SCHIZOPHRENIA IN KWAZULU NATAL:
A study of certified patients, accessibility to mental health services and risk

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ABSTRACT

Schizophrenia is a debilitating mental illness. The prevalence of schizophrenia is of concern and highlights the chronicity of the illness (Kaplan & Sadock, 1998; Warner & de Girolamo, 1995).

It is therefore important that greater understanding of the variables affecting and potentially contributing to schizophrenia is sought. This study deals with three separate areas:

1. Creating a database and describing the socio-demographic profile of 615 certified patients diagnosed with schizophrenia between the years 1995 and 1996, hospitalised at Fort Napier.
2. Exploring whether a meaningful geographical model of socio-demographic variables of schizophrenia can be built, and whether it can determine areas of high schizophrenia sensitivity. Such a perspective of schizophrenia (exploring the combined effect of all the variables connected to schizophrenia) has not been previously researched rather each variable has been studied independently. The model utilised in the Geographical Information Systems (GIS) offers an opportunity to graphically overlay these individual variables and then examine the potential effect. It was only possible to explore socio-demographic variables within this Masters research project.
3. Determining the geographical accessibility of the public provincial hospitals offering psychiatric services to the population, (particularly to persons with schizophrenia). This is relevant to the provision of maintenance programmes and early intervention as encouraged by recent research (Hodges, Byrne, Grant & Johnstone, 1999; Yung et al, 1998).

The socio-demographic profile of the certified patients at FNH correlated with most of the international findings. The presentation of schizophrenia remained constant in South Africa in comparison to international countries and cultures (Warner & de Girolamo, 1995). Overall, the pattern produced by the schizophrenia sensitivity model was unclear other than high and low schizophrenia sensitivity ranges being evenly spread throughout KZN. The model has yet to be further refined to increase its sensitivity to schizophrenia risk. Although statistical significance was not established, the accessibility model suggested that large parts of KZN fall within the range of easy

accessibility in relation to the 19 provincial hospitals that provide a psychiatric service. The potential of the schizophrenia sensitivity model and accessibility model, in spite of the crude and incomplete variables utilised was evident. The GIS was a powerful tool and utilised in this study to collect (from surveys and other databases), store (retrieval and query), manipulate (transforming data, analysis and modelling) and produce data output (data reporting, such as maps and reports) (Foote & Lynch, 1995). The GIS has been a very effective tool in working with epidemiological information and it would be of great use in service planning. It is strongly recommended that there be greater collaboration between mental health services and the GIS Unit, Department of Health.

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Declaration of Originality

The author hereby declares that this whole thesis, unless specifically indicated to the contrary in the text, is her own original work.

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CHAPTER ONE: INTRODUCTION

Schizophrenia is a debilitating mental illness. The aetiology of the disease is little understood. The incidence is minimal. However, the prevalence is of concern and highlights the chronicity of the illness (Kaplan & Sadock, 1998; Warner & de Girolamo, 1995). In spite of greater optimism being experienced over the prognosis of schizophrenia, over 70 % of those suffering from schizophrenia continue to be detrimentally affected by it (Barbato, 1998). This implies that great costs are both directly and indirectly incurred, extending far beyond the individual, to the families, communities, health care systems, and ultimately impacting on a country's economics (Moscarelli, 1994).

It is therefore important that greater understanding of the variables affecting and potentially contributing to schizophrenia is sought; primarily a reason to find a cure. Another reason would be to provide effective management, for example, providing early intervention (McGlashen & Johannessen, 1996), thereby cutting down costs in the long-term.

As schizophrenia is a chronic problem it is essential that effective planning of present and future services be done. The computer based GIS (Geographical Information System), offers a visual medium in which geography and mental health issues are combined to create a more comprehensive picture. This project therefore aims to illustrate the applicability of utilising the GIS in mental health services.

This study deals with three separate areas:

1. Creating a database and describing the socio-demographic profile of certified patients diagnosed with schizophrenia between the years 1995 and 1996.
2. Exploring whether a meaningful geographical model of socio-demographic variables of schizophrenia can be built, and whether it can determine areas of high schizophrenia sensitivity. Such a perspective of schizophrenia (exploring the combined effect of all the variables connected to schizophrenia) has not been previously researched rather each variable has been studied independently. The model utilised in the GIS offers an opportunity to

graphically overlay these individual variables and then examine the potential effect. This information may lead to further understanding and productive avenues. It was only possible to explore socio-demographic variables within this Masters research project.

