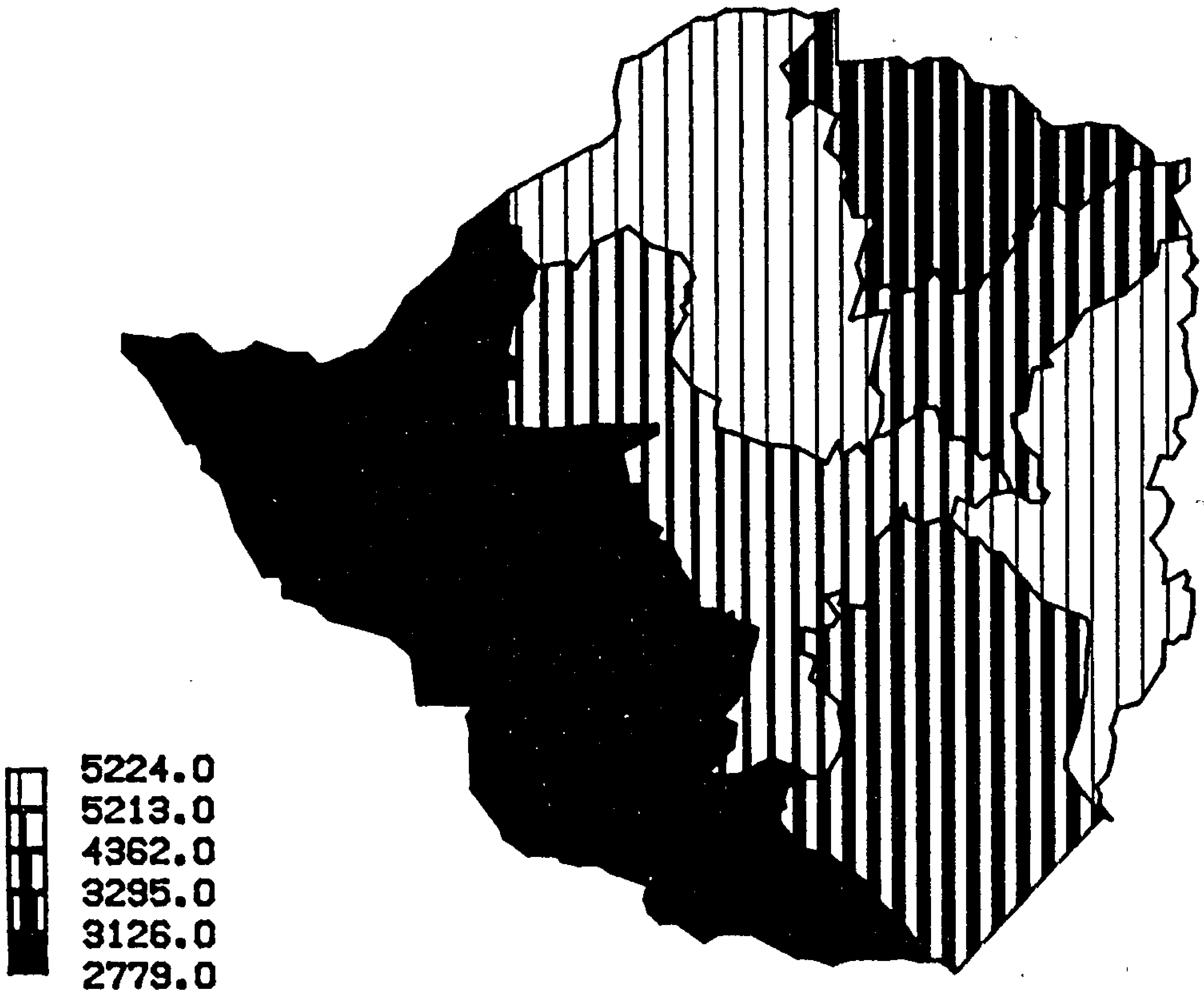
Table 7.2: Village health workers, rural population and population per village health worker: Zimbabwe 1982 & 1983

| Province | Village Health Workers | | Rural Population | | Population per VHWs | |
|---|---|---|---|---|---|---|
| | 1982 | 1983 | 1982 | 1983 | 1982 | 1983 |
| Manicaland | 197 | 382 | 1,027,009 | 1,054,960 | 5,213 | 2,762 |
| Mash. East | 207 | 390 | 647,154 | 661,212 | 3,126 | 1,695 |
| Mash. Central | 171 | 313 | 563,407 | 581,259 | 3,295 | 1,857 |
| Mash. West | 144 | 286 | 752,263 | 769,178 | 5,224 | 2,689 |
| Mat. North | 147 | 296 | 408,582 | 417,387 | 2,779 | 1,410 |
| Mat. South | 169 | 312 | 519,415 | 529,325 | 3,073 | 1,697 |
| Midlands | 220 | 439 | 959,567 | 987,641 | 4,362 | 2,250 |
| Masvingo | 231 | 441 | 1,000,276 | 1,027,134 | 4,330 | 2,329 |
| ZIMBABWE | 1,486 | 2,859 | 5,848,249 | 5,995,034 | 3,936 | 2,097 |

Sources: CSO 1984: Table 2 & 4 & 1985b: Table 3.4

The 1982 figures show that four provinces operated with worse ratios than the national average. This is especially so, when they are contrasted to Matabeleland North which had the best ratio. In 1983 these four provinces were still operating with ratios worse than the national average. These are the provinces of Manicaland, Mashonaland West, Midlands and Masvingo. The reasons for their poor performance might be found in their large share of the rural populations (See Table 7.4 below). This means that more resources need to be expanded on these provinces in order that they be brought into line with the rest of the country. Indeed, Fig. 7.1 illustrates most clearly the

*Population per village health worker: 1982*




*Population per village health worker: 1983*

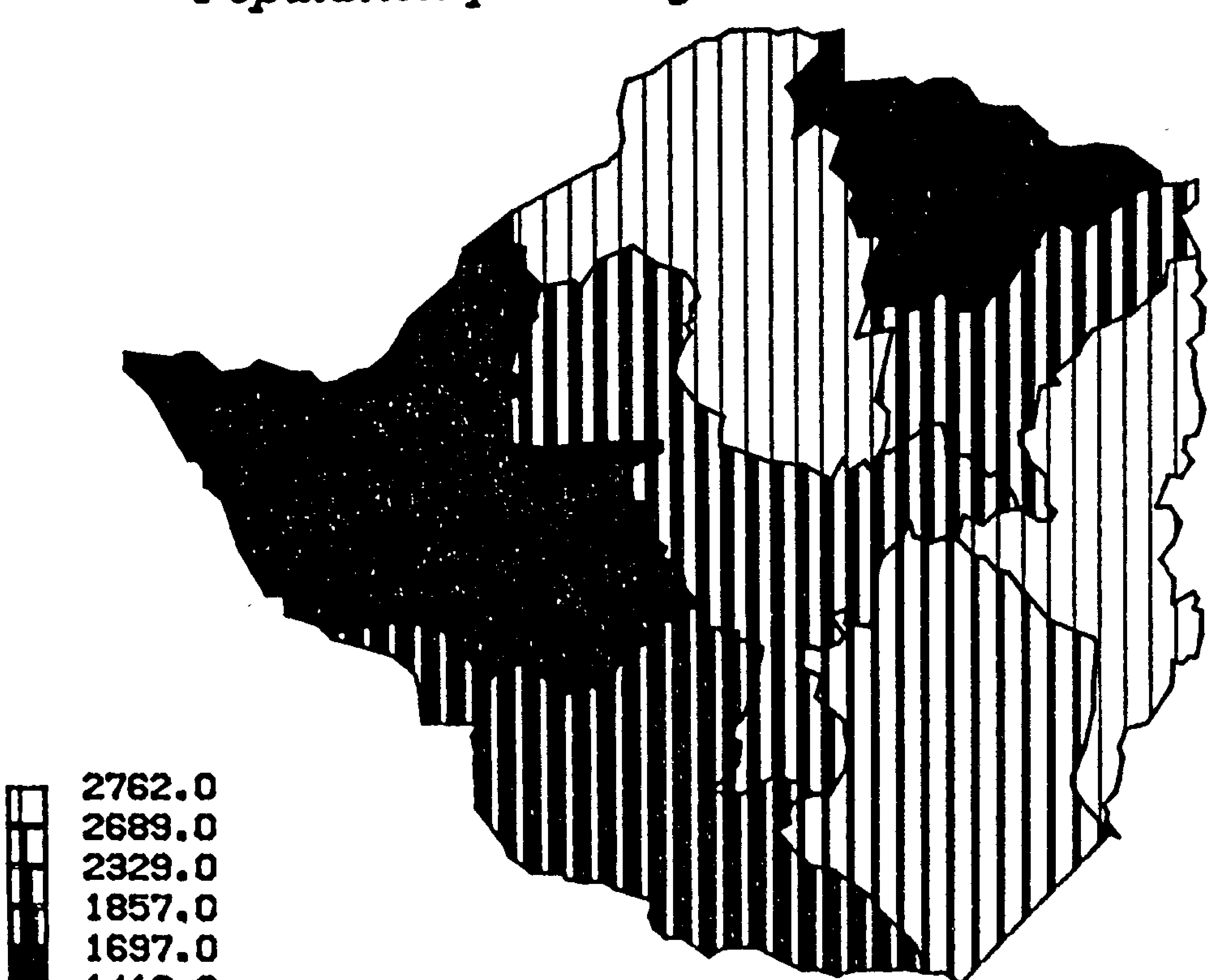



*Fig.* 7.1

changes that occur in the two year period. For example, Masvingo's position at the bottom end of the scale worsens slightly, while Matabeleland South swaps positions with Mashonaland Central which improves its position.

If the gains in the share of VHWs in each province are maintained yearly and, they match the rate of rural population growth, then one would expect them to have a great impact on the health and well being of the rural population. So far, no survey has been carried out to evaluate the impact of the VHW programme on the health and well being of the rural populations. The expectation though is that the programme will have its greatest impact in controlling such preventable diseases like diarrhoea, discussed in Chapter 5 and, hence reduce the overall rate of infant and child deaths from these diseases.

7.2.4 Medical doctors

Data on medical doctors cover all the districts of the country. They therefore fall within the first category, according to the classification in Section 7.1.

Table 7.1 above gave the national ratio of medical doctors to population as 1:11,000 in 1984. Table 7.3 presents data on medical doctors and the population per medical doctor in 1984. The 1984 population is arrived at by projecting the 1982 population forward using the inter-censal growth rate for each district from the 1969 census.

The absolute data in Table 7.3, mapped in Fig. 7.2, show that certain districts lacked a medical doctor. The assumption is made that they are served by doctors from neighbouring districts or that patients have to make the journey to the nearest centre with a doctor (MoH 1985). This has implications for the accessibility and availability of urgent medical attention for the residents of these districts. It also implies a cost in both time as well as money even

Table 7.3: Population, number of doctors and population per medical doctor: Zimbabwe districts 1984.

| | Population 1969 | Population 1982 | Medical Doctors 1984 | Popul-tion 1984 | Population per doctor 1984 |
|---|---|---|---|---|---|
| 1 Buhera | 128,170 | 168,384 | 3 | 175,604 | 58,535 |
| 2 Chipinge | 115,710 | 198,425 | 3 | 215,591 | 71,864 |
| 3 Chimanimani | 132,760 | 75,501 | 3 | 69,222 | 23,074 |
| 4 Mutasa | 57,810 | 91,919 | 2 | 98,717 | 49,358 |
| 5 Makoni | 70,760 | 184,819 | 5 | 214,237 | 42,847 |
| 6 MUTARE | 149,890 | 284,177 | 8 | 313,567 | 39,196 |
| 7 Nyanga | 60,470 | 88,629 | 7 | 93,998 | 13,428 |
| 8 Bindura | 76,520 | 120,663 | 8 | 129,421 | 16,178 |
| 9 Centenary | 50,730 | 89,214 | 4 | 97,309 | 24,327 |
| 10 Darwin | 54,630 | 95,530 | 0 | 104,107 | 0 |
| 11 Mazowe | 86,350 | 147,483 | 0 | 160,143 | 0 |
| 12 Guruve | 84,988 | 41,620 | 0 | 94,855 | 0 |
| 13 Rushinga | 54,773 | 23,220 | 4 | 62,504 | 15,626 |
| 14 Shamva | 73,163 | 42,510 | 0 | 79,537 | 0 |
| 15 HARARE | 925,816 | 432,670 | 360 | 1,040,686 | 2,891 |
| 16 MARONDERA | 130,533 | 94,860 | 5 | 137,104 | 27,421 |
| 17 Mudzi | 28,820 | 35,051 | 0 | 36,123 | 0 |
| 18 Murewa | 126,800 | 193,560 | 3 | 206,574 | 68,858 |
| 19 Mutoko | 94,440 | 107,510 | 4 | 109,675 | 27,419 |
| 20 Wedza | 40,860 | 58,826 | 1 | 62,218 | 62,218 |
| 21 Goromonzi | 83,270 | 158,396 | 1 | 174,866 | 174,866 |
| 22 Seke | 23,670 | 33,244 | 2 | 35,027 | 17,514 |
| 23 CHEGUTU | 111,280 | 180,549 | 1 | 194,505 | 194,505 |
| 24 KADOMA | 89,060 | 188,550 | 4 | 211,612 | 52,903 |
| 25 KARIBA | 15,160 | 31,784 | 2 | 35,618 | 17,809 |
| 26 Hurungwe | 116,150 | 196,112 | 3 | 212,570 | 70,857 |
| 27 LOMAGUNDI | 232,140 | 334,186 | 9 | 353,454 | 39,273 |
| 28 Binga | 40,070 | 47,118 | 3 | 48,307 | 16,102 |
| 29 Bubi | 35,490 | 47,783 | 0 | 50,020 | 0 |
| 30 Lupane | 48,180 | 62,847 | 3 | 65,470 | 21,823 |
| 31 HWANGE | 72,180 | 108,066 | 7 | 114,988 | 16,427 |
| 32 Nkayi | 63,850 | 86,985 | 0 | 91,223 | 0 |
| 33 Nyamandhlovu | 77,870 | 108,392 | 0 | 114,050 | 0 |
| 34 BULAWAYO | 266,560 | 520,861 | 168 | 577,404 | 3,437 |
| 35 Beitbrdge | 67,900 | 69,183 | 0 | 69,383 | 0 |
| 36 Bul. Mangwe | 97,690 | 134,421 | 2 | 141,186 | 70,593 |
| 37 Gwanda | 78,610 | 100,365 | 2 | 104,209 | 52,105 |
| 38 Insiza | 54,520 | 58,339 | 0 | 58,950 | 0 |
| 39 Matobo | 51,080 | 79,912 | 1 | 85,608 | 85,608 |
| 40 Umzingwane | 26,330 | 36,788 | 0 | 38,731 | 0 |

Table 7.3: contd.

| | Population 1969 | 1982 | Medical Doctors 1984 | Popul-tion 1984 | Population per doctor 1984 |
|---|---|---|---|---|---|
| 41 Charter | 121,100 | 139,880 | 6 | 143,017 | 23,836 |
| 42 Chilimanzi | 34,550 | 40 853 | 1 | 41,920 | 41,920 |
| 43 Gokwe | 125,840 | 226 115 | 1 | 247,449 | 247,449 |
| 44 GWERU | 83,170 | 132 207 | 12 | 141,978 | 11,832 |
| 45 KWEKWE | 137,680 | 216 877 | 4 | 232,581 | 58,145 |
| 46 Mberengwa | 138,670 | 184 952 | 7 | 193,331 | 27,619 |
| 47 SHURUGWI | 75,570 | 75 669 | 4 | 75,684 | 18,921 |
| 48 Zvishavane | 37,530 | 54 034 | 2 | 57,150 | 28,575 |
| 49 Bikita | 91,540 | 138 430 | 3 | 147,524 | 49,175 |
| 50 Chiredzi | 110,810 | 171 414 | 13 | 183,314 | 14,101 |
| 51 Ndanga | 111,900 | 135 466 | 3 | 139,508 | 46,503 |
| 52 Gutu | 151,400 | 182 824 | 3 | 188,206 | 62,735 |
| 53 MASVINGO | 118,100 | 180 521 | 18 | 192,698 | 10,705 |
| 54 Mwenezi | 42,460 | 73 026 | 0 | 79,379 | 0 |
| 55 Chivi | 94,800 | 137 141 | 0 | 145,157 | 0 |

Source: CSO 1985b: Table 3.6:31
Notes: GWERU:- district with urban centre.

though the service provided in the end might be free. As most districts without a medical doctor are rural and remote, meaning that their access to health services is particularly poor. It also implies that these districts do not have a fully developed health care delivery system and lag behind other districts, where such facilities have been developed. This has implications for the overall integration of the national health care system i.e. those who work in the primary health care sector have to refer patients to the district medical officers. If these are absent from the district, then the work of the VHWs might not be fully supervised and problem arising on the ground might not be dealt with quickly with dire consequences for the whole programme of primary health care and the well being of the population.

It is important to point out that there are inter-provincial and intra-district flows which reduce some of the disadvantages suffered

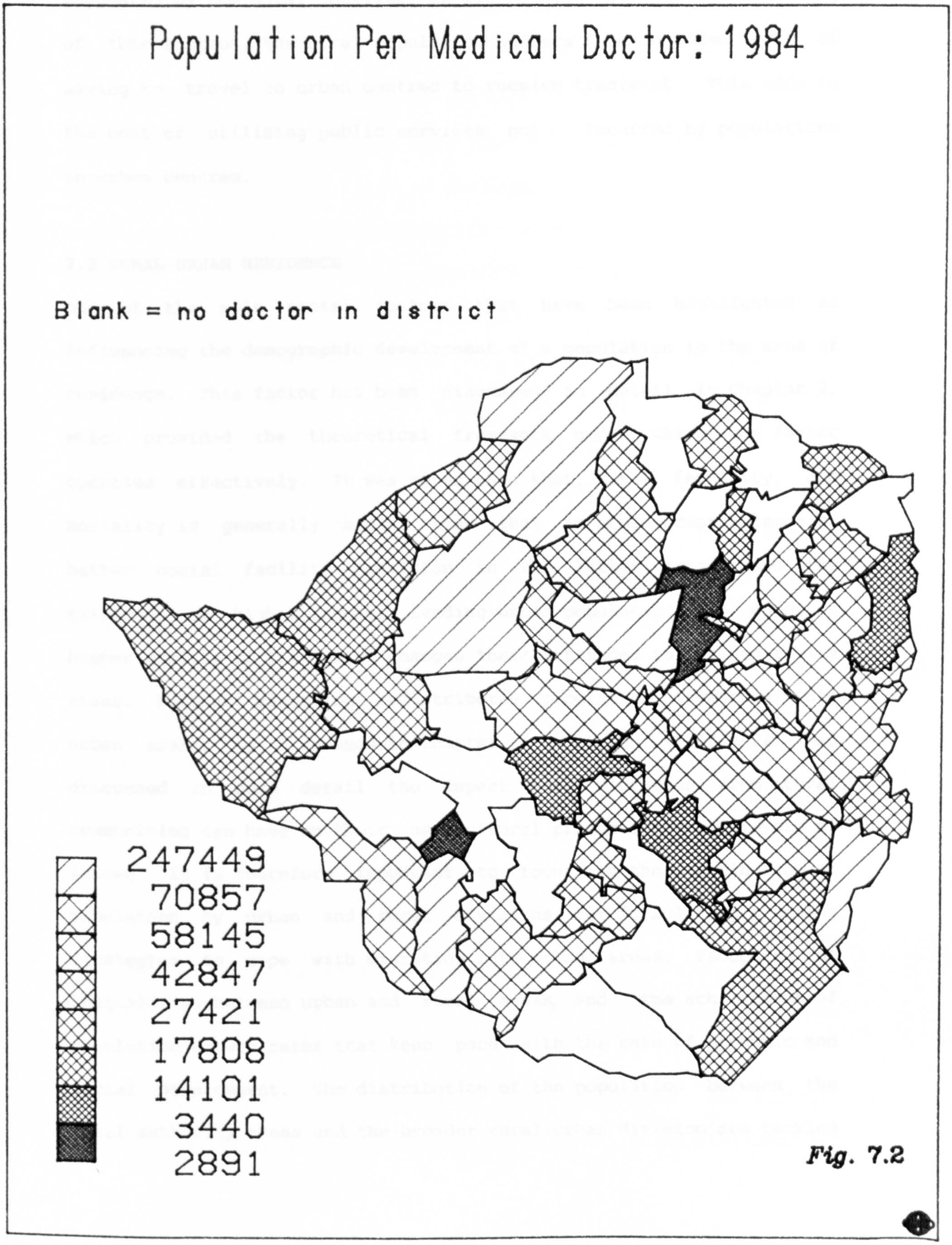

Population Per Medical Doctor: 1984
Blank = no doctor in district
247449
70857
58145
42847
27421
17808
14101
3440
2891

*Fig. 7.2*

by the rural districts. Zinyama (1986) works out an accessibility index which show that the rural districts are not as worse off as suggested by the data. However, as was pointed out at the beginning of this section, the rural population suffers from an added cost of having to travel to urban centres to receive treatment. This adds to the cost of utilising public services not incurred by populations in urban centres.

### 7.3 RURAL-URBAN RESIDENCE

One of the main social factors that have been highlighted as influencing the demographic development of a population is the area of residence. This factor has been discussed in detail in Chapter 2, which provided the theoretical framework under which the factor operates effectively. It was noted then that, rural fertility, and mortality is generally higher than that in urban areas because of better social facility provision in the latter areas, and the existence of higher incomes, leading urban populations to enjoy a higher quality of life which changes their attitudes to desired family sizes. Further, migration redistributes population from rural into urban areas, as discussed in Chapter 6. Lipton (1980:1-24) has discussed in some detail the impact such migration from rural communities can have on their agricultural productivity and levels of income. It is therefore important to focus on the distribution of population by urban and rural divisions for formulating planning strategies to cope with migration into urban areas, reduction of inequalities between urban and rural areas, and the achievement of population growth rates that keep pace with the rate of economic and social development. The distribution of the population between the local authority areas and the broader rural-urban division are tackled in this sub-section.

It may be recalled from Chapter 1 and Chapter 3 that Zimbabwe has three types of local authorities. The first type is the district council, consisting of what were formally known as reserves or Tribal Trust Lands. The second type is the rural council, which consists of commercial farming areas which were reserved for white settler farmers before 1980. The final type is the urban council, made up of cities and towns. The three local authority types actual imply different patterns of socio-economic activities and will therefore have contrasting types of demographic behaviour.

Table 7.4 presents a division of the population of Zimbabwe by local authority areas and by the broad urban-rural division. The data are mapped in Fig. 7.3 for both 1969 and 1982 to provide a comparative overview of rural-urban changes in the intercensal period. Note that there is a slight definition change of what is termed urban between the two censuses. In the 1969 census, the CSO (1976:7) defined an urban area as "... any locality in which there are at least 150 people, and where the majority of the adult males are employed in non-agricultural occupations". In the 1982 census the classification of urban was based on numbers rather than occupation of the male population. The CSO (1985a:55) states that 'urban' "... is defined as a town or place with 2,500 or more inhabitants irrespective of the amenities available within the delimited area". However, for the purpose of the research, the 1,000 benchmark is used so that some of the towns regarded as urban in the 1969 census can be included in the analysis, though they have not grown to fulfil the definition of the 1982 census.

Examining the distribution among local authorities, the district council has the largest share of population within a district both for

Table 7.4: Percent population by districts, local authorities and rural-urban residence.

| Province/ District | District Council | Rural Council | Total Rural | Urban Council | Total Population |
|---|---|---|---|---|---|
| Buhera | 100.0 | 0.0 | 100.0 | 0.0 | 167,543 |
| Chipinge | 68.4 | 28.6 | 97.0 | 3.0 | 202,874 |
| Chimanimani | 72.7 | 25.5 | 98.2 | 1.8 | 76,346 |
| Mutasa | 100.0 | 0.0 | 100.0 | 0.0 | 91,838 |
| Makoni | 79.4 | 14.7 | 94.1 | 5.9 | 184,810 |
| Mutare | 45.8 | 27.9 | 73.7 | 26.3 | 281,467 |
| Nyanga | 76.0 | 20.8 | 96.8 | 3.2 | 91,752 |
| MANICALAND | 72.9 | 18.4 | 91.3 | 8.7 | 1,096,630 |
| | | | | | |
| Bindura | 30.1 | 45.0 | 75.1 | 24.9 | 94,512 |
| Centenary | 20.9 | 72.2 | 93.1 | 6.9 | 72,102 |
| Darwin | 100.0 | 0.0 | 100.0 | 0.0 | 79,420 |
| Mazowe | 47.1 | 42.0 | 89.1 | 10.9 | 120,855 |
| Guruve | 100.0 | 0.0 | 100.0 | 0.0 | 70,516 |
| Rushinga | 100.0 | 0.0 | 100.0 | 0.0 | 47,129 |
| Shamva | 56.0 | 30.4 | 86.4 | 13.6 | 63,675 |
| MASH. CENTRAL | 60.8 | 30.0 | 90.8 | 9.2 | 548,209 |
| | | | | | |
| Harare | 0.0 | 9.6 | 9.6 | 90.4 | 917,607 |
| Marondera | 40.3 | 41.6 | 81.9 | 18.1 | 122,595 |
| Mudzi | 100.0 | 0.0 | 100.0 | 0.0 | 67,782 |
| Murewa | 98.4 | 0.0 | 98.4 | 1.6 | 171,208 |
| Mutoko | 79.7 | 14.9 | 94.6 | 5.4 | 89,278 |
| Wedza | 87.4 | 12.6 | 100.0 | 0.0 | 49,628 |
| Goromonzi | 43.6 | 39.8 | 83.4 | 16.6 | 131,353 |
| Seke | 100.0 | 0.0 | 100.0 | 0.0 | 28,500 |
| MASH. EAST | 31.2 | 13.5 | 44.7 | 55.3 | 1,577,951 |
| | | | | | |
| Chegutu | 41.0 | 37.0 | 78.0 | 22.0 | 145,741 |
| Kadoma | 31.7 | 31.6 | 63.3 | 36.7 | 155,418 |
| Kariba | 37.7 | 14.8 | 52.5 | 47.5 | 26,064 |
| Hurungwe | 59.8 | 34.8 | 94.6 | 5.4 | 161,942 |
| Lomagundi | 23.9 | 59.8 | 83.7 | 16.3 | 275,080 |
| MASH. WEST | 36.8 | 42.9 | 79.7 | 20.3 | 764,245 |
| | | | | | |
| Binga | 95.2 | 4.8 | 100.0 | 0.0 | 49,873 |
| Bubi | 55.8 | 44.2 | 100.0 | 0.0 | 48,755 |
| Lupane | 73.1 | 26.9 | 100.0 | 0.0 | 86,282 |
| Hwange | 38.2 | 4.9 | 43.1 | 56.9 | 100,591 |
| Nkayi | 100.0 | 0.0 | 100.0 | 0.0 | 86,958 |
| Nyamandhlovu | 100.0 | 0.0 | 100.0 | 0.0 | 85,958 |
| Bulawayo | 0.0 | 7.9 | 7.9 | 92.1 | 451,039 |
| MAT. NORTH | 38.4 | 9.6 | 48.0 | 52.0 | 909,325 |

Table 7.4: contd

| Province/ District | District Council | Rural Council | Total Rural | Urban Council | Total Population |
|---|---|---|---|---|---|
| Beitbridge | 72.0 | 20.6 | 92.6 | 7.4 | 72,441 |
| Bulalima Mangwe | 90.7 | 6.9 | 97.6 | 2.4 | 133,302 |
| Gwanda | 83.7 | 5.0 | 88.7 | 11.3 | 100,773 |
| Insiza | 75.0 | 25.0 | 100.0 | 0.0 | 58,404 |
| Matobo | 93.6 | 6.4 | 100.0 | 0.0 | 80,613 |
| Umzingwane | 100.0 | 0.0 | 100.0 | 0.0 | 36,878 |
| MAT. SOUTH | 85.8 | 10.1 | 95.9 | 4.1 | 482,411 |
| | | | | | |
| Charter | 68.2 | 22.6 | 90.8 | 9.2 | 142,562 |
| Chilimanzi | 100.0 | 0.0 | 100.0 | 0.0 | 42,144 |
| Gokwe | 100.0 | 0.0 | 100.0 | 0.0 | 226,842 |
| Gweru | 35.0 | 5.9 | 40.9 | 59.1 | 133,624 |
| Kwekwe | 52.6 | 9.7 | 62.3 | 37.7 | 198,574 |
| Mberengwa | 91.0 | 9.0 | 100.0 | 0.0 | 165,618 |
| Shurugwi | 55.5 | 25.4 | 80.9 | 19.1 | 75,201 |
| Zvishavane | 65.6 | 2.8 | 68.4 | 31.6 | 84,583 |
| MIDLANDS | 71.6 | 8.9 | 80.5 | 19.5 | 1,069,148 |
| | | | | | |
| Bikita | 96.7 | 3.3 | 100.0 | 0.0 | 139,496 |
| Chiredzi | 36.9 | 53.0 | 89.9 | 10.9 | 171,262 |
| Ndanga | 100.0 | 0.0 | 100.0 | 0.0 | 137,891 |
| Gutu | 96.1 | 2.5 | 98.6 | 1.8 | 184,278 |
| Masvingo | 60.5 | 12.4 | 72.9 | 27.1 | 186,956 |
| Mwenezi | 100.0 | 0.0 | 100.0 | 0.0 | 73,327 |
| Chibi | 100.0 | 0.0 | 100.0 | 0.0 | 137,708 |
| MASVINGO | 81.2 | 12.0 | 93.2 | 6.8 | 1,030,918 |

Source: CSO (1984) Table 2:14-28.

the 1969 and 1982 censuses. There are a few exceptions to this, chiefly the district of Harare (Mashonaland East) and Bulawayo (Matabeleland North) which contain the two largest cities and a few districts in Mashonaland West where commercial farming is the main activity. This is to be expected since the district council areas were developed by previous regimes as labour reservoir areas for the urban and rural council areas. The share of the population resident in district council areas has only fallen slightly between the two censuses, i.e. from 59.1% in 1969 to 56.7% in 1982. This is in

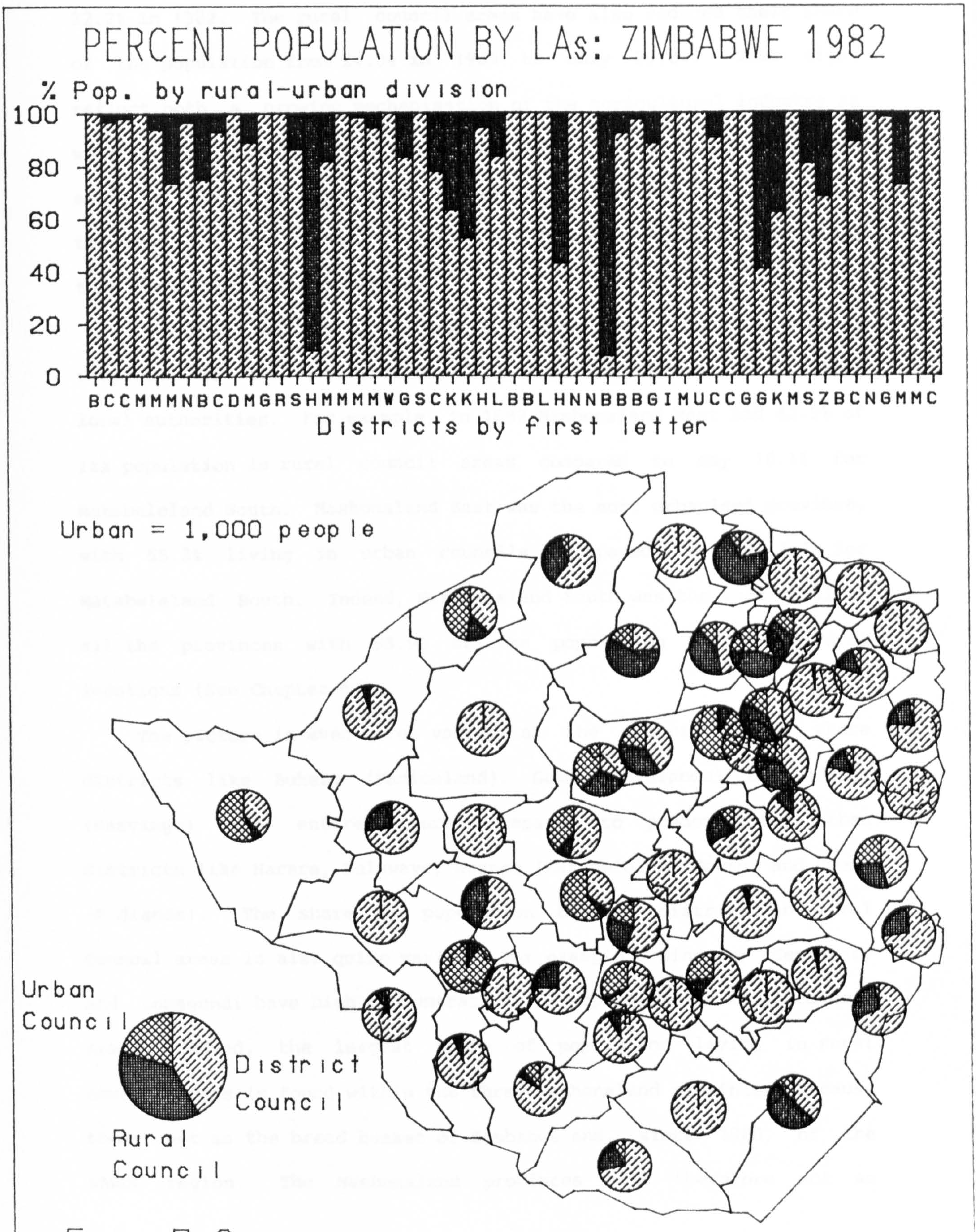

PERCENT POPULATION BY LAs: ZIMBABWE 1982
% Pop. by rural-urban division
100
80
60
40
20
0
B C C M M M N B C D M G R S H M M M M W G S C K K H L B B L H N N B B B G I M U C C G G K M S Z B C N G M M C
Districts by first letter
Urban = 1,000 people
Urban Council
District Council
Rural Council

Fig. 7.3

contrast to the municipalities (i.e. the 16 largest towns in the country) whose share of the population has risen from 16.6% in 1969 to 22.2% in 1982. The rural council areas have also reduced their share of the population from 24.0% in 1969 to only 20.8%. This might reflect both a growing mechanisation of the agricultural industry as well as a preferrence for the urban area, as a destination for migrants, among the population of working age. Indeed, Chapter 3 makes the point that the labour in rural council areas tends to be much older than that found in urban areas.

Provincial and district comparisons show that there is a great variation in the distribution of the population among the various local authorities. For example, in 1982 Mashonaland West had 42.9% of its population in rural council areas compared to say 10.1% for Matabeleland South. Mashonaland East was the most urbanised province, with 55.3% living in urban councils, compared to say 4.1% for Matabeleland South. Indeed, Matabeleland South was the most rural of all the provinces with 95.9% of the population living in rural locations (See Chapter 6).

The picture is even more varied at the district level where districts like Buhera (Manicaland), Gokwe (Midlands) and Ndanga (Masvingo) are entirely rural compared to predominantly urban districts like Harare, Bulawayo, Hwange (Matabeleland North) and Gweru (Midlands). The share of population between district and rural council areas is also quite varied. For example, Bindura, Centenary and Lomagundi have high concentrations of population in rural council areas. Indeed, the largest share of population living in rural council areas is found within the three Mashonaland provinces, because these act as the bread basket of Zimbabwe and, since 1980, of the SADDC region. The Mashonaland provinces will therefore act as destination regions for migrants as Chapter Six has shown while provinces like Matabeleland South will act as source regions for migrants. The later type of province, as Lipton (1980) argues, will be at a great disadvantage in the development sphere, because it is losing most of its productive, energetic and most innovative population to provinces that provide them with better socio-economic opportunities. The growth centre strategy, discussed in Chapter Three, is an attempt to redress the situation, but how far it will succeed is still a matter of great controversy, both nationally and in international research.

## 7.4 HOUSEHOLD ATTRIBUTES

The theories of fertility discussed in Chapter Two and Four are based on household level data or decision making (e.g. Becker 1960). The decisions made by the household on family size are seen to be based on the quality of life such households enjoy. The higher their quality of life, the greater the survival chances of children and the more the household views children as consumption instead of productive goods and the smaller the overall household or family size desired and attained. It is therefore important to focus on aspects of the household that measure the quality of life that the household enjoys, both as a measure of socio-economic development as well as of likely impacts on the demographic profile of the population, as discussed later in Chapter Eight.

The CSO (1985a:6) defined a household as "... a group of persons who usually live together and eat food cooked from the same kitchen, whether or not they are related by blood or marriage. The usual members of the household do not include relatives or guests or visitors who usually live in other places". The definition is probably not as strict as used in other studies, especially in developed countries. However, it is probably a more realistic one for the Zimbabwean or African situation which still has an extensive extended family system.

The data on household attributes are available for districts within five provinces only. The three Mashonaland provinces did not have some of the data processed at the time of the researcher's data collection exercise. The data for the district of Bulawayo also excludes the Municipality of Bulawayo which is processed separately because it is the second largest city and deserves treatment as an entity. However, as far as the size of households are concerned, the data are available for all provinces and districts.

7.4.1 <u>Household size and average household size</u>

Table 7.5 shows the distribution of households by household size. The average household size by province and district is also included. The spatial distribution of average household size is illustrated in Fig. 7.4. Table 7.5 shows that most households have 3 to 6 members, with average household size varying from 3.9 people in urban districts like Harare and Bulawayo to 6.6 in rural districts such as Gokwe, Chivi and Buhera. Urban districts also show a high proportion of households with only one or two members. This can be understood in the light of the history of migration presented in Chapter 6 and the fact that urban dwellers delay marriage or child bearing due to the difficul ties imposed by housing shortages and economic hardships.

Some of the rural districts have a significant number of households with 7 or more members. Interestingly enough and as Fig. 7.5 illustrates, such households seem to be concentrated in Mashonaland Central, Mashonaland West and Matabeleland North. Districts within these provinces have some of the lowest population

Table 7.5: Percent distribution of households by number of members and average household size, districts of Zimbabwe 1982

| District | % Household size 1-2 | 3-6 | 7 + | Average size |
|---|---|---|---|---|
| Buhera | 16.6 | 53.7 | 29.7 | 5.2 |
| Chipinge | 23.0 | 48.8 | 28.2 | 5.1 |
| Chimanimani | 30.6 | 42.1 | 27.4 | 4.6 |
| Mutasa | 18.8 | 55.1 | 26.1 | 5.0 |
| Makoni | 24.8 | 49.2 | 26.0 | 4.8 |
| MUTARE | 32.3 | 43.7 | 24.0 | 4.5 |
| Nyanga | 30.7 | 49.7 | 19.6 | 4.3 |
| Bindura | 22.6 | 36.0 | 41.4 | 4.6 |
| Centenary | 22.0 | 34.7 | 43.3 | 4.4 |
| Mazowe | 11.3 | 38.6 | 50.0 | 5.4 |
| Darwin | 17.1 | 35.2 | 47.7 | 5.0 |
| Rushinga | 11.9 | 37.4 | 50.7 | 5.4 |
| Shamva | 15.2 | 39.5 | 45.3 | 5.0 |
| Guruve | 21.6 | 38.5 | 40.0 | 4.8 |
| HARARE | 40.6 | 42.7 | 16.7 | 3.9 |
| MARONDERA | 30.3 | 40.7 | 29.0 | 5.1 |
| Mudzi | 22.1 | 48.8 | 29.1 | 5.2 |
| Murewa | 18.3 | 45.7 | 36.0 | 5.9 |
| Mutoko | 22.8 | 45.9 | 31.3 | 5.4 |
| Wedza | 15.9 | 44.8 | 39.2 | 6.4 |
| Goromonzi | 25.7 | 41.2 | 33.1 | 5.6 |
| Seke | 19.2 | 46.0 | 34.8 | 5.9 |
| CHEGUTU | 26.8 | 39.0 | 34.1 | 5.8 |
| KADOMA | 28.1 | 39.6 | 32.3 | 5.6 |
| KARIBA | 31.5 | 45.0 | 23.4 | 4.8 |
| Hurungwe | 22.7 | 39.2 | 38.1 | 6.2 |
| LOMAGUNDI | 23.7 | 40.4 | 36.0 | 5.9 |
| Binga | 26.4 | 57.3 | 16.3 | 4.2 |
| Bubi | 21.9 | 40.2 | 37.9 | 5.8 |
| Lupane | 12.9 | 45.5 | 41.6 | 6.1 |
| HWANGE | 35.6 | 42.1 | 22.3 | 4.3 |
| Nkayi | 10.6 | 42.9 | 46.5 | 6.6 |
| Nyamandhlovu | 16.1 | 47.4 | 36.5 | 5.8 |
| BULAWAYO | 28.0 | 34.1 | 37.9 | 4.0 |
| Beitbridge | 27.8 | 50.4 | 21.8 | 4.5 |
| B. Mangwe | 13.2 | 48.9 | 37.8 | 5.9 |
| Gwanda | 24.8 | 43.5 | 31.8 | 5.2 |
| Insiza | 18.6 | 44.2 | 37.3 | 5.8 |
| Matobo | 19.4 | 44.3 | 36.3 | 5.6 |
| Umzingwane | 13.3 | 47.2 | 39.5 | 6.2 |

Table 7.5: contd.

| District | % Household size 1-2 | 3-6 | 7 + | Average size |
|---|---|---|---|---|
| Charter | 26.2 | 48.3 | 25.6 | 4.8 |
| Chilimanzi | 16.3 | 52.4 | 31.3 | 5.4 |
| Gokwe | 12.3 | 49.2 | 38.6 | 6.0 |
| GWERU | 33.2 | 43.8 | 23.0 | 4.5 |
| KWEKWE | 27.9 | 44.0 | 28.1 | 4.9 |
| Mberengwa | 25.5 | 43.5 | 30.9 | 5.2 |
| SHURUGWI | 27.8 | 44.0 | 28.3 | 4.9 |
| Zvishavane | 13.8 | 48.3 | 37.8 | 5.9 |
| Bikita | 15.6 | 52.6 | 31.8 | 5.4 |
| Chiredzi | 35.6 | 46.6 | 17.7 | 4.1 |
| Ndanga | 17.9 | 52.3 | 29.8 | 5.2 |
| Gutu | 18.1 | 52.1 | 29.8 | 5.2 |
| MASVINGO | 30.6 | 43.8 | 25.7 | 4.7 |
| Mwenezi | 16.3 | 51.6 | 32.1 | 5.4 |
| Chivi | 13.7 | 49.0 | 37.4 | 5.8 |

Source: CSO 1982 Census
Notes: GWERU:- district with large urban centre

densities in the country. It would therefore seem that large household sizes are a response to more farm land compared to the southern and eastern parts of the country where overcrowding and population pressure on land might have started a trend toward smaller family sizes or units. This would bear further investigation, both in Chapter Eight and future research work.

The structure of the households are not suprising because of the youthful nature of the population of Zimbabwe. Indeed, the median age of the population is only 17 years while the average age is 25 years. This implies that most households are made up of young people beginning to form families. Thus, the percent of households with household members of 7 or more is relatively small though, fertility levels in the country would seem to point to the existence of large households.

Average household size by district, 1982

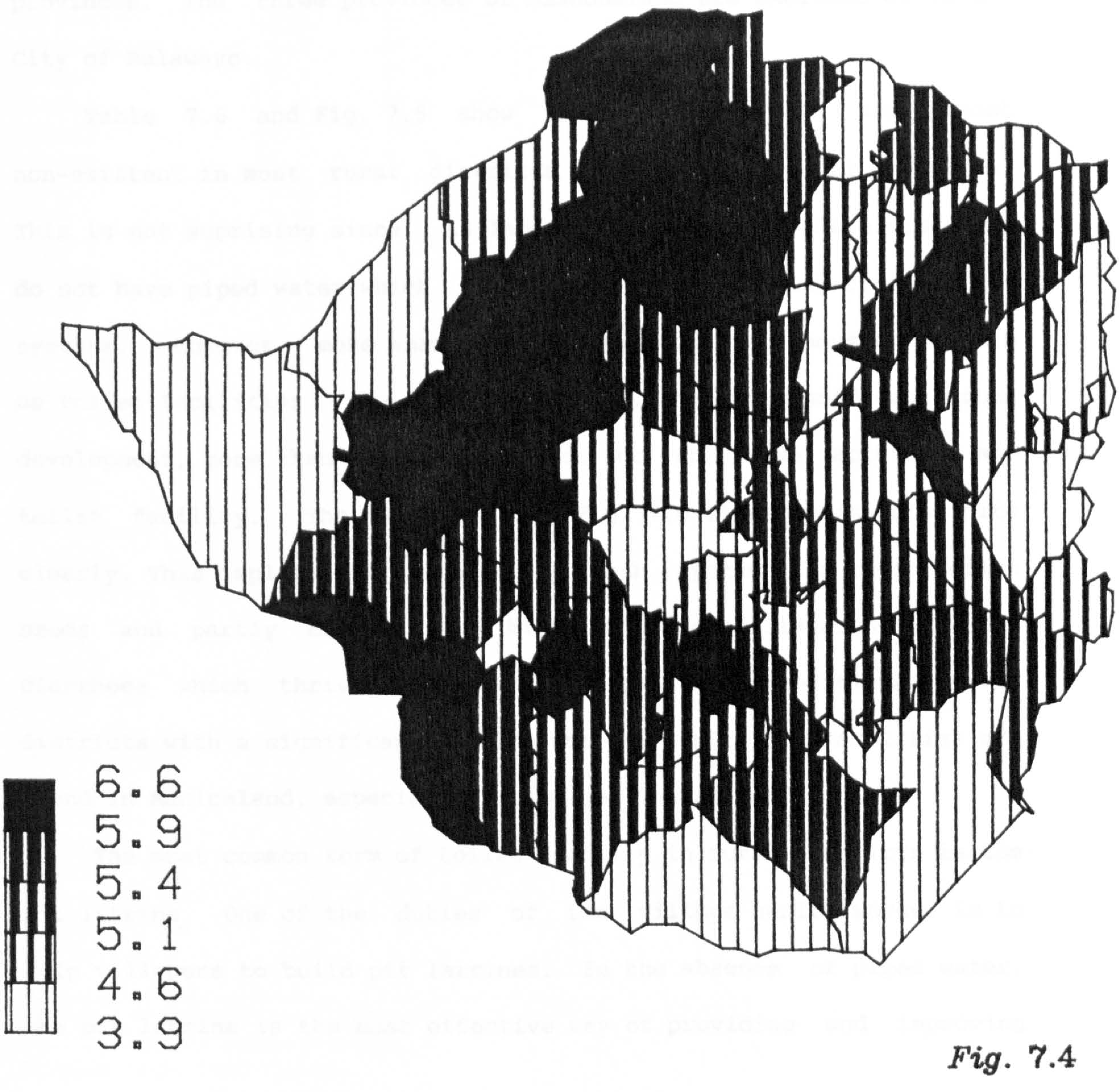



*Fig. 7.4*

7.4.2 Households by toilet facility, water supply and cooking fuel

The quality of life a household enjoys is measured by the type of water and sanitation facility it has access to as well as the type of cooking fuel it uses, among many others. Data on household income, type of dwelling, access to radios and newspapers and use of a private mode of transport would facilitate the analysis of quality of life within a household. However, the latter types of data are not available and point to another area which would benefit from research. The data that are available are on sanitation, measured by type of toilet facility, water supply and cooking fuel, for districts of five provinces. The three provinces of Mashonaland are excluded as is the City of Bulawayo.