3. Determining the geographical accessibility of the public provincial hospitals offering psychiatric services to the population, (particularly to persons with schizophrenia). This is relevant to the provision of maintenance programmes and early intervention as encouraged by recent research (Hodges, Byrne, Grant & Johnstone, 1999; Yung et al, 1998).

In chapter two, schizophrenia is discussed in terms of concept, costs and demographic attributes followed by the population's accessibility to mental health care. The underlying theoretical frameworks of this study (medical geography, demography and epidemiology) are briefly introduced. Lastly, the tool used (Geographical Information System) used for creating the models is introduced and explored in terms of definition, applications, KZN Health GIS Unit and potential errors affecting reliability.

The methodology of this study is discussed in chapter three. Initially the aims and hypotheses are outlined followed by the methodological protocol of the study. The sample and instruments are defined and issues of validity and reliability described. The procedure used to collect and explore the data (for the database of certified patients' with schizophrenia and the GIS models of schizophrenia sensitivity and geographical accessibility), is detailed.

In chapter four the results are reported. Firstly, the essential aspects of the socio-demographic characteristics of KZN are highlighted. The patient sample and the GIS models of schizophrenia sensitivity and geographical accessibility are described.

A detailed discussion of these areas follows in chapter five.

Chapter six concludes the research study, by highlighting important findings, discussing implications of the findings and their possible relevance for future research, and detailing limitations of the study.

CHAPTER TWO: LITERATURE REVIEW

In this chapter, the underlying theoretical frameworks of this study (medical geography, demography and epidemiology) will be briefly introduced. Schizophrenia will then be discussed in terms of concept, costs and demographic attributes followed by mental health care accessibility. Lastly, the tool (Geographical Information System) used for creating the models will be explored in terms of introduction, definition, applications, KZN Health GIS Unit and potential errors.

2.1 THEORETICAL FRAMEWORKS UNDERLYING THE STUDY

2.1.1 MEDICAL GEOGRAPHY

Medical geography forms the theoretical framework of this study. It is concerned with the spatial analysis of human problems but is not an end in itself. Rather it is a multifaceted approach in which a wide variety of geographical (natural and social scientific) methods are applied to health related problems (Mc Glashan, 1972; Pyle, 1979). Medical geography makes a valuable contribution in health planning in terms of location. It aids in planning decisions in which the best location is opted for in terms of the unique conditions and habitat of each community (Mc Glashan, 1972). It is also useful to health authorities in mortality and morbidity mapping at a state level, to develop programmes for delivery of health services and disease prevention and control (Pyle, 1979). Basic demographical information (Mc Glashan, 1972) and epidemiological knowledge (Pyle, 1979) are essential in its study.

2.1.2 DEMOGRAPHY

Demography is the scientific study of human populations, their size, composition and development by studying the causes and consequences of population trends. The term 'population' refers to a number of people residing in some specific geographical area

(classroom or nation). Various characteristics of the populations are studied in demography, such as, stable characteristics (sex, age, racial or ethnic identity), and, economic characteristics (literacy and education, occupation and income). Nations rely on regular censuses (counts) as the foundation of their demographic data-gathering systems (Yaukey, 1985).

2.1.3 EPIDEMIOLOGY

Epidemiology is concerned with the distribution and determinants of disease occurring in human populations (Last, 1988; MacMohan & Pugh, 1970). It is primarily interested in the following factors that influence disease patterns: time, place, and person. Increasingly, modern psychiatric epidemiology is taking into account the reality of countless perspectives for schizophrenia and its treatment (Parry & Swartz, 1997).

This research project focuses on the demographic and socio-economic characteristics of the population studied.

2.1.3.1 Epidemiological Terms

The distribution of disease/disorder in any given population is measured by incidence or prevalence (Barbato, 1998). The choice of measure is dependent on the problem under study (MacMohan & Pugh, 1970).

Incidence describes the occurrence of illness, the number of cases that came into being. The rate of incidence describes the number of new cases that occurred within a given period of time (usually a year) per specified unit of population (Warner, 1994; MacMohan & Pugh, 1970). It directly estimates the probability, or risk, of developing a disease during a specified period of time (Lilienfeld & Lilienfeld, 1980).