Table 7.6 and Fig. 7.5 show that flush toilets are almost non-existent in most rural districts like Buhera, Mwenezi and Gokwe. This is not suprising since, as Table 7.7 illustrates these districts do not have piped water which is necessary for running flush toilet systems. However, more amazing is the percentage of households with no toilet facilities. In most districts, with no significant urban development, more than 60% of households do not have access to any toilet facility. The bargraph in Fig. 7.6 illustrates this quite clearly. This implies the use of the "bush system" for their toilet needs and partly explains the high incidence of diseases such as diarrhoea which thrive best on poor sanitary conditions. Rural districts with a significant development in sanitation facilities are found in Manicaland, especially Mutasa and Chimanimani.

The most common form of toilet facility in rural districts is the pit latrine. One of the duties of the village health worker is to help villagers to build pit latrines. In the absence of piped water, the pit latrine is the most effective way of providing and improving the sanitary conditions of rural populations. In districts of Manicaland like Mutasa, Makoni, Chipinge and Nyanga, a significant number of households rely on pit latrines for their sanitation needs. This is a trend which could be encouraged in the rest of the country so that the diseases that thrive on poor sanitary conditions can be controlled.

Table 7.6: Percent households by toilet facility type

| District | Flush | Pit | None | Total with toilet |
|---|---|---|---|---|
| Buhera | 1.7 | 8.0 | 88.7 | 9.7 |
| Chipinge | 4.9 | 45.8 | 47.7 | 50.7 |
| Chimanimani | 6.3 | 59.1 | 33.2 | 65.4 |
| Mutasa | 2.0 | 61.9 | 34.3 | 63.9 |
| Makoni | 7.7 | 23.6 | 66.0 | 31.3 |
| MUTARE | 32.0 | 30.1 | 34.7 | 62.1 |
| Nyanga | 10.1 | 28.7 | 60.2 | 38.9 |
| Binga | 2.3 | 4.6 | 85.1 | 6.9 |
| Bubi | 9.9 | 16.7 | 69.3 | 26.5 |
| Lupane | 3.3 | 5.3 | 87.0 | 8.7 |
| HWANGE | 46.5 | 8.5 | 37.4 | 55.0 |
| Nkayi | 6.4 | 4.7 | 85.4 | 11.0 |
| Nyamandhlovu | 4.6 | 5.7 | 84.6 | 10.3 |
| Bulawayo | 2.7 | 1.6 | 1.8 | 4.3 |
| Beitbridge | 12.7 | 9.8 | 71.4 | 22.6 |
| B. Mangwe | 5.5 | 5.3 | 85.5 | 10.7 |
| Gwanda | 19.5 | 10.2 | 67.8 | 29.7 |
| Insiza | 11.6 | 10.6 | 75.6 | 22.2 |
| Matobo | 7.5 | 6.9 | 75.6 | 22.2 |
| Umzingwane | 2.3 | 14.3 | 79.0 | 16.6 |
| Charter | 11.2 | 18.2 | 65.7 | 29.5 |
| Chilimanzi | 1.3 | 14.8 | 77.9 | 16.0 |
| Gokwe | 1.2 | 7.1 | 90.5 | 8.3 |
| GWERU | 66.1 | 7.0 | 23.6 | 73.1 |
| KWEKWE | 40.6 | 9.4 | 45.4 | 50.0 |
| Mberengwa | 27.1 | 7.9 | 63.1 | 35.0 |
| SHURUGWI | 25.3 | 19.0 | 54.0 | 44.3 |
| Zvishavane | 0.5 | 11.6 | 86.5 | 12.1 |
| Bikita | 1.7 | 6.6 | 89.4 | 8.3 |
| Chiredzi | 46.8 | 21.6 | 30.6 | 68.4 |
| Ndanga | 0.9 | 8.0 | 89.9 | 8.8 |
| Gutu | 2.5 | 13.7 | 82.3 | 16.2 |
| MASVINGO | 37.9 | 13.4 | 47.5 | 51.3 |
| Mwenezi | 0.7 | 10.7 | 85.8 | 11.5 |
| Chibi | 0.9 | 14.5 | 83.2 | 15.4 |

Notes: Bulawayo: excludes City of Bulawayo, GWERU:- district with large urban centre.
Source: CSO 1982 Census

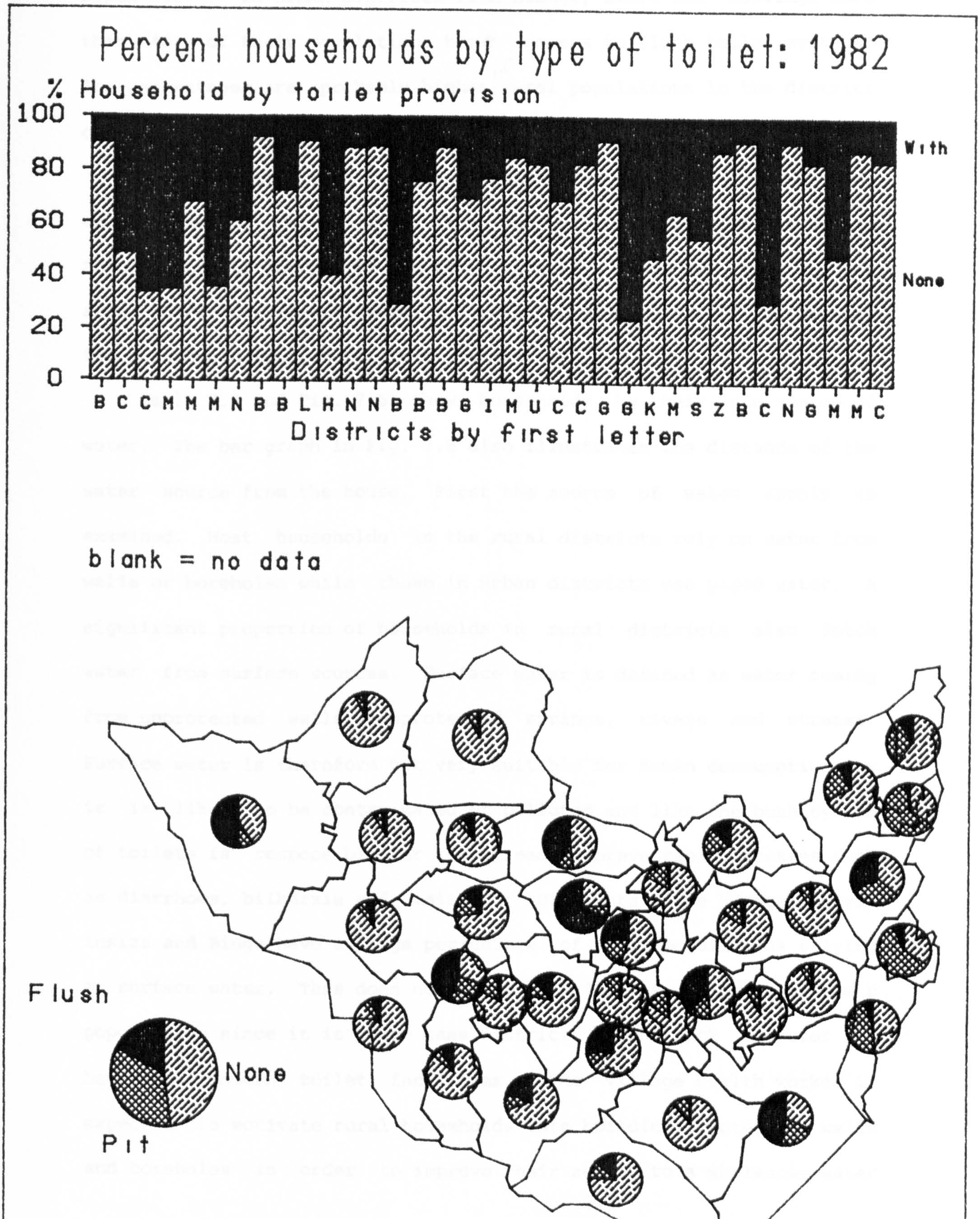

Percent households by type of toilet: 1982
% Household by toilet provision
100
80
60
40
20
0
With
None
B C C M M M N B B L H N N B B B G I M U C C G G K M S Z B C N G M M C
Districts by first letter
blank = no data
Flush
None
Pit

Fig. 7.5

The flush toilet is common in urban area which have access to piped water. In urban districts like Hwange, Gweru and Masvingo more than 40% of their populations have access to flush toilet systems. The percentages are probably higher if rural populations in the district could be separated from the urban ones.

Given the situation just described, one can see a continuum, where planning should move from the no toilet facility situation through the pit latrine to the flush system. However, this is one area where inter-departmental co-operation will be called for between the health and water development ministries.

Table 7.7 and Fig. 7.6 show households by their main source of water. The bar graph in Fig. 7.6 also illustrates the distance of the water source from the house. First the source of water supply is examined. Most households in the rural districts rely on water from wells or boreholes while those in urban districts use piped water. A significant proportion of households in rural districts also fetch water from surface sources. Surface water is defined as water coming from unprotected wells, unprotected springs, rivers and streams. Surface water is therefore not very suitable for human consumption for it is likely to be contaminated or polluted and like the bush system of toilets is responsible for the spread of preventable diseases such as diarrhoea, bilharzia and malaria. Districts like Ndanga, Chivi, Insiza and Binga have a large percentage of their populations relying on surface water. This does not argue well for the wellbeing of their populations since it is these same districts which lack a doctor and have few modern toilet facilities. The village health worker is expected to motivate rural households into building protected wells and boreholes in order to improve their access to a wholesome water supply.

Table 7.7: Percent households by main source of water supply and distance of water source from house, Zimbabwe 1982.

| | Less than 100metres | More than 100metres | Piped | Well b'hole | Surface |
|---|---|---|---|---|---|
| Buhera | 23.5 | 76.2 | 4.2 | 73.4 | 21.7 |
| Chipinge | 35.7 | 63.7 | 31.4 | 27.6 | 39.5 |
| Chimanimani | 37.2 | 62.4 | 30.4 | 33.6 | 33.6 |
| Mutasa | 28.3 | 71.3 | 9.0 | 66.0 | 23.5 |
| Makoni | 34.9 | 63.8 | 16.7 | 69.2 | 12.5 |
| MUTARE | 53.3 | 44.5 | 45.1 | 39.3 | 12.9 |
| Nyanga | 38.3 | 61.1 | 24.9 | 34.6 | 38.5 |
| Binga | 21.3 | 75.6 | 6.1 | 33.7 | 55.8 |
| Bubi | 33.3 | 62.9 | 29.5 | 55.0 | 9.8 |
| Lupane | 18.0 | 79.1 | 8.2 | 59.4 | 29.2 |
| Hwange | 60.5 | 33.8 | 59.3 | 23.9 | 10.8 |
| Nkayi | 25.9 | 71.4 | 9.3 | 61.0 | 25.0 |
| Nyamandhlovu | 22.0 | 74.2 | 13.4 | 70.0 | 11.9 |
| Bulawayo | 65.2 | 34.4 | 78.7 | 12.6 | 6.1 |
| Beitbridge | 42.9 | 52.8 | 33.4 | 49.4 | 12.0 |
| B. Mangwe | 15.9 | 81.1 | 11.5 | 34.3 | 46.0 |
| Gwanda | 30.8 | 67.8 | 28.4 | 42.1 | 26.3 |
| Insiza | 24.9 | 73.6 | 18.8 | 29.4 | 43.8 |
| Matobo | 24.1 | 74.8 | 14.9 | 49.5 | 32.9 |
| Umzingwane | 20.9 | 75.5 | 4.9 | 49.2 | 41.4 |
| Charter | 43.3 | 49.0 | 21.6 | 64.4 | 12.7 |
| Chilimanzi | 14.7 | 84.8 | 3.3 | 66.2 | 28.7 |
| Gokwe | 17.5 | 83.5 | 3.3 | 60.4 | 36.0 |
| GWERU | 76.7 | 21.4 | 70.5 | 20.2 | 7.0 |
| KWEKWE | 54.7 | 42.2 | 52.6 | 30.7 | 12.1 |
| Mberengwa | 37.9 | 61.1 | 33.0 | 31.0 | 32.6 |
| SHURUGWI | 41.3 | 58.2 | 40.8 | 30.8 | 25.6 |
| Zvishavane | 15.1 | 84.2 | 2.5 | 56.0 | 38.3 |
| Bikita | 21.2 | 78.2 | 2.9 | 64.7 | 31.1 |
| Chiredzi | 62.2 | 37.3 | 69.2 | 21.5 | 7.5 |
| Ndanga | 17.0 | 82.5 | 3.2 | 53.8 | 41.2 |
| Gutu | 31.7 | 67.9 | 5.5 | 79.7 | 14.1 |
| MASVINGO | 46.3 | 51.6 | 42.5 | 41.1 | 13.4 |
| Mwenezi | 12.3 | 87.2 | 2.7 | 38.5 | 49.9 |
| Chivi | 16.6 | 82.8 | 4.9 | 47.7 | 45.6 |

Note: Bulawayo: excludes City of Bulawayo; GWERU:- district with urban centre
Source: CSO, 1982 Census

The CSO (1985a:9) argue that more households use surface water during the wet season (about 70%) than during the dry season (50 to 60%). The census was taken in August, which is part of the dry season. The implication of this is that the number of households

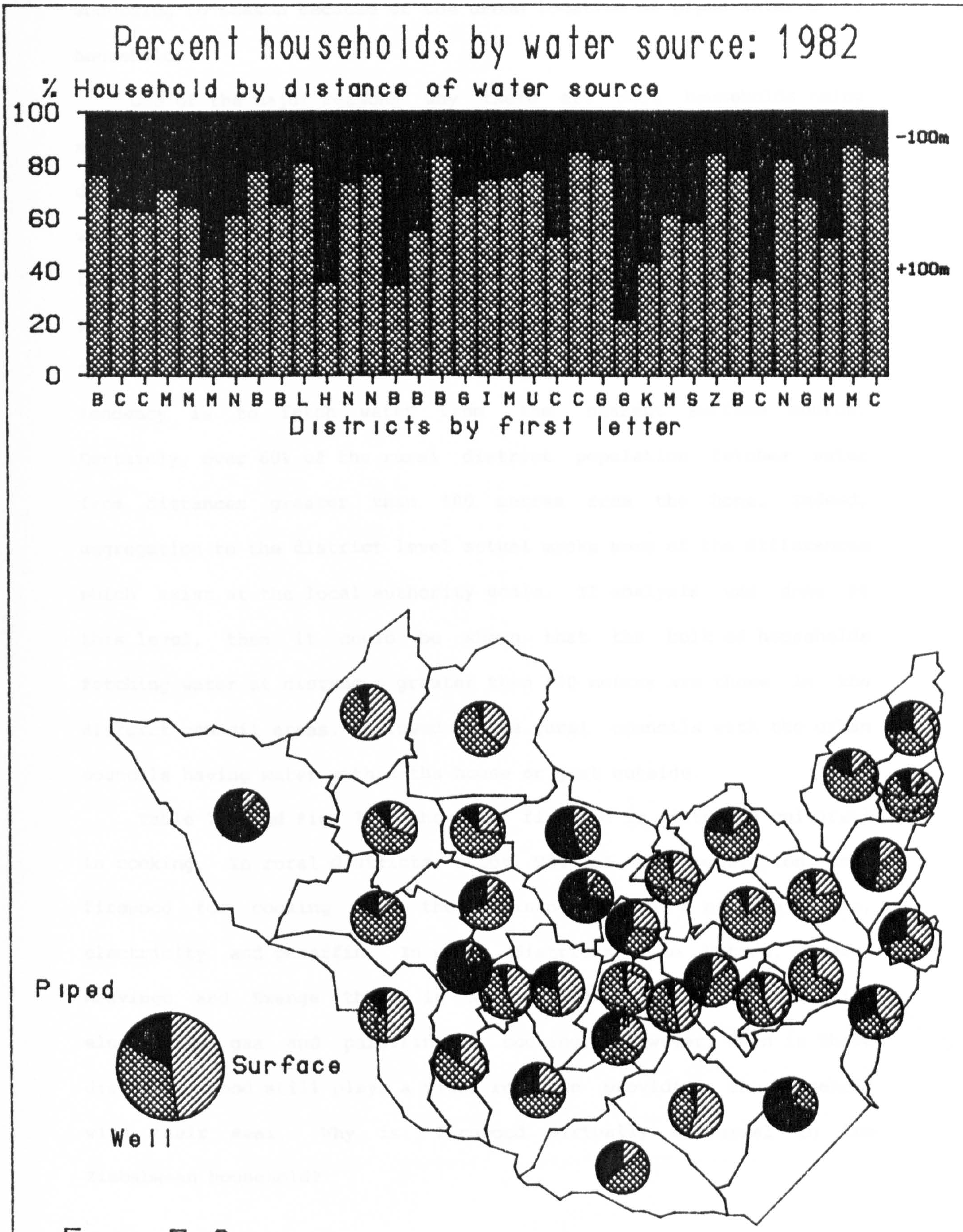

Percent households by water source: 1982
% Household by distance of water source
100
80
60
40
20
0
-100m
+100m
B C C M M M N B B L H N N B B B G I M U C C G G K M S Z B C N G M M C
Districts by first letter
Piped
Surface
Well

Fig. 7.6

using surface water is underestimated while those using well/borehole water is overestimated. Those using piped water should not fluctuate according to season because of the urban location of piped water using households.

One of the major reasons why there are more households using surface water during the wet season than during the dry season has to do with the distance of the water supply from the household. Because water is not piped, fetching water involves a lot of investiment in time and labour. Rural women spend most of their time fetching water and firewood, besides their other chores on the household farm. During the rainy season, when women are heavily involved in agriculture, the tendency is to fetch water from the nearest surface source. Certainly, over 60% of the rural district population fetches water from distances greater than 100 metres from the home. Indeed, aggregation to the district level actual masks some of the differences which exist at the local authority scale. If analysis was done at this level, then it could be shown that the bulk of households fetching water at distances greater than 100 metres are those in the district council areas, followed by the rural councils with the urban councils having water within the house or just outside.

Table 7.8 and Fig. 7.7 show that firewood is virtually universal in cooking. In rural districts, about 98% of the population uses firewood for cooking with the remaining 2% using a mixture of gas, electricity and paraffin. In urban districts like Mutare, Gweru, Masvingo and Hwange there is a significant use of fuels like electricity, gas and paraffin in cooking. However, even in these districts, wood still plays a vital role in providing the household with their meal. Why is firewood virtually universal in the Zimbabwean household?

Several reasons may be advanced for this. The use of modern

Table 7.8: Percent households by main cooking fuel, Zimbabwe 1982

| District | Firewood | Paraffin | Electricity | Modern |
|---|---|---|---|---|
| Buhera | 98.1 | 0.5 | 0.7 | 1.2 |
| Chipinge | 97.3 | 0.9 | 1.0 | 1.9 |
| Chimanimani | 97.5 | 0.7 | 0.6 | 1.3 |
| Mutasa | 98.1 | 1.0 | 0.3 | 1.3 |
| Makoni | 94.2 | 2.4 | 1.7 | 4.1 |
| MUTARE | 80.4 | 8.6 | 8.0 | 16.6 |
| Nyanga | 96.3 | 1.4 | 1.2 | 2.6 |
| Binga | 95.2 | 1.2 | 0.2 | 1.4 |
| Bubi | 93.7 | 1.0 | 1.1 | 2.2 |
| Lupane | 95.3 | 1.1 | 0.4 | 1.5 |
| Hwange | 68.3 | 4.1 | 13.0 | 17.2 |
| Nkayi | 95.4 | 1.2 | 0.3 | 1.5 |
| Nyamandhlovu | 94.8 | 1.0 | 0.3 | 1.3 |
| Bulawayo | 4.4 | 0.4 | 0.8 | 1.1 |
| Beitbridge | 92.5 | 1.5 | 1.4 | 2.9 |
| B. Mangwe | 94.6 | 1.1 | 0.8 | 1.9 |
| Gwanda | 90.5 | 2.1 | 5.7 | 7.7 |
| Insiza | 89.0 | 2.5 | 5.9 | 8.4 |
| Matobo | 94.9 | 1.6 | 1.9 | 3.5 |
| Umzingwane | 94.9 | 0.9 | 0.4 | 1.2 |
| Charter | 95.8 | 1.2 | 1.5 | 2.7 |
| Chilimanzi | 98.8 | 0.2 | 0.2 | 0.5 |
| Gokwe | 98.8 | 0.3 | 0.2 | 0.5 |
| GWERU | 46.4 | 29.0 | 21.0 | 50.1 |
| KWEKWE | 72.3 | 9.5 | 14.3 | 23.8 |
| Mberengwa | 90.4 | 4.3 | 3.8 | 8.1 |
| SHURUGWI | 67.8 | 2.7 | 5.4 | 8.1 |
| Zvishavane | 98.7 | 0.2 | 0.2 | 0.4 |
| Bikita | 99.1 | 0.3 | 0.3 | 0.6 |
| Chiredzi | 92.8 | 3.0 | 2.7 | 5.7 |
| Ndanga | 99.3 | 0.2 | 0.1 | 0.3 |
| Gutu | 98.6 | 0.6 | 0.4 | 1.0 |
| MASVINGO | 77.5 | 8.7 | 10.7 | 19.4 |
| Mwenezi | 99.5 | 0.1 | 0.1 | 0.2 |
| Chivi | 99.2 | 0.2 | 0.2 | 0.4 |

Note: The column "modern" is made up of paraffin, electricity and other fuels like gas and coal. Bulawayo excludes the City of Bulawayo GWERU:- district with large urban centre.
Source: CSO 1982 Census

fuels like paraffin and gas are very expensive because these are mostly imported since Zimbabwe has no crude oil of its own. This makes their use for cooking purposes by the population very limited, as families find them uneconomic. Paraffin is used mainly for

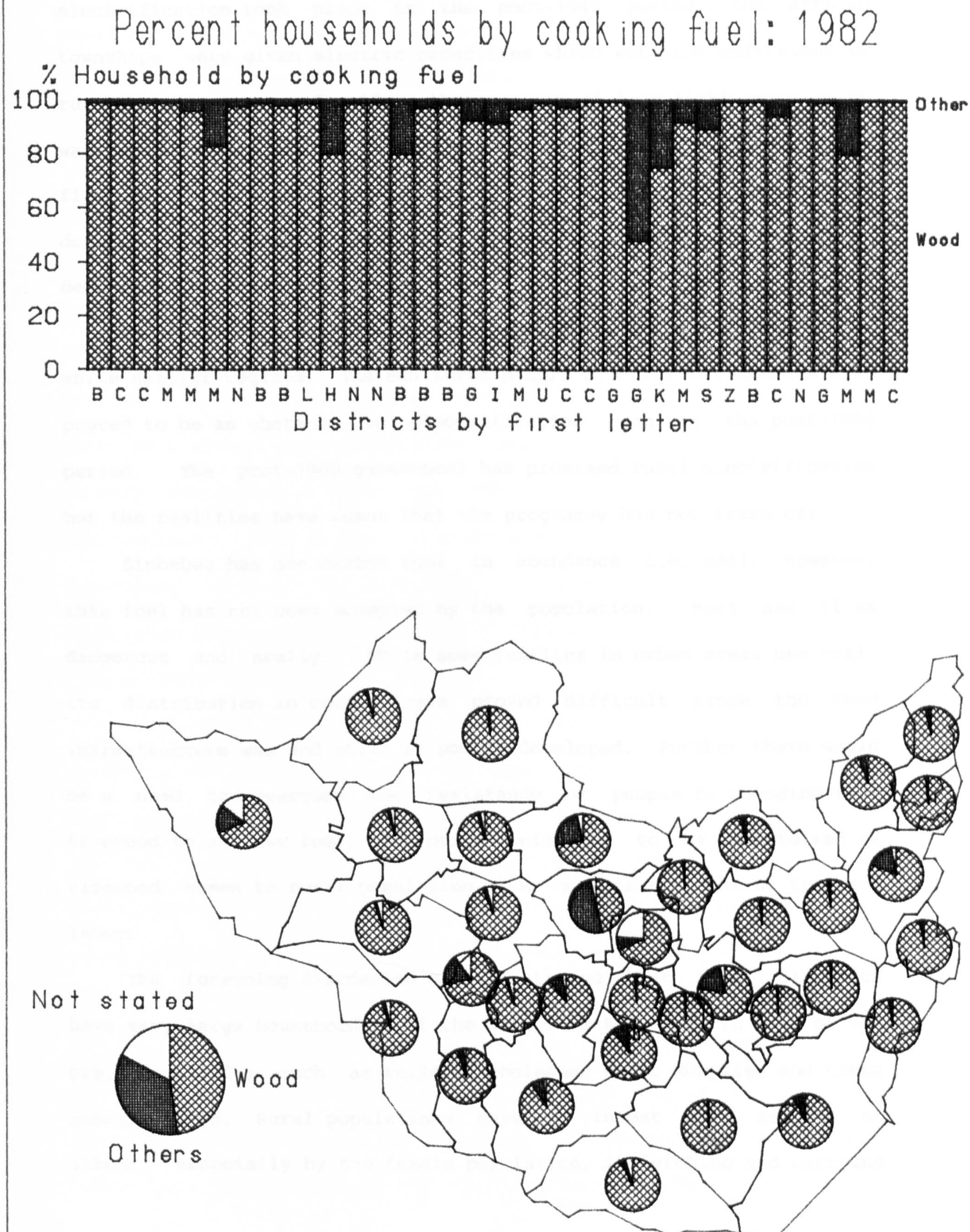

Percent households by cooking fuel: 1982
% Household by cooking fuel
100
80
60
40
20
0
Other
Wood
B C C M M M N B B L H N N B B B G I M U C C G G K M S Z B C N G M M C
Districts by first letter
Not stated
Wood
Others

Fig. 7.7

lighting rather than the more expensive business of cooking. Electrification within the country is not complete. Indeed, some areas within the cities do not have electricity. Further, when electrification took place in the post-1945 period, the African townships were given electric capacities which were not sufficient to run electric stoves. Sometimes the mere use of four light bulbs of 60 watts each would cutoff the electricity supply. This meant that firewood, which is relatively cheap, continued to be used for cooking, despite fears from conservation groups that this was hastening deforestation around the towns.

Within rural districts, electrification was not a priority of the white settler regimes. The scattered nature of rural settlements also proved to be an obstacle to electrification even in the post-1980 period. The post-1980 government has promised rural electrification but the realities have meant that the programme has not taken off.

Zimbabwe has one carbon fuel in abundance i.e. coal. However, this fuel has not been accepted by the population. Most see it as dangerous and smelly. While some families in urban areas use coal, its distribution in rural areas proved difficult since the road infrastructure was and still is poorly developed. Further there would be a need to overcome the resistance of people to changing from firewood to any new fuel. The price would have to be subsidized as firewood comes to rural population at no cost except that of time and labour.

The foregoing discussion has illustrated that rural districts have very large households. At the same time they lack in some of the basic facilities such as toilets, wholesome water supplies and clean cooking fuels. Rural populations have to invest huge amounts of labour, especially by the female population, in fetching and carrying water and firewood to the home. This is on top of their other activities such as farming and their community duties such as the building of schools, dams, road bridges, dip tanks, clinics and hospitals. The large household size of the rural population can, under these circumstances, be appreciated and accepted as a necessity which only improvements in the conditions of living will alleviate.

### 7.5 MARRIAGE ATTRIBUTES

The measures of fertility, discussed in Chapter Four, are based on data from married couples. Indeed, it is often common to speak of marital fertility. It is with this in mind that a discussion of the pattern of marriage within the country is undertaken. Unfortunately, data on marriage are available for only two provinces within the country: Manicaland and Masvingo. The data are classified by age, sex and district. This presents a problem with regard to the best way of presenting the data for discussion. The problem is similar to that faced when analysing the age specific fertility rates i.e. there is no single number indicator.

To overcome the problem of having several marriage rates, it is normal to use the first age at marriage (Newell 1988:96). However, first age at marriage is only effective where registration of marriage is very accurate or complete. Chapter 1 has pointed out that registration of vital or demograhic events within Zimbabwe is far from being complete or accurate. It is therefore not possible to use the indicator of age at first marriage for a discussion of marriage within the country. Newell (1988:97) suggests the use of the "Singulate Mean Age at Marriage" (SMAM) which was developed by Hajnal in 1953. This is an indirect measure which describes the experience of a synthetic cohort in much the same way as the Total Fertility Rate. As such, it is a period measure which is standardised for age. The data used in its calculation are the proportions or percentage single (not the proportions married) classified by age and, preferrably sex, as there is a difference in the age at marriage between the two sexes. The discussion excludes a detailed account of how the SMAM is derived, the reader being referred to any standard text on demography (e.g. Newell 1988:97-101).

Table 7.9 presents the SMAM for the districts of Manicaland and Masvingo together with the national mean, for both sexes and the total population. The latter are an average for the two sexes. The most obvious fact is the difference in the SMAMs for the sexes. Males seem to remain single for longer periods of time. Most males will be expected to remain single or to enter marriage when they are in their mid-twenties. In contrast, most females barely make it to twenty before they are married. In the district of Chiredzi, most females only remain single until the age of 18 by which time most enter into marriage. Urban districts like Mutare and Masvingo show both sexes as entering marriage at older ages though the rural population within these districts mask the full extent of this process. Some of the rural districts where population pressure or overcrowding is a problem (e.g. Chivi and Gutu in Masvingo province) show both sexes remaining single for longer periods of time than districts which do not experience such population pressures. Thus, there appears to be a response to land shortages by delaying marriage.

The SMAM, though a synthetic and indirect measure, provides a useful insight into the pattern of entry into the marriage state. The earlier the sexes lose their state of singleness, the earlier their childbearing span begins and the higher the overall level of fertility within the country or district. Thus, the SMAM can be substituted for age at first marriage in trying to determine how early childbearing in

Table 7.9: Singulate Mean Age at Marriage, districts of Manicaland, Masvingo and Zimbabwe, 1982

| District | Sex | | |
|---|---|---|---|
| | Male | Female | Total |
| MANICALAND | | | |
| Buhera | 25.50 | 19.72 | 22.01 |
| Chipinge | 24.21 | 19.02 | 21.48 |
| Chimanimani | 25.23 | 19.65 | 22.16 |
| Mutasa | 25.70 | 19.94 | 21.86 |
| Makoni | 24.78 | 20.11 | 21.93 |
| MUTARE | 24.81 | 20.53 | 22.52 |
| Nyanga | 24.72 | 19.91 | 22.13 |
| MASVINGO | | | |
| Bikita | 25.26 | 19.97 | 21.95 |
| Chiredzi | 23.47 | 18.19 | 20.71 |
| Ndanga | 25.00 | 19.54 | 21.71 |
| Gutu | 25.88 | 20.68 | 22.73 |
| MASVINGO | 25.05 | 20.19 | 22.55 |
| Mwenezi | 25.17 | 19.53 | 21.53 |
| Chivi | 26.37 | 20.28 | 22.54 |
| ZIMBABWE | 25.17 | 20.30 | 22.51 |

Notes: MUTARE:- district with large urban centre.
Source: CSO 1982 census, Table 25A

a given population begins. In this regard, the important figure is that for females and in the case of Zimbabwe this begins around the age of 19 to 20 years with the national average at 20.3 years.

## 7.6 LABOUR FORCE ATTRIBUTES

The section focusses on the labour force in terms of its employment status. Employment, in Zimbabwe, is often separated into formal and informal categories with subsistence farming occupying its own category. As described in Chapter One, formal employment refers to employment in the modern sector of the economy, whether waged or self-employed. Informal employment exists on the fringes of this modern economy and if often of the self-employment type. Indeed, informal employment is a response to the inability of the modern sector in terms of its capacity to absorb all the job seekers. However, the census data do not distinguish between formal and informal employment, as any person who worked in the week prior to the census was classified as employed, after filter questions about the type of work had been asked to exclude housewives, students and children helping on the family farm (CSO 1985a:97).

The data on the labour force are of two types. The first, produced from the Ten Percent Sample, did not distinguish between those in formal employment and those who are in the subsistence farming sector of the economy. This gave a distorted view of employment and unemployment within the country. This was rectified in the tabulation of the full census, which is only available for the provinces of Masvingo and Manicaland.

Table 7.10 illustrates the data from the Ten Percent Sample while Table 7.11 gives the data from the full census for Masvingo and Manicaland. From Table 7.10 and Figs. 7.8 and 7.9 several interesting features emerge. As to be expected, most employment, especially for males is concentrated in urban districts. Some distortion occurrs because of the inclusion of the subsistence farmers in the data. Thus, districts like Gokwe (Midlands) and Mwenezi (Masvingo) show up as areas of high employment rates. When Table 7.11 is taken into consideration, it can be shown that there is virtually no formal employment taking place in districts like Mwenezi and Buhera (Manicaland). It is therefore reasonable to assume that the distortion is due to the inclusion of subsistence farmers in the data.

Comparing the spatial distribution of male and female employment in Table 7.10 and Fig. 7.8 & 7.9, it can be seen that male employment is highest in urban districts. In contrast, female employment is concentrated in rural districts like Mwenezi, Buhera and Gokwe. This is in keeping with the migration trends described in Chapter Six and

Table 7.10: Percent population by economic activity, 1982

| District | Males | | | | Females | | | |
|---|---|---|---|---|---|---|---|---|
| | Emp. | Une. | Act. | Ina. | Emp. | Une. | Act. | Ina. |
| Buhera | 38.4 | 0.6 | 39.1 | 5.3 | 44.8 | 0.1 | 44.9 | 10.6 |
| Chipinge | 35.4 | 3.4 | 38.9 | 8.2 | 27.5 | 2.0 | 29.5 | 23.4 |
| Chimanimani | 27.7 | 0.3 | 28.9 | 17.1 | 34.4 | 0.1 | 34.5 | 19.5 |
| Mutasa | 19.9 | 2.8 | 22.7 | 18.7 | 25.5 | 0.7 | 26.2 | 32.4 |
| Makoni | 18.2 | 4.9 | 23.1 | 20.9 | 16.7 | 2.7 | 19.4 | 36.5 |
| MUTARE | 30.9 | 2.9 | 34.0 | 14.6 | 21.2 | 2.3 | 23.5 | 27.9 |
| Nyanga | 29.9 | 1.0 | 31.1 | 16.0 | 30.7 | 1.1 | 31.8 | 21.2 |
| Bindura | 32.0 | 2.7 | 34.7 | 16.9 | 16.7 | 2.4 | 19.1 | 29.3 |
| Centenary | 39.3 | 1.0 | 40.4 | 10.0 | 25.7 | 2.1 | 27.8 | 21.8 |
| Darwin | 20.0 | 1.4 | 3.6 | 39.5 | 24.2 | 0.5 | 24.7 | 32.3 |
| Mazowe | 36.5 | 1.2 | 37.7 | 10.2 | 31.4 | 0.6 | 32.0 | 20.1 |
| Guruve | 34.8 | 0.1 | 34.9 | 8.6 | 40.1 | 0.0 | 40.1 | 16.4 |
| Rushinga | 17.5 | 5.4 | 23.1 | 20.7 | 16.2 | 2.5 | 18.7 | 37.5 |
| Shamva | 30.0 | 3.1 | 33.2 | 16.5 | 20.5 | 1.8 | 22.3 | 28.0 |
| HARARE | 34.1 | 4.2 | 39.9 | 14.9 | 11.4 | 3.4 | 15.0 | 30.2 |
| MARONDERA | 26.2 | 4.8 | 31.2 | 19.8 | 8.7 | 2.8 | 11.5 | 37.5 |
| Mudzi | 23.0 | 1.1 | 37.4 | 13.6 | 27.0 | 0.4 | 27.4 | 21.5 |
| Murewa | 29.7 | 0.8 | 37.9 | 10.0 | 37.9 | 0.3 | 38.3 | 13.8 |
| Mutoko | 20.8 | 2.1 | 23.1 | 18.3 | 20.0 | 0.7 | 20.7 | 37.9 |
| Wedza | 23.9 | 1.1 | 25.0 | 18.4 | 32.9 | 0.2 | 33.1 | 23.5 |
| Goromonzi | 16.1 | 5.6 | 21.8 | 23.7 | 6.0 | 3.3 | 9.3 | 45.2 |
| Seke | 22.9 | 2.2 | 25.1 | 16.9 | 18.7 | 1.7 | 20.4 | 37.5 |
| CHEGUTU | 36.0 | 2.9 | 38.9 | 13.2 | 18.8 | 2.8 | 21.6 | 26.3 |
| KADOMA | 36.7 | 3.9 | 40.6 | 11.3 | 17.6 | 1.7 | 19.3 | 28.8 |
| KARIBA | 38.3 | 4.9 | 44.7 | 14.2 | 7.3 | 2.7 | 10.0 | 31.1 |
| Hurungwe | 35.2 | 2.5 | 38.8 | 10.7 | 23.3 | 1.8 | 25.2 | 25.3 |
| LOMAGUNDI | 27.4 | 4.6 | 32.1 | 18.5 | 9.0 | 4.1 | 13.1 | 36.3 |
| Binga | 19.4 | 4.9 | 24.4 | 16.4 | 15.3 | 3.6 | 18.9 | 40.4 |
| Bubi | 31.6 | 1.9 | 33.6 | 14.5 | 23.6 | 1.3 | 25.0 | 26.8 |
| Lupane | 22.6 | 6.3 | 28.9 | 18.3 | 18.5 | 2.2 | 20.8 | 32.0 |
| HWANGE | 27.0 | 5.9 | 32.9 | 17.6 | 3.6 | 4.1 | 7.7 | 41.8 |
| Nkayi | 30.1 | 0.8 | 30.9 | 13.7 | 30.6 | 0.4 | 31.1 | 24.3 |
| Nyamandlovu | 34.6 | 2.3 | 36.9 | 8.7 | 28.3 | 1.2 | 29.5 | 24.9 |
| BULAWAYO | 33.6 | 6.8 | 41.2 | 13.5 | 9.5 | 5.6 | 15.2 | 30.1 |
| Beitbridge | 22.2 | 6.6 | 29.0 | 19.3 | 10.6 | 2.5 | 13.1 | 38.5 |
| B. Mangwe | 19.6 | 6.9 | 26.6 | 16.9 | 19.2 | 4.3 | 23.5 | 33.0 |
| Gwanda | 21.3 | 7.1 | 28.6 | 19.6 | 10.5 | 3.1 | 13.7 | 38.1 |
| Insiza | 20.6 | 2.9 | 23.6 | 21.1 | 20.5 | 2.1 | 22.6 | 32.7 |
| Matobo | 14.5 | 6.2 | 20.9 | 22.3 | 15.0 | 3.4 | 18.5 | 38.2 |
| Umzingwane | 24.9 | 3.5 | 28.4 | 16.6 | 26.7 | 1.3 | 28.0 | 27.0 |

Table 7.10 contd:

| District | Males | | | | Females | | | |
|---|---|---|---|---|---|---|---|---|
| | Emp. | Une. | Act. | Ina. | Emp. | Une. | Act. | Ina. |
| Charter | 28.2 | 0.9 | 29.2 | 15.6 | 33.8 | 0.5 | 34.3 | 20.9 |
| Chilimanzi | 29.9 | 0.7 | 30.6 | 12.3 | 37.1 | 0.2 | 37.2 | 19.8 |
| Gokwe | 37.7 | 0.6 | 38.5 | 5.9 | 39.7 | 0.2 | 39.9 | 15.7 |
| GWERU | 28.2 | 4.1 | 35.9 | 15.3 | 14.2 | 4.3 | 18.6 | 30.2 |
| KWEKWE | 34.6 | 2.7 | 37.4 | 12.8 | 21.8 | 2.0 | 23.8 | 26.0 |
| Mberengwa | 28.8 | 1.9 | 30.9 | 15.7 | 25.4 | 2.8 | 28.2 | 25.1 |
| SHURUGWI | 39.9 | 1.1 | 41.7 | 7.4 | 31.6 | 0.6 | 32.2 | 18.7 |
| Zvishavane | 35.5 | 0.9 | 36.5 | 5.5 | 43.6 | 1.1 | 44.7 | 13.3 |
| Bikita | 27.4 | 5.8 | 33.2 | 10.4 | 34.8 | 1.3 | 36.1 | 20.3 |
| Chiredzi | 37.9 | 3.5 | 41.6 | 11.2 | 15.3 | 2.1 | 17.4 | 29.8 |
| Ndanga | 12.8 | 7.4 | 20.3 | 24.1 | 8.5 | 2.6 | 11.1 | 44.5 |
| Gutu | 27.8 | 0.6 | 28.4 | 15.8 | 29.5 | 0.3 | 29.8 | 26.0 |
| MASVINGO | 23.7 | 4.9 | 28.7 | 19.6 | 15.9 | 1.7 | 17.6 | 34.1 |
| Mwenezi | 34.5 | 0.6 | 35.1 | 9.3 | 35.6 | 0.1 | 35.7 | 19.8 |
| Chivi | 34.2 | 0.7 | 34.9 | 10.2 | 32.7 | 0.2 | 32.9 | 22.0 |

Source: CSO 1982 Census, Ten Percent Sample, Table 18A
Notes: Emp:- employed; Une:- unemployed; Act:- active; Ina:- inactive
GWERU:- district with urban centre.

the sex ratios analysed in Chapter Three.

Districts of high employment rates also show high unemployment rates and high rates of the population that is active. Again, this is to be expected as the population migrates into the areas that offer the maximum likelihood of gaining employment. The observation is true for both males (Table 7.10) and females (Table 7.11). The rural districts will be reflected as areas of low employment, simply because the population left here is not actively seeking work or is involved in subsistence agriculture.

Table 7.11 shows that women are the ones who are most involved in subsistence farming compared to their male counterparts. For example, in Mutasa (Manicaland) 32.9% of the female population in the labour force are involved in subsistence farming compared to 19.5% of males. CSO (1985a:109-110) have shown that female participation in the

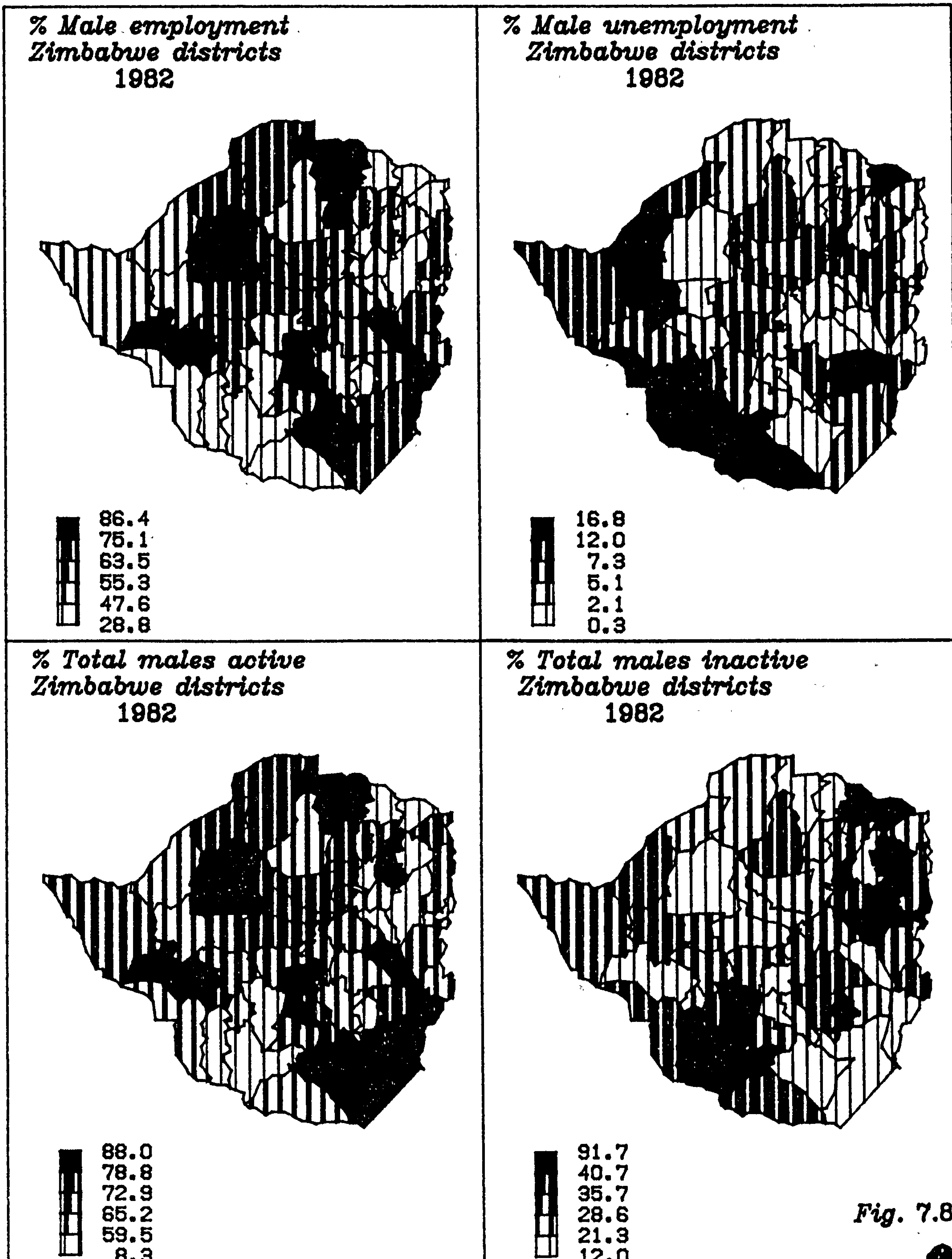

% Male employment
Zimbabwe districts
1982
86.4
75.1
63.5
55.3
47.6
28.8
% Male unemployment
Zimbabwe districts
1982
16.8
12.0
7.3
5.1
2.1
0.3
% Total males active
Zimbabwe districts
1982
88.0
78.8
72.9
65.2
59.5
8.3
% Total males inactive
Zimbabwe districts
1982
91.7
40.7
35.7
28.6
21.3
12.0

*Fig. 7.8*

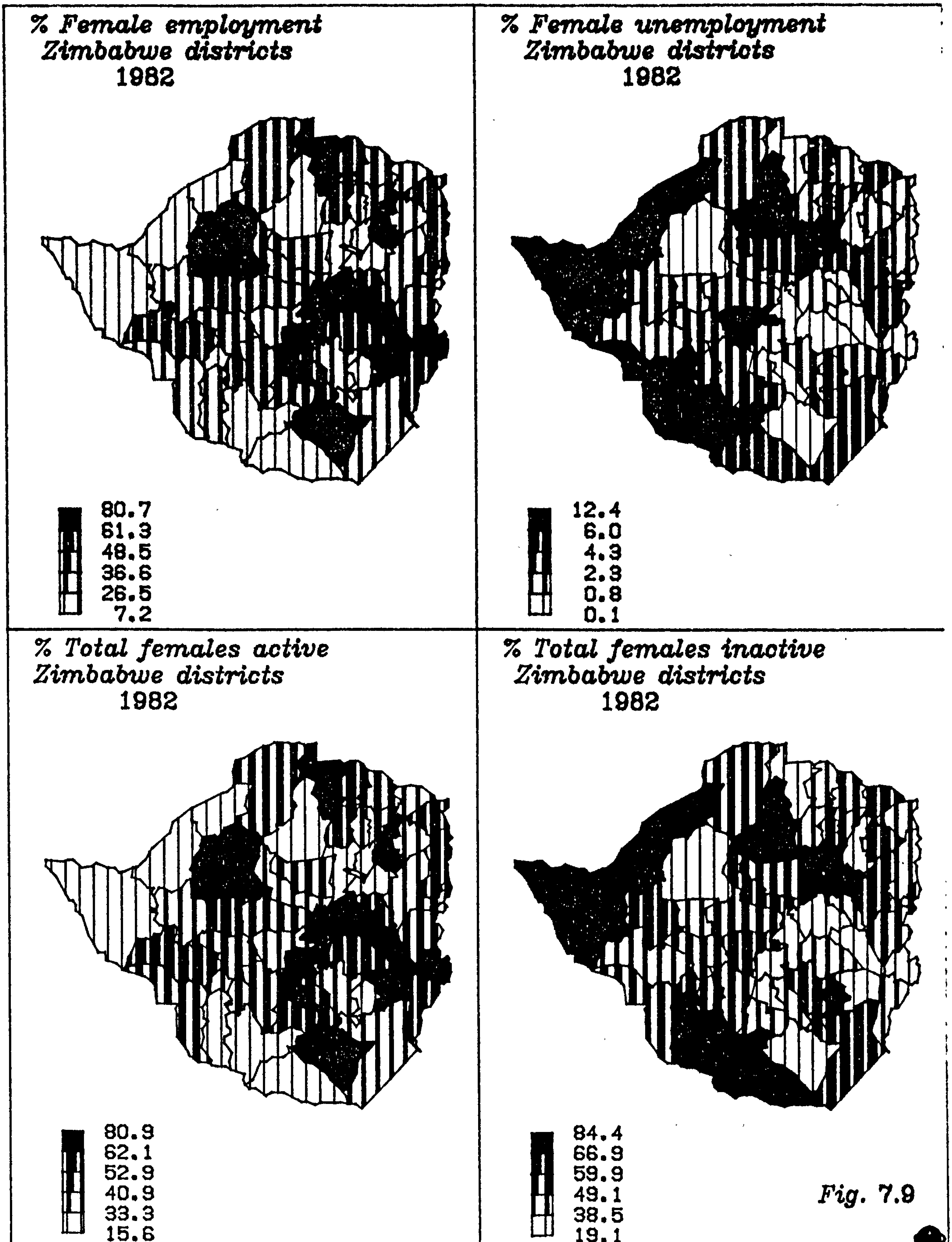

% Female employment
Zimbabwe districts
1982
80.7
61.3
48.5
36.6
26.5
7.2
% Female unemployment
Zimbabwe districts
1982
12.4
6.0
4.3
2.3
0.8
0.1
% Total females active
Zimbabwe districts
1982
80.9
62.1
52.9
40.9
33.3
15.6
% Total females inactive
Zimbabwe districts
1982
84.4
66.9
59.9
49.1
38.5
19.1

*Fig. 7.9*

Table 7.11: Percentage labour force in formal employment and in subsistence farming: Manicaland and Masvingo 1982

| District | Males | | | | | Females | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Emp. | Sub. | Une. | Act. | Ina. | Emp. | Sub. | Une. | Act. | Ina. |
| MANICALAND | | | | | | | | | | |
| Buhera | 5.9 | 32.6 | 0.4 | 38.9 | 4.6 | 3.6 | 39.3 | 0.1 | 43.0 | 12.5 |
| Chipinge | 14.1 | 16.6 | 3.7 | 34.4 | 12.4 | 7.7 | 17.1 | 2.0 | 26.7 | 26.5 |
| Chimanimani | 14.5 | 14.0 | 0.8 | 29.4 | 18.4 | 6.1 | 24.6 | 0.4 | 31.0 | 21.2 |
| Mutasa | 6.2 | 19.5 | 1.9 | 27.6 | 13.6 | 2.6 | 32.9 | 1.0 | 36.5 | 22.4 |
| Makoni | 15.4 | 19.2 | 5.5 | 40.1 | 28.0 | 5.0 | 24.8 | 3.2 | 33.0 | 48.6 |
| MUTARE | 19.6 | 13.3 | 3.1 | 36.0 | 14.0 | 6.1 | 16.1 | 2.3 | 24.5 | 25.4 |
| Nyanga | 15.1 | 14.7 | 0.8 | 30.7 | 16.6 | 3.2 | 29.9 | 0.4 | 33.5 | 19.2 |
| MASVINGO | | | | | | | | | | |
| Bikita | 3.8 | 30.1 | 2.3 | 35.9 | 7.3 | 2.5 | 37.3 | 1.0 | 40.9 | 15.9 |
| Chiredzi | 8.6 | 44.2 | 1.6 | 19.2 | 40.6 | 1.0 | 24.2 | 1.3 | 20.4 | 19.7 |
| Mwenezi | 3.6 | 23.5 | 2.7 | 29.8 | 13.7 | 4.4 | 23.4 | 1.1 | 28.9 | 27.7 |

Source: CSO, 1982 Census, Table 18A
Notes: Sub:- subsistence farmers.

subsistence farming sector varies from about 28% in age group 20-24 to a peak of about 35% in age group 50-59. This is why the description of rural communities in Zimbabwe are full of images of old women eking a livelihood out of the infertile and eroded soils of the communal lands.

## 7.7 EDUCATION

### 7.7.1 Some background information

Education in Zimbabwe begins with seven years of primary schooling, followed by four years of secondary schooling, leading to the O-level certificate. For those who do not drop out, a further two years of secondary schooling are possible leading to University after passing the A level examinations. This only relates to formal education. Informal education as well as adult and vocational education are also provided. Both formal and informal education are provided on a private and public basis. In fact, the provision of education, is very similar to that of health services with government's education budget covering teacher salaries, construction and maintenance of school buildings, cost of administering examinations and so on (Ridell 1984; CSO 1985b). The section will confine itself to the examination of the formal education system. This is not to underplay the importance of the informal, adult and vocational education but is mainly dictated by the data.

The inherited educational system showed inequalities in the quality and quantity of educational facilities at a number of different scales. There was the racial bias which favoured the non-black population. For example, in 1978, the state was spending 11 times more on each white pupil than on a black one (GoZ 1982). They were differences too, in the physical and equipment levels of the non-black and the black schools with the latter generally having poorer facilities and less qualified teachers. The bias was further expressed at the rural-urban scale. Urban schools on the whole had better facilities as well as better trained teachers than rural schools. This can be seen in the examination of average class sizes in both primary and secondary education, expressed as teacher:pupil ratios (CSO 1985b).

The discussion on education will focus on the literacy of the population, based on the 1982 census for Manicaland and Masvingo. Literacy rates are worked out based on two definitons, discussed below.

7.7.2 Literacy rates

The United Nations Education, Scientific and Cultural Organisation (1984:30) describes a literate person as one who can read and write with understanding, a short simple statement of one's everyday life. The census data was collected on the basis of education and enrolment and as such was not directly concerned with the issue of literacy (CSO 1985a). This has to be inferred from the data on education and enrolment. This of course makes the task of defining the literate or illiterate person difficult. The CSO decided to adopt two definitons, adopted here, in order to derive the literate population. The first definition was based on the assumption that anyone who has been to school or had left school at the time of the census was literate (the liberal definition). The second was based on the assumption that any person who had completed three years of primary education was literate (the formal definition). It is based on the assumption that if one completes three years of education then one can make a simple statement about one's everyday life and therefore one is functionally literate. Use of these definitions causes one to arrive at different literacy rates.

Table 7.12 provides literacy rates for the provinces of Manicaland, Masvingo and Zimbabwe by sex based on the liberal definition. The rates are for the population aged fifteen years and over. Even by this liberal definition, the female population has higher rates of illiteracy than the male one. This is true even in rural districts like Buhera, and especially so in the more remote districts of Chipinge, Mwenezi and Chiredzi, where the female population is higher than the male population (See sex ratios in Chapter 3). Part of the reason is that male children where given preference when it came to sending children to school (Zvobgo 1986; CSO 1985b). This is because of the traditional view that held the son as the one who would look after the parents in their old age whereas, the daughter got married and the rewards from her education were bestowed on her new family. Thus, nationally 29.1% of the female population is illiterate compared to only 17.0% males. On the whole,

Table 7.12: Percent population by district and sex, Manicaland Masvingo and Zimbabwe, 1982 census (liberal definition)

| District | | Level of education (%) None | Educated | Total |
|---|---|---|---|---|
| Buhera | M | 9.22 | 90.71 | 42.20 |
| | F | 18.81 | 81.08 | 57.80 |
| Chipinge | M | 28.97 | 70.89 | 44.64 |
| | F | 57.84 | 41.97 | 55.36 |
| Chimanimani | M | 17.85 | 82.04 | 46.59 |
| | F | 29.55 | 70.35 | 53.41 |
| Mutasa | M | 17.55 | 82.32 | 37.90 |
| | F | 23.76 | 76.16 | 55.36 |
| MUTARE* | M | 13.03 | 86.80 | 50.10 |
| | F | 15.36 | 84.50 | 49.90 |
| Nyanga | M | 21.36 | 78.54 | 46.48 |
| | F | 35.97 | 63.89 | 53.52 |
| MANICALAND | M | 16.85 | 83.03 | 45.45 |
| | F | 26.84 | 73.03 | 54.55 |
| Bikita | M | 14.96 | 84.99 | 41.08 |
| | F | 31.00 | 68.94 | 58.92 |
| Chiredzi | M | 28.13 | 71.85 | 52.76 |
| | F | 55.32 | 44.61 | 47.24 |
| Ndanga | M | 15.22 | 84.71 | 42.00 |
| | F | 32.37 | 67.58 | 58.00 |
| Gutu | M | 6.16 | 93.75 | 42.47 |
| | F | 11.05 | 88.88 | 57.53 |
| MASVINGO* | M | 10.93 | 88.75 | 50.10 |
| | F | 22.55 | 77.40 | 49.90 |
| Mwenezi | M | 32.66 | 67.30 | 40.65 |
| | F | 59.01 | 40.94 | 59.35 |
| Chivi | M | 13.13 | 86.79 | 41.43 |
| | F | 28.04 | 71.91 | 58.57 |
| MASVINGO | M | 16.30 | 83.57 | 45.43 |
| | F | 31.43 | 68.51 | 54.57 |
| ZIMBABWE | M | 17.00 | 83.00 | - |
| | F | 29.10 | 70.90 | - |

Source: CSO 1982 census, Table 13A and Table IV.5:90-91
Notes: M:- male; F:- female; * urban district.

23% of the national population is illiterate. This can be considered a low figure by the standards of the third world though, the overall aim, is to eliminate illiteracy from the population as a whole.

Table 7.13 provides literacy rates based on the functional definiton. The functional definition seems to increase the illiteracy of the population. This is to be expected as the older population did

Table 7.13: Literacy rates by districts and sex Manicaland, Masvingo and Zimbabwe, 1982 census, (functional definition)

| | | Percent Illiterate | Percent Semi-literate | Percent Literate | Percent Total |
|---|---|---|---|---|---|
| Buhera | M | 9.30 | 17.96 | 72.37 | 42.20 |
| | F | 18.94 | 22.15 | 58.44 | 57.80 |
| Chipinge | M | 21.97 | 16.66 | 60.75 | 44.05 |
| | F | 51.36 | 11.80 | 36.44 | 55.95 |
| Chimanimani | M | 17.95 | 16.73 | 65.01 | 46.59 |
| | F | 30.08 | 17.19 | 52.93 | 53.41 |
| Mutasa | M | 17.62 | 15.30 | 66.67 | 37.92 |
| | F | 23.84 | 16.76 | 60.58 | 62.08 |
| Makoni | M | 14.08 | 13.93 | 71.71 | 43.81 |
| | F | 14.28 | 17.27 | 68.13 | 56.19 |
| MUTARE* | M | 11.69 | 12.87 | 73.24 | 50.15 |
| | F | 15.48 | 15.41 | 68.53 | 49.85 |
| Nyanga | M | 21.44 | 15.17 | 63.07 | 46.48 |
| | F | 36.04 | 17.30 | 46.43 | 53.52 |
| MANICALAND | M | 15.13 | 15.09 | 69.79 | 45.25 |
| | F | 24.90 | 16.71 | 58.39 | 54.75 |
| Bikita | M | 15.03 | 17.42 | 67.13 | 41.08 |
| | F | 31.09 | 20.26 | 48.20 | 58.92 |
| Chiredzi | M | 28.22 | 17.48 | 53.68 | 52.78 |
| | F | 55.43 | 14.41 | 29.72 | 47.22 |
| Ndanga | M | 15.24 | 17.53 | 66.87 | 42.00 |
| | F | 32.42 | 21.08 | 46.23 | 58.00 |
| Gutu | M | 6.47 | 13.45 | 79.71 | 42.47 |
| | F | 11.10 | 19.55 | 68.76 | 57.53 |
| MASVINGO* | M | 12.96 | 16.20 | 69.71 | 47.84 |
| | F | 25.64 | 19.64 | 54.12 | 52.16 |
| Mwenezi | M | 32.73 | 25.78 | 41.26 | 40.65 |
| | F | 59.03 | 18.18 | 22.63 | 59.35 |
| Chivi | M | 13.17 | 17.22 | 69.07 | 41.43 |
| | F | 28.12 | 19.71 | 51.62 | 58.57 |
| MASVINGO | M | 16.37 | 16.53 | 66.52 | 45.43 |
| | F | 31.50 | 18.68 | 49.36 | 54.57 |
| ZIMBABWE | M | 30.50 | - | 69.50 | - |
| | F | 44.40 | - | 55.60 | - |

Source: CSO, 1982 Census, Table 14A and Table IV.6:92-94
Notes: M:- male; F:- female; * urban district.

not benefit from the liberalisation of education in the late 1970s and after independence. Thus the rates of literacy should go down while those of illiteracy go up when three or more years of education are taken into consideration. Thus, female illiteracy rises from 29.1% nationally to 44.4% while the males rise to 30.5%. The illiteracy rate for the whole population also goes up to 37.7%. The remote districts, like Mwenezi, suffer the most from the more strict definition of education. On the basis of the functional definition a lot of work needs to be done to improve the literacy of the population. There is a need to have adult literacy programs if the literacy of the population above 15 years of age is to be improved rapidly.

### 7.8 CONCUDING COMMENTS

The examination of socio-economic development has covered a wide canvas, from health provision, patterns of marriage through to literacy in the population. It is not possible to do justice to all the elements of socio-economic development in such a broad discussion. Indeed, a thesis on socio-economic development alone would be the best way to discuss in detail all the elements involved. The description of social and economic development was offered as a means of bridging the gap between the demographic descriptions given in earlier chapters and the statistical analysis to be performed in Chapter Eight. Indeed, the first two sections of Chapter Eight try to do more justice to the social and economic descriptions given in this chapter by examining the dimensionality of development through factor and cluster analysis. This will compensate for the mainly descriptive and sketchy account given in this chapter. It must, therefore, be borne in mind that the data presented here were merely being prepared for analysis in Chapter Eight.

However, despite what has just been said, important patterns of development do emerge from the social and economic development. It is important to note that regional variations, normally masked by data aggregated to the national level, have been revealed. Chief among these is the disadvantage at which peripheral rural districts like Mwenezi and Binga operate. Such districts have a low share of the national cake of development. For example, they do not have medical doctors resident within them. They exhibit low literacy rates, high levels of persons involved in subsistence agriculture and low formal employment opportunities. Further, households in such districts have a low quality of life as measured by the sanitation and water supply indicators. It is not suprising, therefore that, the migration maps of Chapter Six show such districts as areas of high out-migration and overall negative net migration rates.

In contrast to the peripheral rural districts are the urban districts. These have the best social and economic development opportunities and as such boast a higher quality of life than their rural counterparts. They are therefore the destination regions of the migration streams described in Chapter Six giving them the characteristic pyramids shown in Chapter Three. The concentration of the youthful population, in the early twenties, in urban districts gives them the low fertility observed in Chapter Four, while the higher quality of life is reflected in lower infant and child mortality as described in Chapter Five.

Sufficient regional variations in social and economic development exists to have an impact on the demographic development of the country, as described in this and previous chapters. The next chapter turns first, to the measurement of the dimensionality of that development and secondly, to the investigation of how the social and economic development has influenced the demographic development in the country.

# CHAPTER EIGHT

# INTEGRATION - ANALYSIS OF THE RELATIONSHIPS

## 8.1 INTRODUCTION

Chapter One set out the major aim of the thesis as studying the relationship between population change and socio-economic development. Subsequent chapters have set out to describe and analyse the nature of the population of Zimbabwe, mainly at the district and provincial levels (Chapters 3 to 6), while Chapter 7 sought to capture social and economic development at similar spatial scales. The descriptions and analyses also included definitions of the various factors that go to make the demographic and socio-economic setup of a country such as fertility, the meaning of population change and development. Most of the variables representing population change or socio-economic development were mapped. As a result, Chapter 7 ended by promising analysis of the dimensionality of development based upon the collection of maps, tables and other illustrations used in the description of demographic and socio-economic development. The question to pose and answer is: can a common development pattern be discerned in the demographic, social and economic development of the country? If so, does such a pattern provide a new basis for the regionalization of the country?

Chapter 8 addresses these questions and answers some of the issues raised in previous chapters, fulfilling the objective of analysing the relationship between population change and socio-economic development. The remainder of the chapter is divided into four major sections. Section 8.2 presents the variables that have been assembled for the analysis of population change and socio-economic development. It investigates common patterns in the demographic and socio-economic development of the country through the use of factorial analysis. Section 8.3 uses cluster analysis to shed further light on the dimensionality of development. Section 8.4 uses correlation analysis to eliminate those variables which are strongly correlated between themselves and to substantiate the theories and hypotheses posited in Chapter Two. The logic behind the elimination process being that such variables can easily be represented by a single one, reducing the overall number of socio-economic variables to be correlated with fertility and migration. The reduced list of variables will be entered into a multiple regression model exploring the relationship between fertility and migration, on the one hand, with socio-economic development on the other. Inadequate data eliminates mortality from the analysis. Section 8.5 will conclude the discussion by summarizing the threads of the argument.

## 8.2 ZIMBABWE: A FACTORIAL ANALYSIS

### 8.2.1 The data structure

Section 8.1 has noted that the data to be analysed in this chapter come from previous chapters. Goddard and Kirby (1976:3) argue that "... isomorphism, or the existence of simple, one-to-one causal relationships ..." is very rare in the social sciences. The preceeding chapters have worked more or less on the basis of comparing or exploring one-to-one relationships. In this chapter, the data so gathered are processed for use or analysis by multi-variate techniques such as factor and cluster analysis, and multiple regression.

To use the data for multi-variate analysis, it was necessary to process it into a common access file. Most of the data were processed using SPSSX or programs written by the researcher with the results stored on disk. Fig. 8.1 illustrates how these data were brought

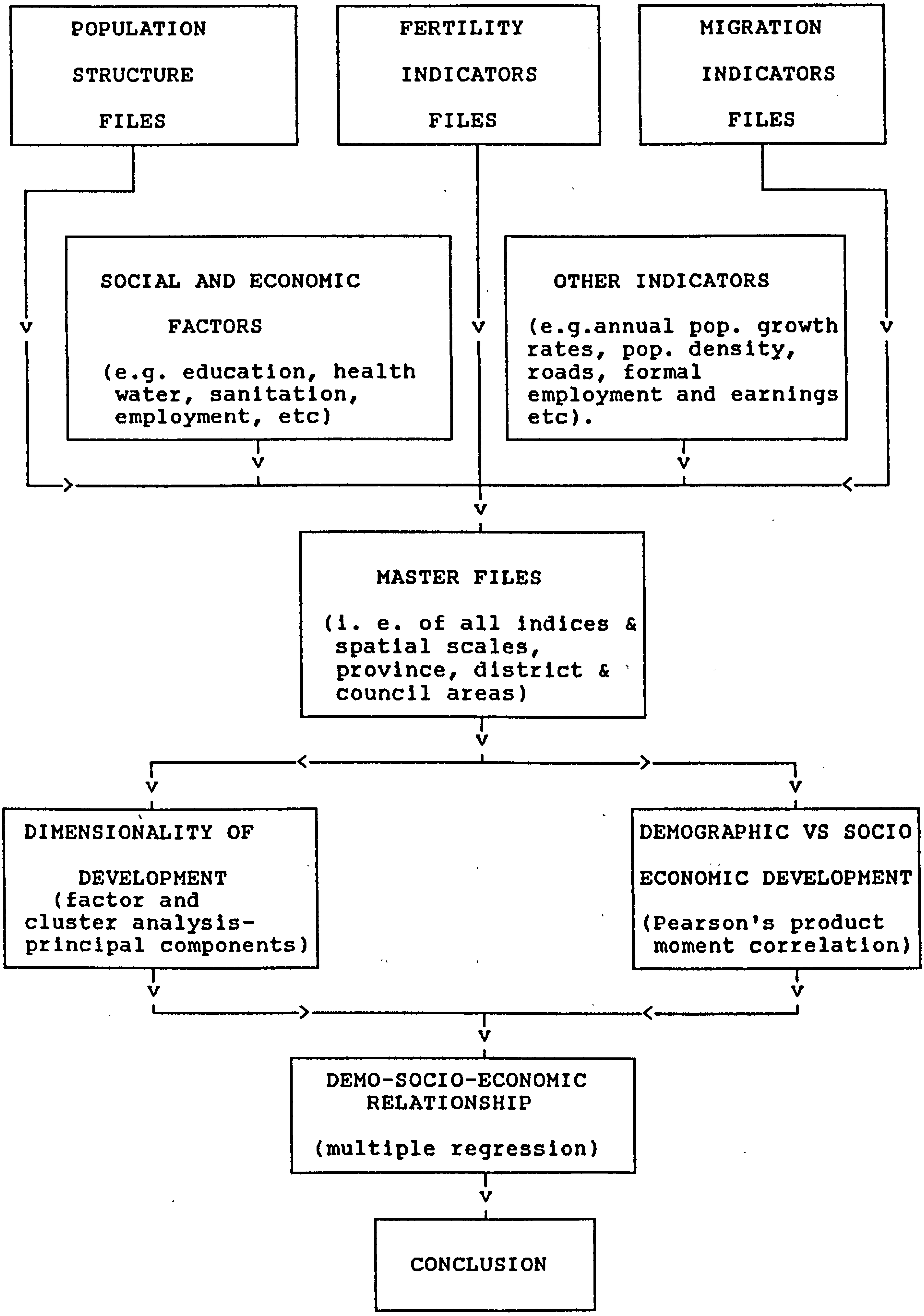



Fig. 8.1: The data and chapter structure

together. The various results files containing the demographic and socio-economic data were brought together into a master file using the MATCH FILES procedure under SPSSX. It can be seen that the upper half of Fig. 8.1 is very similar to that of Fig. 1.5 in which the thesis structure is outlined. The exception is the absence of Chapter Five, excluded because of inadequate data on mortality. The lower half of Fig. 8.1 represents the analyses to be performed in this chapter.

Three master files were created according to the geographical region upon which the analysis was to be based. The three geographical regions adopted were: the province (eight spatial units), the district (thirty-five district units) and the local authority level, referred to as the council, (twenty-seven council units of two provinces - Manicaland and Masvingo, see Appendix A for names of these council units). The three spatial levels in essence represent the administrative hierarchy of the country as outlined in Chapter One (see Section 1.3.2). They represent the availability of data for measuring the various variables under study. For example, at the council level, the only fertility measure available is the child-woman ratio with no information on migration. The district level has all information on fertility and migration but lacks that on marriage and literacy, available at the council level. The province provides information on formal employment and earnings in the twelve largest cities and towns, not available for the district or the council area. The use of thirty-five districts is itself a response to the incomplete nature of data at this spatial scale. The twenty districts of the Mashonaland provinces were excluded because they lacked data on water, sanitation and cooking fuel which affected the calculation of factor scores. Rees (1970:323) argued in relation to the city of Chicago that the use of two sets of areal units might isolate a larger range of dimensions of differentiation of the urban population, thus improving the understanding and interpretation of the socio-economic space of the city. A similar argument was advanced by Morris and Pyle (1971:288-289) with regard to the city of Rio de Janeiro. The expectation is that the treatment of the Zimbabwean data at the three spatial scales might have similar results even if the variables are not always identical at all spatial scales.

The variables, included in the master files, are shown in Table 8.1. All in all, there was a total of sixty-eight variables. This meant that if all variables were available at all spatial scales, then the largest matrix would have been 35 by 68 variables. The three matrices contain almost the same number of variables. The province is represented by a matrix of 8 by 50 variables, the district by a 35 by 49 matrix and the council by a 27 by 49 matrix. What varies is the fact that the variables are not always identical.

### 8.2.2 Factor analysis: background

There exists a large pool of techniques for use in multi-variate analyses. These range from canonical correlation (Ray 1971; Clark 1975), to multiple regression (Talyor 1975) through more sophisticated techniques like cluster analysis (Knox 1974) and a spectrum of techniques which together are broadly known as factor analysis (Goddard and Kirby 1975; Rees 1971; Cole and King 1968; Rummel 1970). Each multi-variate method or technique involves different aims and operates under different assumptions. For example, multiple regression attempts to explain a "dependent variable" in terms of several independent variables while factor analysis tries to create one or more new variables, called factors, each representing a cluster of interrelated variables within the original data set (Goddard and Kirby 1976:3).

Table 8.1: Variables used in the analysis

VARIABLE - MEANING

**A. Population structure**

1. DPM - percent male
2. DPF - percent female
3. PCHILD - percent children under 15 years
4. PLABOR - percent population in labour force (15-64 years)
5. POLDAGE - percent population 65 years and over
6. SR - sex ratio (100 males to 100 females)
7. DR - dependency ratio (per 1000 population in labour force
8. MMAGE - mean age of male population
9. MFAGE - mean age of female population
10. MTAGE - mean age of total population
11. AGR - average annual growth rate (1969 to 1982)
12. DENSE - density of population per square kilometre

**B. Fertility**

13. CWR - child woman ratio (children 0-4 per 1000 women 15-49)
14. CBR - crude birth rate (births per 1000 population)
15. GFR - general fertility rate (births per 1000 women 15-49)
16. TFR - total fertility rate (children per woman)

**C. Migration**

17. SMR - percent none migration rate
18. OMR - percent out migration rate
19. IMR - percent in migration rate
20. NMR - percent net migration

**D. Health**

21. PVHW82 - percent village health workers 1982
22. PVHW83 - percent village health workers 1983
23. PD84 - percent doctors 1984
24. CBD - percent community based distributors 1984
25. NSTATUS - percent children 0-59 months malnutritioned
26. BREAST - percent children 0-23 months still breastfeeding

**E. Education**

27. PEDUC - percent children 5-19 in education 1984
28. MLIT - percent males literate
29. FLIT - percent females literate
30. PLIT - percent persons literate

**F. Formal employment and earnings**

31. PMEMP82 - percent male employees in formal employment
32. PFEMP82 - percent female employees in formal employment
33. MEARN82 - average earnings per employees (Zimbabwe dollars)

**G. General employment**

34. PMEMP - percent males employed
35. PMUMP - percent males unemployed
36. PMARM - percent males in armed services
37. PMSUB - percent males in subsistence farming
38. PMACT - percent males active in labour force
39. PMICT - percent males inactive in labour force

VARIABLE - MEANING

**G. General employment (contd)**

40. PFEMP - percent females employed in labour force
41. PFUMP - percent females unemployed
42. PFARM - percent females in armed forces
43. PFSUB - percent females in subsistence farming
44. PFACT - percent females active in labour force
45. PFICT - percent females inactive in labour force

**H. Rural/urban residence**

46. DCP - percent in district council areas
47. RCP - percent in rural council areas
48. TRP - percent total rural population
49. UCP - percent in urban council areas

**I. Household compositions**

50. HP2L - percent households with 2 or less persons
51. H36P - percent households with 3 to 6 persons
52. HP7M - percent households with 7 or more persons
53. AVHH - average size of households

**J. Marriage**

54. SM7 - singulate mean age at marriage for males
55. SF7 - singulate mean age at marriage for females
56. ST7 - singulate mean age at marriage for persons

**K. Water supply and source**

57. PHHWL - percent households with water supply < than 10
58. PHHWM - percent households with water supply > than 10
59. PIPED - percent households with piped water
60. PWLBR - percent households with well or borehole water
61. PSURF - percent households with surface water supply

**L. Toilet facilities**

62. PTHHF - percent households with flush toilet systems
63. PTHHP - percent households with pit latrines
64. PTHHN - percent households with no toilet facility

**M. Cooking facilities**

65. PTHWD - percent households using firewood
66. PTHPN - percent households using paraffin
67. PTHET - percent households using electricity

**N. Roads**

68. PTAR - percent state roads which are tarred
69. PGRAVEL - percent state roads which are gravel

Factors analysis originated in the field of psychology. Psychologists tried to relate aspects of mental development to latent dimensions of personality (Goddard and Kirby, 1976; Rees 1971:220; Cole and King 1968). Factor analysis entered the field of geography via work in social area analysis performed by urban sociologists in the 1950s. Goddard and Kirby cite the work of Bell (1955) in social area analysis as leading the way in this field. The advent of the modern computer in the 1960s meant that the field of factor analysis became accessible to a large number of researchers. The computer also concided with the advent or the height of the quantitative revolution in geography. As a result a lot of quantitative techniques were accepted into geography which came from other social sciences. Factor analysis was accepted along with a multitude of others and the work of the Department of Geography at the University of Chicago led the way in this field.

Several steps are involved in carrying out factors analysis though, with the use of the computer, most of these are now built into software like SPSSX. The steps are summarised as follows after the work of Rees (1971:221) and Cole and King (1968:155):

1. assembly of a data matrix based on some areal unit of observation
2. the data matrix is converted into a standardized matrix from which the means and standard deviations of the variables are computed. These are used to compute the variance.
3. the variables in the converted matrix are all correlated with each other by product-moment correlation (usual Pearson's), giving a correlation matrix.
4. factors are obtained from the correlation matrix. This is usual done using principal component analysis. The number of

factors obtained are the dimensions of variance underlying the original variables. The loadings of the individual variables on each factor are also calculated. The factor loading vary between -1 to +1.

5. for a better interpretation of the factors obtained, the factor matrix may be rotated to different positions in the factor space, either through "orthogonal" rotation (the most common rotation performed) or through "oblique" rotation. Rummel (1970) and Goddard and Kirby (1976:14,24-30) discuss at length the rotation of factors and the advantages of each rotation technique.
6. the final step in factor analysis involves the calculation and interpretation of factor scores i.e. the weightings of the observational units on each factor. Normally, the factor scores are mapped and are therefore useful for the regionalisation of the areas under study (Cole and King 1968:297-304). Goddard and Kirby cite the following studies as having attempted some form of regionalisation: Moser & Scott (1961) in a classification of British towns, Davies (1972) in an analysis of shopping trips to define regional and functional structure and Goddard (1970) in a study of taxi flows within London.

Rees also provides a useful (though by now somewhat dated) review of the application of factor analysis to the study of geographic problems. He classifies the studies according to the observational units used. He demonstrates that these vary from the international through national to city scale studies. Most of these studies use data collected from censuses and at times the census tracts as their observational unit. Rees himself demonstrates the use of census tract data in his study of the factorial ecology of the City of Chicago. In the present case, the study is based on census data though the observational units used are administrative rather than the census tracts. The next sub-section addresses the issue of factor analysis at the provincial scale. The question to be answered is: which variables possess common patterns of variation over the set of observations? Can these be used to create new regions of Zimbabwe?

### 8.2.3 Factor analysis: the provincial scale

The variables available at the provincial scale giving descriptions of the following social and economic characteristics of the population: population structure, fertility, migration, health, education (though only percent children 5-19 in education), formal employment, general employment, rural/urban residence, household composition and road surfaces. Most of the variables come from the 1982 Census of Population though a few are taken from statistics available in 1983 and 1984.

The analysis proceeded in the following manner:

1. the master file containing the variables (50) for the provinces and the provinces themselves was subjected to SPSSX for factor analysis.
2. factors were extracted from the matrix of correlation coefficients by the principal component method summarising the common pattern of variation among the 50 variables in a table of factor loadings.
3. the factors were rotated to the normal varimax position to achieve a simple structure in which the variables associated mainly with single factors (Rees, 1970:326).
4. factors scores were calculated to allocate each observation a value giving it a position on scales defined by the particular

factors.

The table of factor loadings is used in the interpretation of the results, and that for the provinces is presented in Table 8.2. The table only shows factor loadings greater than +.4 or less than -.4 which Rees argues helps in making the structure of the factor loadings clear. The factor loadings have also been sorted in descending order for the same reason i.e. making their structure clear. The rows consist of variables whose abbreviations are given in Table 8.1. The columns represent the factors ordered according to the size of their eigenvalues.

The eigenvalues represent the degree of intercorrelation among the variables. If on the one hand, the intercorrelation among the fifty variables had been zero, then each of the eigenvalues would have had a value of 1 for each of the 50 variables. If, on the other hand, all the variables were entirely correlated then the first eigenvalue would have a value of 50 leaving the rest with zero (Cole and King 1968:295). As to be expected, there is neither zero nor complete correlation among the variables. However, as Goddard and Kirby (1976:20) point out, the first component or factor accounts for the greatest amount of variance in the origin variables. This is shown by the fact that the first factor in Table 8.2 accumulates 23.97 out of the 50 units of variance with the second taking 10.42 and the third 8.05. In percentages terms, the first factor accounts for 47.9% of the variance, with the second accounting for 20.8% and the third for 16.1%. In cumulative percentage terms, the first three factors account for over four-fifths of the variance (84.9%). This supports the argument put forward by Goddard and Kirby that where a large number of variables are present, the great majority of the variance is accounted for by a relatively small number of factors. This achieves

Table 8.2: First six (varimax rotation) factors, Zimbabwe provinces, 1982

| FACTORS | I Demographic Structure | II General Employ. | III Household Sizes | IV Formal Employ. | V Roads | VI General male activity |
|---|---|---|---|---|---|---|
| Eigenvalues | 23.97 | 10.42 | 8.05 | 3.54 | 2.10 | 1.23 |
| % of var. | 47.90 | 20.80 | 16.10 | 7.10 | 4.20 | 2.50 |
| Cum. var % | 47.90 | 68.80 | 84.90 | 92.00 | 96.20 | 98.60 |
| MMAGE | 0.98045 | - | - | - | - | - |
| DR | -0.97160 | - | - | - | - | - |
| PLABOR | 0.96299 | - | - | - | - | - |
| NMR | 0.96244 | - | - | - | - | - |
| DPM | 0.95752 | - | - | - | - | - |
| DPF | -0.95752 | - | - | - | - | - |
| SR | 0.95588 | - | - | - | - | - |
| PCHILD | -0.95113 | - | - | - | - | - |
| TFR | -0.94895 | - | - | - | - | - |
| GFR | -0.94820 | - | - | - | - | - |
| DCP | -0.93108 | - | - | - | - | - |
| CWR | -0.92871 | - | - | - | - | - |
| IMR | 0.91795 | - | - | - | - | - |
| UCP | 0.90329 | - | - | - | - | - |
| TRP | -0.90329 | - | - | - | - | - |
| MTAGE | 0.87298 | -0.44927 | - | - | - | - |
| CBR | -0.83117 | 0.50273 | - | - | - | - |
| OMR | -0.81086 | - | - | - | - | 0.41627 |
| SMR | 0.81086 | - | - | - | - | -0.41627 |
| PFARM | 0.71951 | -0.59333 | - | - | - | - |
| AGR | 0.71735 | - | - | 0.45474 | - | - |
| PD84 | 0.71448 | - | 0.47545 | 0.44488 | - | - |
| H36P | -0.71007 | - | 0.65286 | - | - | - |
| PEDUC | -0.70751 | - | - | 0.41204 | 0.42759 | - |
| PMUMP | - | -0.94550 | - | - | - | - |
| PMEMP | - | 0.89563 | - | - | - | - |
| MFAGE | - | -0.86267 | - | - | - | - |
| NSTATUS | - | 0.83673 | - | - | - | - |
| BREAST | - | 0.80749 | - | - | - | - |
| PFEMP | -0.52866 | 0.78697 | - | - | - | - |
| PFACT | -0.47261 | 0.78202 | - | - | - | - |
| PFUMP | 0.66672 | -0.68424 | - | - | - | - |
| POLDAGE | -0.65430 | -0.67276 | - | - | - | - |
| HP7M | - | - | -0.96318 | - | - | - |
| PP84 | - | - | 0.85525 | - | - | - |
| HP2L | 0.55008 | - | 0.76655 | - | - | - |
| MEARN82 | 0.51010 | - | 0.71474 | - | - | - |
| PVHW83 | - | 0.48352 | 0.69283 | - | - | - |
| PVHW82 | - | 0.45540 | 0.64878 | - | - | - |
| DENSE | - | - | 0.63575 | 0.45322 | - | - |
| PMARM | 0.60344 | - | 0.63238 | - | - | - |
| SR82 | - | - | - | -0.94750 | - | - |
| PMEMP82 | - | - | - | -0.93031 | - | - |
| PFEMP82 | - | - | - | 0.92866 | - | - |
| AVHH | - | - | - | -0.87981 | - | - |
| PTAR | - | - | - | - | -0.92859 | - |
| PGRAVEL | - | - | - | - | 0.92859 | - |
| RCP | - | - | - | -0.53626 | -0.70491 | - |
| PMACT | 0.44247 | 0.56770 | - | - | - | -0.57072 |
| CBD | - | 0.46981 | 0.47865 | - | - | -0.50051 |

what they term "a parsimonious" description of the data i.e. an economical or careful description of the data.

The principal components analysis extracted six factors at the provincial level. The interpretation of the factors is carried out below. The factors and factor loadings are shown in Table 8.2. The figures in brackets, in the interpretation below, are the factor loadings that show the association between variable and factor. The terms high and low are used to describe how the provinces, districts or council areas perform on each factor, based on the factor loadings. High and low used in this sense only refer to averages rather than an absolute value. In a way, the terms are only trying to describe provinces that do well and those that do not do well on a given factor.

*8.2.3.1 Factor I: Demographic/population structure*

The first factor is an index of population structure. In the case of the study by Rees (1971) of the City of Chicago, this factor was classified as a stage in the life cycle factor. This was possible because at the level of the city, it was possible to identify residential areas favoured by one or other types of family. However, in this case, the data are for the population so, that the factor is more easily classified as one of population structure. The population structure can be seen as being mediated through fertility, migration and other population growth variables, classified under the term demographic.

Provinces which score highly on this factor contain populations with high mean ages, especially male and persons (the factor loading for these variables being 0.98045 & 0.87298), most of these are in the labour force ages (0.96299), and as a result are provinces of high net migration, in-migration, non-migration rates and high annual rates of population growth (0.96244, 0.91795, 0.81086 & 0.71735 respectively, Table 8.2). Further, such provinces have high percentages of males in the population (0.95752) and consequently have sex ratios that are dominated by males (0.95588), are highly urbanized (0.90329) by Zimbabwean standards, and seem to have a large percentage of doctors (0.71007). These provinces are recognizable as the provinces of high social and economic development described in Chapter Seven.

On the other hand, provinces which have low scores on this factor (Table 8.2) tend to have high percentages of children under the age of 15 years (factor loading -0.95113) and those above the age of 65 years (-0.65430) and a result have high dependency ratios (-0.97160). They also have high percentages of the female population (-0.95752), are rural (-0.90329) and have a high proportion of their populations living in district council areas (-0.93108) and as result boast high rates of out-migration (-0.81086). The high concentrations of women in such provinces mean that they have high fertility rates as measured by the crude birth rate, the general fertility rate and the total fertility rate as well as the ratio of children to women (-0.83117, -0.94820, -0.94895 & -0.92871). Not suprisingly, such provinces have a large percentage of households with 3 to 6 members as well as a large number of children 5-19 years of age in the eduational system (-0.71007 & -0.70751). Again, the provinces are recognizable from the descriptions in Chapter Three and Four.

The interpretation of the first factor in the previous two paragraphs, points to a second way of considering the factor. It can be seen as a factor that divides the country into developed and under-developed regions. Todaro (1982:65-86) argues that developing countries are characterized by high rates of fertility, population growth and dependency ratios as well as low rates of urbanisation.

However, it is recognised that certain regions within a developing country form a core of development which has more in common with the developed nations than its immediate hinterland (Simon 1986:7-9; Zinyama 1986:105-106; Kay 1980:101). It is this dichotomy in the development space of the country that factor one is highlighting. The provinces with low fertility rates, high urban populations and a mature age structure form the developed core while those on the converse, form the under-developed periphery.