The incidence rates of adults with schizophrenia, in various countries, are found to fall between 0.1 and 0.4 per 1000 population per year (Jablensky et al., 1992). After using standard diagnostic approaches and corrected age, the range of mean incidence is 0.07-0.17 per 1000 (mean: 0.11; SD: 0.03).

Incidence rates are more precise indicators of the occurrence of an illness and are more useful in the development of etiological theories (Warner & de Girolamo, 1995; Strömgren, 1987; MacMohan & Pugh, 1970). Incidence tends to rely on first admission figures and the diagnosis given. This proves to be problematic in schizophrenia as the diagnosis requires signs of the disturbance to be present for at least 6 months (American Psychiatric Association, 1994). On the first admission, the diagnosis of schizophrenia is unlikely to be given (Strömgren, 1987).

Prevalence deals with the total number of cases (new and old) known to exist during a specific period of time (Warner, 1994; Lilienfeld & Lilienfeld, 1980). Prevalence data reflects not only the disease occurrence but in addition its duration (Warner& de Girolamo, 1995). Three types of prevalence are used: point prevalence, period prevalence, and, lifetime prevalence. *Point prevalence* is concerned with the total number of cases that are in existence at any designated point in time. *Period prevalence* deals with the total number of cases of disease observed at some time, during any given period of time. Lifetime prevalence refers to the number of people in the population who have suffered from the illness at any period in their lives. *Lifetime prevalence* is unaffected by the rate at which people recover (Warner, 1994). The range of findings on point or period prevalence of up to one year for schizophrenia, with age-corrected rates, varies from 0.9 to 17.4 per 1000 (mean: 5.8; SD: 3.6). In developing countries the range is 0.9-8.0 per 1000 (mean 3.4; SD 3.4). In developed countries the range is 1.3-17.4 per 1000 (mean 6.3; SD 4.32) (Warner & de Girolamo, 1995). The number of people with schizophrenia around the world can be estimated at about 29 million, of which 20 million live in developing or least developed countries (Barbato, 1998). Prevalence is useful in administrative situations, such as, policy and planning medical care services (Myers et al, 1982; Lilienfeld & Lilienfeld, 1980). Diseases of long duration, such as schizophrenia, impose greater burden on the community than those of short duration.

Cases likely to be missed by both of these measures include prodromal cases (Miller & Swartz, 1992), and the percentage of population who have never had medical treatment or hospital admissions (Folnegovic, Folnegovic-Smalc & Kulcar,1990; Hare 1986). An estimated 0.025 to 0.05 % of the total population of the United States is treated for schizophrenia annually. In spite of the severity of the illness, only half of

all people with schizophrenia are considered to obtain treatment (Kaplan & Sadock, 1998).

2.2 SCHIZOPHRENIA

2.2.1 CONCEPT

Schizophrenia was first presented to medical language in 1911 by Bleuler, a Swiss psychiatrist (Thara, Sucharitakul, Mendis & Islam, 2001; Barbato, 1998; Sue, Sue & Sue, 1994). At times it is referred to as a distinct disorder although, many consider it a group of disorders made up of a constellation of signs and symptoms, with different aetiologies and outcomes (American Psychiatric Association, 1994; Sue et al., 1994; Andreasen & Carpenter, 1993). Not one symptom of schizophrenia is considered to be pathogenic (Sue et al., 1994). In fact, causes are varied and largely unknown (Barbato, 1998). There are many limitations in the making of the diagnosis of schizophrenia (Maj, 1998). A defining feature of this heterogeneous clinical syndrome is the psychotic symptom, which the DSM-IV (American Psychiatric Association, 1994) described as 'delusions, any prominent hallucinations, disorganised speech, or disorganised or catatonic behaviour' (American Psychiatric Association, 1994 p 273). Barbato (1998) summarises schizophrenia as displaying complex disturbances of perception, affect, thinking and social behaviour. Evidence of this complex disease indicates schizophrenia to be a serious mental health problem (Barbato, 1998).
One of the distinguishing features of the first definitions of schizophrenia was a heavy reliance on a deteriorating course and poor outcome. There is greater variation in the clinical course of schizophrenia than initially considered in classical psychiatry (American Psychiatric Association, 1994; Barham and Hayward, 1990) as well as more favourable outcomes subsequently reported (Peters, 1999; Vázquez-Barquero et al., 1999; Davidson, 1992; Thara, Henrietta, Joseph, Rajkumar & Eaton, 1994). Barbato (1998) gives a stern, grounding warning, that 'the more optimistic picture emerging from recent studies should not, however, lead us to overlook the fact that in about 60 % of cases, schizophrenia runs a prolonged course (p8)'.