The factor scores of the provinces are shown in Table 8.3 and mapped in Fig. 8.2 using four equal sized classes of two provinces

Table 8.3: Provincial factor scores: Zimbabwe 1982.

| Province | | | | | Factors Scores | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Factors I | | II | | III | | IV | | V | | VI | |
| Demo. | | Gen. Emp. | | H.hold | | For. Emp. | | Roads | | Male Act. | |
| NORTh | 1.38 | CENT | 1.14 | EAST | 1.44 | MANI | 1.03 | MIDL | 1.48 | EAST | 1.24 |
| EAST | 1.23 | MIDL | 1.00 | MIDL | 0.69 | EAST | 0.82 | NORT | 0.78 | CENT | 1.11 |
| WEST | 0.57 | MASV | 0.44 | MASV | 0.49 | NORT | 0.71 | MASV | 0.72 | SOUT | 0.75 |
| CENT | 0.03 | MANI | 0.39 | MANI | 0.44 | CENT | 0.44 | SOUT | 0.37 | MASV | 0.07 |
| MIDL | -0.13 | WEST | -0.16 | WEST | -0.13 | SOUT | -0.09 | CENT | -0.29 | MIDL | -0.17 |
| MASV | -0.79 | EAST | -0.17 | SOUT | -0.35 | MASV | -0.21 | EAST | -0.55 | WEST | -0.37 |
| SOUTh | -1.11 | NORT | -0.70 | NORT | -0.76 | MIDL | -0.69 | WEST | -1.25 | MANI | -1.23 |
| MANI | -1.18 | SOUT | -1.95 | CENT | -1.82 | WEST | -2.01 | MANI | -1.26 | NORT | -1.40 |

Notes: See Table 8.2 for full factor labels and provincial names.

each. The core or area with the most mature population structure is made up of two provinces i.e. Mashonaland East which contains the capital city of Harare and Matabeleland North containing the second largest city of Bulawayo. The extremes of the periphery are made up of the provinces of Manicaland and Matabeleland South. The latter does not contain any significant urban centres and therefore is the most rural of the provinces. It may be recalled, from Chapter 3, that the province also contained a large proportion of its population over the age of 65 years. Manicaland does have a large urban centre

***Demographic structure scores: Zimbabwe 1982***

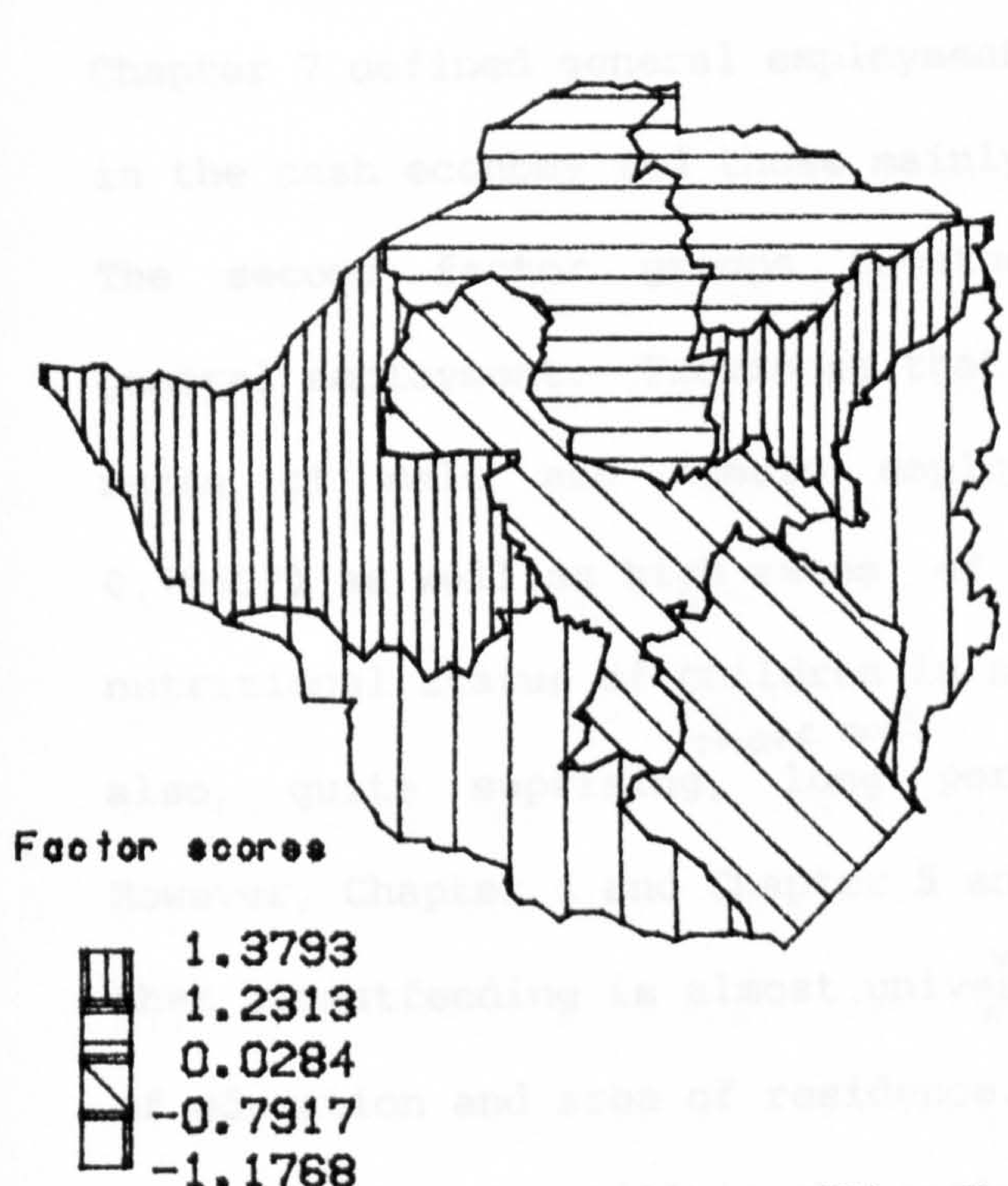



***Fig.* 8.2**

***General employment/Subsistence farming scores: Zimbabwe 1982***

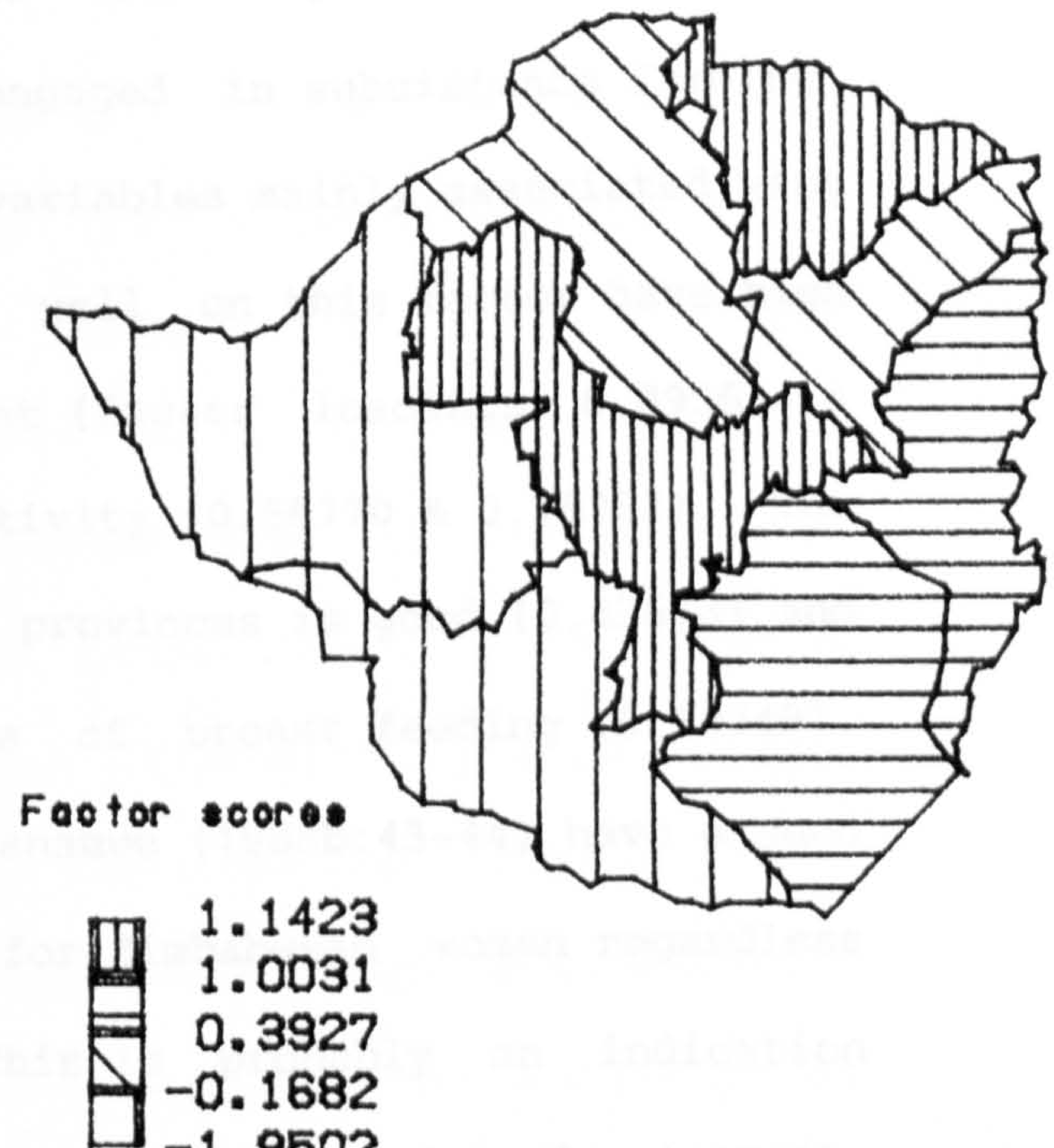



***Fig.* 8.3**

***Household size scores: Zimbabwe 1982***

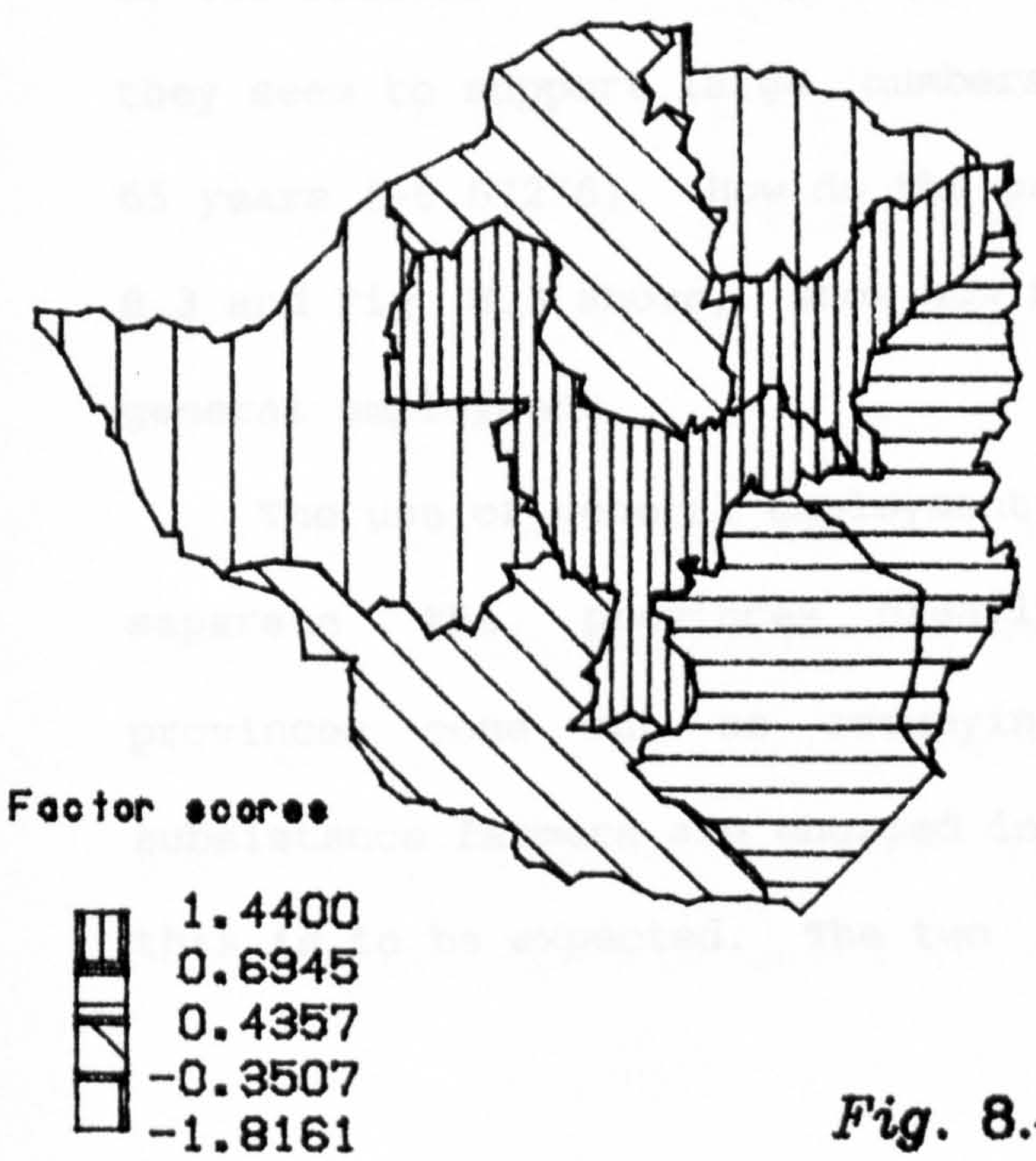



***Fig.* 8.4**

***Formal employment: Zimbabwe 1982***

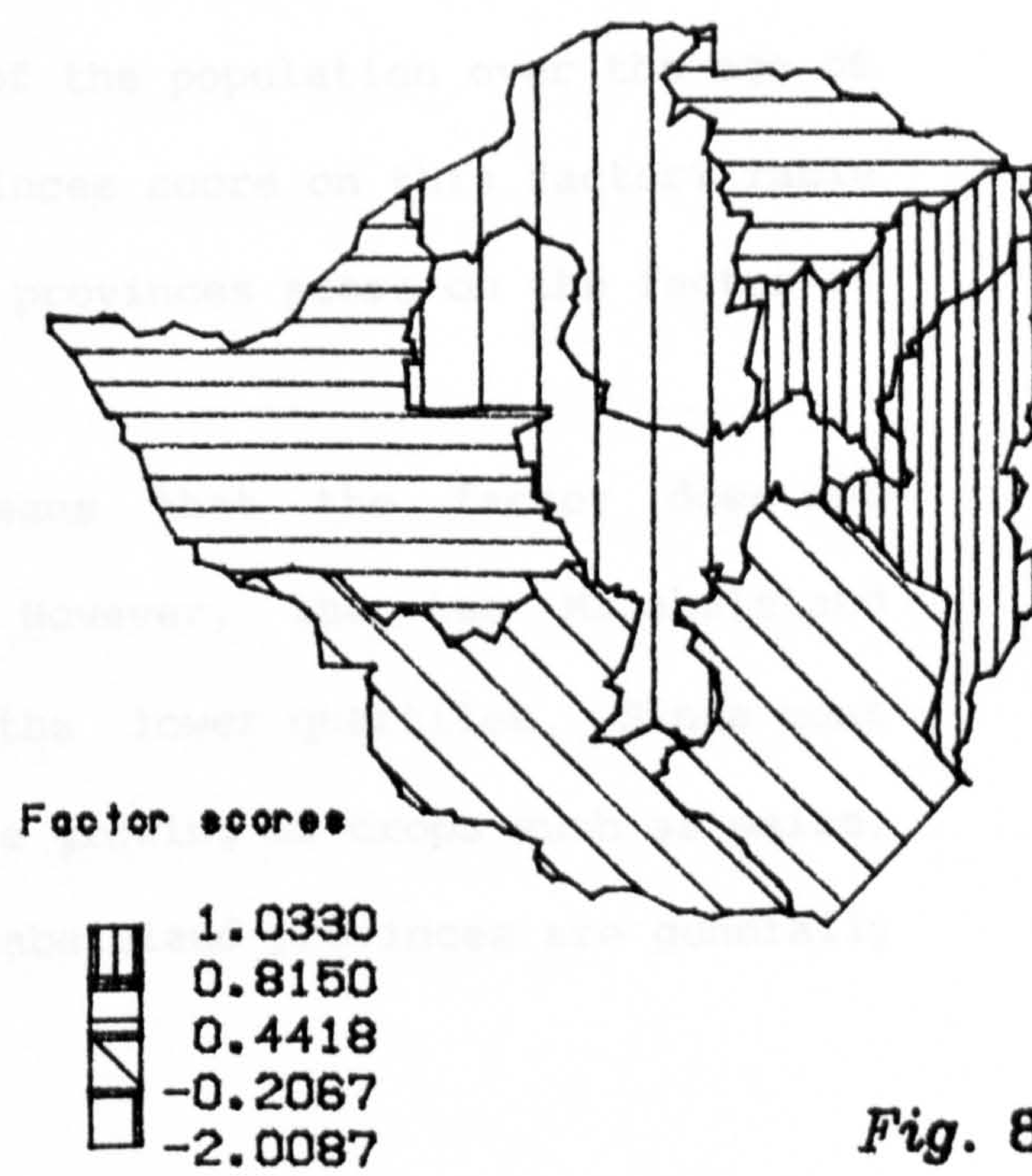



***Fig.* 8.5**

(Mutare) but suffered large population losses during the War of Liberation (1972-1979). The remainder of the provinces occupy the inner quartiles with Mashonaland West and Central being closer to the core and Midlands and Masvingo to the periphery.

*8.2.3.2 Factor II: General employment*

Chapter 7 defined general employment as including both those working in the cash economy and those mainly engaged in subsistence farming. The second factor groups together variables mainly associated with general employment. Provinces that do well on this factor have high rates of male and female employment (factor loadings 0.89563 & 0.78697) as well as high rates of activity (0.56770 & 0.78202). The nutritional status of children in such provinces is good (0.83673) and also, quite suprising, there are long periods of breast feeding (0.80749). However, Chapter 4 and Chapter 5 and Zanamwe (1988b:43-44) have argued that breastfeeding is almost universal for Zimbabwean women regardless of education and area of residence. This is probably an indication that Zimbabwe is still on the early stages on the road to development.

Provinces doing poorly on this factor have high rates of both male and female umemployment (-0.94550 & -0.68424). The average age of the females in such provinces seems to be very low (-0.86267) and they seem to support large numbers of the population over the age of 65 years (-0.67276). How do the provinces score on this factor? Table 8.3 and Fig. 8.3 above, show how the provinces score on the factor of general employment.

The use of general employment means that the factor does not separate the provinces clearly. However, the two Matabeleland provinces come out as occupying the lower quartiles. Since most subsistence farmers are engaged in the growing of crops such as maize, this is to be expected. The two Matabeleland provinces are generally dry and in Chapter 1, it was pointed out that they occupy an ecological zone suitable for extensive agriculture, especially cattle ranching. Indeed, the main activities of the commercial farmers in these provinces is extensive cattle ranching. Thus on the general level, these provinces would come up as areas of poor general employment.

Suprisingly, the uppermost quartile is occupied by Midlands and Mashonaland Central. This suggests that the factor is picking up the influence of the subsistence farming sector more than that of formal employment. Why? Because provinces which have strong formal employment opportunities like Mashonaland East and West only score moderately on this factor or even poorly as in the case of Matabeleland North. In fact, the two Mashonaland provinces just mentioned, occupy the lower portion of the inner quartiles. Provinces with large district council populations like Masvingo, Manicaland and Midlands (see Section 7.3 & Table 7.4) register more strongly on the factor. Thus the factor might be viewed as one that describes the extent and strength of the subsistence economy in the provinces. It is very weak in the Matabeleland provinces and seems to be most strong in the Midlands and Mashonaland Central provinces. The factor may be reclassified as a factor of subsistence rather than general employment. If that is done, then its interpretation becomes easier.

*8.2.3.3 Factor III: Household composition*

Factor III seems to be strongly influenced by household size or composition. It also takes into account population density and not suprisingly, the population per village health worker is included in the factor. This is because the numerator for the population density and the population per village health worker are the same. Average earnings per employee were also trapped by this factor.

Provinces scoring highly on the factor, have households with two or less members and those with 3-6 members (factor loadings 0.76655 & 0.65286 respectively). Such provinces have high average earnings per employee (0.71474), high shares of the national population in 1984 (0.85525) and did well on the population per village health worker in both 1982 and 1983 (0.64878 & 0.69283). Such provinces also have high population densities in 1982 (0.63238). Conversely, such provinces do not have a large number of households with seven or more members (-0.96318). Table 8.2 gives the factor loadings while Table 8.3 gives the factor scores for the household factor.

Fig. 8.4 shows how the provinces score on this factor. The lower quartiles are occupied by Matabeleland North and Mashonaland Central, the provinces with the lowest population densities, and the lowest share of the population in 1984. Probably, the lower population densities or lower shares of population mean that the size of households in these provinces are larger, supporting the theory that availability of land or the lack of overcrowding leads to larger family sizes. The upper quartile are occupied by Mashonaland East and Midlands. These have the largest shares of the national population as well as high population densities (CSO, 1984; CSO 1985b:43; Simon 1986:11). The presence of several large urban centres and the effects of land crowding might suggest that these provinces are tending toward smaller families of six or less members. Hicks (1974:416) argued in relation to fertility in Mexico that fertility tended to increase as the land/man ratio improved. The converse would suggest that as land/man ratios deteriorated then fertility would decline leading to smaller family sizes. The work of Schutjer et al (1983:400) supports the view that landless families had lower fertility than those who held and cultivated land. The main reason for this, they postulate, is that the land-labour argument no longer applies to those who do not hold any land or whose land holdings are declining. The fact that the upper portion of the inner quartile is occupied by Masvingo and Manicaland, which also have high population densities and have been highlighted in local research literature as having problems of overcrowding and acute land shortages (See Government of Zimbabwe-Rhodesia, 1979; Kay 1980:103-106; Whitlow 1980:3-11; Duggan 1980:227), would seem to support the argument for smaller family size as the size of land holdings fall.

*8.2.3.4 Factor IV: Formal employment*

Variables loading highly on the fourth factor seem to be related mostly to aspects of formal employment within the provinces. Formal employment and earnings are based on the twelve largest cities. Two provinces did not have any statistics on formal employment and earnings, these being Mashonaland Central and Matabeleland South. Instead of dropping them from the analysis, they were included by setting their employment and earnings to the national average. This introduces a certain degree of distortion on this factor, but it was considered the only way to study formal employment.

Provinces that do well on this factor have a large female presence in the formal labour force as shown by the variable that measures the percentage of female employees in the province (factor loading 0.92866). Further, formal employment, which most takes place in urban centres is related to population density (0.45322), to the average annual growth rate (0.45474) and to the percent of children in education (0.41204). The variable, percent doctors in the province also loads on this factor, as it is a measure of both employment as well as the concentration of employment opportunities in urban locations.

Provinces on the opposite end of the scale have employment opportunities .that are heavily weighed in favour of the male population (loading -0.93031) and therefore have unfavourable sex ratios (-0.94750). Such provinces have a significant proportion of their populations living in rural council areas (-0.53626) and tend to have on the average, large average household sizes (-0.87981).

The spatial pattern of Factor IV is displayed in Fig. 8.5, above. The bottom quartile is occupied by Mashonaland West and Midlands which have large rural council poulations. Indeed, in the former province, the rural council population is larger than that in the district and the urban councils (see Chapter 3). Mashonaland West mostly provides employment in the commercial farming sector and as argued before, this is a sector that tends to attract male employees. Midlands provides a mixture of opportunities both in the commercial farming and in the mining and manufacturing sectors. However, these opportunities are still more favourable for males as they have to do with mining minerals such as asbestos and iron ore as well as manufacturing in ferro-chrome and heavy chemical industries. Matabeleland South and Masvingo follow closely with extensive cattle ranching in the former and irrigation agriculture in the southern parts of the latter.

The upper quartile is occupied by Mashonaland East and Manicaland with Matabeleland North and Mashonaland Central occupying the upper inner quartile. These would seem to provided employment opportunities that do not discriminate heavily against females, thus having higher rates of female participation in the active labour force. Employment opportunities extend into the tertiary sectors which are more favourably to female employees. This is especially true of Mashonaland East were the city of government is. Thus, the factor would seem to divide the country into those regions or provinces where the main form of employment is in the primary sector (agriculture, mining and industries processing these raw materials) and those providing employment mainly in the secondary and tertiary sectors of the economy. Thus, if regionalisation is based on this factor then, Matabeleland North has more in common with the three provinces in the east and north east of the country than with its southern neighbour, Matabeleland South.

*8.2.3.5 Factor V & VI: Roads and general male activity*

The last two factors carry the least amount of variance in the variables and as a result are more difficult to interpret. Factor V seems to be related to the percentage of tarred or gravel roads in a province. This seems to be related to the portion of the population living in rural council areas. Provinces scoring high on this factor have a large percentage of their roads as being gravel (0.92859), i.e. those which do not seem to have a significant proportion of their roads under tar and have large rural council populations. In fact regionalisation on this factor would show a north-west south-east divide of the country with the three Mashonaland provinces and Manicaland boasting more tarred roads than the Matabeleland provinces, Midlands and Masvingo (see Fig. 1.3). There is a hint that province size might just play a part in the way in which this factor divides the country. However, to confirm this would need the inclusion of the area of each province as one of the variables in the analysis. This was left out as it was partly covered by the density variable.

Factor VI seems to classify together percent of males active in the labour force with percent of community based distributors (the measure of family planning effort). It also relates these to out-migration and non migration rates. The factor does not come out clearly enough and is therefore difficult to interpret. Probably the variables are giving a spurious loading on this factor.

Four dimensions of the social and economic space of Zimbabwe have been described in detail. These can easily replace the various maps that have been described in the preceding chapters as Berry (1961:110) has argued in relation to world economic maps. Berry reduced 43 maps of indices of development to four basic patterns. He also demonstrated that the four factors that describe the patterns can be subjected to multiple regression in order to use them in a predictive capacity. The inclusion of demographic variables in the calculation of the factors precludes their use in such a predictive capacity. For now, the discussion turns to the examination of the district level where more or less the same factors emerge. However, additional factors are also provided while other such as those of formal employment and nutritional status are lost. The questions to be answered are: what are the common patterns of variation in social and economic development at the district level? To what extent did aggregation to the provincial level mask major differences at the district level? Does the reduction in the size of the areal unit under consideration lead to a clearer regionalisation of the country?

8.2.4 Factor analysis: the district scale

The process of setting up the district files for factor analysis is similar to that described for the provincial scale. As already noted, the variables are slightly diffirent. Factor analysis extracted nine factors at the district level. Seven of these are described in detail in the following paragraphs and their spatial patterns are mapped. The factors themselves are presented in Table 8.4 while their scores are given in Table 8.5. The factors are also ranked in descending order with the four capitalised letters in the first columns acting as the abbreviation for a particular district. A detailed description of the factors and their spatial patterns now follows.

*8.2.4.1 Factor I: Demographic/population structure*

This factor is similar to that described under the provincial scale. However, there are a couple of exceptions. First, migration variables are separated from the factor and load on Factors V & VI. Secondly, the signs are reversed. For example, the fertility variables now appear with positive signs whereas in the provincial case they appeared with negative signs. The factor still describes the population structure and fertility but shows the weight of the inclusion of more rural districts and probably the smaller size of the spatial units. In this respect it is more identical to the first factor at the council level than the provincial one (see Section 8.2.5).

Districts loading highly on this factor are those with high fertility rates as measured by the child to woman ratio (loading 0.89315), the total fertility rate (0.89285) and the general fertility rate (0.89229) and consequently have high concentrations of children under the age of 15 years (0.83695). Such districts show high crude birth rates (0.76668) as well as high dependency ratios (0.78652). They also exhibit large number of women living within them (0.70228) who get most of their water supplies from well and boreholes (0.59330) while their teeming children are at school (0.54604). The total rural population in such districts is quite high (0.54543) and a large proportion of it lives in district council areas (0.53628). In this description, it is possible to recognise the under-development symptoms as described by Todaro (1982:65-86), i.e. high fertility and high dependency ratios as well as low rates of urbanisation.

Conversely, districts which seem to do poorly on this measure are actual the developed ones. These have age structures that are dominated mainly by the population in the labour force ranges

Table 8.4: First nine factors (varimax rotation): thirty-five districts of Zimbabwe, 1982

| FACTOR | I | II | III | IV | V | VI | VII | | |
|---|---|---|---|---|---|---|---|---|---|
| | Demographic Structure | Socio-Econ. Status | Subsistence Employment | Migration IN | OUT | Sanitation | Population Distribution | Water Source | Household Size |
| Eigenvalues | 23.25 | 16.54 | 3.62 | 3.22 | 2.51 | 2.34 | 1.44 | 1.28 | 1.18 |
| % of var. | 47.50 | 13.30 | 7.40 | 6.60 | 5.10 | 4.80 | 2.90 | 2.60 | 2.40 |
| Cum. var. % | 47.50 | 60.80 | 68.20 | 74.80 | 79.90 | 84.70 | 87.60 | 90.20 | 92.60 |
| CWR | 0.89315 | - | - | - | - | - | - | - | - |
| TFR | 0.89285 | - | - | - | - | - | - | - | - |
| GFR | 0.89229 | - | - | - | - | - | - | - | - |
| PCHILD | 0.83695 | -0.43801 | - | - | - | - | - | - | - |
| MMAGE | -0.80290 | 0.41688 | - | - | - | - | - | - | - |
| MTAGE | -0.79717 | - | - | - | - | - | - | - | - |
| PLABOR | -0.79376 | 0.44291 | - | - | - | - | - | - | - |
| DR | 0.78652 | -0.44429 | - | - | - | - | - | - | - |
| CBR | 0.76668 | - | - | - | - | - | - | -0.42330 | - |
| SR | -0.71607 | - | - | 0.50505 | - | - | - | - | - |
| DPM | -0.70228 | - | - | 0.49048 | - | - | - | - | - |
| DPF | 0.70228 | - | - | -0.49048 | - | - | - | - | - |
| PWLBR | 0.59330 | -0.41024 | - | - | - | - | - | 0.42549 | - |
| HP2L | -0.57743 | 0.47422 | - | - | - | - | - | - | - |
| PEDUC | 0.54604 | - | - | - | 0.44720 | - | - | - | - |
| PPNET | - | 0.95048 | - | - | - | - | - | - | - |
| PTHPN | - | 0.93869 | - | - | - | - | - | - | - |
| PTHET | - | 0.89592 | - | - | - | - | - | - | - |
| PTHWD | - | -0.87424 | - | - | - | - | - | - | - |
| PTHHF | -0.42455 | 0.80390 | - | - | - | - | - | - | - |
| PHHWL | -0.44487 | 0.70120 | - | - | - | - | - | - | - |
| PHHWM | 0.44528 | -0.69333 | - | - | - | - | - | - | - |
| PIPED | -0.57321 | 0.62945 | - | - | - | - | - | - | - |
| TRP | 0.54543 | -0.62121 | - | - | - | - | - | - | - |
| UCP | -0.54572 | 0.62100 | - | - | - | - | - | - | - |
| DCP | 0.53628 | -0.54297 | - | -0.42105 | - | - | - | - | - |
| PMEMP | - | - | 0.92925 | - | - | - | - | - | - |
| PFACT | - | - | 0.89448 | - | - | - | - | - | - |
| PFICT | - | - | -0.89448 | - | - | - | - | - | - |
| PFEMP | - | - | 0.89273 | - | - | - | - | - | - |
| PMUMP | - | - | -0.86486 | - | - | - | - | - | - |
| PMACT | - | - | 0.84485 | - | - | - | - | - | - |
| PMICT | - | - | -0.84485 | - | - | - | - | - | - |
| PFUMP | - | 0.44906 | -0.70535 | - | - | - | - | - | - |
| MFAGE | - | - | - | -0.84320 | - | - | - | - | - |
| IMR | - | - | - | 0.72891 | - | - | - | - | - |
| POLDAGE | - | - | - | -0.72370 | - | - | - | - | - |
| NMR | - | - | - | 0.68808 | -0.50757 | - | - | - | - |
| SMR | - | - | - | - | -0.96065 | - | - | - | - |
| OMR | - | - | - | - | 0.95243 | - | - | - | - |
| DTT | - | - | - | - | -0.60279 | - | - | - | - |
| PTHHP | - | - | - | - | - | -0.92162 | - | - | - |
| PROPH | - | 0.57736 | - | - | - | -0.60685 | - | - | - |
| PTHHN | - | -0.58723 | - | - | - | 0.59197 | - | - | - |
| RCP | - | - | - | - | - | - | 0.87569 | - | - |
| PSURF | - | -0.46317 | - | - | - | - | - | -0.74806 | - |
| HP7M | 0.41927 | - | - | - | - | - | - | - | 0.75317 |
| AVHH | 0.44902 | - | - | - | - | - | - | - | 0.67039 |
| H36P | - | -0.42762 | - | - | - | - | - | - | -0.64921 |

Table 8.5: Factor scores for thirty-five districts of Zimbabwe, 1982

| Factors / District | I Demographic | | II Socio-econ. | | III Subsist. | | IV In-migr. | | V Out-migr. | | VI Sanitation | | VII Pop. distr. | | VIII Water | | IX Household |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAKOni | 1.84 | GWER | 4.38 | BUHE | 1.82 | BULA | 2.48 | LUPA | 3.02 | BULM | 1.18 | CHIR | 2.72 | MAKO | 2.49 | NKAY | 2.18 |
| BUHEra | 1.40 | KWEK | 1.80 | ZVIS | 1.56 | CHIR | 1.99 | BUBI | 2.56 | BUHE | 1.12 | BUBI | 2.54 | TSHO | 2.21 | INSI | 1.49 |
| INSIza | 1.34 | MASV | 1.38 | SHUR | 1.46 | LUPA | 1.89 | CHIL | 1.63 | TSHO | 1.09 | CHIP | 1.52 | CHAR | 1.47 | UMZI | 1.35 |
| GOKWe | 1.19 | MUTR | 1.19 | GOKW | 1.34 | GOKW | 1.41 | MASV | 1.08 | BIKI | 1.00 | MUTR | 1.33 | BULA | 1.39 | BULM | 1.20 |
| BIKIta | 1.15 | HWAN | 1.15 | CHIL | 1.03 | HWAN | 0.98 | SHUR | 0.88 | BING | 0.91 | MBER | 1.00 | GUTU | 1.12 | MATO | 1.08 |
| MUTAsa | 0.95 | SHUR | 0.50 | MWEN | 0.93 | KWEK | 0.84 | GWER | 0.67 | GOKW | 0.88 | INSI | 0.82 | BUHE | 0.68 | LUPA | 1.00 |
| MATObo | 0.68 | INSI | 0.43 | CHIV | 0.92 | BIKI | 0.77 | ZVIS | 0.63 | NDAN | 0.66 | SHUR | 0.68 | BEIT | 0.65 | GWAN | 0.91 |
| LUPAne | 0.66 | MBER | 0.22 | TSHO | 0.77 | MWEN | 0.75 | NDAN | 0.54 | MBER | 0.61 | CHAR | 0.50 | CHIR | 0.61 | TSHO | 0.72 |
| NDANga | 0.61 | MAKO | 0.19 | CHAR | 0.67 | ZVIS | 0.62 | BULA | 0.50 | BEIT | 0.53 | CHIM | 0.49 | GWAN | 0.44 | GOKW | 0.69 |
| NKAYi | 0.51 | ZVIS | -0.05 | CHIP | 0.63 | CHIP | 0.59 | MWEN | 0.28 | LUPA | 0.52 | NYAN | 0.45 | HWAN | 0.36 | CHIV | 0.65 |
| ZVIShavane | 0.50 | BUHE | -0.06 | NYAN | 0.62 | BUHE | 0.51 | INSI | 0.28 | GWER | 0.43 | BEIT | 0.39 | MASV | 0.35 | MBER | 0.59 |
| GUTU | 0.38 | BULA | -0.08 | CHIM | 0.52 | NKAY | 0.24 | NYAN | 0.20 | GWAN | 0.39 | MASV | 0.23 | CHIL | 0.34 | BUBI | 0.59 |
| MASVingo | 0.23 | CHAR | -0.11 | NKAY | 0.49 | BUBI | 0.22 | CHAR | 0.13 | CHIV | 0.34 | MAKO | 0.21 | KWEK | 0.31 | CHIM | 0.59 |
| KWEKwe | 0.22 | GWAN | -0.14 | GUTU | 0.45 | NDAN | 0.07 | BING | 0.10 | MWEN | 0.33 | LUPA | 0.13 | BUBI | 0.22 | KWEK | 0.40 |
| MWENezi | 0.17 | CHIR | -0.15 | KWEK | 0.36 | BEIT | 0.03 | GUTU | 0.09 | BUBI | 0.31 | BULM | -0.04 | MUTR | 0.14 | ZVIS | 0.33 |
| UMZIngwane | 0.12 | MATO | -0.18 | BIKI | 0.31 | CHIM | -0.02 | CHIM | -0.01 | KWEK | 0.28 | KWEK | -0.09 | SHUR | 0.10 | SHUR | 0.20 |
| MUTaRe | 0.10 | CHIM | -0.28 | BUBI | 0.29 | MUTA | -0.08 | MAKO | -0.05 | ZVIS | 0.19 | MATO | -0.10 | MUTA | 0.07 | BULA | 0.14 |
| CHIManimani | 0.09 | NKAY | -0.29 | MBER | 0.27 | BING | -0.14 | UMZI | -0.14 | MATO | 0.16 | BUHE | -0.16 | BIKI | 0.03 | HWAN | 0.12 |
| GWERu | -0.04 | BIKI | -0.40 | MUTR | 0.19 | MUTR | -0.15 | GWAN | -0.19 | GUTU | 0.16 | GWAN | -0.28 | GOKW | 0.01 | CHIP | -0.07 |
| CHARter | -0.09 | MUTA | -0.40 | GWER | 0.04 | MAKO | -0.17 | CHIV | -0.22 | HWAN | 0.10 | BING | -0.34 | MATO | -0.06 | MUTR | -0.28 |
| CHILimanzi | -0.08 | GOKW | -0.41 | CHIR | -0.08 | UMZI | -0.19 | MATO | -0.30 | NKAY | 0.08 | BIKI | -0.38 | NKAY | -0.08 | MWEN | -0.38 |
| BUBI | -0.11 | CHIL | -0.44 | UMZI | -0.25 | INSI | -0.24 | MUTR | -0.32 | SHUR | -0.01 | GUTU | -0.39 | LUPA | -0.18 | MASV | -0.39 |
| BINGa | -0.15 | GUTU | -0.46 | BULA | -0.30 | CHIV | -0.27 | TSHO | -0.34 | CHIL | -0.06 | GOKW | -0.40 | NDAN | -0.47 | GWER | -0.53 |
| CHIVi | -0.19 | CHIP | -0.47 | MUTA | -0.57 | GWER | -0.29 | BIKI | -0.47 | MASV | -0.19 | NDAN | -0.40 | INSI | -0.53 | MUTA | -0.65 |
| CHIPinge | -0.24 | BUBI | -0.48 | MASV | -0.61 | MASV | -0.42 | NKAY | -0.51 | UMZI | -0.22 | CHIV | -0.48 | NYAN | -0.55 | CHAR | -0.66 |
| CHIRedzi | -0.30 | BULM | -0.51 | BULM | -0.95 | MATO | -0.70 | BUHE | -0.54 | INSI | -0.26 | TSHO | -0.54 | UMZI | -0.58 | MAKO | -0.69 |
| TSHOlotsho | -0.38 | TSHO | -0.55 | LUPA | -0.96 | GUTU | -0.73 | MUTA | -0.56 | CHIR | -0.27 | HWAN | -0.60 | CHIV | -0.62 | BIKI | -0.74 |
| BULalima Mangwe | -0.75 | UMZI | -0.58 | INSI | -0.98 | SHUR | -0.97 | KWEK | -0.69 | BULA | -0.37 | NKAY | -0.61 | CHIM | -0.86 | CHIR | -0.78 |
| HWANge | -0.79 | NYAN | -0.62 | BING | -1.14 | MBER | -1.00 | BEIT | -0.72 | MAKO | -0.43 | MWEN | -0.67 | ZVIS | -0.91 | CHIL | -0.79 |
| GWANda | -0.85 | CHIV | -0.67 | BEIT | -1.21 | GWAN | -1.06 | CHIP | -0.89 | CHAR | -0.50 | GWER | -0.72 | MBER | -0.95 | NDAN | -0.81 |
| BEITbridge | -0.86 | BING | -0.69 | GWAN | -1.23 | CHIL | -1.21 | BULM | -1.15 | MUTR | -0.65 | UMZI | -0.80 | GWER | -1.02 | GUTU | -0.95 |
| MBERengwa | -0.96 | LUPA | -0.73 | MAKO | -1.29 | NYAN | -1.31 | MBER | -1.17 | CHIP | -0.71 | CHIL | -1.11 | BULM | -1.12 | NYAN | -1.14 |
| SHURungwi | -1.16 | MWEN | -0.79 | HWAN | -1.32 | TSHO | -1.40 | HWAN | -1.32 | NYAN | -0.79 | ZVIS | -1.45 | CHIP | -1.31 | BEIT | -1.14 |
| NYANga | -1.50 | NDAN | -0.81 | MATO | -1.69 | CHAR | -1.41 | CHIR | -1.48 | MUTA | -3.37 | BULA | -1.59 | MWEN | -1.34 | BUHE | -1.36 |
| BULAwayo | -3.69 | BEIT | -0.88 | NDAN | -2.10 | BULM | -1.62 | GOKW | -1.48 | CHIM | -3.42 | MUTA | -1.84 | BING | -2.40 | BING | -2.86 |

Notes: see Table 8.4 for full factor labels.

(loading -0.79376), predominently male (-0.70228) and therefore have sex ratios that favour the male population (-0.71607). This has an impact on the average age of the male population which is higher than in districts described in the previous paragraph (-0.8029) and pushes upwards the overall average age of the total population in such districts (-0.79717). Such districts are fairly urbanised (-0.54572) and hence have small family sizes as measured by the precent of households with two or less members (-0.57743). Thus, these districts can be seen as low fertility, low dependency ratio and urbanised regions dominated by males in their age structure.