The study of the causes and treatment of schizophrenia is not pertinent to this research. Intensive research into the many possible causes and most effective treatment continues worldwide. These causes include biological, psychological and environmental factors. The diathesis-stress model integrates these three factors by suggesting that the individual has a specific vulnerability (diathesis) which, when acted on by a stressful influence, allows the symptoms of schizophrenia to develop (Kaplan and Sadock, 1998).

Hospitalisation is indicated for 'primarily diagnostic purposes, for stabilization of medications, for patients safety... and for grossly disorganized or inappropriate behaviour (Kaplan & Sadock, 1998, p485)'. The length of stay is determined by the severity of the illness and the availability of outpatient treatment facilities. Short stays of 4 to 6 weeks are as effective as long-term hospitalisations especially if active behavioural approaches are implemented in the hospital settings (Kaplan & Sadock, 1998).

At times, psychiatric patients may need compulsory treatment and detention in psychiatric hospitals or institutions. The Mental Health Act (Act No 18 of 1973) encompasses all psychiatric patients requiring detention in psychiatric facilities and prescribes the admission procedure (Gangat, 2000):

a) voluntary admission (Article 3),
b) admission by consent (Article 4),
c) admission by certification (Article 9),

Admission by certification refers to the depriving of a person of his/her usual freedom and civil rights. It implies that he/she cannot vote nor sign cheques and is confined to the institution.

d) emergency admission (Article 12),
e) state patients (Article 28), and
f) informal admission to general hospital.

In MacPherson's (1995) survey of patients with schizophrenia between 1990 and 1995 at the Midlands Hospital Complex (Fort Napier Hospital and Town Hill Hospital) in Pietermaritzburg, South Africa, schizophrenia was the predominant

diagnosis (55.6 %) followed by schizophrenia with substance abuse (12 %) and schizophreniform (10.8 %).

2.2.2 SCHIZOPHRENIA COSTS

Schizophrenia is a chronic, debilitating and costly mental illness. In the U.S.A., the cost of treatment of schizophrenia, excluding indirect costs, has been estimated to be close to 0.5 % of the gross national product (Warner and de Girolamo, 1995). In the U.K., schizophrenia accounts for more expenditure related to health care utilization, unemployment and family burden than any other single psychiatric illness in the U.K. (Davies and Drummond, 1994). In South Africa, schizophrenia is one of the most costly mental illnesses (Department of Health, 1998). Globally schizophrenia is seen to consume a vast amount of each country's budget and overall resources.

Over and above defining the costs of schizophrenia in terms of direct, indirect and intangible costs (Suleman, Ohaeri, Lawal, Haruna & Orija, 1997). Torrey (1988) highlighted an area often not included in the cost estimate of schizophrenia, that of not fully considering the magnitude of the illness. Schizophrenia often begins between the ages of 17 and 25 years, and only about one quarter completely recover. Torrey (1988) saw the cost of schizophrenia as three-fold:

1) the cost to raise and educate these individuals
2) the loss of productivity: many being unable to contribute to society economically
3) most of these individuals require costly services from society for the rest of their lives.

Schizophrenia is the most under-researched disease in the western world (Suleman et al., 1997). In the United States, a calculation was made that if research discoveries could reduce the cost of schizophrenia by only 10 % by 1998, the savings accrued over the following decade would total at least $180 billion (Torrey, 1988).

2.2.3 DEMOGRAPHIC CHARACTERISTICS

2.2.3.1 Age

The onset of schizophrenia is usually between the ages between 15 and 25 years. It is extremely rare to have an onset of schizophrenia prior to the age of 10 years and after the age of 50. Approximately 90 % of the patients in treatment are between the ages of 15 and 55 years old (Kaplan and Sadock, 1998).

2.2.3.2 Gender

The prevalence of gender is equal in schizophrenia. However, the presentation in onset and course varies. Males tend to present with earlier onset of schizophrenia, with at least half being hospitalised prior to the age of 25 years. Males are more likely to present with negative symptoms and hence be more severely impaired. Their outcome is considered worse in comparison to females. Females tend to present with schizophrenia at a later age, only about a third are hospitalised prior to the age of 25, and are more likely to function more adaptively (American Psychiatric Association, 1994). It is well established that females experience a milder course and better outcome (Barbato, 1998). The gender difference in the age of onset is a robust phenomenon and is found to be consistent in all cultures (Gureje, 1991). However, in one study, Fennig, Putnam, Bromet & Galambos (1995) did not find a strong correlation between gender and negative symptoms or premorbid functioning. This highlights how little is understood about schizophrenia.

2.2.3.3 Marital status

Warner and de Girolamo (1995) found marital status to be associated with risk of schizophrenia in several studies. Lower rates of most mental disorders are found among married people than those unmarried (never married or were presently separated, divorced or widowed) (WHO International Consortium in Psychiatric

Epidemiology (ICPE), 2000; Andrews et al, 2001; Sethi et al, 1974). Women tend to marry earlier than men and to have a later onset of schizophrenia. Marriage is considered to be a protective factor for those with schizophrenia. It is uncertain, however, whether marrying early protects the individual from early onset of schizophrenia, or whether the early onset of schizophrenia prevents the individual from marrying. It can be said that if the individual has married, it is considered to be a positive factor indicating the possibility of a better prognosis. It has been suggested that marriage exerts a protective effect that delays the onset of illness in women. Alternatively, the illness in its early stages may act as a barrier to marriage (Warner & de Girolamo, 1995).

2.2.3.4 Location

There is a direct correlation between schizophrenia and urbanisation (Torrey and Bowler, 1990). Pederson and Mortensen (2001) found a correlation of urbanisation of place of birth with the risk of developing schizophrenia. Greater numbers of people with schizophrenia are found within urban areas (American Psychiatric Association, 1994). Warner & de Girolamo (1995) emphasize that the high urban rates may well be due to rural dwellers being less likely to seek treatment or because people with schizophrenia and prodromal features may gravitate towards urban areas. It is presumed that rural areas are different in density (people per square unit of ground) compared to urban areas. For example, in KwaZulu Natal, the Durban District Council (DC) and DC 22 are at least twice more densely populated then to the other DCs (See chapter: Results).

2.2.3.5 Population Density

The epidemiology of schizophrenia has been correlated with population density. A strong correlation was found within cities that had a population of one million people and more; a weaker correlation with cities of 100 000 to 500 000 people. No correlation was found in cities with less than 10 000 people (Kaplan & Sadock, 1998).

This effect of population density is consistent with the observation that the incidence of schizophrenia in children with one or two parents with schizophrenia is twice as high in cities than in rural communities. This observation also suggests that social stressors found in urban settings may affect the development of schizophrenia in people at risk (Kaplan & Sadock, 1998).

2.2.3.6 Seasonality of birth

People with schizophrenia are most likely to be born in winter and early spring, and least likely to be born in late spring and summer. In the Southern Hemisphere, they are more likely to be born between July and September (Kaplan & Sadock, 1998). Eaton, Day & Kramer (1988) reported the excess of births among treated people with schizophrenia at this time of year, to be approximately 10 % higher than at any other time of the year. Adams & Kendell (1999) suggested that the significant year-to-year variation in the birth rate of people subsequently developing schizophrenia provides a potential clue to the nature of environmental determinants of schizophrenia. Various hypotheses have been put forward as possible explanations. One proposes that a season-specific risk factor may be operative, another suggests 'people with a genetic disposition for schizophrenia have an increased biological advantage to survive season-specific insults' (Kaplan & Sadock, 1998, p458), whereas another investigates the interactions with specifically the human leukocyte antigen (HLA) and the population at risk (Narita et al., 2000). The season of birth is considered to be a valuable area of research. It is expected that eventually a relevant risk factor in a significant proportion of cases in schizophrenia will be uncovered (Warner & de Girolamo, 1995).