Fig. 8.6 displays the spatial pattern of the factor scores based on the demographic population structure factor or the development under-development factor. Mapping of these factor scores is based on five classes containing seven observational units following the convention adopted by Berry (1961) i.e. using rankings. Thus, the first class contains the seven highest ranks while the last class contains the seven lowest ranks. Three clusters of high fertility and high dependency ratios are described by the first and second classes. The first cluster runs from the north-east (Makoni-Mutasa) through Buhera to Masvingo in the centre. The second cluster is in the north, beginning from Gokwe running in an east-west direction from Kwekwe to Lupane through Nkayi. The third cluster is less continuous being made up of Matobo in the south-west and Mberengwa and Insiza to its north-east. However, Umzingwane breaks up this cluster as it lies between Matobo and Insiza. The interesting fact about these clusters is that they follow the belt of intense land pressures, poor land quality and high population densities as defined by Whitlow (1980:3-11) and Kay (1976:156). Indeed, it would be interesting to see how completely this belt could be reconstructed if districts of

*Demographic structure scores*
*Zimbabwe districts*, 1982

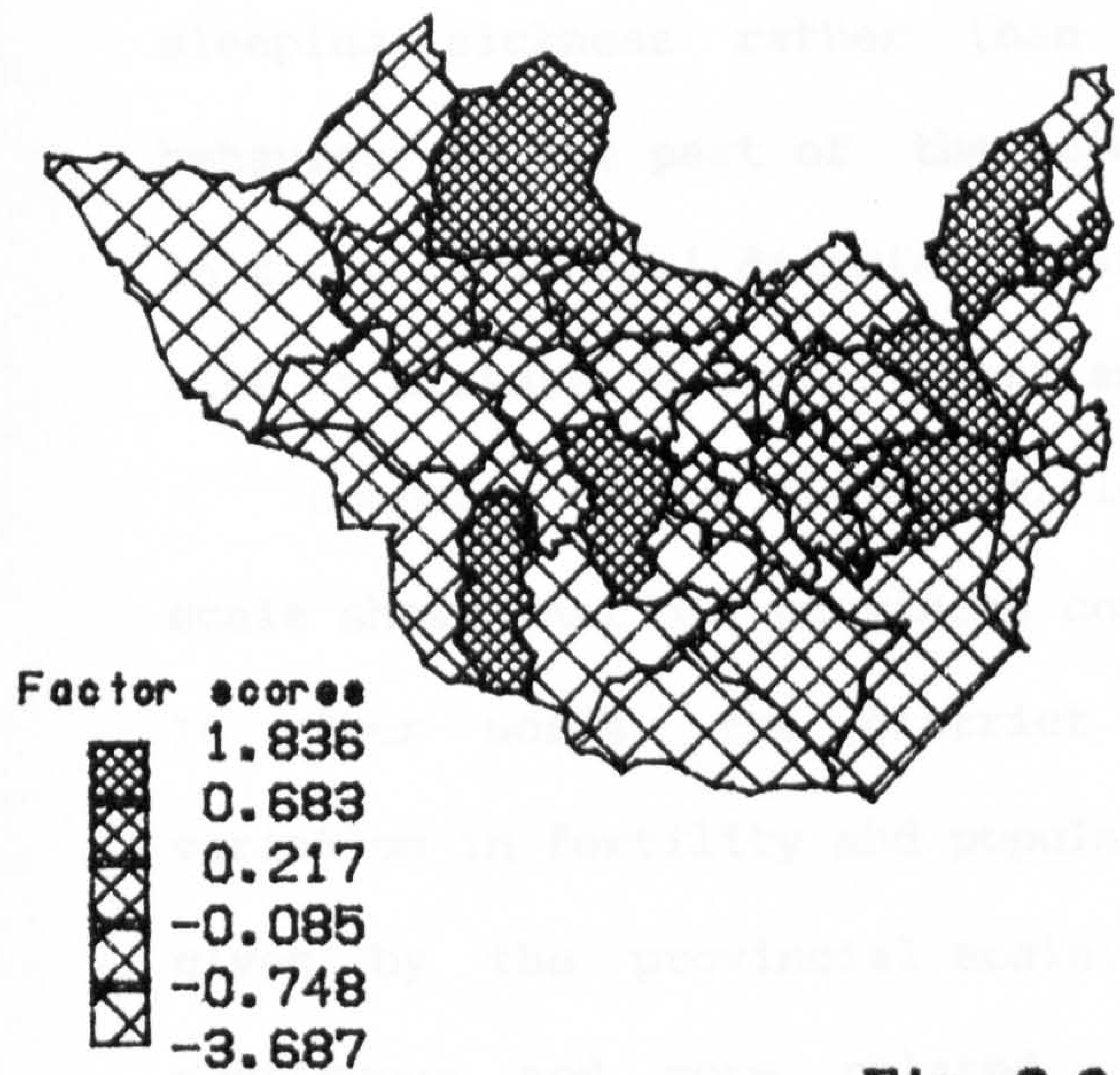



*Fig.* 8.6

*Socio-economic status*
*Zimbabwe districts*, 1982

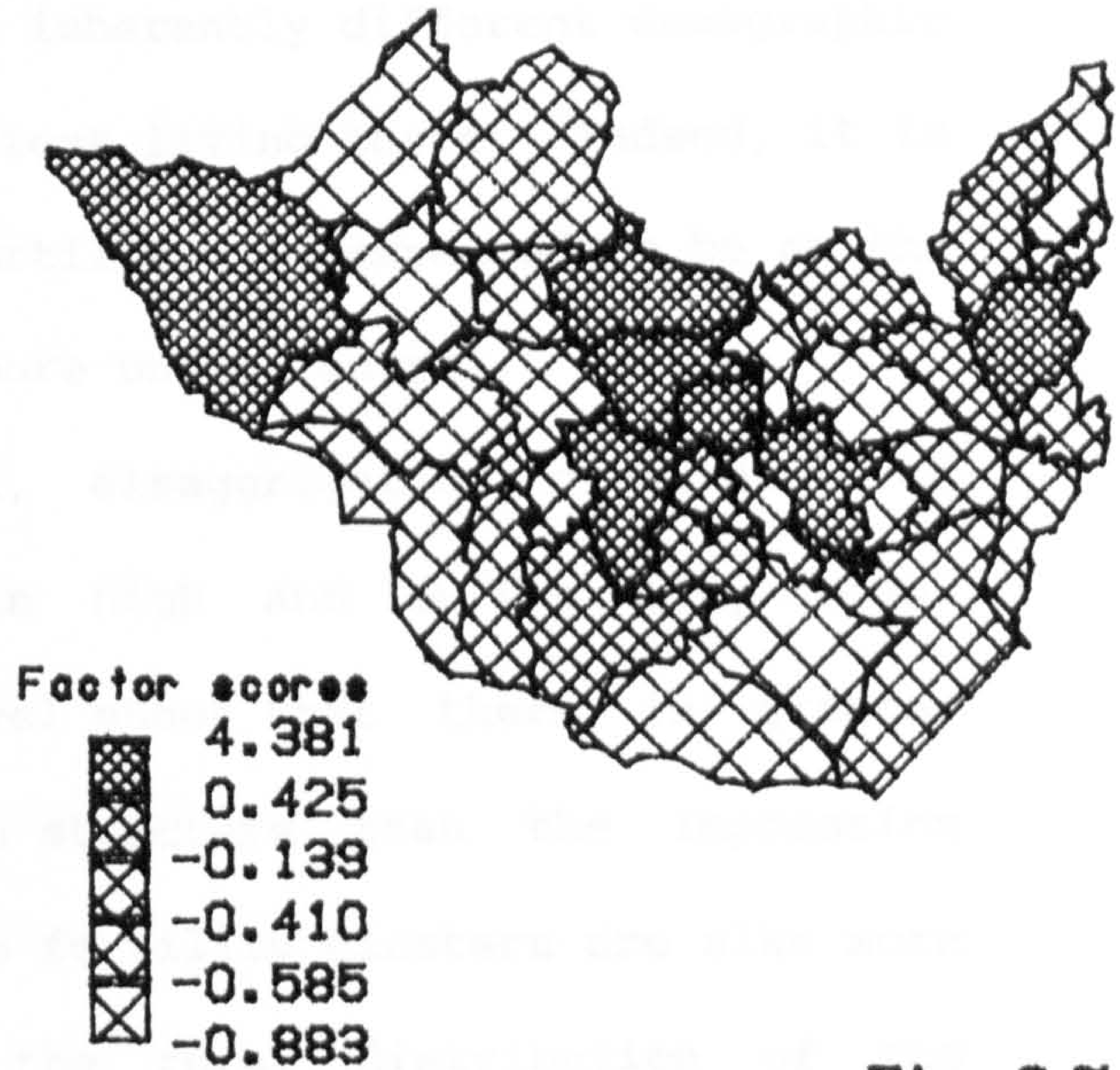



*Fig.* 8.7

*Subsistence farming scores*
*Zimbabwe districts*, 1982

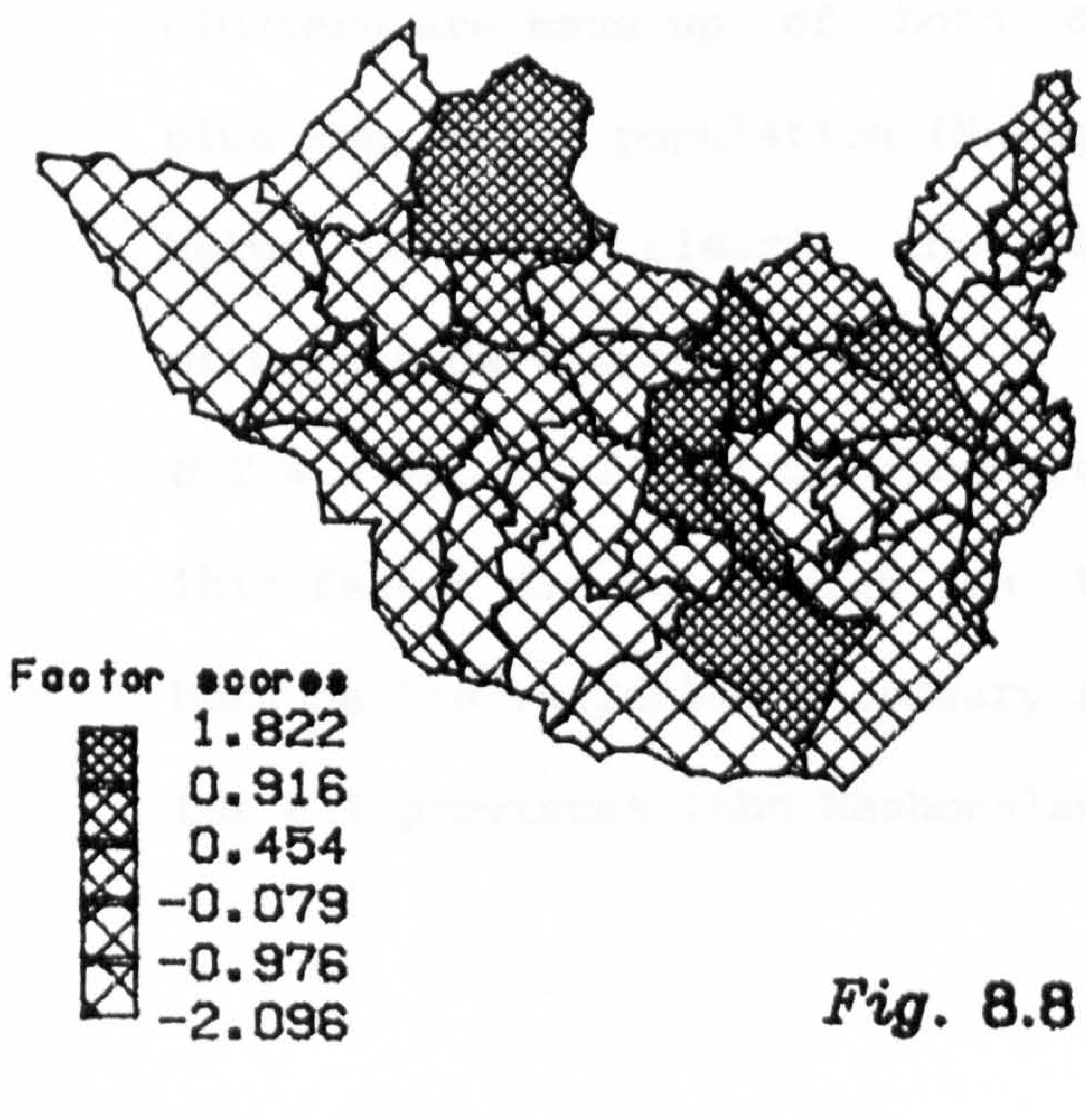



*Fig.* 8.8

*In-migration scores*
*Zimbabwe districts*, 1982

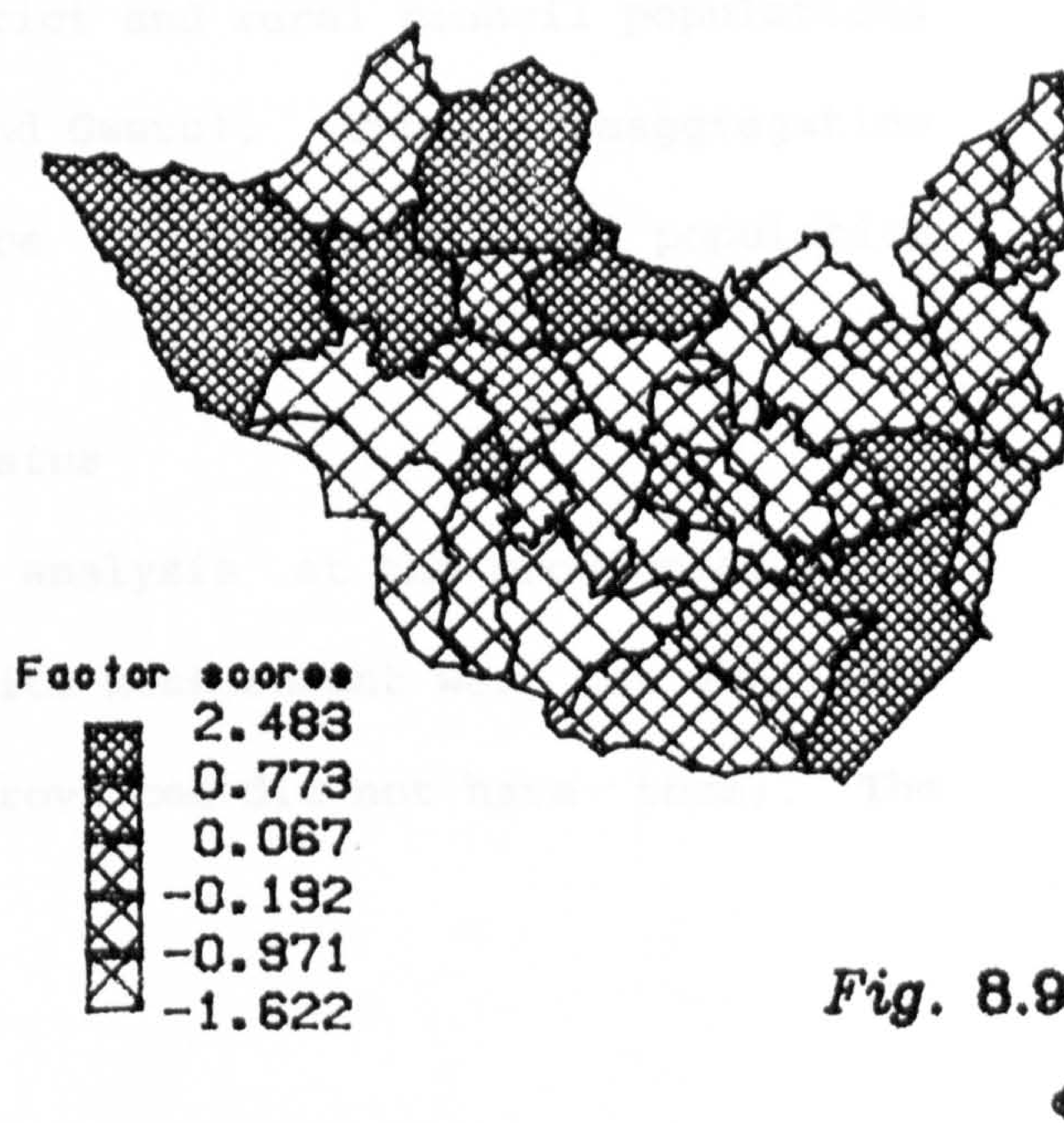



*Fig.* 8.9

the whole country had been considered. The low fertility areas seem to be a combination of peripherality as well as development. Thus areas of low fertility, low dependency ratios and favourable age structures emerge as peripheral districts such as Binga, Chiredzi and Beitbridge as well as urban districts such as Hwange, Gweru and Shurugwi. The peripheral districts of low fertility reflect late settlement and development because of the presence of diseases such as malaria and sleeping sickness rather than any inherently different demographic behaviour on the part of the populations living there. Indeed, it is in these peripheral districts that fertility is expected to be on the rise as disease is brought more and more under control.

Compared to the provincial level, disaggregation to the district scale shows that all provinces contain high and low fertility areas. In other words, the district level shows that there is greater variation in fertility and population structure than the impression given by the provincial scale. The fertility clusters are also more continuous and more related to the rural distribution of the population. Thus most districts in the high fertility clusters are either made up of district council populations (e.g. Buhera, Mutasa and Nkayi) or are made up of the former with a share of rural council populations (Makoni and Insiza). Most of those in the low fertility clusters are made up of both district and rural council populations plus some urban population (Hwange and Gweru). Thus, disaggregation helps to make clearer the picture of demographic and population structure development.

*8.2.4.2 Factor II: Socio-economic status*

This factor did not emerge in the analysis at the provincial scale because the variables necessary for its measurement were not available for all provinces (the Mashonaland provinces did not have them). The factor groups together cooking fuel, water source and distance to the source of water and toilet facilities with urban-rural residence. It is more or less the flip side of Factor I. Indeed, variables that had negative signs on Factor I have positive signs on this factor. As such it measures the quality of life enjoyed in particular districts and hence its labelling as a factor of social and economic status.

Districts doing well on this factor have populations who live chiefly in urban districts (loading 0.62100), giving them access to piped water (0.62945), which is usually less than 100 metres from the home (0.70120) and as a result enjoy the use of flush type toilets (0.80390) and modern cooking methods (0.95048), which are made up of paraffin (0.93869) and electricity (0.89592). This explains the presence of small household sizes, most with two or less family members (0.47422).

Districts coming out poorly on this factor have large proportions of their populations living in chiefly rural districts (loading -0.62121), of which the majority are in district council areas (-0.54297), with their water supply at distances greater than 100 metres from the house (-0.69333) which come from two chief sources, wells and boreholes (-0.41024) and open unprotected surface water (-0.46317) and consequently, most do not have modern sanitation facilities (-0.58723) and use firewood as their chief cooking fuel (-87424). The need for labour to fetch water and carry firewood might explain the presence of a large number of children under the age of 15 years (-0.43801) and therefore the higher dependency ratios of these districts (-0.44429) and households that range in size from 3 to 6 members (-0.42762).

Fig. 8.7, above, maps the spatial pattern of this factor. Again three clusters are discernable. The first and largest cluster occurs in the centre of the country. This groups together most of the urban districts of the Midland province stretching from Kwekwe to Zvishavane and links these to the urban district of Masvingo. A few of the districts in this cluster do not contain urban populations (e.g. Insiza and Mberengwa) but they have a large propotion of their population living in rural council areas where water and sanitation provision is similar to the urban areas.

The second cluster is in the east of the country. It is centred on the urban district of Mutare in Manicaland province and include Makoni and Buhera as well as Charter district in the Midlands. Buhera is a suprise inclusion as it is an entirely rural district made up of a district council population. The suggestion is that a few of the districts of longer settlement might be breaking through to the higher level of developed districts. Probably, proximity to Mutare has helped influence social behaviour and hence a change in social status in this district.

Matabeleland North provides the third cluster. This is not continuous but is made up of Bulawayo and Hwange, the two most urban districts in the province. Note though that Bulawayo actually excludes the City of Bulawayo. What is featured in the analysis is the rural council area which falls under the district of Bulawayo. The interesting fact about these clusters is that they concide with the areas of high development pontential as defined by Davies (cited in Simon 1986:9). The rest of the country, Davies showed as lacking in development pontential because of lack of electricity, significant mineral resources and lack of road and railway infrastructure. The rural council areas and the urban areas showed greater development pontetial because of the existence of this infrastructure as well as better quality land. Thus the urban areas and the rural council areas are high social status areas because the quality of life in these areas is much better than in the district council areas. So districts which contain a large proportion of their populations in urban and rural council will show up as high social status areas while those with mainly district council populations (with a few exceptions like Buhera) will display low social status.

*8.2.4.3 Factor III: General employment/subsistence*

The factor did emerge at the provincial level where it was also linked to length of breastfeeding and the nutritional status of children under the age of 3 years. However, these two variables are not available at the district and council level. It has been pointed out that the factor measures subsistence farming more than it does employment in the cash economy. Districts doing well on this factor therefore have high percentages of males in the subsistence sector (loading 0.92925) as well as females (0.89273) giving high overall male and female activity in the labour force (0.89448 female and 0.84485 male). Conversely, such districts will have low rates of male and female inactivity (-0.84485 & -0.89448) and low unemployment rates for both sexes (-0.86486 male and -0.70535 female). These inactivity and unemployment rates are for lack of involvement in the subsistence farming sector.

Not suprisingly, the high employment regions or districts, for subsistence farming emerge as those with huge district council populations. These occur in three clusters as illustrated in Fig. 8.8 above. The first and most extensive cluster begins in the south (Mwenezi) and runs northwards through the centre of the country encompassing districts like Chivi, Shurugwi and Chilimanzi before swing eastwards through Charter, Buhera to Chimanimani and Chipinge in southern Manicaland. The second cluster occurs in the western parts of the country. This is made up of Gokwe and Nkayi as well as Nyamandlovu but it is not a continuous belt. The third cluster is in the north east. It is made up of a single district i.e. Nyanga. In fact, these clusters include a number of the districts which Factor II classified as low social status areas (cf. Fig. 8.7 & 8.8). This confirms the fact that general employment is real a proxy for subsistence farming for it has been argued that the low social status areas do not offer much development pontential and therefore very few employment opportunities (Simon 1986:9).

*8.2.4.4 Factor IV: In-migration & V: Out-migration*

Factore IV and V deal with migration. Factor IV groups areas of high in-migration (loading 0.72891) as areas of high net migration (0.68808). Such areas have a deficit of old people over the age of 65 years (-0.72370) and a mature female age structure as shown by the average age of the female population (-0.84320). The areas are male dominated (0.49048) and therefore the sex ratio is in favour of the male population (0.50505). Such districts tend not to be dominated by district council populations (-0.42105) and therefore can only be thought of as urban or containing large rural council populations. In this respect, Factor IV might be seen as the other side of Factor III, for it seems to be highlighting the districts of development potential and therefore those offering formal employment opportunities. Districts which did poorly on factor three are expected to do better or even well on this factor. Indeed, one can argue that the factor is acting as a proxy for formal employment in much the same way that Factor III was a proxy for subsistence farming.

Conversely, Factor V highlights districts of high out-migration (loading 0.95243) which having low rates of non-migrating populations (-0.96065) and consequently have low or even negative net migration rates (-0.50757). The high rates of out-migration lead to an erosion of the total population in the district (-0.60279). Districts which did well on Factor III should also do well on this factor. This is because it is a factor picking up low social status and subsistence. One can view these two factors as secondary ones helping to explain social status and type of employment.

Fig. 8.9 and Fig. 8.10 provide a visual illustration of the two factors and should be compared to Figs 8.7 & 8.8 and to Fig. 6.9 which shows spatial patterns of life time migration in 1982. In Fig. 8.9 the areas of high in-migration and hence positive net migration occur in three clusters. There is an extensive western cluster which covers urban districts like Hwange, Bulawayo and Kwekwe as well as rural districts which have been used for resettlement like Gokwe and Lupane. In the centre of the country is a single cluster which is associated with the mining activities in the Zvishavane district. The final cluster occurs in the south-eastern part of the country. This includes the irrigation areas of Chiredzi and Chipinge.

Fig. 8.10 shows the areas of high out-migration and low stayer rates. The most extensive cluster is almost unbroken, stretching as it does from the south (Mwenezi), northwards to Chilimanzi and Charter and westwards through Insiza to Binga in the north-west. The isolated cluster occurs as Nyanga in the north-east. Note that because factors scores are calculated on the basis of all variables, the distinction or regionalisation of districts is not always completely free of overlaps. Thus, certain districts feature in either factor even though the factors are regarded as opposing ends of the spectrum. A district like Lupane is shown as both a district of high in-migration as well as high out-migration. This is not realistic in practice. It is therefore other variables which must be registering heavily on the

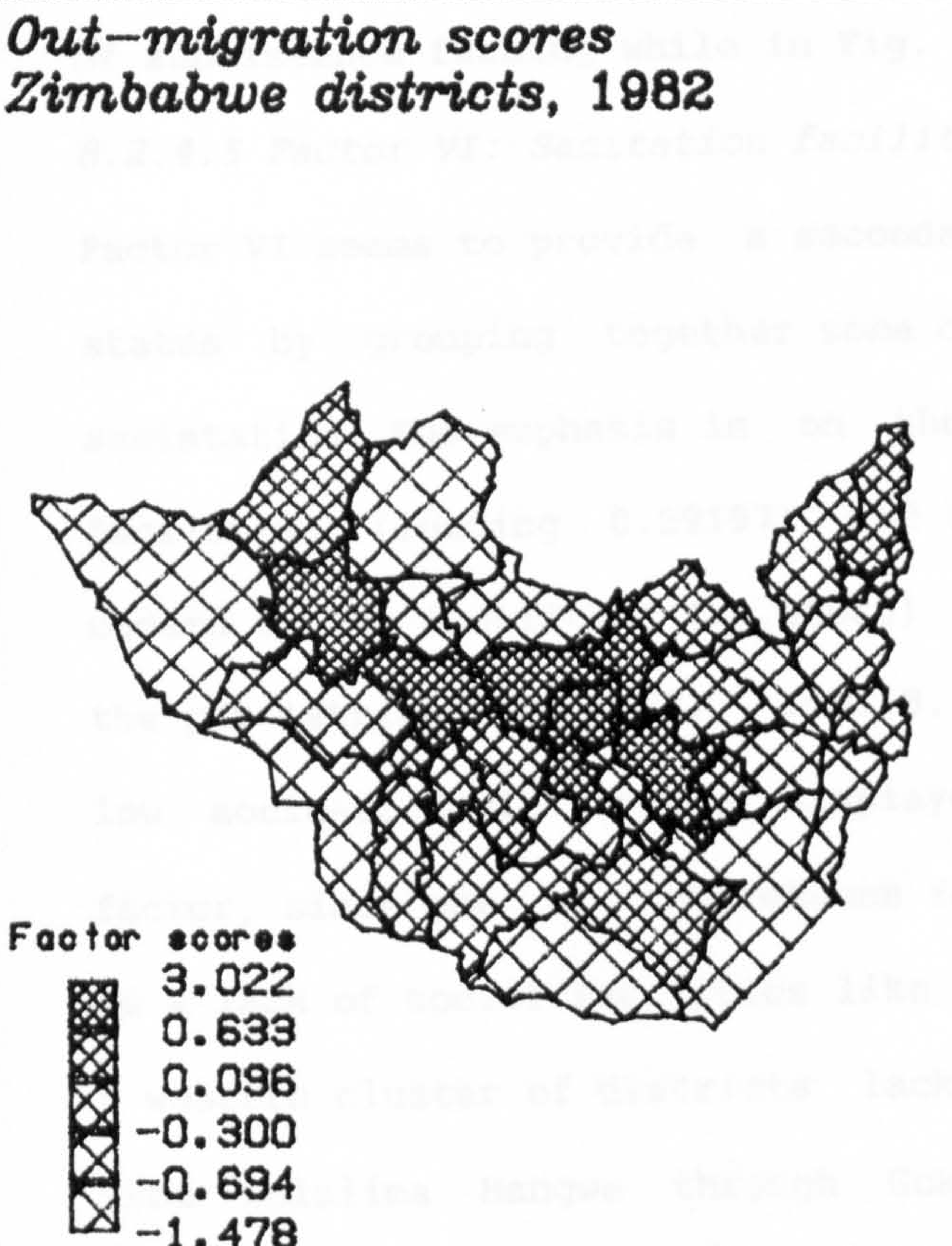



Fig. 8.10

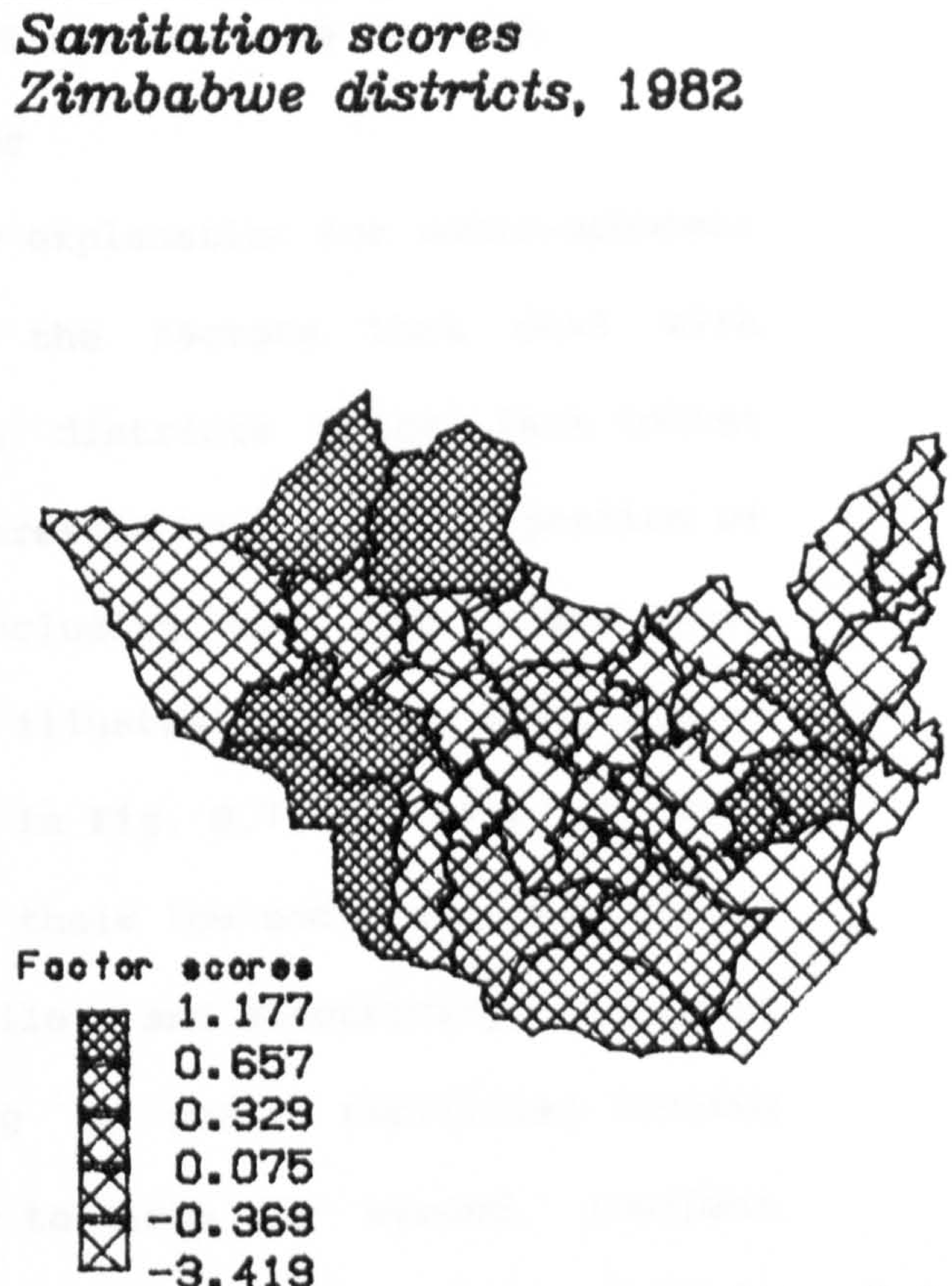



Fig. 8.11

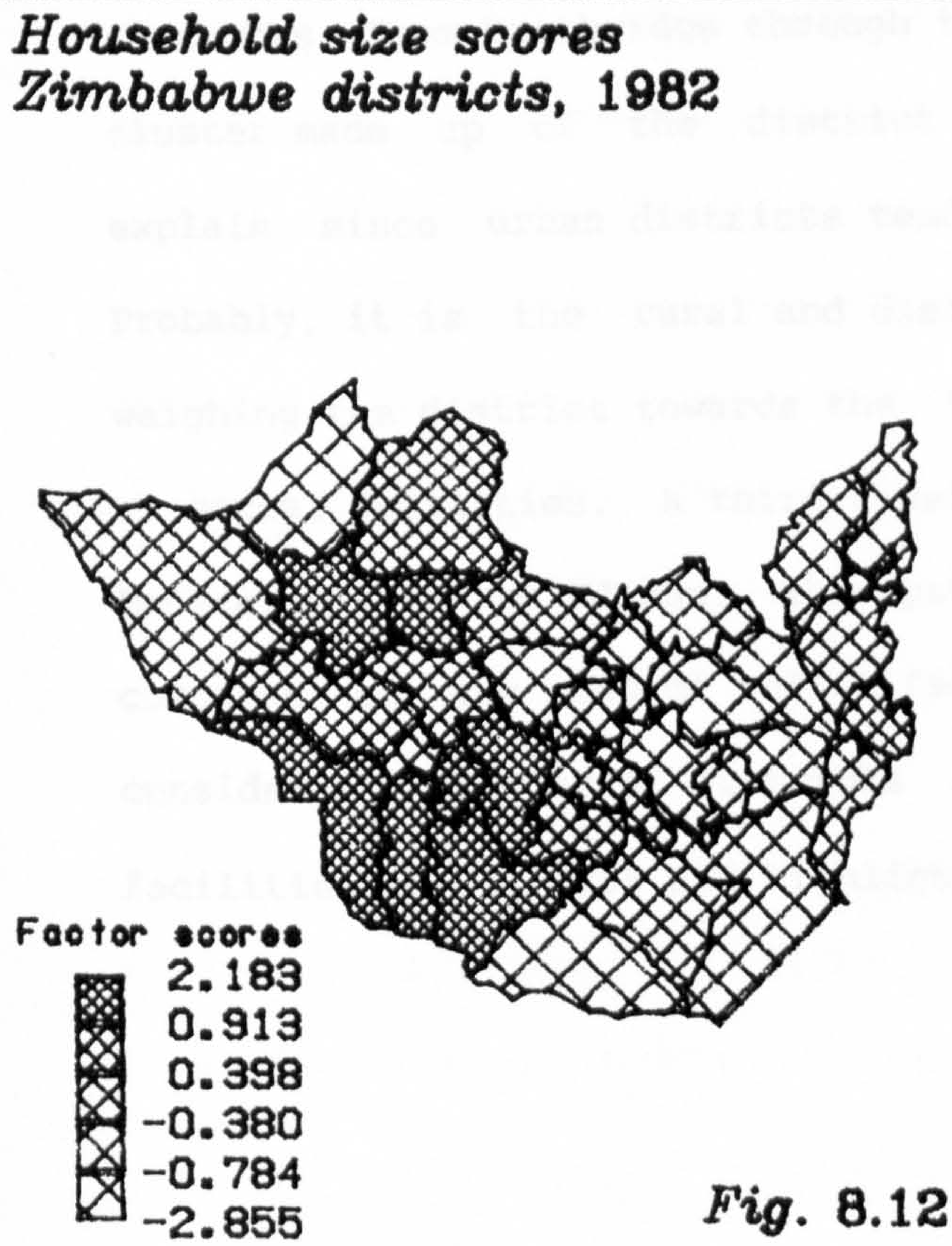



Fig. 8.12

factor scores of the district, like the percent male or the sex ratio, to bring it to the fore in both factors. Most of the districts involved though are those of low socio-economic status and high levels of subsistence farming while in Fig. 8.9 the converse is true.

*8.2.4.5 Factor VI: Sanitation facilities*

Factor VI seems to provide a secondary explanation for socio-economic status by grouping together some of the factors that deal with saniatation. The emphasis is on those districts which lack toilet facilities (loading 0.59197) and therefore have a low proportion of modern toilet facilities (-0.60685) including the most common type, the pit latrine (-0.92162). Fig. 8.11 illustrates, that districts of low socio-economic status, displayed in Fig. 8.7, do well on this factor, since one of the reasons for their low socio-economic status is a lack of social facilities like toilets and electricity. There is a western cluster of districts lacking in social facilities running from Bulalima Mangwe through Gokwe to Binga. A second, southern cluster of districts with very little in term of toilet facilities, stretches from Beitbridge through to Chivi and includes an isolated cluster made up of the district of Gweru, which is difficult to explain since urban districts tend to have better social facilities. Probably, it is the rural and district council populations which are weighing the district towards the low status associated with the lack of social facilities. A third cluster is made up of the districts of Buhera, Bikita and Ndanga. The spatial patterns of this factor can be compared to the map of toilet facilities shown in Fig. 7.5. A considerable number of districts shown as not having any toilet facilities in Fig. 7.5 are highlighted quite strongly in Fig. 8.11.

*8.2.4.6 Factor VII: Population distribution and VIII: water source*

Not much discussion will be expanded on these two factors. Suffice to say that Factor VII seems to highlight population distribution by rural council areas. The first 17 districts highlighted by this factor (see Table 8.5) have a significant proportion of their population living within rural council areas. The last 18 districts do not have as much of their populations living in rural council areas. These mostly have populations in district council areas or as in the case for Gweru or Hwange in urban councils. Table 7.4 and Fig. 7.3 can be used to check on this fact.

Factor VIII seems to highlight water source, especially poor quality water sources like open, unprotected surface water. Districts which do well on the factor fetch most of their water from wells or boreholes (loading 0.42549) while those which do poorly fetch it from surface sources (-0.74806). Water source seems to be related to the crude birth rate with those districts fetching water from surface sources having higher CBR compared to those getting it from wells or boreholes (-0.42330). The implications are that surface water is much further from the household and therefore children might be required to fetch it. Rosenzweig and Evenson (1977:1065) have argued that models of household production see children born to families in rural settings as economic assets. Part of the economic activity of such children include providing labour for herding cattle, looking after younger siblings, fetching water and firewood. Thus in this cases the association between water source and the crude birth rate would seem to be confirming this argument.

*8.2.4.7 Factor IX: Household composition*

Factor IX is concerned with household composition and average household size. It shows that districts which have large average household sizes (0.67039), generally have households with seven or more members within them (0.75317) and therefore lower proportions of households with 3-6 members.

Fig. 8.12 shows only two clusters of such large household sizes. The main cluster runs from Chivi in the centre of the country, westwards to Bulalima Mangwe before swing north to Nkayi, Gokwe and Lupane. An isolated cluster occurrs in the eastern district of Chimanimani in Manicaland. According to the argument already advanced above, these districts have low population densities, which is used as a proxy for land size and availability or overcrowding, and as a result can afford larger families than some of the districts identified in the high fertility clusters of Fig. 8.6. In this, Fig. 8.12 is very much similar to Fig. 7.4 which mapped average household size, especially in identifying the western belt as a belt of large households.

8.2.5 <u>Factor analysis: council scale</u>

The master file for analysis at the local authority level, referred to in the remainder of the chapter as the council level, or scale, was set up in an identical manner as that for the provinces and districts. Certain variables were not available at the council level. These included the finer measures of fertility like the total fertility rate, the general fertility rate or even the crude birth rate. Only the child to woman ratio was available as a measure of council area fertility. Further, no information on migration was available. This reduces the degree of comparability with the provincial and district scales, on the one hand.

On the other hand, a new set of variables are introduced. The first set are to do with the labour force. It is possible, at this scale, to separate formal employment from subsistence farming.

Marriage age is included through the singulate mean age of marriage for males, females and persons. Education is represented by the literacy variable for males, females and persons. The expectation is that the new variables will make the interpretation of the socio-economic status and household composition variables easier and that disaggregation to the council level will reveal some of the variations that were concealed by the district scale. The assumption being made is that if the district scale can reveal variations masked at the provincial level then, the council scale can do the same for the district, despite having fewer fertility and migration measures.

Eight factors were extracted using principal component analysis. They were rotated using normal varimax rotation to improve the interpretation of their simple structure. Only loadings greater than +0.4 or less than -0.4 were considered for easier interpretation and consistency with the provincial and district scales. Table 8.6 presents the factors and their loadings on the variables while Table 8.7 gives the factor scores. The description and interpretation of the first five factors and their spatial patterns follows. The last three are excluded because their are secondary factors highlighting particular features of the first five.

*8.2.5.1 Factor I: Socio-economic status*

The lack of fertility and migration variables at the council level is revealed by the fact that Factor I emerges more strongly as a factor of socio-economic status rather than a demographic-population structure one. In effect, it combines Factors I, II and IX identified at the district level into a single factor. As a result it might be more accurately interpretated as a social-household status factor. Further, whereas Factor II at the district level highlighted areas of high socio-economic status, in this case the reverse is true. The social/household status factor at the council level is highlighting areas of low socio-economic standing with large household sizes.

Councils with low socio-economic status have large household sizes and expanding population structures, and load heavily on this factor. Such councils have large average household sizes (loading 0.94439), most of them with 7 or more members (0.91954) and a fairly large proportion with 3 to 6 members (0.73306) which are full of children under the age of 15 years (0.87616) and a fair share of old age people over the 65 year age ranges (0.77819). Such councils therefore have a heavy burden of dependency (0.92945), borne by the female population (0.91249), and gives large child to women ratios (0.73712). These households of women, children and old age people have poor social conditions illustrated by the fact that most fetch water at distances greater than 100 metres from the house (0.90598) mainly from two sources - wells and boreholes (0.77116) and unprotected surface water (0.58121). They lack in toilet facilities (0.85618) and use mainly firewood for their cooking (0.47310). The poor social provision is complemented by a narrow base of employment opportunity. Most of the population in these council areas is engaged is subsistence farming (0.68696), of which males seem more active (0.69784) than females (0.58851).

The converse, the more developed council areas, are those with small households of two or less members (-0.93868), dominated by males (-0.91249) giving sex ratios biased in favour of the male population (-0.91608) in an age structure dominated by the labour force population (-0.90564). Social provisions are a lot better than in the council areas described in the previous paragraph. The households enjoy water that is less than 100 metres from the home (-0.91880) most of which is piped (-0.90446) enabling the use of flush type toilets

Table 8.6: First five factors (varimax rotation), local authority areas of Manicaland and Masvingo, 1982

| Factor | I Socio-economic | II Marriage Literacy | III Unemployment Activity | IV Cooking/ Sanitation | V Formal Employ. |
|---|---|---|---|---|---|
| Eigenvalues | 24.57 | 6.79 | 5.35 | 3.07 | 2.33 |
| % of var. | 50.10 | 13.80 | 10.90 | 6.30 | 4.80 |
| Cum. var. % | 50.10 | 64.00 | 74.90 | 81.20 | 85.90 |
| AVHH | 0.94439 | - | - | - | - |
| HP2L | -0.93868 | - | - | - | - |
| DR | 0.92045 | - | - | - | - |
| HP7M | 0.91954 | - | - | - | - |
| PHHWL | -0.91880 | - | - | - | - |
| SR | -0.91608 | - | - | - | - |
| DPF | 0.91249 | - | - | - | - |
| DPM | -0.91249 | - | - | - | - |
| PHHWM | 0.90598 | - | - | - | - |
| PLABOR | -0.90564 | - | - | - | - |
| PIPED | -0.90446 | - | - | - | - |
| MMAGE | -0.89500 | - | - | - | - |
| PCHILD | 0.87616 | - | - | - | - |
| PTHHN | 0.85618 | - | - | - | - |
| POLDAGE | 0.77819 | - | - | - | - |
| PWLBR | 0.77116 | - | - | - | - |
| PMEMP | -0.73722 | - | - | - | 0.59839 |
| CWR | 0.73712 | - | - | - | - |
| H36P | 0.73306 | - | - | - | - |
| MTAGE | -0.72654 | - | - | - | - |
| PMSUB | 0.69784 | - | - | - | -0.60101 |
| PTSUB | 0.68696 | - | - | - | -0.60416 |
| PTHHF | -0.63993 | - | - | 0.63228 | - |
| PSURF | 0.58121 | - | - | - | - |
| FLIT | - | 0.91558 | - | - | - |
| SF7 | - | 0.90183 | - | - | - |
| PLIT | - | 0.89645 | - | - | - |
| ST7 | - | 0.88337 | - | - | - |
| MLIT | - | 0.85642 | - | - | - |
| SM7 | - | 0.80417 | - | - | - |
| PMUMP | - | - | 0.89688 | - | - |
| PTUMP | - | - | 0.88675 | - | - |
| PFACT | - | - | -0.84521 | - | - |
| PFICT | - | - | 0.84521 | - | - |
| PFUMP | -0.45702 | - | 0.68602 | 0.49549 | - |
| DENSE | - | - | - | 0.78327 | - |
| PTHWD | 0.47310 | - | - | -0.73765 | - |
| PTHET | -0.44977 | - | - | 0.73036 | - |
| PTHPN | -0.46974 | - | - | 0.72024 | - |
| PTHHP | - | - | - | -0.48027 | - |
| PFEMP | -0.46293 | - | - | - | 0.76479 |
| PTEMP | -0.67480 | - | - | - | 0.68707 |
| PFSUB | 0.58851 | - | -0.42816 | - | -0.61506 |
| PMACT | - | - | - | - | - |
| PMICT | - | - | - | - | - |
| PTACT | - | - | - | - | - |
| PTICT | - | - | - | - | - |
| MFAGE | - | - | - | - | - |
| AGR | - | - | - | - | - |

Table 8.7: Factor scores for the local authority areas of Manicaland and Masvingo, 1982

| Local authority | I Socio-Econ. | | II Mar/Lit | | III Unemploy. | | IV Coo/Sani. | | V Formal Emp. |
|---|---|---|---|---|---|---|---|---|---|
| MASVingo DC | 1.06 | GUTUD | 1.52 | MAUND | 2.06 | MUTAM | 2.71 | CASHR | 2.75 |
| BATAnai DC | 1.06 | GUTCR | 1.19 | MAKOR | 1.16 | MASVM | 2.71 | GUTCR | 1.93 |
| GAZAland DC | 0.95 | NYAND | 0.94 | TSUNR | 1.15 | BUHED | 0.77 | MASVD | 1.65 |
| NYANingwe DC | 0.95 | MASVD | 0.65 | GUTUD | 1.12 | MASVR | 0.58 | CHIPR | 1.09 |
| GAZa K. DC | 0.94 | NYAHD | 0.60 | MUTAM | 1.11 | GAZKD | 0.52 | GAZAD | 0.56 |
| BIKIta P. DC | 0.94 | MUTAM | 0.59 | CHIRR | 0.85 | BIKID | 0.44 | MASVM | 0.44 |
| NYAHunda RC | 0.87 | MASVR | 0.59 | NYAHR | 0.83 | NYAGD | 0.36 | BATAD | 0.35 |
| ZAKA DC | 0.83 | MUTAD | 0.56 | MASVM | 0.80 | CASHR | 0.31 | CHIMR | 0.29 |
| GUTU DC | 0.78 | BUHED | 0.49 | GAZAD | 0.69 | CHIRR | 0.30 | NYAHR | 0.27 |
| MAUNgwe DC | 0.77 | MASVD | 0.46 | MUTAR | 0.44 | ZAKAD | 0.28 | MUTAR | 0.24 |
| NYAnGa DC | 0.64 | MAUND | 0.45 | MASVD | 0.41 | CHITD | 0.18 | MASVR | 0.21 |
| BUHEra DC | 0.56 | TSUNR | 0.39 | BATAD | 0.20 | MUTAD | 0.16 | MAUND | 0.18 |
| MUTAre DC | 0.40 | INYAR | 0.34 | GAZKD | 0.15 | NYAHR | 0.11 | MUTAM | 0.11 |
| CHITepo DC | 0.38 | MUTAR | 0.32 | NYAND | 0.12 | MABVD | 0.05 | NYAGD | -0.05 |
| MABVazuva DC | 0.30 | MAKOR | 0.30 | MASVR | 0.10 | MASVD | -0.27 | MAKOR | -0.19 |
| CASHel RC | 0.01 | CHITD | 0.23 | CHIPR | 0.09 | GAZAD | -0.30 | NYAND | -0.31 |
| TSUNgwesi RC | -0.01 | MABVD | 0.11 | INYAR | -0.36 | BATAD | -0.34 | TSUNR | -0.36 |
| GUTu Chats RC | -0.45 | BIKID | 0.02 | ZAKAD | -0.50 | GUTCR | -0.36 | ZAKAD | -0.40 |
| MAKOni RC | -0.47 | CASHR | -0.05 | BIKID | -0.59 | MAKOR | -0.44 | GAZKD | -0.42 |
| MASVingo RC | -0.69 | ZAKAD | -0.09 | MUTAD | -0.74 | CHIPR | -0.50 | MABVD | -0.63 |
| CHIPinge RC | -0.80 | CHIMR | -0.14 | CHITD | -0.89 | MAUND | -0.66 | GUTUD | -0.75 |
| MUTAre RC | -1.00 | NYAGD | -0.18 | GUTCR | -0.96 | NYAND | -0.71 | CHITD | -0.92 |
| MUTAre MC | -1.05 | BATAD | -1.22 | CASHR | -1.30 | GUTUD | -0.83 | BIKID | -0.96 |
| MASVingo MC | -1.24 | GAZAD | -1.58 | MABVD | -1.37 | CHIMR | -0.88 | INYAR | -0.99 |
| CHIRedzi RC | -1.70 | CHIRR | -1.82 | CHIMD | -1.50 | TSUNR | -0.93 | MUTAD | -1.20 |
| CHIMani RC | -1.74 | CHIPR | -2.07 | BUHED | -1.51 | MUTAR | -1.51 | CHIRR | -1.32 |
| INYAnga RC | -2.31 | GAZKD | -2.60 | NYAGD | -1.58 | INYAR | -1.75 | BUHED | -1.55 |

Notes: Full factor labels in Table 8.6

(-0.63993). Employment is mainly in the formal sector and is male dominated (-0.73722) though females do feature (-0.46293). The male dominance pushes the average employment for persons up (-0.67480). The households can afford the use of electricity (-0.44977) and paraffin (-0.46974) for cooking a boon from their involvement in the cash economy, as evidenced by the level of employment in the formal sector.

The spatial patterns of Factor I are mapped in Fig. 8.13 based on the factor scores in Table 8.7. The capitalised letters show the abbreviations to be used in subsequent references to the council, with D referring to district councils, R to rural councils and M to urban or municipal councils. The councils are divided into three equal classes on the basis of the first factor. Table 8.7 illustrates that the first factor divides the councils almost neatly between district councils on the one hand and rural-urban councils on the other. The exception is Nyahunda RC, which in fact has more in common with the district councils than the rural councils because it was part of what were formally known as African Purchase Areas (Cheater, 1982; see Chapter 1). The factor therefore shows that the former African Purchase Lands have similar social and household characteristics to their district council counterparts.

Fig. 8.13 shows that the worse off district councils are generally in Masvingo Province with only one, Gazaland DC, in southern Manicaland Province. This more or less creates a north-south divide between the district councils of the two provinces, with those in the north having social and household conditions that are a moderate improvement on their southern neighbours. Thus, district councils like Buhera, Nyanga and Chitepo, all in Manicaland Province seem to have better social-economic conditions than those like Gaza Komanani,

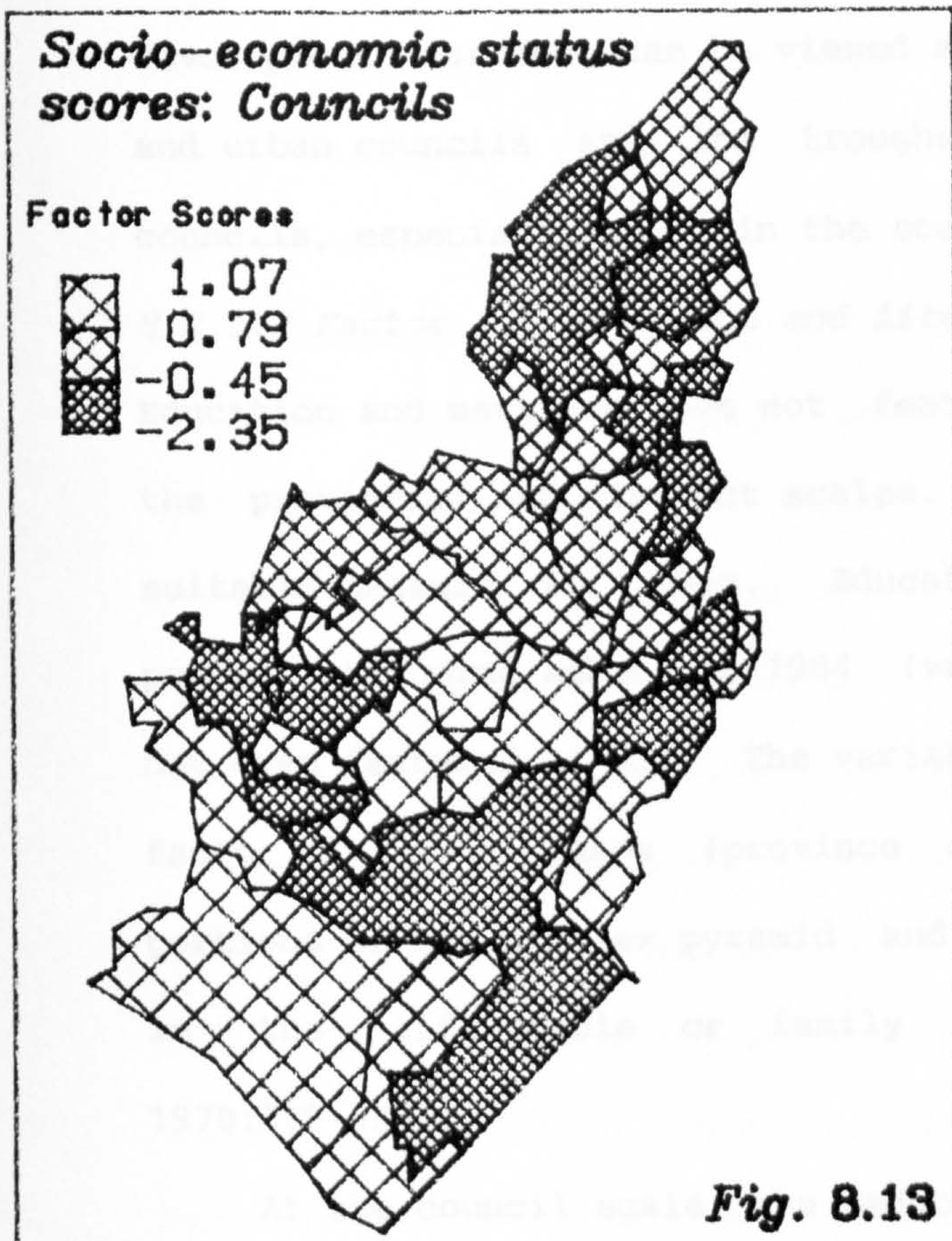



Fig. 8.13

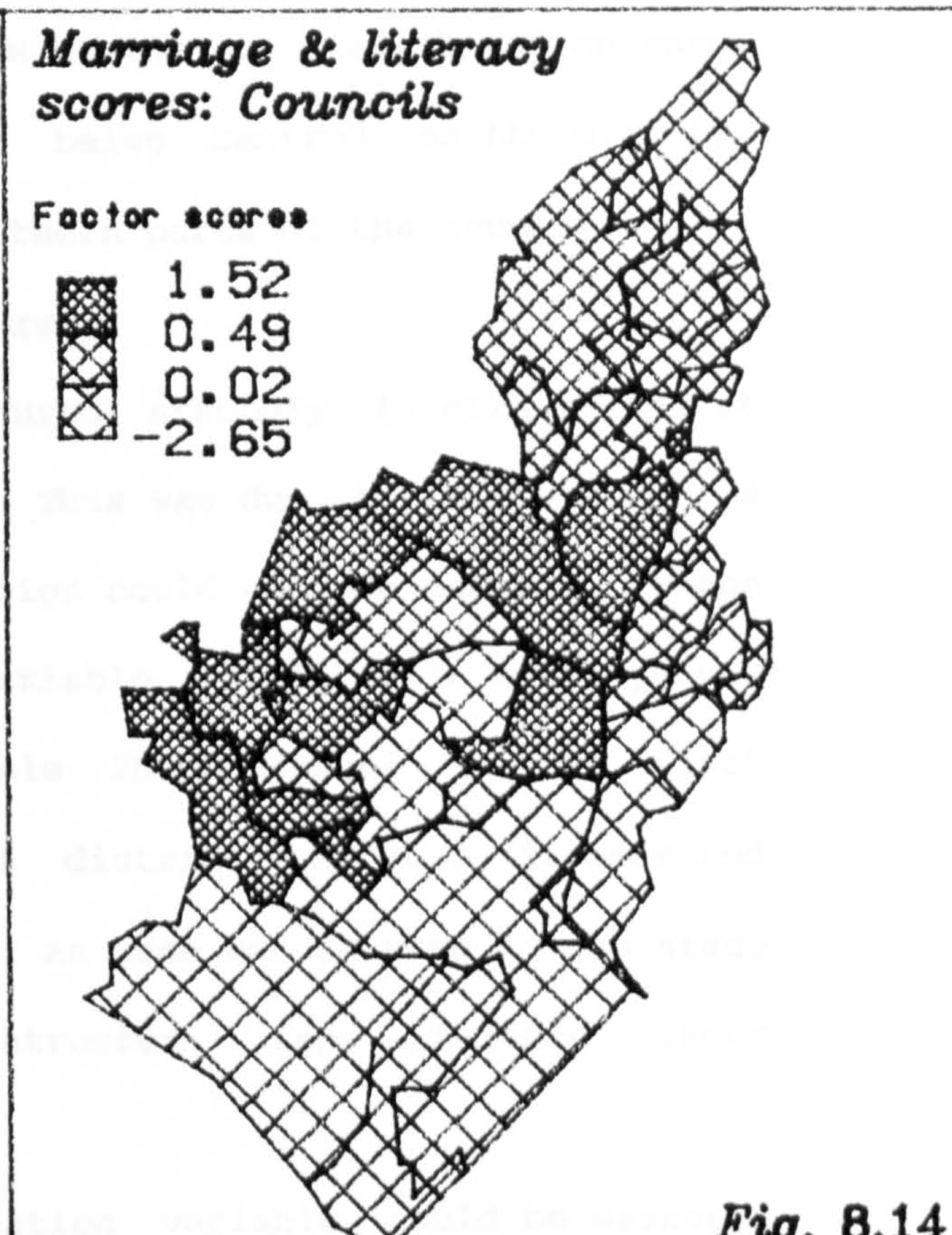



Fig. 8.14

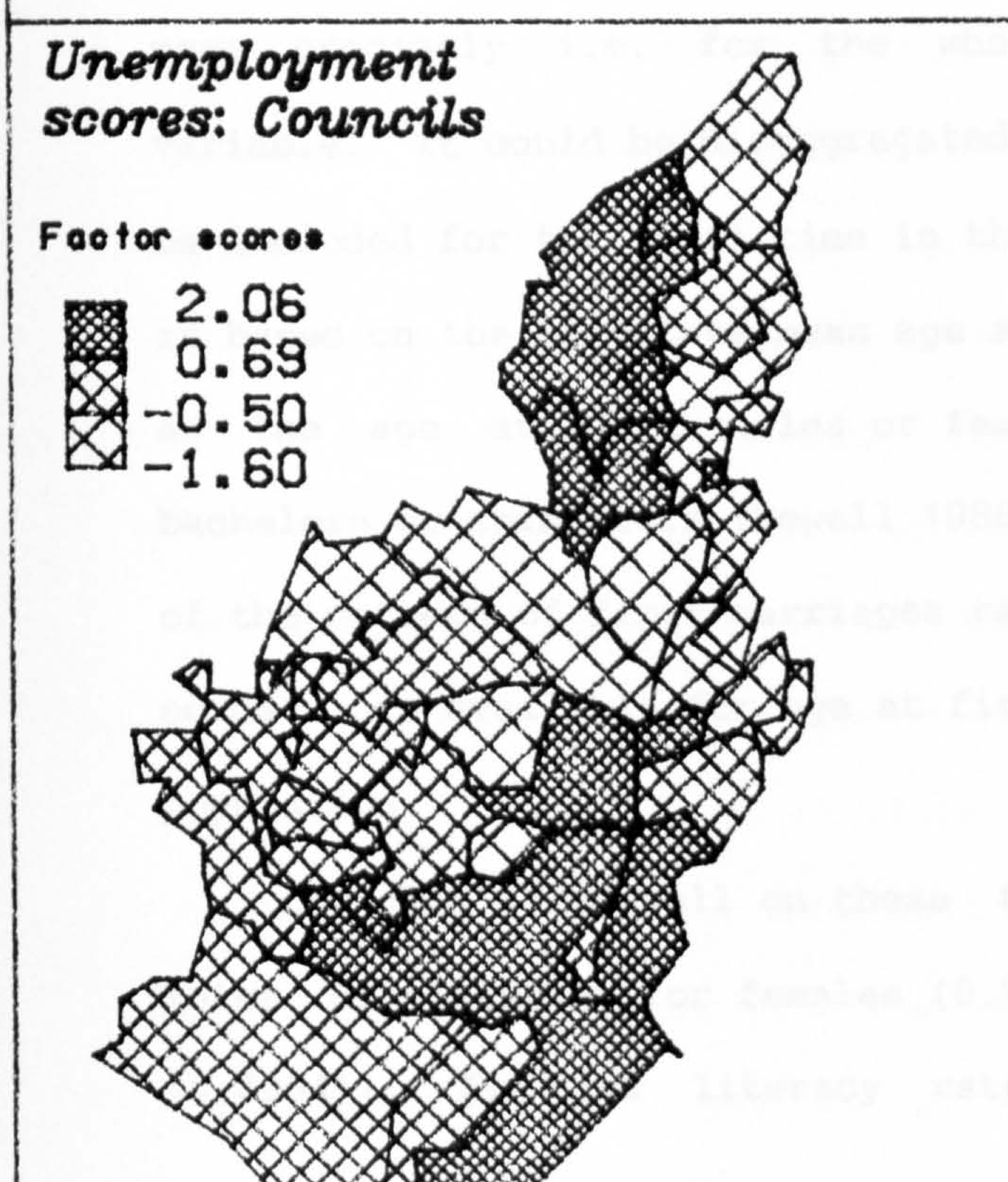



Fig. 8.15

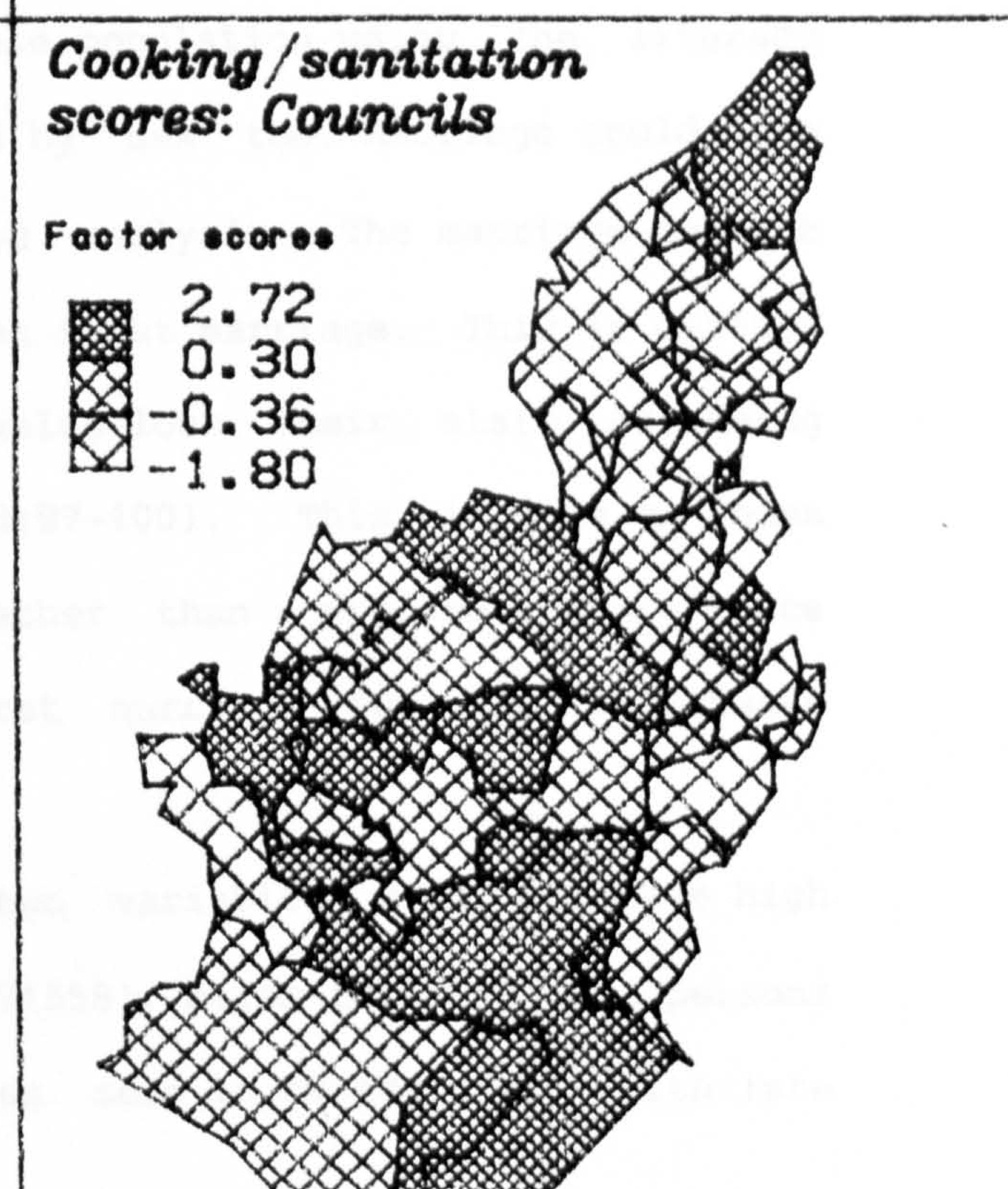



Fig. 8.16

Nyaningwe and Batanai in Masvingo Province. Rural council areas and urban councils come out as having the best socio-economic conditions as well as household characteristics. Thus, the socio-economic development surface can be viewed as having its peaks based on rural and urban councils and its troughs being centred on the district councils, especially those in the southern parts of the country.

*8.2.5.2 Factor II: Marriage and literacy*

Education and marriage have not featured strongly in discussions at the provincial and district scales. This was due to a lack of a suitable measure for them. Education could only be measured by the percent attending school in 1984 (variable PEDUC) while marriage was not even featured at all. The variable PEDUC loaded on the first factor in both cases (province & district) because it measured portions of the age-sex pyramid and as such was related to the stage in the life cycle or family structure type factors (Rees 1970:318-320).

At the council scale, the education variable could be measured more precisely i.e. for the whole population using the literacy variable. It could be disaggregated by sex too. Marriage could also be included for the first time in the analysis. The marriage measure is based on the singulate mean age at first marriage. This is defined as the age at which males or females lose their state of being bachelors or spinisters (Newell 1988:97-100). This is more an index of the pattern of first marriages rather than a precise measure since no data are available for age at first marriage for the Zimbabwean population.

Councils doing well on these two variables seem to have high rates of literacy for females (0.91558), males (0.85642) and persons (0.89645). The high literacy rates seem to be associates with late entry into marriage for both sexes (females 0.90183 & males 0.80147) giving a persons average of 0.88337.

Fig. 8.14 illustrates the spatial pattern of the marriage-education factor. Again, there is a north-south divide to the provinces though there is no distinction along district/rural-urban council lines. The southern councils of Chiredzi RC, Gaza Komanani DC, Zaka DC, Chipinge RC and Gazaland DC feature as the areas of poor literacy rates and early marriages. The south eastern corner of the country has already been described as an area of late development. This seems to have affected the spreads of educational facilities and hence the literacy rates. Consequently, it can be argued that the social change in attitudes towards marriage, which accompany improved literacy, have not taken place to the same extent as for those councils in the north and east of the country's two provinces. The educational core and hence the regions of late entry into marriage seem to be based in a belt stretching from Nyaningwe DC, north-eastwards to the councils of Masvingo MC and RC, Buhera and Mutare DC plus Mutare MC. Most of Manicaland councils feature as having moderate rates of literacy as well as entry into marriage, though Nyanga DC seems to have more in common with the southern councils of Masvingo than with its neighbours. Thus, education or literacy and entry into marriage can be seen as related. High literacy rates, probably achieved by a longer stay within the educational system, leads to delayed entry into marriage (ZNFPC 1985).

*8.2.5.3 Factor III: Unemployment and activity rates*

Unemployment and rates of activity or inactivity within the labour force age ranges emerge as a separate factor at the council scale. This contrasts sharply with the district and province level where the employment factors tended to group together. The factor highlights areas of high male (loading 0.89688), persons (0.88675) and female (0.68602) unemployment as areas which have low female participation in the labour force (-0.84521). The low levels of female participation in the labour force in such areas leads to high rates of female inactivity (0.84521), especially because the women are not being absorbed by activities like subsistence farming (-0.42816).

Consequently, Fig. 8.15 picks up councils like Mutare MC, Tsungwesi RC, Chiredzi RC and Chipinge RC as areas of high male and female unemployment as well as having low rates of female particpation in the labour force. Not suprisingly, such councils tend to provide formal employment within the cash economy (i.e. they are rural or urban councils), though a few district councils like Chipinge and Maungwe are included in the high unemployment areas. Probably, such district councils have high rates of landlessness and hence their populations will feature as being unemployed because they would not be classified as subsistence farmers. Unfortunately, no national study on landlessness within the country has as yet been carried out to substantiate such an assumption or interpretation. However, inferences can be drawn from research and debates on land pressure, landless peasants and land reform (see, Government of Zimbabwe-Rhodesia 1978, Whitlow 1977, Kay 1980, Zinyama 1982 & 1986, Bush & Cliffe 1984, and Simon 1985).

District councils feature as low unemployment areas because most of their population are in the peasant farming sector and would therefore be classified as subsistence farmers. This would boost the labour force participation rates of the female population, whom as Factor I has consistently shown are mostly concentrated in rural areas, especially those that make up the district council areas (Bush and Cliffe, 1984:92-93; Kay 1980:106). Consequently, their rates of inactivity would be low and their economic contribution through the subsistence farming sector high.

Unemployment and rates of economic activity emerge as being related to the sectors of the economy from which households derive their livelihood. The formal employment sector shows high rates of unemployment for either sex, though more acute among males. The female population are shown as being more active in the subsistence sectors of the economy. The factor, therefore, lends greater force to the view of the country's economy as being dual (Simon 1985:82; Bush and Cliffe 1984:77) and for the female population in the district council areas being characterised as "farmer-housewives" (Bush & Cliffe 1984:92-93).

*8.2.5.4 Factor IV: Cooking/sanitation*

The socio-economic structure of the council areas is further explored through Factor IV. This contrasts areas of poor socio-economic provision with those better served. The latter areas tend to have high population densities (0.78327) probably pushed upwards by the urban councils, and use both electricity (0.73036) and paraffin for cooking (0.72024). Households in such council areas also have flush toilet facilities (0.63228). Though having such good socio-economic provisions, the female population features quite significantly in the unemployment statistics of such council areas (0.49549). Because of the better provision of modern socio-economic facilities such areas do not rely on firewood for cooking (-0.73765) and have very few households which lack in toilet facilities (-0.48027).

When cooking and toilet facilities are separated from the other socio-economic and population structure variables (shown in Factor I), their spatial distribution is shown to be more variable or spread among the various types of councils, as Fig. 8.16 illustrates. From

Table 8.7 it is seen that Mutare and Masvingo urban councils provide the best socio-economic conditions. However, some district councils like Buhera, Gaza Komanani and Nyanga have managed to improve the provision of cooking and toilet facilities. Most probably for such district councils, toilet facilities are more in the form of ventilated pit latrines while cooking might be slowly switching to the use of paraffin as opposed to the use of wood or electricity, for Chapter 7 has shown that running water and electricity are very rare in district council areas (see Section 7.4.2 & Tables 7.5-7.7). Not all rural councils are as well off, in terms of social provisions, as suggested by Factor I. Certain rural councils like Makoni, Mutare, Chipinge and Chimanimani are shown to have levels of social provisions that are comparable to district councils like Nyaningwe, Gutu and Maungwe where provision is far from ideal or adequate. Thus, the factor highlights the pitfalls inherent in characterising all district or rural councils as homogeneous or having similar development profiles. Some rural councils, on the one hand, are more similar to district councils in certain respects while certain district councils, on the other hand, are much closer in their development profiles to rural councils.

*8.2.5.5 Factor V: Formal employment versus subsistence employment*

Like Factor IV above, Factor V provides further insights into the employment structure and patterns of the country. The emphasis is on distinguishing between council areas which are chiefly in the formal sectors of the economy and those which are in the traditional sectors. The division is provided by the classification of employment into formal employment for the former sector and subsistence farming for the latter sector. Thus, dualism is again being highlighted or brought to the fore.

Councils that do well on this factor (Table 8.6) have high rates of female participation in the labour force (0.76479) as well as that for persons (0.68707). Males feature (0.59839) but the strongest explanation for males patterns of employment and activity in the labour force are provided by Factor I. Conversely, those doing poorly show populations engaged in subsistence farming. These tend to be highest for females (-0.61506) than males (-0.60101) or persons (-0.60416). Thus, the factor confirms the dominance of females in the subsistence sector of the economy.

The spatial patterns of this factor is almost the flip side of Factor I, though the district councils involved are somewhat different. The areas of subsistence farming and therefore of poor formal employment opportunities come out as mostly being in district council areas, as illustrated by Fig. 8.17. The exceptions are Chiredzi and Inyanga RCs which, probably through the females in subsistence farming, also show as areas of poor employment opportunity. At least, for Chiredzi RC this does not seem to be correct as it is an areas of extensive irrigation works providing employment to thousands of people. However, the nature of employment on the irrigation schemes might militate against female employment thus pushing Chiredzi RC towards areas of poor formal employment opportunities, especially since males do not feature so strongly on this factor.

On the other hand, Masvingo, Gazaland and Batanai DCs are grouped with areas providing formal employment opportunities like Masvingo MC and Chimanimani RC. This again is difficult to explain since these district councils would be expected to show poor employment opportunities. All that can be reiterated is that there are pitfalls in characterising all district councils as similar. Besides these

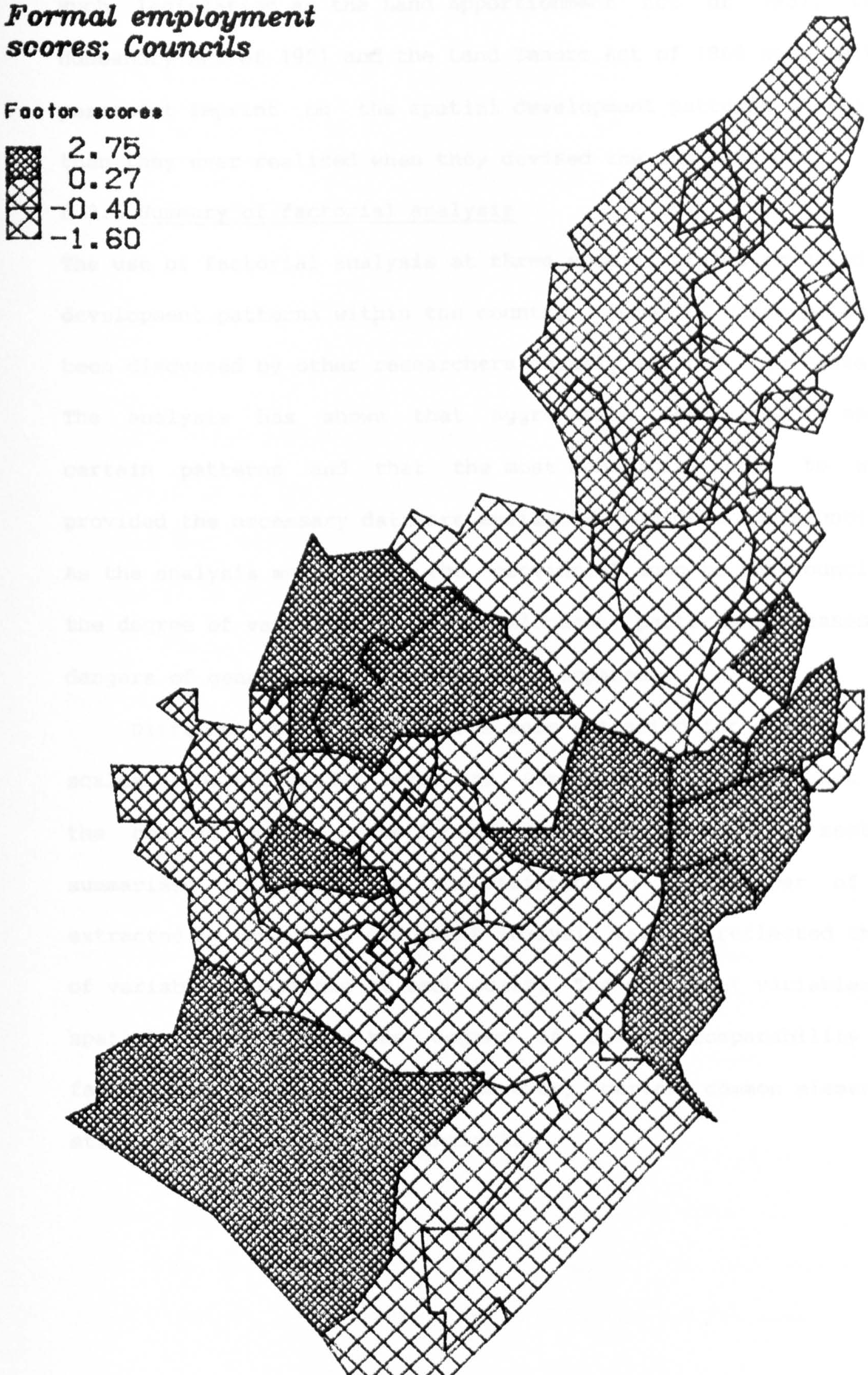

Formal employment scores; Councils
Factor scores
2.75
0.27
-0.40
-1.60

*Fig.* 8.17

exceptions, the general rule of formal employment in rural and urban council areas and subsistence farming in district council areas do hold. In other words, the white colonial and settler architects of such legislation as the Land Apportionment Act of 1931, the Land Husbandry Act of 1951 and the Land Tenure Act of 1969 have left a more permanent imprint on the spatial development patterns of the country than they ever realised when they devised the legislation.

8.2.6 Summary of factorial analysis

The use of factorial analysis at three spatial scales revealed various development patterns within the country. Some of these patterns have been discussed by other researchers, mostly at the aggregate scale. The analysis has shown that aggregation does lead to masking of certain patterns and that the most beneficial scale to work at, provided the necessary data are available, would be the council level. As the analysis moves from the provincial down to the council scale, the degree of variation in the development patterns increases and the dangers of generalisation become more apparent.

Different numbers of factors were extracted for different spatial scales. The provincial level had six factors, the district nine and the council eight. The factors discussed in previous sections are summarized in Table 8.8. The variation in the number of factors extracted by principal component analysis largely reflected the number of variables available at each scale. The different variables at each spatial scale limited the degree of direct comparability between factors and spatial scales. However, certain common elements could still be inferred from the analysis.

Table 8.8: Summary of extracted factors for all spatial scales

| Factor | Province Label | Province cum. var % | District Label | District cum. var % | Council Label | Council cum. var % |
|---|---|---|---|---|---|---|
| I | Demographic | 47.9 | Demographic | 47.5 | Socio-econ. | 50.1 |
| II | General emp. | 68.8 | Socio-econ. | 60.8 | Marr/Literacy | 64.0 |
| III | H.hold size | 84.9 | Subsistence | 68.2 | Unemployment | 74.9 |
| IV | Formal emp. | 92.0 | In-migration | 74.8 | Cook/Sanitat. | 81.2 |
| V | Road dev. | 96.2 | Out-migration | 79.9 | Formal employ. | 85.9 |
| VI | Male activity | 98.6 | Sanitation | 84.7 | - | - |
| VII | - | - | Pop. distr. | 87.6 | - | - |
| VIII | - | - | Water source | 90.2 | - | - |
| IX | - | - | H.hold size | 92.6 | - | - |

The first factor, as expected, accounted for the greatest amount of variance in the explanatory variables (Cole and King 1968:295; Goddard and Kirby 1976:20), with 47.9% explained at the provincial scale, 47.5% at the district and 50.1% at the council scale (Table 8.8). The first factor was essentially the same for all spatial scales. It was a demographic-population structure factor though the variables loading on it varied from spatial scale to spatial scale. At the most aggregate level, the province, the factor was most strongly a demographic-population structure one, grouping together aspects of the nation's fertility as well as migration patterns and portions of the age-sex pryamid (Table 8.2). Thus, the factor was described as combining aspects of stages in the life cycle with family status which emerged in urban factorial ecology research (Rees 1970 & 1971).

It is important, however, to make a distinction between the stages in the life cycle and family status of urban factorial ecology from that described under the province. In the developed city neighbourhoods, variation in family size and age composition is due to a process of selective migration and fertility-mortality differentials. Selective migration is most important for the middle class, who as students live in student areas, then through work, marriage and having children move into surburbs. The fertility and mortality differentials are most important for the working class. These live on council estates and general have large families. Thus, the variation in family size is based on class structure which partly dictates the areas of residence and the locality of movement within the city.

In Zimbabwe, in contrast, the processes of selective migration, fertility and mortality differential are going on without class as an important base. The process of selective migration is concentrating young males, and to a certain extent, females into the cities and towns and whole households into new resources areas i.e. areas of resettlement. Thus, the migration process is from rural to urban areas or from rural to rural areas whereas in the developed city neighbourhoods the process occurs within the same city. The selective migration process is partly responsible for the gradient of low to high fertility-mortality between urban and rural areas and between the most developed and least developed areas of the country.

Disaggregation to the district level led to the separation of migration from the first factor and the inclusion of more socio-economic variables (Table 8.4). In fact, migration split into two factors, one emphasizing in- and net-migration and the other highlighting out-migration and non-movers. At the council level (Table 8.6), the factor still describes the population structure though there are fewer variables dealing with fertility and none with migration. Indeed, at this level, the factor emerges more clearly as a population structure versus socio-economic development factor. In other words, it contrasts levels of demographic development to those of social and economic development.

Other factors provide further illumination to the development and population profiles of the country. A strong thread of the spatial development of the country that emerges from these other factors, as well as the first factor, emphasizes the dualistic nature of the economy of the country. The dual nature of the economy has been used extensively in discussions on the economic and social development of the country by researchers such as Mitchell (1969:156-180), Kay (1976 & 1980), Zinyama (1986) and Cliffe (1986). The factorial analysis carried out in this section shows dualism in economic development as a more permanent feature of the development profile of the country and therefore more than a convenient classification used by geographers and economic planners. Patterns of social provision (water, sanitation and cooking fuel) and those of economic development, represented by patterns of formal and traditional or subsistence employment, highlight the dualistic aspects of development most strongly, especially at the council scale. For example, the council level illustrates that rural and urban councils provide better social facilities and economic opportunities than district councils. The latter have poor social facility provision and are the basis of the traditional sector of the economy i.e. subsistence farming. However, a note of caution was sounded as the analysis revealed that the councils do not always fall into a neat pattern as just described. Some rural councils are much closer to district councils, especially in their social provisions, than to other rural councils while a few district councils seem to be breaking the barrier into levels of social provision that are similar to those found in rural council areas.

To conclude the sector, one can argue that disaggregation to three spatial scales has shown a much more complex development profile within the country. Moyo (1986:167-169) argues that the roots of the development profile were laid through the white settler state's alienation of land from the African population in the 1890s and the first and second decades of the 1900s which was formalised by legislation introduced in the 1930s, the 1950s and the 1960s such as the Land Apportionment Act (1930) and the Land Tenure Act (1969). Based upon these pieces of legislations, the development peaks of the country were centred on urban areas with the troughs based in the district council areas while the rural councils occupied the slopes. However, a few district council areas have achieved moderate development enabling them to occupy the slopes along with rural councils of moderate development (Simon 1986:9). Simon has argued that these district councils tend to be closer to urban centres and would therefore seem to benefit from the "trickle down effects" propounded by the economic theorists of the 1950s and 1960s (Todaro 1982). However, whatever the route by which such district councils manage to improve themselves, the dangers of both aggregation and generalisation are illustrated. In this respect, the concern of this research with disaggregated analysis is justified.

Various ways of examining and regionalising the demographic, social and economic development of the country have been discussed. The importance of the dual nature of development has been highlighted along with other aspects. The question to ask is whether a further statistical analysis could reveal or shade light on this dualism. Could, say cluster analysis, be able to reproduce the classification of the country by urban, rural and district council areas? Could it be able to illustrate that provinces and districts with large district council populations cluster together as discussed in the preceding sub-sections? Could it show any breakthrough to the slopes by certain district councils as implied by some of the factors in factorial analysis? Norusis (1985:183) has argued that both factorial analysis and cluster analysis identify related groups of variables. Thus, they provide a useful way of cross-checking results, though they do not always arrive at the same variable groupings. Indeed, it is more accurate to state that factor analysis identifies groups of variables while cluster analysis identifies groups of cases. The mapped factor scores of factor analysis enables an identification of similar areas to be made a factor at a time. Cluster analysis takes all the data on the areas and puts them into one set of summary groups. It is therefore a more powerful means of regionalizing a country by identifying the areas with the most similar development profiles. When the areas identified by one of the factor scores are similar to those identified by cluster analysis, a useful check on the interpretation of the factor analyis is provided. The next section tries to provide such a cross-check using cluster analysis.

## 8.3 CLUSTER ANALYSIS

The main objective of cluster analysis is to identify groups of objects or cases that share common characteristics, enabling a description of the objects by their similarity as well as they ways in which they differ. The objective of the section is to assess the value of the three spatial scales (province, districts and councils) as the basis for discussing the development profile of the country as in Section 8.2. The main objective is to check whether provinces, districts or council areas can be evaluated according to the levels of development commonly associated with each type of spatial scale. In other words, is the concern with disaggregation or the identification of sub-groups within a given spatial scale misplaced? Are discussions of dualism and land tenure divisions not adequate for the analysis of the development surface of the country?

Before these questions are addressed, the steps involved in cluster analysis will be outlined. Cluster analysis at the provincial, district and council scale will be carried out with a brief discussion of the results.

8.3.1 Steps in cluster analysis

Norusis (1985:167) argues that a number of decisions must be made before actual cluster analysis can commence. These decisions answer questions such as: which variables serve as the basis for cluster formation; how will the distance between cases be measured; and what criteria are used to combine cases into clusters?

Selection of variables does not concern us too much as the variables used for factor analysis will be applied. The distance measure is more crucial. Distance, in this case, must be understood as referring to the degree of similarity between cases rather than a physical measure (based on miles or kilometres). Even before the distance measure is chosen a decision must be made whether to standardize the variables or not. The question of standardization arises from the fact that variables might have different units of measurement. The variables used in factor analysis, had variables like those of fertility which were based on births per thousand women or population, while those of social and economic development were chiefly based on percentages and density was based on population per square kilometre. These different units of measurement need to be standardized so that the contribution of each variable is the same and the analysis is not skewed according to the size of the unit of measurement. The most commonly adopted method of standardization is to use the Z-scores, in which all the original variables are transformed to have a mean of zero and a standard deviation of 1 (Norusis 1985:179). The data for the cluster analysis are standardized in this way. Indeed, Z-scores standardization is carried out in the factor analysis before the factor scores are computed.

Once the variables had been standardized, the distance measure was computed. Convention was followed by computing the distance measure using the *squared Euclidean distance*. This defines distance between two cases as the sum of the squared difference in values for each cell of the matrix of variable proportions (Boden 1989:355). Mathematically, this can be expressed as:

$$SED(X,Y) = \sum_i (X_i - Y_i)^2 \qquad (8.1)$$

where $SED(X,Y)$ = *squared Euclidean distance* for cases X & Y
$X_i$ = standardized ith variable for case X
$Y_i$ = standardized ith variable for case Y

The distance matrix is the precusor to the clustering procedure. The clustering itself was carried out using the "average linkage between groups method" (Norusis 1985:180) where the distance between two clusters is the average of the distance between all pairs of variables in which one member of the pair is from each of the clusters (Boden 1989:357). Again, this can be expressed mathematically as in Equation 8.2:

$$D_{xy} = \sum_{X \in x \; Y \in y} SED(X,Y) \; / \; n_x \, n_y \qquad (8.2)$$

where $D_{xy}$ = distance between clusters x and y
$SED(X,Y)$ = squared Euclidean distance between case X & Y (computed in Equation 8.1 above)
$n_x \, n_y$ = number of cases in clusters x and y

The method is agglomerative i.e. the number of cluster solutions formed are equal to the number of cases in the cluster analysis. The next sub-section discusses each cluster solution in turn.

### 8.3.2 The cluster solutions

Tables 8.9 to 8.11 present the cluster solutions for the three spatial scales used in the factorial analysis. Only, the two to five cluster solutions are shown as well as the distance coefficients. Towards the end of each cluster solution, a cluster label is applied to the new clusters being formed. A brief description of the cluster solutions at each spatial level follows.

#### *8.3.2.1 Provincial 5-cluster solution*

Table 8.9 presents the hierarchical clustering of the provinces of Zimbabwe. Initially, there are eight clusters made up of individual provinces. The first stage combines Manicaland and Masvingo to form a single cluster leaving the other six provinces in the individual clusters. The process is repeated based upon the most similar clusters until all clusters are joined i.e. the provinces for the country of Zimbabwe. It is normal to have a criterion at which to start discussion of the cluster solutions. This is most easily done where clusters can be grouped together by recognisable common characteristics. The five cluster stage is the first point at which the common characteristics of the provincial clusters, and indeed, the district and council clusters, are easily recognised. It was decided to use the five-cluster solution as the criterion for starting the discussion.

The first cluster, in the five-cluster solution, is made up of the provinces with fairly large populations, of which 59% or more live in the district council areas, while 14.5% or less are found in urban areas (Table 8.9b; CSO 1985a:55). These are the provinces of Manicaland, Masvingo, Midlands and Mashonaland Central as Table 8.9 shows. The most recognizable factor about areas of large district council populations is that their populations are engaged in

Table 8.9: Agglomeration schedules and cluster membership for the clustering of provinces based on demographic, social and economic variables, Zimbabwe 1982.

(a) Agglomerative schedule

| Stage | Clusters Combined<br>Cluster 1 | <br>Cluster 2 | New cluster<br>formed | Coefficient |
|---|---|---|---|---|
| 1 | Manicaland | Masvingo | M/M | 15.5 |
| 2 | M/M | Midlands | M/M/MD | 20.5 |
| 3 | M/M/MD | Mash. Central | Large population mainly DCs (+59.1%) | 52.0 |
| 4 | Mash. East | Mat. North | Urban | 58.3 |
| 5 | Large population mainly DCs (+59.1%) | Mat. South | Mainly rural (rural +91.5%) | 95.5 |
| 6 | Mainly rural | Mash. West | Rural (+78.7%) | 123.4 |
| 7 | Rural | Urban | ALL | 216.5 |

Table 8.9(b): Means of variables in the provincial three-cluster solution

| Cluster Number | Variables in the cluster Means<br>TFR | <br>NMR | <br>NSTATUS | <br>PD84 | <br>PCHILD | <br>DPF | <br>MMAGE | <br>PMEMP | <br>PMEMP82 | <br>PVHW82 | <br>H36P | <br>DCP | <br>AGR | <br>DENSE | <br>PEDUC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6 | -5 | 23 | 3.66 | 50.61 | 52.34 | 21.28 | 61.2 | 87.99 | 13.30 | 45 | 74 | 3 | 20 | 31.58 |
| 2 | 6 | 25 | 21 | 39.50 | 42.26 | 49.18 | 21.81 | 59.6 | 85.36 | 11.91 | 41 | 35 | 4 | 36 | 27.21 |
| 3 | 6 | 17 | 18 | 2.70 | 47.49 | 49.45 | 20.82 | 64.0 | 92.08 | 9.69 | 40 | 37 | 3 | 14 | 21.17 |

subsistence farming. Thus, the cluster formed may be described as one that mainly highlights the subsistence farming sector of the economy. Mashonaland East, the most urbanised province, containing the capital city, Harare, forms the second cluster with Mashonaland West forming the third. Mashonaland West is distinguished from the other provinces by the fact that it contains large sections of its population living in rural council areas. Forty-four percent of the population in Mashonaland West lives in rural council areas where the main activity is large scale commercial farming. Thus, the cluster may be labelled as one of large commercial farming activity.

The fourth cluster is made up of Matabeleland North which contains the second largest city and consequently is also highly urbanised. The fifth cluster, formed by Matabeleland South, represents the smallest province, by population size, with features of least urbanisation. The population in district council areas, in this province, is around 79.6% with the rest living in rural councils.

The five-cluster solution, on examination proves to be closely associated with Factors I & II presented in Table 8.2 above, whose spatial patterns were mapped in Fig. 8.2 and Fig. 8.3. The first of the factors deals with the demographic structure of the provinces while the second highlights levels of livelihood within them. Thus, the cluster analysis and the factorial analysis seem to agree to a certain extent on the way in which the provinces may be classified.

*8.3.2.2 Provincial 4-3-2 cluster solutions*

The remainder of the solutions merely draw the boundaries more clearly around the 5-cluster solution. The 4-cluster solution still highlights the subsistence economy of the first cluster (Manicaland, Masvingo, Midlands Mashonaland Central), the urbanism of the second (Mashonaland East & Matabeleland North), the commercial farming of the third (Mashonaland West) and the extreme ruralism of the fourth (Matabeleland South). The 3-cluster solution emphasizes the dual economy as represented by the subsistence farming of the first cluster, to which Matabeleland South has now been added and the modern sector represented first, by the urban cluster and secondly by the commercial farming cluster. Table 8.9(b) illustrates that the three clusters have similar fertility structures, average female ages and annual growth rates. Differentiation arises when other variables are considered. For example, the first cluster is generally one of negative migration, with around 4% of the national share of doctors, which might explain the 23% of children under two and half years who are malnourished. The cluster has fairly large households of 3 to 6 members, around 45%, with a lot of children under the age of 15 years and a lot of women within the cluster. Thus, the first cluster can easily be recognised as exhibiting features of the traditional sector of the economy and the associated underdevelopment profile.

In contrast, the second cluster can be recognised as containing most of the modern economy. It has the highest positive net migration rates, the highest annual growth rate of around 4%, the largest concentration of the nations doctors, on average 40%, the lowest percentage of the population in district council areas (35%) and the lowest percentage of children under the age of 15 years (42%). The urban concentration is also shown by the high population density, on average around 36 persons per square kilometre compared to 14 persons per square kilometre in the third cluster and 20 persons per square kilometre in the first. The third cluster is made up of a single province, Mashonaland West, which contains most of the large scale commercial farming. Strongest evidence of the commercial farming activities is shown by the fact that on average around 18% of the children two and half years are malnourished compared to 23% in the first cluster. The positive migration rate also distinguishes the area as providing formal employment, especially to males, on average around 92% compared to 87% in the first cluster, which is made up of five provinces.

The 2-cluster solution defines the rural periphery in contrast to the urban core, a feature highlighted by Factor I. Thus, the six provinces with large rural populations are contrasted to the urban provinces of Mashonaland East and Matabeleland North.

*8.3.2.3 District 5-cluster solution*

Table 8.10 presents the cluster solutions at the district level. The approach is essentially that adopted for the province scale. However, more spatial units are included which increases the difficulty of interpreting and labelling the clusters. For consistency with the provincial level, discussion of solutions begins at the 5-cluster level.

The first cluster in the group represents districts which are largely composed of district council populations. These are labelled "predominantly DCs" in Table 8.10(a). In other words, the entire population of such districts live within the district council areas. though some, like Bikita have small rural council areas where small-scale commercial farming takes places. In Section 8.2.4, these areas have been shown to have greater similarity with district council areas than with the large scale commercial farming areas. As such, they can safely be classified with district councils. Table 8.10(b) shows that on average, district council populations make 94% of the cluster population. On average, 54% of the population in the cluster are female and 54% of the population is under the age of 15 years. The general employment variable, which includes both subsistence and

Table 8.10: Agglomeration schedules and cluster membership for the clustering of districts based on demographic, social and economic variables, Zimbabwe 1982.

(a) Agglomerative schedule

| Stage | Clusters Combined Cluster 1 | Cluster 2 | New cluster formed | Coefficient |
|---|---|---|---|---|
| 1 | Mwenezi | Chivi | MW/CH | 9.6 |
| 2 | Nkayi | Umzingwane | NK/UM | 13.1 |
| 3 | Buhera | Gokwe | BH/GK | 13.6 |
| 4 | Matobo | Ndanga | MT/ND | 14.6 |
| 5 | Mutare | Kwekwe | MR/KK | 18.1 |
| 6 | Charter | Gutu | CT/GT | 18.2 |
| 7 | BH/GK | Bikita | BH/GK/BK | 18.8 |
| 8 | Zvishavane | MW/CH | ZV/MW/CH | 21.9 |
| 9 | Nyanga | Mberengwa | NY/MB | 22.2 |
| 10 | Tsholotsho | Chilimanzi | TT/CL | 24.2 |
| 11 | Beitbridge | Gwanda | BB/GW | 24.9 |
| 12 | Chipinge | Chimanimani | CP/CM | 29.1 |
| 13 | Makoni | Insiza | MK/IZ | 30.1 |
| 14 | BH/GK/BK | ZV/MW/CH | Predominantly DCs | 31.6 |
| 15 | MR/KK | Masvingo | MR/KK/MS | 32.0 |
| 16 | TT/CL | CT/GT | TT/CL/CT/GT | 34.3 |
| 17 | NY/MB | Shurugwi | NY/MB/SR | 37.0 |
| 18 | Bulalima Mangwe | MT/ND | BM/MT/ND | 37.3 |
| 19 | Binga | BM/MT/ND | BN/BM/MT/ND | 44.6 |
| 20 | NK/UM | TT/CL/CT/GT | NK/UM/TT/CL/CT/GT | 48.6 |
| 21 | Bubi | Lupane | BU/LP | 49.7 |
| 22 | CP/CM | NY/MB/SR | CP/CM/NY/MB/SR | 51.8 |
| 23 | MR/KK/MS | Hwange | MR/KK/MS/HW | 55.1 |
| 24 | BN/BM/MT/ND | BB/GW | MN/BM/MT/ND/BB/GW | 59.4 |
| 25 | Mutasa | MK/IZ | MU/MK/IZ | 67.1 |
| 26 | MU/MK/IZ | NK/UM/TT/CL/CT/GT | MU/MK/IZ/NK/UM/TT/CL/CT/GT | 75.7 |
| 27 | MR/KK/MS/HW | Gweru | Large MC (30,642+, -Bulawayo) | 86.8 |
| 28 | MU/MK/IZ/NK/UM/TT CL/CT/GT | MN/BM/MT/ND BB/GW | large rural councils fairly large DC populations | 94.0 |
| 29 | CP/CM/NY/MB/SR | Chiredzi | Rural councils (+small town) | 96.7 |
| 30 | large RCs with fairly large DCS | BU/LP | Predominantly RC | 112.6 |
| 31 | Predominantly DC | Predominantly RC | Rural | 135.2 |
| 32 | RC (+small town) | large MC | Urban (-Bulawayo) | 208.5 |
| 33 | Urban (-Bulawayo) | Bulawayo | Urban | 310.5 |
| 34 | Rural | Urban | All | 481.9 |

Table 8.10(b): Means of variables in the district five-cluster solution

| Cluster | TFR | PCHILD | DPF | MMAGE | PMEMP | NMR | H36P | DCP | PHHWM | PTHNN | PTHWD | PEDUC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Means of variables in the cluster | | | | | | | | | | | |
| 1 | 6 | 53.98 | 53.95 | 20.73 | 78.72 | 4 | 50.73 | 94 | 82.02 | 87.34 | 98.90 | 37.78 |
| 2 | 6 | 47.92 | 51.53 | 21.16 | 68.90 | 7 | 45.79 | 67 | 57.28 | 48.13 | 90.35 | 31.30 |
| 3 | 6 | 52.36 | 53.37 | 21.91 | 52.23 | -20 | 48.30 | 87 | 71.07 | 75.85 | 95.05 | 37.27 |
| 4 | 6 | 47.34 | 50.38 | 20.88 | 58.01 | 6 | 43.48 | 46 | 37.71 | 37.70 | 68.99 | 29.45 |
| 5 | 5 | 37.65 | 41.19 | 20.42 | 74.86 | 79 | 40.49 | 0 | 34.36 | 28.88 | 71.57 | 15.40 |

formal employment, shows around 79% of males employed, which is probably influenced by the number of subsistence farmers in the cluster. Poor development of socio-economic infrastructure is demonstrated by the fact that around 82% of households fetch water from distances greater than 100 metres from the house, 87% have no toilet facility and around 99% use firewood as a cooking fuel. The cluster has subsistence farming as the predominant form of economic activity, thus districts in the cluster exhibit very strong features of the subsistence economy with the associated poor social and economic provision.

The second cluster is a mixture of rural councils which contain small urban settlements of 5000 or less population with some district councils where features of the subsistence economy are not so strongly defined as in the first cluster. Districts in this cluster are labelled "large rural councils with fairly large district councils" in Table 8.10(a). Districts within the cluster are beginning to experience a transformation or at least a blunting of the worst features of the subsistence economy. Evidence to support this contention is still very thin on the ground because studies of individual districts are rare. However, some evidence is provided by Cliffe (1986:31,188) who compares percentage of households with no cattle, livestock units and average arable land per household from studies carried out between 1982 and 1984. The importance of cattle lies in the fact that they provide draught power for the tilling of the land for the crucial "winter ploughing", which prepares the land for early planting in late October to early November. Cattleless households in Gutu (belonging to the second cluster) are 20% compared to Chivi's 43% (in the first cluster). Households in Mwenezi (first cluster) on average till 3.6 hectares of arable land compared to 4.8

hectares in Gutu (second cluster). The average arable land per household within Gutu is much closer to the envisaged maximum, of 5 hectares, under the land reform and land resettlement schemes proposed after 1980 (Zinyama 1982:151). Further, in terms of livestock units, i.e. the average of all types of farm animals a household owns, Gutu still has a better average with 3.2 livestock units per household compared to only 1.2 in Mwenezi. It is unfortunate that only these two districts afford any degree of comparision but, the point can be made that there is differentiation in the resources available to households in the two clusters, causing them to cluster differently.

The third cluster is made up of districts with large rural councils as well as small urban settlement (2,500 to 5,000; CSO 1984:29-30). These have a greater mix of population, social and economic conditions than those in the second cluster. Table 8.10(b) shows the cluster exhibits very strong negative net migration rates pointing to the fact that the cluster is losing population, probably to the two clusters above it. The social and economic conditions in the cluster are much closer to those in the first cluster than the second or the two above it. Thus, 95% of households use fuelwood for cooking, 76% have no toilet facilities, 71% fetch water at distances greater than 100 metres from the home and 87% of the population is found in rural council areas.

The difference between the third and the fourth clusters lies mainly in the size of the urban settlements. The fourth cluster has the larger urban settlements which are generally termed "municipalities" while the fifth cluster is made up of Bulawayo, the district containing the second largest city. Again, Table 8.10(b) shows the fourth cluster having 46% of its population in district council areas, 39% with water greater than 100 metres from the home, 38% with no toilet facilities and 69% using fuelwood for cooking. The near universal use of fuelwood in cooking is shown by the high percentage of households even in urban districts who still use it instead of electricity or paraffin.

Again, the five cluster solution bears some resemblance to the first and second factors analysed at the district scale. For example, Fig. 8.7 dealing with employment, shows all urban districts and the rural council areas as the regions of high employment i.e. the third to the fifth cluster while the second and most of the first where classified as areas of subsistence farming. The divisions are not as neat as described but the broad charactersistics can still discerned. The first and second factors, therefore, would seem to produce the same regionalisation of Zimbabwe's districts as the 5-cluster solution.

*8.3.2.4 District 4-3-2 cluster solution*

The 4-cluster solution highlights overall subsistence or district council type districts as it combines cluster 1 and 2 discussed above into the first cluster. The other clusters remaining as before. The three cluster solution is similar to the provincial one. It separates predominantly rural districts, from the urban districts excluding Bulawayo which forms the third cluster. The 2-cluster solution is again an urban-rural division of the country.

*8.3.2.5 5-cluster council solution*

Table 8.11 presents the agglomerative schedules and cluster membership of the councils areas. The first cluster is formed by the district councils which are mostly in the north and north-east of the provinces. These are the districts which have a longer settlement history and which Whitlow (1980) identified as suffering from moderate to acute land pressure. Davies (1978,1980) also identified these as

Table 8.11: Agglomeration schedules and cluster membership for the clustering of councils based on demographic, social and economic variables, Zimbabwe 1982.

(a) Agglomerative schedule

| Stage | Clusters Combined Cluster 1 | Cluster 2 | New cluster formed/label | Coefficient |
|---|---|---|---|---|
| 1 | Chitepo DC | Mutare DC | CHD/MTD | 6.8 |
| 2 | Buhera DC | Bikita P. DC | BHD/BKD | 9.1 |
| 3 | Gazaland DC | Batanai DC | GZD/BTD | 9.5 |
| 4 | Nyanga DC | Zaka DC | NYD/ZKD | 12.6 |
| 5 | Gutu DC | Nyaningwe DC | GUD/NND | 14.1 |
| 6 | Makoni RC | Masvingo RC | MKR/MSR | 14.3 |
| 7 | BHD/BKD | Mabvazuva DC | BHD/BKD/MBD | 18.5 |
| 8 | MKR/MSR | Mutare RC | MKR/MSR/MTR | 20.7 |
| 9 | Tsungwesi RC | Nyahunda RC | Small-scale farming | 24.7 |
| 10 | Cashel RC | Gutu-Chatsw. | Small RCs | 25.2 |
| 11 | Inyanga RC | Chimanimani RC | IYR/CMR | 27.3 |
| 12 | BHD/BKD/MBD | NYD/ZKD | Central-northern DCs | 28.3 |
| 13 | GUD/NND | Masvingo DC | GUD/NND/MSD | 28.6 |
| 14 | Mutare MC | Masvingo MC | Urban | 32.0 |
| 15 | GZD/BTD | Gaza Komanani DC | South-eastern DCs | 32.2 |
| 16 | Small-scale farm | GUD/NND/MSD | Central-western DCs | 38.7 |
| 17 | Chipinge RC | Chiredzi RC | South-eastern RCs | 43.3 |
| 18 | Maungwe DC | Central-western | North-western DCs | 59.4 |
| 19 | IYR/CMR | MKR/MSR/MTR | North-eastern RCs | 62.3 |
| 20 | Central-northern | North-western | Mainly DCs | 67.9 |
| 21 | South-eastern RCs | North-eastern RCs | Large RCS | 74.5 |
| 22 | BHD/BKD | Mainly DCs | Predominantly DCs | 91.4 |
| 23 | Predominantly DCs | South-eastern DCs | District Councils | 104.3 |
| 24 | Small RCs | Large RCs | Rural Councils | 123.6 |
| 25 | District Councils | Rural Councils | Rural | 211.6 |
| 26 | Rural | Urban | All | 400.3 |

Table 8.11(b): Means of variables in the council five-cluster solution

| Cluster | CWR | H36P | PHHWM | PTHNN | FLIT | ST7 | PFEMP | PFSUB | AGR |
|---|---|---|---|---|---|---|---|---|---|
| | Variables in the cluster Means | | | | | | | | |
| 1 | 931.85 | 50.50 | 75.69 | 70.49 | 74.50 | 19.97 | 6.53 | 49.28 | 2.42 |
| 2 | 922.05 | 51.52 | 84.20 | 78.29 | 41.88 | 18.91 | 6.22 | 45.07 | 3.87 |
| 3 | 1049.34 | 39.03 | 45.85 | 53.77 | 76.67 | 20.39 | 54.81 | 5.84 | -0.63 |
| 4 | 765.65 | 40.43 | 36.61 | 31.58 | 65.74 | 19.78 | 18.56 | 24.73 | 2.89 |
| 5 | 532.88 | 39.97 | 3.20 | 0.81 | 87.74 | 20.36 | 21.58 | 0.26 | 5.94 |

the councils with the least development potential as did Kay (1976). The council areas in the first cluster suffer from overcrowding, land degradation and lack of development potential.

The second cluster is made up of three councils in the south and south-eastern parts of the provinces (Gazaland, Gaza Komanani and Batanai). These, it was argued under factor analysis and in Chapter 7, suffered from late development. If a broader view point is adopted, then these councils are too distant from Harare and therefore suffer from their peripheral location. Simon (1986:9) argued that district councils that were further from urban centres also suffered from lack of development because of the inadequately developed infrastructure of such areas.

The third cluster is made up of two rural councils, Gutu-Chatsworth and Cashel. These are the smallest councils and under factor analysis exhibited features that were similar to some of the more successful district council areas. The size of the councils is being measured in terms of population rather than physical or areal extent, though even if the latter was used, the councils would still appear small.

The larger councils, such as Chiredzi, Masvingo, Makoni and Nyanga form the fourth cluster. As usual, some of these, like Chiredzi and Nyanga contain small urban settlements of 2,500 to 10,000 population while others, like Mutare and Masvingo are wholly rural but, close to urban centres. These are the opposite of the district councils in the second cluster for they have great development potential, and some like Chiredzi have been developed extensively through irrigation agriculture since the 1960s.

The urban cluster is formed by the cities of Mutare and Masvingo. These represent the factors of urbanism while the other factors represent a sliding scale of ruralism which might be said to stretch from extreme ruralism, examplified by the second cluster, through modified ruralism as in the first cluster to elements of urbanism as embodied in the fourth cluster. Again, the solution is an amalgamof Factors I and II presented in Fig. 8.13 and 8.14 above. However, this is not as clear as in the provincial and district examples.

*8.3.2.5 Council 4-3-2 cluster solution*

The 4-cluster solution combines the first and second clusters into one, representing the district councils. In other words, this is a cluster which describes the features of district councils; poor social provision, late development, little development potential and lack of a well developed infrastructure with a continuing system of subsistence agriculture (Table 8.6). The other three clusters remain as they were i.e. small rural councils, large rural councils with small urban centres and urban councils.

The three cluster solution, provides a familiar solution: the land tenure divisions of the country inherited from the colonial past. The first cluster is that of district councils (formerly African Reserves), the second of rural councils (formerly European farming land) and the third cluster is of urban councils (once classified as European land; see Fig. 1.3). The three cluster solution is similar to the Factor I solution mapped in Fig. 8.13, which led to the conclusion that the legislators who drew up the land tenure acts have left a more permanent record on the development profile and potential of the various land units than they ever envisaged. The two cluster solution is, as usual, the rural-urban one.

8.3.3 Concluding remarks on cluster analysis

The broad objectives for carrying out cluster analysis have been fulfilled. First, the results of the cluster analysis, especially the 5-cluster solutions, would seem to confirm the broad findings and regionalisation of the various spatial scales by the first and second factors. The main observation which arises from both cluster and factor analysis is that there are varying degrees of development within given spatial groups. Thus, at the provincial scale, it was shown that Matabeleland South stood alone as the least developed area of the country, while Mashonaland East ranked as the most developed area, while commercial farming was highlighted in Mashonaland West, which deserves the term "bread basket of Zimbabwe".

At the district level, the five cluster solutions separated districts of poor development potential, often overcrowded and lacking in infrastructure from those which showed signs of development potential. Districts like Mwenezi, with average arable land holdings of 3.2 hectares per household, and Chivi where 43% of households did not have cattle, crucial for ploughing and planting on time, were separated from districts like Gutu, with larger average arable land holdings (4.8 hectares per household) with 80% of households having cattle for use as draught power. Districts with large rural councils separated into those containing small urban settlements and those without, confirming the age-sex structures discussed in Chapter Three. The former have greater development potential than the latter. Indeed, factor analysis has shown that some of the latter could easily be classified with the better off districts containing large populations in district council areas like Gutu District. Urban districts were themselves split into different groups, with Gweru, Masvingo and Mutare going into the group of large urban centres but separated from the largest, Bulawayo.

The council level provided further evidence of differential development, even among spatial units classified as belonging to the same land tenure type. Thus, when district councils were examined, those identified in previous studies as being overcrowded, with poor grazing and development potential came out in one group while those of late development, mostly in the south-east of the country, which also suffered the disadvantage of being peripheral came out in another cluster. Rural councils were split into two groups according to size and presence of small urban centres, while large urban areas formed a separate cluster. At this level, the three-cluster solution proved to be the same regionalisation of the country as the Land Tenure Act (1969) as well as that of Factor I (Fig. 8.13 & Table 8.7).

Both the cluster and factor analysis have demonstrated that it is possible to consider development in Zimbabwe as more varied than current research approaches have indicated. Limitations have been imposed by consideration of the land tenure divisions as the main framework of research. This limits the research horizons to the three cluster solution of the council level when more might be gained by research directed at socio-economic differentiation as provided by the five or even four cluster solutions. The other solutions, six plus, not included in the discussion here, need further researching with appropriate data schedules. Future research will benefit most if it escapes the narrow confines of the land tenure divisions. The next section turns its attention to how the socio-economic development profiles discussed under factorial and cluster analysis can be related to the demographic profiles of the country.

## 8.4 CORRELATION AND MULTIPLE REGRESSION ANALYSIS

The section sets out to examine the relationship between the development profiles described in this and other chapters with the demographic profiles of Chapters 3, 4, and 6. First, correlation analysis is performed to eliminate redundancies and to establish the direction of the relationship between variables. The second part of the section uses multiple regression analysis to discuss the relationship between selected socio-economic and demographic variables. The basic theories and hypotheses discussed in Chapter Two will form the basis for variable selection for the multiple regression analysis.

### 8.4.1 Correlation analysis: an introduction

Correlation analysis measures the relationship between two sets of numerical data which are normally termed variables. It provides a descriptive statement about the nature of the relationship between the two sets of data being compared. Despite its descriptive nature, when applied with due consideration, correlation analysis can be used as the basis for making inferential statements. It can provide a useful indication of which relationships between given sets of variables are worth exploring. The confidence limits normally associated with the correlation coefficients can be used as a basis for accepting or rejecting given hypotheses.

The range of Pearson's correlation coefficient is the same as that of the factor loadings in a factorial analysis i.e. it lies between +1, which stands for perfect positive correlation, through zero to -1, representing perfect negative correlation (Gregory 1978:176). The correlation index or coefficient reflects the degree of association between given variables. The coefficients measure the degree to which a change in one variable is mirrored in changes in the second variable. Cole and King (1968:253) argue that an index of correlation which is found to be reasonably high (in either direction) may be interpreted as follows:

(a) It may reflect some degree of causal relationships between two variables, either direct or through some other variables, in the study or not included. Direct associations in the current study are found among the fertility variables, while indirect association can be inferred from the negative association between piped water and the fertility variables. The latter seem to be measuring income and higher socio-economic status hence, their negative association with fertility.

(b) It could be a chance occurrence i.e. the high index of correlation is purely coincidental.

(c) Two general trends may produce a correlation without there being an obvious causal relationship. This is more common in spatial and temporal data.

Cole and King argue that the last two must be considered as possible dangers in correlation work. However, these should not stop the use of the correlation index for it enables more precise statements to be made about the nature of relationships than is possible with visual or verbal observations. Indeed, correlation often confirms some of the relationships which have been worked out in verbal or visual form while disapproving of others.

The building block of the correlation technique is the correlation matrix. The correlation matrix is used to detect linkages among two or more variables as well as the direction of the relationships (positive or negative). The linkages so detected are important for the elimination of variables which are strongly associated especially if multiple regression analysis is to be carried out i.e. to reduce the degree of multicollinearity (Rosenzweig & Evenson, 1977:1075). The direction of the relationship can be used to confirm or reject given hypotheses, within desired confidence limits. However, the details of such acceptance or rejections shall not be entered into here. Instead the correlation matrix shall be used to fulfil two objectives. First, it shall be used as the basis for comparing the relationship between demographic and socio-economic variables with those highlighted in other literature. In other words, it shall be used to establish whether the variables for Zimbabwe have the expected or desired signs as those found by other researchers and discussed in Chapter 2. Secondly, it shall be used as the basis for the selection of variables to be entered into the regression equations.

### 8.4.2 Correlation analysis: an examination of the variables

Johnston (1985) provides an excellent approach to the use of correlation and regression analysis. His study is based on the geography of elections within Britain but the approach is relevant to any study. The approach takes given hypotheses, examines and explains them in turn before subjecting them to regression analysis. Further, the regression analysis is carried out by adding explanatory variables a step at a time (see, for example, Chapter 6:110-162). A similar approach is adopted here. First, the demographic variables, which act as the dependent variables, are examined to establish any relationships within the set. Secondly, the correlation between the demographic variables with the explanatory variables is discussed. This will establish whether the variables are suitable for use in regression and will aid the specification of the regression equations.

*8.4.2.1 Correlation analysis: the demographic variables*

Table 8.12 presents the correlation between the demographic variables, covering both fertility and migration, at the provincial scale. The relationships are similar at the district level and the council level does not have any data on migration. To avoid repetition, the discussion will use examples from the most appropriate level.

Bogue and Palmore (1964:318) found a strong positive relationship among all the fertility measures which is amply illustrated in Table 8.12. For example, the correlation between the general fertility rate and the total fertility rate is perfectly positive (1.0). The degree of the positive relationship is shown by the fact that all are significant at the 0.01 level, supporting the argument that fertility measures are good predictors of each other, advanced by Bogue and Palmore. Further, the argument of multicollinearity advanced by Rosenzweig and Evenson can be seen to hold, implying that the fertility measures should not be used in the regression equations as independent variables, where fertility is being predicted. The correlation coefficients also show that it is not necessary to formulate regression equations for all the fertility variables. One, like the total fertility rate which is free from the influence of the age structure of the women in the child-bearing age groups, can be easily used to illustrate the relationship between fertility and socio-economic development.

Turning to the migration set, it can be asserted that the correlation among the variables is fairly high. Table 8.12 shows that the stayers or non-migration rate and the out-migration rate are perfectly but negatively correlated (-1.0) while the in-migration rate and the net migration rate are perfectly and positively correlated (1.0). The reason is simply that the areas that attract migrants are less likely to have high out-migration rates. Indeed, Chapter Six demonstrated that fact that areas of high in-migration rates also exhibit high non-migration rates, low out-migration rates and, consequently, high net migration rates. This factor has been picked up clearly by the correlation analysis despite the use or because of the use of life time migration data.

Table 8.12: Correlation coefficients among demographic variables

(i) Fertility variables

| | CWR | CBR | GFR | TFR |
|---|---|---|---|---|
| Child woman ratio | 1.0000 | .8689* | .9890** | .9893** |
| Crude birth rate | .8689* | 1.0000 | .9150** | .9143** |
| General fertility rate | .9890** | .9150** | 1.0000 | 1.0000** |
| Total fertility rate | .9893** | .9143** | 1.0000** | 1.0000 |

(ii) Migration variables

| | SMR | IMR | OMR | NMR |
|---|---|---|---|---|
| Non-migration rate | 1.0000 | .6556 | -1.0000** | .7552 |
| In migration rate | .6556 | 1.0000 | -.6556 | .9848** |
| Out migration rate | -1.0000** | -.6556 | 1.0000 | -.7552 |
| Net migration rate | .7552 | .9848** | -.7552 | 1.0000 |

Notes: * significant at the 0.01 level; ** signif. at the 0.001 level

Closer examination of the correlation between stayers or the non-migration rate and the outmigration rate leads to the conclusion that there is only one, rather than two variables. The correlation coefficients are an exact replica of each other except for the sign. Thus, the correlation between the general fertility rate and the non-migration rate is -.8276 while with the out-migration rate it is 0.8276. Thus, one can easily use either of the variables in examining the relationship between migration and other socio-economic variables.

Even the relationship between in-migration and net migration is quite close though the coefficients are not exact mirror images of each other. Thus, the non-migration rate can be dropped from the regression equations as its nature is adequately captured by the out-migration rate.

The demographic variables have been shown to be highly correlated with each other. This makes their use as independent variables less desirable due to multicollinearity. Further, any of the variables can be selected for use as dependent variables as Bogue and Palmore (1964:322) have argued. Subsequent analysis will show all the variables in correlations though for the regression analysis only one or two will be chosen to for further analysis.

The remainder of the section examines the demographic variables in relation to the socio-economic variables on the basis of the theory discussed in Chapter 2. Fertility and migration will be discussed with respect to their relationship with income, land, education, employment, family planning, infant mortality, urbanisation and labour force status. This will establish the nature of the relationship as well as the suitability of the variables to measure or act as proxies of the socio-economic variables listed in the preceding sentence.

*8.4.2.2 Fertility, migration and income*

The relationship between fertility and income was hypothesized by Malthus to be positive. Becker (1960:209-231), in his definitive essay on the economic theory of fertility, argued for a positive relationship between fertility and income. However, he pointed out that empirical work did not support this hypothesis. Parents who had high incomes were also found to have fewer children. This led him to the conclusion that the way parents view children is of great importance. If, as happens in most rural societies, children are viewed as productive goods, then a rise in income is accompanied by a rise in fertility. If, however, children are viewed as consumption goods, then rises in income are accompanied by a desire to consume more high quality children leading to lower fertility. The postulations of Becker have been supported by other researchers such as McInnis (1977:201-227), Cochrane (1975:373-390), Rosenzweig and Evenson (1977:1067-1079) and Isserman (1985:24-45), to mention but a few. Tsui and Bogue (1978) support the view of income as being negatively associated with fertility. They argument sees rising income, as measured by per capita gross national product, as being responsible for some of the largest declines in fertility in developing countries between 1968 and 1975.

For Zimbabwe, the only available measure of income is the average earnings per employee at the provincial level. This is not the same as per capita income or even per capita gross national product. However, it is the only variable available that can be used to examine the relationship between fertility and income. Table 8.13 shows that the relationship between fertility and mean earnings per employee is negative, for all the fertility measures. In other words, the relationship is similar to that observed in empirical work rather than that postulated by Becker or Malthus. The negative association between fertility and average earnings per employee lead one to agree with Isserman and Cochrane who conclude that overall fertility levels have fallen with rising income, even though the current study is only cross-sectional rather than cross-temporal in nature.

Table 8.13: Fertility, migration and income

| Dependent variable | Explanatory variable Mean earnings per employee 1982 |
|---|---|
| (i) fertility variables | |
| Child woman ratio | -.5913 |
| Crude birth rate | -.2575 |
| General fertility rate | -.5342 |
| Total fertility rate | -.5305 |
| (ii) migration variables | |
| Non-migration rate | .4099 |
| In-migration rate | .4702 |
| Out-migration rate | -.4099 |
| Net migration rate | .4974 |

The variable average earnings per employee is more suitable for the measurement of migration than fertility. Differential earnings between areas or regions are postulated to be positively related to migration levels. This is because earnings represent or act as a proxy for the perceived availability of employment by the migrants. Todaro (1969) developed a theory of migration based on conditions at the destination in which employment opportunities and income to be earned played an important part. His theory examines the "pull" side of migration while most migration studies look at conditions at the origin of migrants i.e. the "push" side (Isserman, 1985).

Table 8.13 shows that the relationship between migration and mean earnings per employee captures both the push and pull arguments. Out-migration is negatively related to average earnings per employee. In other words, areas suffering from high out-migration rates are those that do not provide high earnings with the associated employment opportunities and other socio-economic benefits. Rates of staying, in-migration and net-migration are positively related to earnings.

This would then seem to support the argument of investigating conditions at the destination. In other words, knowledge of earnings at the destination can be used to predict in-migration levels while those at the origins may be used to predict out-migration rates.

*8.4.2.3 Fertility, migration and land*

Fertility and land are postulated to be positively related. This stems from arguments such as the land-labour hypothesis and the land-security hypothesis of Schutzer et al (1983:393-403) and from the observed fact that rural families tend to be larger than urban ones in most socities. The arguments include examination of such land attributes such as land size, land tenure, measurement of land and land inheritance structures. The arguments have been covered in Chapter Two and in Zanamwe (1988a:12-15). The relationship that can be observed is that between land tenure and fertility. No variables exist for measuring land size or the inheritance structures though the variable of land tenure does include the notion of inheritance or the means of disposing of land.

Land tenure can be measured using the share of population who live in district council areas, which as already discussed, have a communal form of land tenure, and those living within rural council areas, which have individual tenure. Table 8.14 shows that at the provincial scale, the relationship between fertility and land tenure is positive for both the district and rural council areas. However, it is strongly positive for the district council areas with the child woman ratio, the general fertility rate and the total fertility rate being significant at the 0.01 level. The rural council areas have a positive weak association with fertility. Indeed, except for the child woman ratio, the association is almost zero.

The situation is reversed at the district scale. Disaggregation shows that the relationship between land tenure and fertility is very strong indeed. The CWR, GFR and TFR are now significant at the 0.001 level and the CBR at the 0.01 level for the district councils. Examination of the rural council areas shows a negative but weak association between land tenure and fertility, with the association near zero. How can this relationship be explained?

An obvious explanation for the high positive association of fertility with communal land tenure as embodied in the variable of proportion of population living in district council areas could be the concept of "institutional settings". It was argued in Chapter Two and by the United Nations (1981) that insitutional settings are important in understanding the demographic and socio-economic relationships within a society. In this case, the institutional settings are concerned with the settlement history of Zimbabwe between 1890 and the present day. The land tenure divisions highlighted by the factor and cluster analyses are creations of the white settler state that was terminated at independence in 1980. Mitchell (1969), Simon (198), Cheater (1982), Duggan (1980), and Bush and Cliffe (1984) have highlighted the way in which the land tenure and production relations were altered by the colonial state in its attempt to reduce the competition between the African population and the European settlers. This led to draconian legislation that restricted Africans to dry areas of the country with low soil fertility, leading eventually to land degradation in these areas. The high fertility of the populations in the district councils is therefore associated with a concentration of 95% of the national population onto about 50% of the land. This would lead to the strengthening of the land-security type of hypothesis as parents tried to ensure that their children would look after them in their old age.

It would also lead to a "tragedy of the commons" type of scenario, where each household tried to ensure adequate income from the land by having more children, initially to help in working the land and later by owning land and offering the produce to ageing parents through the extended family and kinship ties system. The subsistence economy of the district council areas seemed to ensure continued high fertility in these areas compared to the rural council areas, based on individual tenure, and where mechanization made children less important as labour and more relevant as consumption goods. State legislation ensured that land in the rural councils could only be inherited by a single offspring (Cheater 1982:86; Duggan 1980:230) to avoid fragmentation. Such legislation might influence parents to have fewer children, to avoid the difficulty of choosing the heir to the farm, from among them.

Turning to migration and land, the variable most researchers use to measure the relationship is land scarcity. Merrick (1978), Hicks (1974) and Seiver (1975) have discussed the effect of land scarcity on migration. Merrick points out that legislation that prevents inheritence of land by more than one offspring increases the rate of

Table 8.14: Fertility, migration and land

| Dependent Variable | Explanatory Variable Population % in DCs Prov. | Dist. | % in RCs Prov. | Dist. | Density Province |
|---|---|---|---|---|---|
| Child woman ratio | .8567* | .5427** | .1123 | -.0956 | -.4329 |
| Crude birth rate | .7509 | .4656* | .0310 | -.0384 | .0221 |
| General fertility rate | .8611* | .5476** | .0801 | -.0948 | -.3063 |
| Total fertility rate | .8633* | .5499** | .0744 | -.0959 | -.3086 |
| In-migration rate | -.9387** | - | .3686 | - | .3975 |
| Out-migration rate | .7337 | - | .0209 | - | -.1096 |
| Net-migration rate | -.9680** | - | .2858 | - | .4008 |

Notes: * signif. 0.01 level; ** signif. 0.001 level; - no data out-migration from rural areas. In this respect therefore, one would expect a positive association between individual land tenure and migration. However, it is not possible to use the variables selected for fertility to examine this, for the rural councils embode more than individual land tenure. While the sons of the commercial farmers might migrate out of these areas, rural council areas attract people from district council areas because they provide employment. Thus, the institutional and functional settings that complicate the relationship between land and fertility can be seen to operate with regards to migration.

Adepoju (1980) argues that migration should be analysed using variables that measure land scarcity such as population density, land overfarmed, soil erosion and other environmental factors i.e. those that indicate conditions at the origin point: the rural area. The variable population density is available at the provincial level and its relationship with the migration variables is shown in Table 8.14 above. The variable is negatively related to the out-migration rate and positively related to the other migration variables. The reasons for this is that population density is a consequence of rather than a cause for migration. Population density is invariably lower in rural areas than in urban areas which the factor and cluster analyses showed as the main destinations of most of the migrants. This is further supported by the negative association between the share of the population in district council areas and rates of in-migration and net migration. Thus, the relationship between migration and land cannot be explored with the variables currently available.

*8.4.2.3 Fertility, migration and education*

Education is hypothesized to have a negative impact on fertility, operating through two main components, the general literacy of the population and the educational attainment of women. The latter is the more important component (Zanamwe 1988a:16). For example, Rosenzweig and Evenson (1977) argue for the greater effect of female educational attainment in reducing fertility in rural India compared to male. This is achieved through delayed marriage due to attending educational institutions, better and more effective use of contraceptives as well as changes in female roles and attitudes towards large families. Hicks (1974) argues that education opens up employment opportunities for women which are incompatible with their roles as housewives. Merrick (1978) sees the influence of education operating through knowledge of better sanitation and health increasing the survival chances of children and reducing the need for excess births to ensure child survival. Education therefore reinforces the negative effects of child survival chances on fertility.

The education variable is normally measured by the percent literate in a given population above the age of 15 years. The variable was not available for the provincial and district scales. The variable available was the proportion of the population 5-19 years attending school. Table 8.15 shows the variable as being positively associated with fertility which would seem to contradict the arguments provided above. The reason is that the variable is measuring that part of the population pyramid that is attending school. Thus, it is closer to a population structure variable, which would be expected to correlate positively with fertility rather than an education variable. It might be important for cross-temporal studies to monitor the changes in the percent of the population 5-19 years attending school and changes in fertility but it is not the proper variable for a cross-sectional study of fertility and socio-economic change, even if Tsui and Bogue (1978) used a similar variable in their study of fertility decline in developing nations.

Having discounted the share of population enrolled in education as having only a spurious association with fertility through the population structure variable, attention is paid to the relationship between fertility and literacy of the population. This is available at the council scale for both sexes and persons (Table 8.15). The difficulty of dealing with the council level as far as fertility is concerned arises from the availability of only one fertility variable, the child to woman ratio. However, the CWR is still a valuable indicator of fertility levels as Bogue and Palmore (1964:321-323) have illustrated and would be expected to carry the same sign as the more refined measures of fertility. Further, Chapter Four used the child-woman ratio to estimate the more refined measures of fertility based upon the recognised relationship between them. These measures

Table 8.15: Fertility and education

| Explanatory variable | Dependent variable | | | |
|---|---|---|---|---|
| | CWR | CBR | GFR | TFR |
| (i) Provincial & district scale | | | | |
| % attending school 5-19 yrs (prov) | .5076 | .5754 | .5496 | .5543 |
| % attending school 5-19 yrs (dist) | .5385** | .3654 | .5389** | .5418** |
| (ii) Council scale | | | | |
| % males 15+ literate | -.2176 | - | - | - |
| % females 15+ literate | -.1210 | - | - | - |
| % persons 15+ literate | -.1742 | - | - | - |

Notes: ** significant at the 0.001 level; - no data avaible were estimated at the provincial and district scales. Indeed, Table 8.15 shows that there is a negative relationship between the child woman ratio and literacy in the population. It is strongest for males (-.2176) compared to females (-0.1210) which probably captures the history of differential access to education for the two sexes. Overall, though the relationship seems to be rather weak even if it carries the expected sign.

Migration and education are supposed to be positively correlated, especially in developing countries like Zimbabwe. This arise from the urban bias of educational institutions and employment opportunities. Kasanga and Avis (1986) note that for Ghana the educated in the 19 to 29 age group have the highest propensity to migrate. They conclude that this is a response to the concentration of post secondary educational institutions and job opportunities in the few urban centres of Ghana. However, as with fertility at the provincial and district scale, no variable properly captures the relationship between migration and education. The council scale does not have data on migration. The relationship will therefore not be considered in the regression equations.

*8.4.2.5 Fertility, migration and employment*

The sign of the relationship between fertility and employment varies with the way in which employment is defined. It is probably much more accurate to examine the relationship between fertility and labour force status rather than employment. It is the nature of employment that is important rather than the availability of it, and hence the concern with labour force status. When migration is considered it is the availability and existence of employment opportunities that is important. Thus, migration is positively related to employment or rather to available employment opportunities as Chapter Six and Seven showed, whereas with regards to fertility it is the nature of work that the population is involved in that is of great importance. Employment in this section is taken to mean employment in the formal and informal work outside the household. This distinguishes it from the work, mostly done by women, within the household, both domestic and family tasks such as looking after the family farm.

Schutzer el at (1983), Phillips et al (1969), Hicks (1974) and Ekanem (1979) have found a positive relationship between fertility and percent of the labour force in agriculture. This led Schutzer et al to formulate their land-labour hypothesis in which the need for labour to work the household's farm under the subsistence farming system leads to higher fertility. As the labour force composition shifts in favour of employment outside agriculture so fertility declines. Indeed, Zanamwe (1988a:17) argues that one of the implicit assumptions of the demographic transition theory is that industrialization and urbanization will induce changes in the fertility structure of the population, the overall effect of the change being downward, i.e. towards lower fertility. Ekanem (1979) found that the decline in the share of the population engaged in agriculture was the most important singular factor responsible for fertility declines in sub-Saharan Africa. He estimated that 65% of the observed fertility decline stemmed from the shifting balance between the population engaged in agriculture and those engaged in other non-agricultural activities. His findings are similar to those arrived at by Tsui and Bogue (1978) in their study of fertility decline in the developing countries.

Further, female labour force participation, because of its strong association with female education attainment and income has a strong and negative impact on fertility. Becker's (1960) economic theory of fertility is used to explain this negative association between fertility and female labour force participation. Cochrane (1975) argues that higher opportunity costs are involved if children are raised where the wife is working and the child is taken as a consumption good. Phillips et al (1969) note the higher costs of raising children in urban settings, where most of the employment opportunities for both sexes exist, when compared to the rural areas. This leads families to require income from both spouses adding to the costs of having children if the wife has to take time off work in order to bear and raise them. Van de Walle (1979) and Redwood (1983) also find a negative association between fertility and increased female labour force participation, the former in Ticino (Switzerland) and the latter in the United States.

Table 8.16(a) shows that employment in the formal or modern sectors of the economy is negatively associated with fertility while employment in the subsistence sector is positively associated with fertility, at the council scale. The council scale is considered because it is the only one that provides a classification of employment activities by broad economic sectors. The association between fertility and female labour force participation is captured at the provincial level. The sign is as expected i.e. it is negative and fairly strong. Thus, the variables of percent females in formal employment in 1982 can be used to examine the relationship between fertility and female labour force participation while that of persons employed in subsistence farming can be used to explore labour force status.

Table 8.16(a): Fertility and employment

| Explanatory variable | Dependent variable CWR | CBR | GFR | TFR |
|---|---|---|---|---|
| (i) Council scale (labour force status) | | | | |
| % males formally employed | -.4503* | - | - | - |
| % males subsistence farming | .4809* | - | - | - |
| % females formally employed | -.0481 | - | - | - |
| % females subsistence farming | .4080 | - | - | - |
| % persons formally employed | -.3396 | - | - | - |
| % persons subsistence farming | .4681* | - | - | - |
| (ii) Province scale (female labour force participation) | | | | |
| % females formally employed 1982 | -.5241 | -.2955 | -.4695 | -.4695 |

Notes: * significant at the 0.01 level; - no data available.

Migration is positively associated with the existence of employment opportunities. In this regard, Todaro's approach, which considers the conditions at the destination is of crucial importance (Todaro, 1969). Todaro argued that the decision to migrate is based on the migrant's information about the existence of employment opportunities at the destination, acting as pull factors, plus the economic conditions at the origin less the cost of migrating, which act as the push factors. The difficulty which arises is how to measure the probability of gaining employment or the existence of employment opportunity. Todaro suggests the use of unemployment figures and the number of jobs being created as reflected in newspaper advertisements. The logic behind the use of unemployment figures is that not every migrant is absorbed into gainful employment. However, areas or regions perceived by migrants as offering employment opportunities will attract a large share of the migrant population which will push the unemployment rate upward. It is to be expected, especially in the

African context, that urban areas will have higher unemployment figures than rural areas. Among urban areas, probably the largest cities will show higher unemployment rates because they are perceived as offering the best employment opportunities by the migrants.

Table 8.16(b) shows the relationship between migration and unemployment for both sexes at the provincial and district scales. The correlation between rates of female unemployment and migration rates are as expected. There is a positive association between female in-migration rates and unemployment. In other words, the unemployment rate is picking up the expectation of securing employment by the female population. The male correlation is different. First, it is much weaker than that of females, being much nearer to zero. Secondly, the signs for in-migration and net migration are negative. In other words, as unemployment rises so migration into a region

Table 8.16(b): Migration and employment

| Explanatory variable | Dependent variable IMR | OMR | NMR |
|---|---|---|---|
| (i) Provincial scale | | | |
| % males unemployed | -.3130 | -.0528 | -.1932 |
| % females unemployed | .4265 | -.6274 | .5315 |
| (ii) District scale | | | |
| % males unemployed | -.0105 | .0283 | -.0201 |
| % females unemployed | .0835 | -.0598 | .1653 |

falls. This seems to show a distinct difference in behavioural patterns between the male and female population or the existence of different employment opportunities. Clearly, male employment opportunities are more widespread compared to those of females. Chapter 6 and Chapter 7 pointed out that most employment on commercial farms was male dominated. This would split the migration stream of males between commercial farming regions and urban areas and also enable males to switch employment as conditions changed much more easily than the female population. Also the smaller size of the female labour force which is active in formal employment might mean that it is more sensitive to changes in employment conditions than the male population. Thus, the sucking in of the female population leading to a rise in the female unemployment rate might be a more sensitive indicator of the existence of employment opportunities than that of males. It will therefore be used as the variable representing the existence of employment opportunities at the provincial and district levels.

*8.4.2.6 Fertility and family planning*

The relationship between fertility and family planning is considered to be negative since the aim of all such programmes is the reduction of fertility. However, its role in reducing fertility is still in contention. The Population Research Bureau (1985), Ekanem (1979) and Tsui and Bogue (1978) have argued that family planning can act to reduce fertility within a country. However, they point out that it cannot act alone. To be most effective it requires situations of mass education, improvements in the social status of women, greater access to health facilities and a more equitable distribution of income. For example, the Population Research Council points out that the low social status of women in Kenya is responsible for the continued high fertility in that country, despite a family planning history stretching from the early 1960s. Further, Freedman (1982) cites government support as of crucial importance in the success of family planning efforts. This was not forthcoming in Kenya until 1982. In India, China and Indonesia, government support for family planning programmes is viewed as a decisive factor in the decline in fertility within these countries.

Family planning in Zimbabwe has existed since 1957 though governmental support only started in earnest between 1972 and 1973 (Zanamwe 1988b:42). Statistics on family planning have been collected on the basis of the number of women accepting a particular family planning method. To aid the distribution of contraceptive devices a group of community based distributors, mainly female, were trained and sent into the villages. Because, statistics of acceptors are not disaggregated to the district or even provincial level, the community based workers are the only variable that can be used to represent the efforts of the government to bring family planning to the population. Further, they probably represent the clearest sign of government support for family planning.

Statistics for community based distributors are available only at the provincial scale. Table 8.16 shows that fertility and the community based distributors are positively correlated. This is not the expected direction of the relationship. What is causing the reversal in the sign?

Table 8.17: Fertility and community based distributors (province)

| Explanatory variable | Dependent variable | | | |
|---|---|---|---|---|
| | CWR | CBR | GFR | TFR |
| Community based distributors | .3570 | .5173 | .3749 | .3807 |

The most likely explanation is that the community based distributor is the wrong variable for use in measuring family planning effort. In fact, the positive correlation between fertility and the community based distributor (CBD) says more about the success of the government policy in targeting the high fertility areas as in need of the services of the CBD. If the relationship had been negative, then one would have expressed some doubt as to the seriousness of government support for the family planning programme. However, what it means is that there is no measure in the current study that can be used to represent the effect of family planning on fertility. Also, where a policy, like the family planning programme, is under consideration, only a cross-temporal study can effectively measures its effectiveness. The current study does not have cross-temporal data and at most could only infer the general effectiveness of the family planning programme.

*8.2.4.7 Fertility, infant mortality and associated indicators*

Ekanem (1979) argued, in connection with the incipient fall in fertility observed in sub-Saharan countries, that falls in infant mortality were a major contributory factor. Indeed, he argued that the fall in infant mortality was the second largest contributor to the decline in fertility, contributing 54% of the observed fall as against 65% for share of population in agriculture cited above, 51% for literacy and 37% for urbanisation. The positive association between declines in infant mortality and fertility is due to the realisation by parents that there is no need for excess birth to safeguarding against infant deaths. The relationship has been summarized in the demographic transition model though Ekanem and Hicks (1974) argue that infant mortality decline alone will not necessarily lead to declines fertility. These have to be accompanied by first, changes in attitudes towards large family sizes and secondly, by sustained improvements in socio-economic conditions. Ekanem cites a study in south-western Nigeria where, despite falling infant mortality, 49.1%

of women interviewed wanted four or more children, as against 1.5% who wanted 0-3 children and 41.5% who left it to the "will of God". Such attitudes need to be changed through what Freedman (1982) calls "loading the communication system" i.e. propaganda to encourage smaller families and developmental policies that give security to parents, especially in old age.

Infant mortality is often seen as the most sensitive indicator of development in the socio-economic field, especially that designed to improve health and sanitation. For example, Hazledine and Moreland (1977) found a positive relationship between fertility and infant mortality for Asian countries. The magnitude of the relationship was related to the availability and accessibility of health services. They conclude that policies aimed at spreading better health and sanitation conditions for the largest section of the population have the greatest chance of influencing fertility through reductions in infant mortality. Since there is no direct variable to measure the effects of infant mortality on fertility in Zimbabwe, the variables that best represent policies designed to improve health and sanitation will be used as proxies in the analysis. These variables include: at the provincial level, nutritional status, percent of doctors in 1984, the percent of village health workers in 1982 and 1983; at the district and council scales these include the water, cooking fuel and sanitation variables. The variables and their correlation coefficients with fertility are shown in Table 8.18.

The nutritional status of children is measured by the percent under sixty months who are malnourished. Because the variable embodies the concept of the survival chance of children, it should be positively correlated with fertility. This arises from the fact that malnourished children have reduced resistance to and are likely to fall prey to disease, as argued in Chapter 5. Their deaths provide parents with a need to replace them. In this respect, the variable is capturing the argument advanced by Merrick (1978) that in regimes of low infant survival, a certain number of excess births are required for parents to achieve their desired family sizes, and hence the positive relationship with fertility.

Table 8.18: Fertility and associated health indicators

| Explanatory variable | Dependent variable CWR | CBR | GFR | TFR |
|---|---|---|---|---|
| (i) province scale | | | | |
| % children under 60 months malnourished | .1876 | .5872 | .2455 | .2456 |
| % doctors in province (1984) | -.8813* | -.5883 | -.8063* | -.8065 |
| % village health workers 1982 | .2979 | .6403 | .3922 | .3943 |
| % village health workers 1983 | .2721 | .5977 | .3528 | .3560 |
| (ii) district scale | | | | |
| % hh. with piped water | -.6036** | -.5511** | -.6087** | -.6110** |
| % hh. with well/b'hole water | .6124** | .3091 | .6071** | .6083** |
| % hh. with flush toilets | -.5147** | -.4726* | -.5187** | -.5207** |
| % hh. with no toilets | .5268** | .4388* | .5280** | .5302** |
| % hh. using electricity | -.4256* | -.4279* | -.4303* | -.4322* |
| % hh. using firewood | .4548* | .4715* | .4577* | .4596* |

Notes: * signif. 0.01 level; ** signif. 0.001 level.

Unlike nutritional status, the doctors and village health workers are a symbol of improved survival chances of the infants and children as well as the population in general. They would therefore be expected to correlate negatively with fertility. The relationship is true for the medical doctors but not for the village health workers. What causes these differences? The answer seems to lie in the fact that the relationship being captured is related more to government policy and the distribution of medical personnel than fertility differentials. Chapter 7 argued that the distribution of doctors is mainly urban based. Indeed, it was shown that Harare alone captured 53% of all medical doctors. This will contribute to the improvement of the survival chances of children and combined with other socio-economic factors will lead to lower fertility.

At the same time, it was argued that the village health worker was essentially rural based. The positive relationship between fertility and the village health workers is therefore capturing the success of government policy in sending this type of health personnel into the areas where they are most needed. The argument advanced for the community based distributor also holds for the village health worker. Further, the fact that both the community based distributor and village health worker programmes started around 1981 means that their impact could not have been picked up by the 1982 Census whereas doctors have been operating for a longer period of time (CSO 1985a). Thus, it might be instructive to include the percent of doctors in a province as a proxy for the survival chances of children while excluding the village health worker because of the recency of the programme.

At the district and council level, the survival chances of children are best represented by the variables that measures the quality of life in an area, i.e. water and sanitation. Improvements in water and sanitation are negatively related to fertility. Again, Chapter 5 has argued that most children in Zimbabwe suffer from easily curable or preventable diseases most of which are water borne or a result of poor sanitation e.g. malaria and diarrhoea. Improvements in sanitation and water will increase the survival chances of children and eventually lead to declines in fertility as the need for replacement births is eliminated. Table 8.18 illustrates the point clearly. Households that have piped water, flush type toilets and who use electricity for cooking have lower fertility than those who fetch water from wells and boreholes, have no toilets and use firewood for cooking. The variables, also incorporate other influences, such as the need for child labour to fetch the water and woodfuel, as argued by Cain (1986:11). However, they do indicate that improvements in water quality and sanitation will be accompanied by significant changes in fertility, though the relationship is indirect, operating through other socio-economic variables.

*8.4.2.8 Fertility, migration and urbanisation*

Urbanisation is hypothesized as being negatively related to fertility and positively to migration. In fact, with regards to migration, urbanisation is both a cause and a consequence of migration. Cities attract migrants who are looking for means to better their lives and as a consequence the rate of urbanisation is pushed up. Maybe in developing countries, urbanisation has ceased to be a consequence of migration since most cities in these countries have ceased to grow and some are declining. Indeed, even in developing countries one can argue that urbanisation is the cause for the process termed "counter-urbanisation", in which residents of large cities desert them in search of a better life, in terms of a cleaner environment, in surrounding peri-urban and rural areas.

Zanamwe (1988b) has argued that the negative impact of urbanisation on fertility is based on changing attitudes and cultural values to the family. Within the context of Africa, urbanisation is the process that distances the migrant from the cultural and social ties of the extended family and clan systems. New values, oriented towards a nuclear family are acquired. The urban environment further provides better water and sanitation facilities as well as improved access to doctors and health facilities as discussed in the preceding subsection and Chapter Seven. This leads to better survival chances for infants and children, which leads to lower fertility (Sulaiman 1984; Caldwell 1979; UNICEF 1985).

Table 8.19 would seem to support this argument based on correlations at the provincial and district levels. There is a negative and significant relationship between fertility and percent of population living in urban centres as there is a positive and significant relationship between fertility and percent population in rural areas. The correlation coefficients support the findings of the ZNFPC (1985) which found the fertility of rural women in Zimbabwe consistently higher than that of urban women at every age group. They explained the differential in terms of the higher loss of infants and children by rural women compared to urban ones. Indeed, the PSSU (1984) and UNICEF (1985) estimated that child mortality (0-4) contributed 40 to 53% of all deaths within rural areas compared to only 29% for Harare and 38% for the nation. Thus, the quality of life in urban areas plus the changing attitudes toward family size would seem to have a significant impact on fertility.

Table 8.19: Fertility, migration and urbanisation

| Dependent variable | Explanatory variable % population | | | |
|---|---|---|---|---|
| | Rural | | Urban | |
| | Province | District | Province | District |
| Child woman ratio | .9724** | .5771** | -.9724** | -.5776** |
| Crude birth rate | .8121* | .5231** | -.8121* | -.5230** |
| General fertility rate | .9579** | .5834** | -.9579** | -.5839** |
| Total fertility rate | .9567** | .5855** | -.9567** | -.5860** |
| In-migration rate | -.7722 | -.4647* | .7722 | .4647** |
| Out-migration rate | .7879 | .0140 | -.7879 | -.0152 |
| Net migration rate | -.8525* | -.5049** | .8525* | .5075** |

Notes: * signif. 0.01 level; ** signif. 0.001 level.

With regard to migration, it is the employment opportunities represented by urban centres that gives the positive association with urbanisation. The arguments valid for the positive association between employment and migration also hold here. As Kasanga and Avis (1986) argued, employment and educational opportunities are concentrated in urban areas. These opportunities attract migrants because they represent differential development between the urban cores and the rural peripheries, a factor highlighted by the factor and cluster analyses. The two cluster solutions proved to be an urban-rural division of the country in as much as the factor analysis showed the urban districts enjoyed a better quality of life.

The correlation coefficients in Table 8.19 support the arguments. There is a positive correlation between rates of in-migration and net migration with percent population in urban areas while there is a negative association with out-migration rates. At the provincial level, the net migration is significant at the 0.01 level while at the district level, it is significant at the 0.001 level and the in-migration rate is significant at the 0.01 level. Thus, urbanisation can be taken as a fairly good indicator of migration levels into a province or district.

*8.4.2.9 Fertilty and other socio-economic variables*

Two socio-economic variables not covered above remain to be examined. These are related to fertility and do not have a direct bearing on migration. They are related to the population structure and the marriage pattern of the population. These variables are shown in Table 8.20.

Table 8.20 shows the percent of children under 15 years is positively related to fertility. Bogue and Palmore (1964:322-324) point out that the percent of children under the age of 15 years underestimates fertility due to mortality. They also see further contamination to the variable arising from the fact that it deals with past rather than current levels of fertility. This makes it less clear whether it is over- or under-estimating current fertility levels. Under conditions of falling fertility, one would assume the former while the latter would hold if fertility was rising. They conclude that the measure must be interpreted along the same line as the crude birth rate measure, i.e. as a biased estimate that includes other effects.

The final variable is related to age at first marriage and the prevalence of spinsterhood in the population. Bogue and Palmore (1964:325) argue that if two populations have an equal number of women in the childbearing ages, but one of the populations has a cultural

Table 8.20: Fertility and other socio-economic variables

| Explanatory variable | Dependent variable | | | |
| --- | --- | --- | --- | --- |
| | CWR | CBR | GFR | TFR |
| % children under age 15 yrs | .9917** | .8553* | .9835** | .9838** |
| Mean age at marriage (female) | -.0297 | - | - | - |
| Mean age at marriage (persons) | -.1625 | - | - | - |

Notes: * signif. 0.01 level; ** signif. 0.001 level; - no data.

pattern of early marriage and the other of late marriage, it is likely that the former will have a substantially higher fertility than the latter. The pattern of marriage should be negatively associated with fertility i.e. as age at first marriage age increases then fertility will be seen to decline. Indeed, Table 8.20 shows a negative correlation between age at marriage for females and persons and the child to woman ratio at the council scale, though it is very weak.

This might be an indication of little variation in the age at which women in Zimbabwe get married. However, such a small variation will gradually produce the desired fertility differentiation and deserves to be investigated.

*8.4.2.10 Summary of results of the correlation analysis*

The correlation analysis has shown that most relationships between fertility, migration and socio-economic development are as postulated in the literature. The only drawback is that some of the variables are not appropriate for discussing the relationships. For example, the family planning variable was found to bring out government support for family planning efforts. It turned out to be a measure of the success of government policy aimed in targetting the high fertility areas as areas into which contraceptive distribution and knowledge should be spread. Similar effects were observed with the village health worker variable. Health personnel would have a negative impact on fertility through the improvements in health, water and sanitation which they would introduce. While this might be the case, the village health worker programme was found to be too recent to have any significant impact on the fertility levels of 1982.

Despite such drawbacks certain variables were found to be suitable for use in the envisaged regression analysis. These are summarized in Section 8.4.3 below. The Section also explains the relationship which the variables are supposed to measure. Some of them are direct measures while others act as proxies for variables which could not be measured directly. For example, the percent of doctors in a given province is seen as a proxy for improved child survival chances which is negatively associated with fertility while "quality of life" index is a proxy for differentials in water and sanitation development.

8.4.3 Regression analysis: an introduction

Multiple linear regression analysis has been applied by researchers with three goals in mind. Firstly, it is used to develop equations that summarizes the relationship between a dependent variable and a set of independent variables. Secondly, it can be used to identify a subset of independent variables that are most useful for predicting the dependent variables. Thirdly, it can be applied to predict values of the dependent variable from the values of the independent variables (Norusis 1985:9; Hammond and McCullagh 1974:218; Cole and King 1968:138), when only the latter are available. Regression analysis proceeds through fitting a regression line in such a way that the coefficients for the independent variables are chosen so that the sum of the squared differences between the observed and predicted values of the dependent variable based on the model is as small as possible. This is known as the least-squares method. Of course, as with all other statistical methods, there are other techniques that can be applied to fit the regression line besides least-squares. The regression line is known as the "line of best fit" (Hammond and McCullagh 1974).

In this section, multiple linear regression is used in a predictive capacity as well as in its role as summarizing the relationship between independent and dependent variables. The fertility and migration measures are taken as dependent while the socio-economic variables act as independent variables. Pearson's product-moment correlation analysis has already been used to select some of the independent variables for use in the regression analysis. Thus, the second goal of regression analysis can be dispensed with.

The basic model proposes that current levels of fertility and migration are a function of past demographic events as well as progress in the fields of social and economic development. With regards to fertility, such socio-economic developments can be seen to include rises in income, education, urbanisation and changes in the role and composition of the labour force. For migration, economic developments are of crucial importance. These represent differentialS in wage levels as well as the availability of employment opportunities. Social factors play a role by acting as push factors i.e. the migrants move in search of a better quality of life. To measure differentials in the "quality of life", the variables which deal with water, sanitation and cooking facilities have been averaged into a quality of life index, QOL. From a destination point of view, this variable is postulated as being positively related to migration while from an origin viewpoint, it should be negative.

The variable, quality of life (QOL), can also be entered as one of the independent variables in the fertility models. In this instance, it acts as a proxy for a host of social factors, including improved child survival chances, as a result of improved water and sanitation, and the labour value of children. Cain (1985:11) argued that children are used in rural settings to fetch water from rivers, wells and boreholes and as labour on the fields or farms. Because of this, the sign of the variable with fertility is not unidirectional. If the variable is a stronger proxy of the survival chances of infants and children than of their labour value, then the relationship would be negative and vice versa.

*8.4.3.1 Multiple regression of fertility*

Multiple regression analyses were undertaken to establish linear relationships between fertility and socio-economic development at the provincial, district and council scales. Table 8.21 illustrates the derived regression equations predicting fertility measures (child woman ratio, general fertility rate and total fertility rate) from the independent variables. R is a measure of the correlation between the dependent and the independent variables while R-squared measures the "goodness of fit" of the linear model to the observed data. The R-squared change provides an indication of the increase in the goodness of fit as successive independent variables are added to the regression model (Boden 1989:201).

At both the provincial and district scale, the model best fits predictions of the total fertility rate, which as argued before (see Chapter 4) is free from the bias of age distribution. At the council scale, the model best fits predictions based on the total population rather than the female population, seeming to contradict arguments that improvements in the educational attainment and social standing of women leads to greater falls in fertility. The relationship between fertility and past fertility levels, measured by percent of children under 15 years (PCHILD) and female labour force participation (PFEMP82, PFEMP) are as expected (positive for the former and negative for the latter). The percent of population in rural areas (TRP) also has the expected sign (positive) as does the marriage variables (SF7, ST7; negative) and the quality of life variable, (postulated to be either positive or negative).

Table 8.21: Multiple regression equations to predict fertility from socio-economic factors: provincial, district and council scales

Provincial scale

(a) GFR=-15.438+4.075(PCHILD)+0.007(MEARN82)-0.765(PFEMP82)+0.215(PD84)

| Step | Enter | R | R-squared | R-squared change |
|---|---|---|---|---|
| 1 | PCHILD | 0.9835 | 0.9674 | 0.9674 |
| 2 | MEARN82 | 0.9870 | 0.9741 | 0.0068 |
| 3 | PFEMP82 | 0.9877 | 0.9756 | 0.0014 |
| 4 | PD84 | 0.9931 | 0.9862 | 0.0106 |
| (b) TFR=1.889+0.084(PCHILD)+0.00016(MEARN82)-0.015(PFEMP82)+0.004(PD84) | | | | |
| 1 | PCHILD | 0.9838 | 0.9679 | 0.9679 |
| 2 | MEARN82 | 0.9876 | 0.9754 | 0.0076 |
| 3 | PFEMP82 | 0.9883 | 0.9768 | 0.0014 |
| 4 | PD84 | 0.9933 | 0.9866 | 0.0097 |
| District scale | | | | |
| (c) GFR=-86.152+5.238(PCHILD)+0.052(TRP)+0.32(QOL)-0.069(PFEMP) | | | | |
| 1 | PCHILD | 0.8002 | 0.6403 | 0.6403 |
| 2 | TRP | 0.8007 | 0.6412 | 0.0009 |
| 3 | QOL | 0.8135 | 0.6618 | 0.0207 |
| 4 | PFEMP | 0.8155 | 0.6650 | 0.0031 |
| (d) TFR=0.444+0.108(PCHILD)+0.0011(TRP)+0.0066(QOL)-0.0014(PFEMP) | | | | |
| 1 | PCHILD | 0.8018 | 0.6429 | 0.6429 |
| 2 | TRP | 0.8023 | 0.6436 | 0.0008 |
| 3 | QOL | 0.8148 | 0.6639 | 0.0203 |
| 4 | PFEMP | 0.8167 | 0.6670 | 0.0031 |
| Council scale | | | | |
| (e) CWR = -66.406 + 26.112(PCHILD) - 1.836(PFSUB) + 0.204(FLIT) -16.285(SF7) + 0.626(QOL) | | | | |
| 1 | PCHILD | 0.9262 | 0.8579 | 0.8579 |
| 2 | PFSUB | 0.9447 | 0.8925 | 0.0346 |
| 3 | FLIT | 0.9450 | 0.8931 | 0.0006 |
| 4 | SF7 | 0.9464 | 0.8957 | 0.0026 |
| 5 | QOL | 0.9468 | 0.8964 | 0.0007 |
| (f) CWR = 766.983 + 26.051(PCHILD) - 2.567(PTSUB) + 1.622(PLIT) -55.348(ST7) - 0.299(QOL) | | | | |
| 1 | PCHILD | 0.9262 | 0.8579 | 0.8579 |
| 2 | PTSUB | 0.9476 | 0.8979 | 0.0400 |
| 3 | PLIT | 0.9477 | 0.8981 | 0.0002 |
| 4 | ST7 | 0.9547 | 0.9115 | 0.0133 |
| 5 | QOL | 0.9548 | 0.9116 | 0.0002 |

Notes: see text for explanation of variables.

Average earnings per employee (MEARN82) and percent of doctors (PD84) in a province, which were expected to be negatively correlated with fertility come out positive. The variable of urbanization or ruralism (TRP) is excluded from the regression model, at the provincial scale though included at the district scale. Its inclusion at the district scale only has a slight effect on the overall fit of the model as indicated by an R-squared change of only 0.0009 (GFR) and 0.0008 (TFR). Unexpected too, is the negative correlation between fertility and percent of population in subsistence farming (PFSUB, PTSUB) and positive relationship with the literacy variables for males and persons (FLIT, PLIT). How can these unexpected signs be explained?

It is difficult to provide any concrete explanation without further investigation in the field, based on smaller samples. At this stage, explanations can only be inferential as well as informed by other research work. The positive relationship between fertility and average earnings per employee might be indicative of two interlinked factors. The first factor is that rising wage levels have not as yet fed into the demographic side to have any significant impact on fertility. This arises from the fact that most of the wages rises captured in the variable of average earnings per employee were introduced in the 1980s, beginning in July 1980 as part of government policy aimed at reducing income differentials within the country (MoFEPD 1986:90). A time lag would be expected to operate which would make it appear as though rising incomes or wages levels are accompanied by rising fertility, in a Malthusian-Beckerian manner.

The second factor might be that average earnings per employee are a poor proxy for the income variable or are highlighting very unequal income distribution within the country. Riddell (1984:467-469) argued that figures on income differentials in Zimbabwe are hard to come by. There is no breakdown of income by social class or industrial sectors. While it is government policy to reduce income differentials, Ridell

(1984:368) and MoFEPD (1986:91) report initial narrowing between 1980-1982 followed by widening in 1983-1984. Such trends would encourage parents to invest in child rather than financial security. The distribution of the wages in September 1982 would seem to lend credence to this. The MoFEPD (1986:91) reports that 49.3% of employees in the formal sector earned less than Z$150, excluding those employed in the agricultural sector, while 70% earned less than Z$250. In contrast, if high income earners are taken as receiving a wage of Z$750 or more, then 5.6% of employees in the formal sector earned this or more. Tightening the high income definition to include only those earning Z$1000 or more, sees the wage was enjoyed by only 3.2% of the employees in the formal sector. In other words, income differentials must be reduced in a sustained effort if they are to have the desired impact on fertility. Currently, income differentials are still to great to have an effect on fertility and the time lag accompanying attempts by government too reduce such differentials cause the relationship to appear positive. Probably measured cross-temporally rather than cross-sectionally as in the current study, with changes in incomes being related to changes in fertility, the relationship might hold as postulated. But, such a study will still have to await the collection of adequate data on income in Zimbabwe.

Similar arguments can be advanced with regards to the other variables which do not carry the expected signs. For example, the policy of government to spread better health and education to the largest number of the population was still too recent to have been reflected in the 1982 Census. Free primary education was introduced in September 1980 along with free access to health facilities for those earning Z$150 per month or less (MoLMPSW 1984:55). The changes in health might be felt immediately, i.e. through declines in the infant mortality rate, but the impact of such declines and of the educational programmes might need at least a generation to work themselves into the demographic side of the equation. Because of this, improvements in health and sanitation as well as rising literacy levels will seem to be positively related to fertility, as in the current model. These are merely time lag effects and do not substantially alter the evidence from other empirical studies i.e. of a negative relationship between fertility, health and education.

Subsistence farming provides an example were lag effects have worked their way into the demographic side of the equation. The factor and cluster analysis showed that development reflected largely the land tenure divisions of the colonial settler state. These land tenure divisions were relaxed by the Muzorewa government in 1978 through the repeal of the Land Tenure Act of 1969 (Bush and Cliffe 1984:81-82). The Land Tenure Act had resulted in the overcrowding of the communal lands (which form the district council areas) and the generation of land pressure, land degradation and the creation of a rural landless class (Kinsey 1982:94). Kinsey argues that studies conducted in the mid-1970s reveal a growing problem of rural landlessness. Some estimates put forty per cent of males aged sixteen to thirty years as having no land while others found four to eleven percent of households landless. Most of the landlessness conceded with the belt of high fertility, highlighted by Factor I above (district scale). In Chapter Two, it was argued that increased overcrowding, land degradation and landlessness would feedback into the fertility behaviour of the population resulting in lower fertility. Cain (1985:13) reports lower marital fertility among landless households of Bangladesh compared to those owning land. Landless households had a total marital fertility of 6.8 children per woman compared to 7.7 for those owning 3 or more acres of land. Cain explains the lower fertility for the landless in terms of spouse separation generated by migration in search of employment. Merrick (1978:331-334) found a negative association between fertility and land scarcity in rural Brazil. He argued that the cost of obtaining land to pass on to children should have a depressing effect on fertility whereas abundance of land would encourage higher fertility. The land tenure acts of the colonial settler state, by restricting large sections of the African population to drier, overcrowded communal lands seemed to have raised the cost of land, leading both to landlessness and increased migration from rural areas into urban ones. Further, as Bush and Cliffe (1984) have demonstrated, most of the households in rural areas are headed by women while the men work in urban areas. The effect of spouse separation would also enforce the depressing effect of growing landlessness and overcrowding on fertility. The overall effect is to show the variable of subsistence farming acting more as a proxy for land scarcity, land degradation, land pressure and landlessness. Viewed in this way, the variable does have the expected sign.

*8.4.3.2 Multiple regression of migration*

Analysis based on the Pearson product-moment of correlation showed that very few of the variables derived from the Census could be applied in regression equations with migration. Most variables were seen as consequences rather than causes of migration. However, the correlation analysis did enable the selection of a few variables for use as independent variables in the regression equations. These and the regression equations are shown in Table 8.22 below, at the provincial and district scales.

The regression model best fits the prediction of the net migration rate (NMR) at the provincial level, based on percent population in urban areas (UCP), percent population in formal employment in 1982 (PTEMP82) and average earnings per employee in 1982 (MEARN82), as independent variables.

Table 8.22: Multiple regression equations to predict migration from socio-economic factors: provincial and district scales

**Provincial scale**

(a) OMR = -146.56 - 0.141(UCP) + 3.241(PTEMP82) + 0.01(MEARN82)

| Step | Enter | R | R-squared | R-squared change |
|---|---|---|---|---|
| 1 | UCP | 0.7879 | 0.6208 | 0.6208 |
| 2 | PTEMP82 | 0.7889 | 0.6223 | 0.0016 |
| 3 | MEARN82 | 0.8341 | 0.6957 | 0.0733 |

(b) IMR = -1363.506 + 0.409(UCP) + 27.771(PTEMP82) - 0.013(MEARN82)

| Step | Enter | R | R-squared | R-squared change |
|---|---|---|---|---|
| 1 | UCP | 0.7722 | 0.5963 | 0.5963 |
| 2 | PTEMP82 | 0.8111 | 0.6579 | 0.0617 |
| 3 | MEARN82 | 0.8159 | 0.6657 | 0.0077 |

(c) NMR = -1375.518 + 0.781(UCP) + 27.855(PTEMP82) - 0.036(MEARN82)

| Step | Enter | R | R-squared | R-squared change |
|---|---|---|---|---|
| 1 | UCP | 0.8525 | 0.7268 | 0.7268 |
| 2 | PTEMP82 | 0.8722 | 0.7608 | 0.0340 |
| 3 | MEARN82 | 0.8856 | 0.7842 | 0.0234 |

**District scale**

(d) IMR = 13.964 + 0.307(UCP) + 0.156(PTEMP) + 0.157(QOL)

| Step | Enter | R | R-squared | R-squared change |
|---|---|---|---|---|
| 1 | UCP | 0.4657 | 0.2169 | 0.2169 |
| 2 | PTEMP | 0.4817 | 0.2320 | 0.0151 |
| 3 | QOL | 0.4913 | 0.2414 | 0.0094 |

(e) NMR = -36.96 + 0.551(UCP) + 0.329(PTEMP) + 0.423(QOL)

| Step | Enter | R | R-squared | R-squared change |
|---|---|---|---|---|
| 1 | UCP | 0.5075 | 0.2576 | 0.2576 |
| 2 | PTEMP | 0.5255 | 0.2761 | 0.0185 |
| 3 | QOL | 0.5444 | 0.2963 | 0.0202 |

Notes: see text for explanation of variables

The model is very weak at the district level revealing the inadequacy of the three variable model in predicting migration behaviour. Indeed, out-migration rates had to be excluded at this level because they produced very weak R-squared coefficents (of less than 0.12). However, it can be pointed out that though the fit is generally weak, the model signs are all correct at the district level. It was hypothesized that, urbanisation would exert a strong positive influence on migration, as would the existence of employment and the perceived better quality of life. These variables are shown to be positively associated with levels of in-migration and net-migration though the low R-squared means that they cannot be used in a predictive capacity. Most likely the inclusion of a distance measure, such as discussed in Chapter Six, would improve the overall fit of the model at this scale.

The low fit of the model at the district level might also have other contributory factors which are masked by aggregation to the provincial scale. Adejopu (1980) argued that areas of economic growth are not always the destination of migrants. He points out that the continued sustained growth of rural populations is both through natural increase as well as rural to rural migration. Resettlement of landless peasants discussed in Section 8.4.3.1 has been a major policy of the Zimbabwe government since September 1980 (Kinsey 1982:92; Simon 1986:13-14). The colonial settler state has also resettled people in rural areas in order to alienate the best land for its settlers. These effects are likely to be included in the migration measures, which, it must be recalled, are based on lifetime rather than annual migration figures. Such effects would be most immediate at the most spatially disaggregated scale while being masked at the most aggregate scale. Thus, the poor fit at the district scale highlights the factors of rural to rural migration, the inadequacy of the lifetime migration measure in capturing everyday migration behaviour and decisions, as well as the dangers of aggregation to higher spatial scales, which has been one of the major concerns of this study. The inadequacy of the independent variables in explaining what is happening with regards to migration is also further emphasized.

The provincial scale provides a problem of interpretation when some of the signs are considered even if it offers the best fits for the model. Consider out-migration, for example. The sign with urbanisation is as expected, i.e. it is negative. In other words, areas that lack in urban development are areas of high out-migration (Todaro 1969; Adejopu 1980) and are probably perceived by migrants as areas that offer a poor quality of life. However, when it comes to formal employment and earnings, out-migration is positively associated with both. This would appear to be a contradiction since both factor and cluster analysis revealed regions of high employment as regions of high in-migration. The cause for the reversal in signs is difficult to fathom unless other indirect effects are being picked up by the formal employment and earnings variables. These would bear further investigation outside the current study.

The signs for in-migration and net migration with formal employment and urbanization are as expected. However, the average earnings of employees raise a further problem as it is found to be negatively associated with either in-migration or net migration. Probably the arguments advanced at the district levels with regards to rural to rural migration also hold true at this scale, though probably to a lesser extent due to aggregation. Average earnings per employee are based on employees in formal employment, in the twelve largest cities. However, employment has been shown to be more widely distributed. Indeed, Kinsey (1982:97) reported that in 1980, the commercial farming sector provided a third of all formal employment in the country and was the largest single employer of labour with 370,000 employees out of an estimated formal labour force of one million (GoZ

1981:30). Further, the commercial farming sector was estimated to have some 230,000 families which depended directly on it for their livelihood. This, coupled with the fact that some migration would have been under official resettlement schemes would weaken the effect of wage differentials based on urban employees in predicting migration patterns. Only if the government fully implements its policy of ending migrancy, discussed by Bush and Cliffe (1984) and Simon (1986), would migration into urban areas accelarate and average earnings differentials among cities or provinces have a significant impact. Thus, the average earnings variable does not conform to the expected hypothesis because it does not cover the whole of the population in the formal sector and excludes considerations of rural to rural migration connected with resettlement and the creation of new households by couples marrying within rural communities.

*8.4.3.3 Summary of results of the multiple regression analysis*

The basic models tested seem to a large measure to conform to the hypotheses under consideration. Fertility and migration are found to be related to levels of economic and social development. However, there are other factors which complicate the relationships which have not been taken into consideration by the model equations. Such factors include lag effects of policies designed to reduce inequalities in income, access to health and education in relation to fertility as a depended variable. These, generally postulated to have a negative impact on fertility are founded, in the current models to have a positive one. Subsistence farming, normally thought to be positively related to fertility is found to have a negative impact because of the existence of land pressures in the communal lands since the 1950s (Kinsey 1982:93). While no independent variable measures such effects in the current models, these can be inferred from past research as well as common sense.

Migration models also show themselves to be affected by indirect effects on the independent variables. These include the existence of rural to rural migration as well as migration into commercial farming areas or rural councils as they have been referred to in this chapter. Further complication arose from inadequate data on wage differentials. Only data for the twelve largest cities was available as a measure of the wage differentials and the fact that this variable was negatively correlated with in-migration and positively with out-migration shows its inadequacy as well as highlighting the fact that not all migration streams are for employment in waged labour. The weak fit of the model at the district scale, with less than 30% of the variation in migration levels explained compared to over 66% at the provincial level, shows that the more disaggregated the level, the larger the influence of such indirect factors.

## 8.5 CONCLUDING REMARKS

Detailed comments have been given at the end of each analytical method discussed. The comments to be made in this section will therefore be of a brief nature. Indeed, the comments will concern themselves with some of the general weaknesses in the discussion of the correlation and regression analysis.

The fertility indicators in Section 8.4.1 are closely correlated because they used the same data. The CWR was used in Chapter Four to derive the GFR adjusted for mortality. This in turn was used to derive the TFR based on a multiple regression model. Thus, if the TFR is estimated as a linear function of the GFR, then it will be perfectly correlated. Thus, the method of constructing the fertility indicators, especially the fine measures, is partly responsible for the high correlation coefficient index.

A similar agrument applies to the correlation between stayers and out-migration rates. These are simply linked by definition thus:

OMR = 1 - SMR

SMR = 1 - OMR.

The conclusion that they are flip sides of the same coin therefore holds.

The variables PCHILD in the regression models includes elements of multicollinearity. The children in the 0-4 age groups are also part of the children in the 0-14 age groups. These children are what is captured by the child-woman ratio, used to derive the finer measures of fertility. Even where the child-woman ratio alone is used, the presence of children under five on both sides of the equation complicates matters. In the final analysis, the variable PCHILD is saying that areas with high fertility in the past 15 years or so have also had high fertility in the past five years as indicated by the CWR measures. It does not adequately capture the element of change which is one area of concern in the research. It fails to identify those district council areas that might be making the transition to lower fertility levels. This, of course, can only be done using cross-temporal data, which is still woefully lacking. Future research work will seek to rectify this situation.

The order the variables enter into the regression model also have some influence on the explanatory and predictive outcome of the model. Space and time constraints do not allow all possible permutations of such entries to be made. This will require further detailed work with improved data sets, outside the scope of the study.

The migration regression results, even though they are weaker than desired, are much more straightfoward than those of the fertility analysis. They do not contain a variable like PCHILD which has a degree of mutlicolinearity with the dependent variables like the CWR. Indeed, an area for future research is to combine the spatial interaction model of Chapter Six with the socio-economic model of this chapter to see if a better fit and prediction capacity can be obtained.

Overall, it can be concluded that interesting results have emerged from the analysis done in this chapter. However, more work remains to be done, especially in fine tuning the regression models of fertility and migration and the inclusion of mortality in the models. Other techniques will also need to be considered as will a multi-regional cross-temporal approach.

# CHAPTER NINE

# CONCLUSION

*Let us hear the conclusion of the whole matter:....*

*(Ecclesiastes 12 v 13)*

## 9.1 INTRODUCTION

The thesis set out as its main objectives, the description and analysis of demographic data; the establishment of a link between population change and socio-economic development and the development of methods of estimating demographic measures from partial data. These objectives have been fulfilled with varying degrees of success and something has been learnt about important elements of the structure of the Zimbabwean population. Section 9.2 provides a summary of some of the findings while Section 9.3 provides pointers to future directions of research arising from the current thesis and readings of the literature.

## 9.2 SUMMARY: POPULATION AND SOCIO-ECONOMIC DEVELOPMENT

The thesis was set against a background of both pre- and post-independent Zimbabwe. It established that policies formulated in the pre-independent era were still largely responsible for the observed patterns of population distribution and demographic characterstics and, for the patterns of social and economic development. Indeed, policies formulated in post-independency are aimed at eradicating some of the effects of the pre-independent period. The government policy of equitable distribution of land and income, of greater access to health and education for the maximum number of people possible, of rural development and improving standards of living are all a direct response to the policies which existed in the settler state which discriminated against the majority of the population. Some of the discrimination of the settler state and the new policies of the independent state would affect the pace of social and economic change which, in turn, would gradually affect the rate of demographic change. Did this happen?

Chapters Three to Seven provide ample evidence of the interlink between social and economic development, on the one hand, and demographic development on the other. Such links were further proved by the factorial, cluster, corrrelation and, to a limited extent, regression analysis in Chapter Eight. Chapter Three showed that the structure of the population was partly a result of legislation such as the Land Tenure Act as well as that of natural demographic processes. This is especially evident if Chapter Three and Chapter Six are thought of as complementing each other. The structure of the population is seen as a response to selective migration in an era of restricted movement for the African population. The end result was to create district council areas were the population was predominantly female, young children and old people (Mzite 1981:64). The effect was to weight the median and average age of the district council population in favour of children, increase the dependency burden of the adult, create split families, necessitating the perpetuation of the circulatory labour migration system, create increasing pressures on land due to overcrowding and land degradation further feeding into the migration circle as families sought a way to improve their incomes. Meanwhile, the urban population structure was dominated by African males, with a more balanced structure for other racial groupings (European, Asian and Coloureds), as was that of rural councils, reflecting available employment opportunities and restriction on African males bringing their families into urban areas.

However, the study of migration is itself limited by the nature of the data used for the analysis. This is life-time migration data, which provides a good summary of what has been happening to the population in the last 25 years or so. Absence of more refined data to measure migration, for example, place of residence in the previous year prior or even five years prior to the census, means that any changes that arose from the relaxation of influx control since the late 1970s cannot be measured. Such data were collected by the 1982 Census, but as pointed out in Chapter Six, the associated tabulations were never produced. It is to be strongly recommended that in future the Central Statistical Office tabulates such information and makes it available to researchers. Great benefits will accrue to both government planners and researchers if such data are made available.

Evidence from the life-time migration measures show that Zimbabweans have fairly high rates of migration, which probably is a result of the circulatory labour migration described above. Further, the migration streams, especially of males, were concentrated on twelve districts which were the most urbanized or had large scale agricultural development schemes. Analysis of the 1969 Census showed differential patterns of migration among the sexes which also helps to explain the age and sex structures discussed in Chapter Three. Males, as noted, went into urban districts or where large scale commercial farming was taking place. In other words, males were responding to available employment opportunities. Females seemed to be involved in some form of rural to rural migration, which seemed to be linked to marriage patterns. Variations in these patterns arose, for example, in the Matabeleland provinces: more females moved into urban areas than in the other provinces, but the general pattern remained the same. Unfortunately, the 1982 Census did not tabulate life-time migration statistics by sex and again, this should be strongly urged on the Central Statistical Office.

A main concern of Zimbabwean research literature has been with fertility. Indeed, Mzite (1981:65) argues that researchers in Zimbabwe have been preoccupied with the high levels of fertility to the extent of over-emphasizing these levels to the detriment of other demographic characteristics of the population such as mortality. Fertility levels in Zimbabwe are quite high, comparable to those in Kenya within Africa. However, evidence from comparison of the 1969 and 1982 Censuses shows that fertility is falling within the country, even at the national level. The need is to identify the areas in which fertility remains high and the causes for it. The fertility analysis was able to do the former. Chapter Four showed that, at the district and provincial levels, there was some variation in fertility. Generally speaking, the more urbanized the province or district, the lower was its fertility. Further, it was demonstrated that even districts where growth centres have been established for sometime, like Sanyati, were also tending towards lower fertility. In this respect, the government policy of spreading development more equitably across the spatial development surface of the country would seem to be a good contraceptive. Definitely a gradient of high to low fertility exists based on areas of residence, the high fertility being centred on rural districts, especially the district council areas while the low fertility is centred on large urban centres like Harare and Bulawayo.

The high fertility observed raises serious concerns with regards to provision of social services. Of priority is the provision of child health care, the provision of schools and eventually the provision of a means of livelihood to the youthful population. Development coupled with family planning has been suggested as the best way for ensuring a transition to lower fertility. This has generated a lot of debate in Zimbabwean literature, the recent thrust of which has been that family planning alone is woefully inadequate to control fertility unless sustainable development and rises in income are made. Chapter Eight has supported the contention that sustainable rises in income and general development are necessary if fertility is to be lowered as desired. It also made the point that, at the moment, the type of income statistics available are not very suitable for providing a definitive conclusion on the effects of income on fertility. At best, it is informed by other studies, mainly in developed countries, i.e. it is inferential.

Mortality has been the area most neglected by researchers, as Mzite has argued. Chapter Five provided some of the reasons for this, chief of which is a dearth of statistics on mortality and the lack of training among most of the research workers in the appropriate estimation techniques. The 1982 Census tried to rectify the situation on mortality by collecting information which could be used to estimate mortality levels. However, this information has been limited to the provincial level and as such still masks variations at the district and local authority level. Even though only limited to the provincial level, the thesis showed evidence of variations in infant, child, adult mortality and life expectancies by provinces and sexes.

Of major concern are the causes of these mortality variations. It was disheartening to note that the major causes of deaths among infants and children were diseases of poverty and ignorance. These deaths are therefore unncessary and could be prevented in a number of ways. Mzite (1981:66) suggests greater access to health and other social facilities for the mass of the population. His views are supported by Agere (1986) and by the current research. There is also a need to promote policies of preventative medicine as seen in the village health worker scheme and of providing health services and personnel within rural areas. The former, preventative health via the village health worker, is seen to be working as demonstrated by the correlation analysis in Chapter Eight. The later, equitable distribution of skilled health personnel, is not, as amply demonstrated by the concentration of trained and skilled medical personnel in urban districts discussed in Chapter Seven. However, social improvements that guarantee the overall improvement of the living conditions of the rural population will not only improve the mortality situation but the fertility one as well. Thus, in the final analysis, mortality and fertility both depend on improvements in the social and economic status of the population, if they are to fall to the desired levels.

Chapter Seven and Chapter Eight both highlight the differential rates of development within the country. Historical patterns of development are seen as a major determinant of the extent of development. District council areas were seen to be at the bottom of the development rung while urban districts were at the top. While these generalizations hold, it was demonstrated by the factor and cluster analysis that certain district councils, like Gutu and Sanyati, have managed to pull ahead of others, illustrating the dangers of generalizations. Such district councils had more land and more cattle per household which enabled them to grow cash crops for sale. This implies that the subsistence economy of such district councils was being transformed into a cash economy.

Developments in education and health were still inequitable but this was a reflection of the short time in which the government policies of equity had had time to operate before the census was taken. The next census might show that the gap between urban and rural districts has narrowed. This would help eradicate some of the ignorance discussed above which helps keep fertility high through the need of replacement births. The programme of the village health worker should ensure the continued increase in the number of households who enjoy wholesome water from protected wells and boreholes and who have adequate sanitary facilities through the building of ventilated latrines.

## 9.3 FUTURE RESEARCH AND CONCLUDING COMMENTS

The above section has summarized some of the findings and arguments of the thesis. The canvass that was covered was very broad. It was therefore, not possible to do justice to all the aims outlined in the thesis. This should be possible in future research work. The thesis stands as a first attempt to tie together the strands of Zimbabwean social, economic and demographic development. The attempt has been hindered by lack of adequate data, especially with regards to mortality, as well as by the nature of the data itself, for example, life-time migration data. At times, data inadequacies were overcome by the use of estimation as was done for fertility and partially, for mortality. The major achievement of using such data estimation techniques is that it will encourage other researchers in future to go beyond the official data sources in trying to explain observed demographic and development patterns within the country.

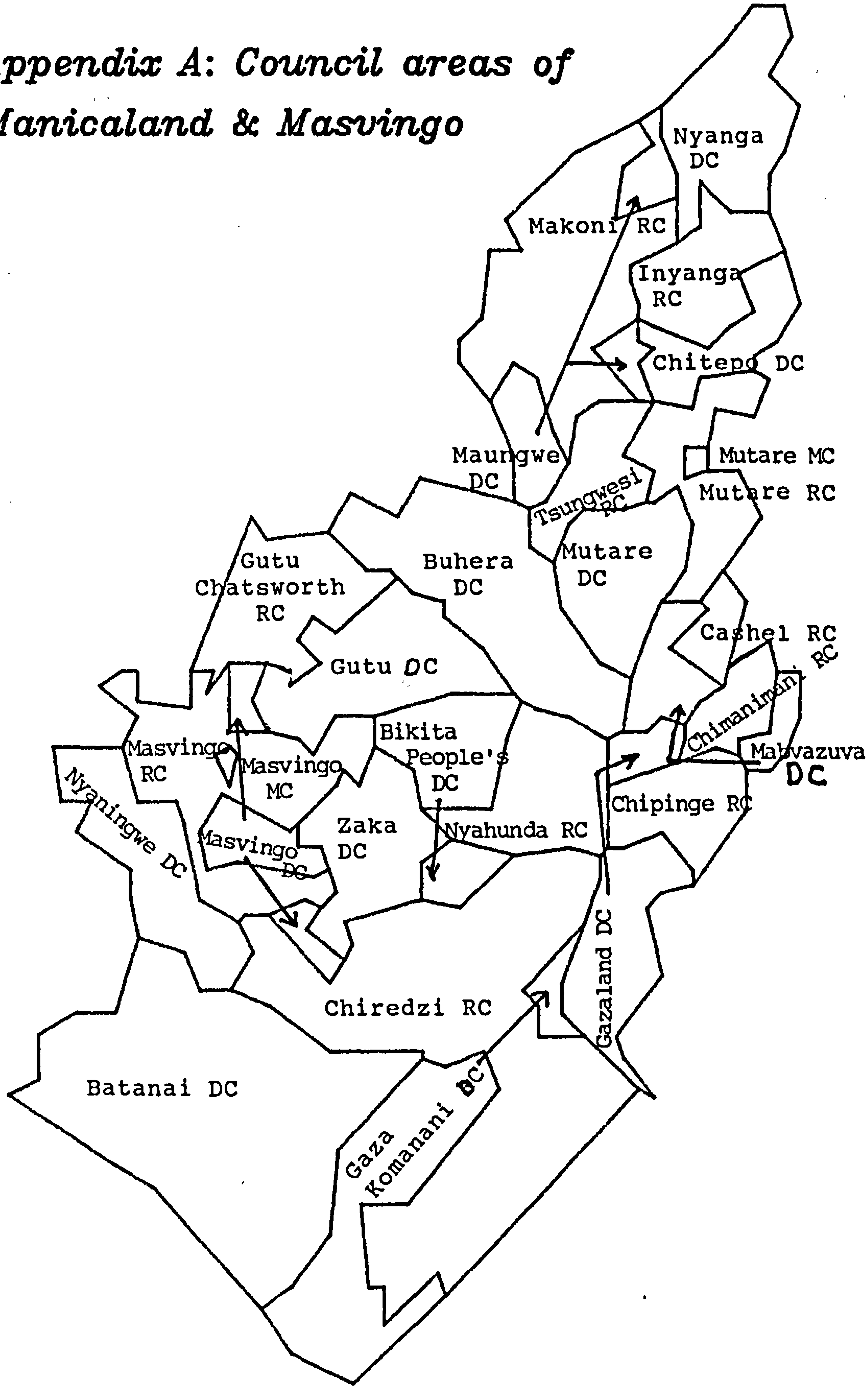
It was noted, in some of the chapters, that certain areas needed further research. The first such area to be noted was in connection with the impact of growth centres on the demographic structure of the population around them. Sanyati and Mudzi provided evidence that growth centres do wield some influence on the demographic structure of the areas in which they are located. Further exploration of this influence might help the proponents of the growth centre as a strategy for development. An issue for close examination would be the migration patterns that the growth centres are likely to generate and the way they affect attitudes towards availability of employment in more distant centres.

Fertility analysis must continue and be disaggregated to local authority levels. This can be justified on the basis that most of the studies upon which theories of fertility are based at the level of the household. Studies at the local authority levels are likely to yield closer agreement with international studies as well as picking up other fertility determinants which are masked by aggregation to district levels. Further benefits will accrue from mortality analysis by sex, age and region. The same argument can be applied to migration with the addition that migration measures based on the year prior to the census must be used.

The regression analysis will be examined in future research work. Improvements must be made in the independent variables used, especially the use of a genuine variable that represents income and the inclusion of the land variables. Employment variables will also have to be defined more precisely, in the hope that the regression models can have a better fit than in the current study. The cluster analysis also revealed the need to consider other forms of regionalizing the country besides those based on administrative boundaries. These require further exploration in future research work.

The thesis has shown that greater understanding of demographic, social and economic development and the manner in which they are interlinked can accrue from an adoption of a geographical disaggregated approach to their study. Investigation and examination of issues of population and socio-economic development showed greater variation in development patterns than suggested by other studies using nation level data. The Central Statistical Office should be encouraged to provide local level statistics so that such variations could be studied in greater detail. Further, besides disaggregation, a cross-temporal analysis instead of the current cross-sectional analysis will be of great value when such data are available. Thus, the ultimate aim is to enable the analysis of the demographic, social and economic development of the country using a multi-regional approach based on small area statistics!

*Appendix A: Council areas of Manicaland & Masvingo*



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