2.2.3.7 Culture

Schizophrenia is prevalent in all cultures with the core symptoms of schizophrenia universally identifiable (Kaplan & Sadock, 1998). Mowry et al. (1994) found that the prevalence rates of symptoms of schizophrenia appeared to vary across different

ethnic groups. Even though no racial prevalence difference is noted in schizophrenia, it is still a pertinent variable to examine in South Africa due to the legacy of apartheid. Much discrimination was directed at South African people of colour resulting in them dominating the lower socio-economic ranks. Extreme inequality in the distribution of income exists among racial groups and households. 'The poorest 40 % of households in South Africa earn less than 6 % of total national income, whilst the richest 10 % earn more than half of the national income' (White Paper on Social Welfare, 1997). Although 'poverty is not confined to any one race group, it is concentrated among blacks, particularly Africans: 61 % of Africans and 38 % of coloureds are poor, compared with 5 % of Indians and 1 % of whites' (Poverty and Inequality in South Africa, 1998). This factor may play an important role in the epidemiology of schizophrenia.

Lilienfeld & Lilienfeld (1980) described religion to be an interesting population characteristic as it usually related to the living habits of that population. This is of particular relevance to South Africa as it may affect whether medical professionals or traditional healers (including faith healers) are the first choice for treatment. After all, it is estimated that there are some 150 000 traditional healers in South Africa (including faith healers) (Karlsson & Moloantoa, 1984). Many of the problems that they deal with are mental health related (Freeman, 1991). It is believed that as many as 80 % of the South African population consults traditional healers (Hopa, Simbayi & du Toit, 1998).

2.2.3.8 Socio-economic status

An excess of people with schizophrenia is found in the lower social classes (Freeman and Alpert, 1986). Socio-economic status is a theoretical concept and still awaiting a clear definition. Many variables encompass the concept such as, occupation, family income, living conditions, and social prestige. Each variable measures a different component of this complex subject, and its association can be expected to vary according to the variable used (MacMohon & Pugh, 1970). Traditional measures of social class (education, occupations and income) have been inversely related to the

prevalence of psychiatric disorders (Andrews et al, 2001; Jablensky et al, 2000; WHO International Consortium in Psychiatric Epidemiology, 2000; Muntaner, Eaten, Diala, Kessler & Sorlie, 1998; Torrey and Bowler, 1990). The majority of epidemiological studies have concluded that the lower the social class position the greater the risk of psychiatric disorder (Timms, 1998; Kawachi & Kennedy, 1997). In spite of the strong association between schizophrenia and a low social-class position, it has not been established that this is an aetiological relationship (Timms, 1998).

2.2.3.9 Occupation

About 75 % of people with severe schizophrenia are unable to work and are unemployed (Kaplan & Sadock, 1998). Those in employment had the lower rates of all mental disorders (Andrews et al, 2001; Jablensky et al, 2000; Timms, 1998; Sethi, Gupta, Mahendru & Kumari, 1974). Among men in the workforce, a regular increase in mental illness was found as the work status decreased (Timms, 1998; Ödegaard, 1956). The relative risk of males in unskilled working class occupations being hospitalised with a psychotic illness was twelve times more than those classified as being upper middle class (Timms, 1998). Similarities of chronic schizophrenia and the psychological effects of long-term unemployment have been highlighted (Warner, 1985). These findings are of particular significance to South Africa as South Africa is characterised by large-scale unemployment in the formal sector of the economy resulting in great poverty exists alongside extreme wealth (White Paper on Social Welfare, 1997). Unemployment among people with disabilities is high and 1.6 % of the total South African population receives a disability grant (White Paper on Social Welfare, 1997). It is an historic fact that unfortunately a large proportion of the South African population has been exposed to the psychological effects of long-term unemployment, minimal educational opportunities, job discrimination and racial and political conflicts.

2.2.3.10 Migration

Inconsistent findings have emerged to whether migration represents a risk factor in schizophrenia as some migrant groups continue to show very high rates of hospital admission for schizophrenia, while other studies fail to show excess (Warner, 1985). A possible explanation is that the nature of migration has changed and the process of self-selection that operated before is no longer a prominent factor. However, there is some evidence in relating the difference in variance rates to whether the migrant enters the new culture at a high or low social status. Those who encounter poverty and stress are routinely found to experience greater rates of psychotic[1] illness whereas those who enter a new culture with a high status studies have revealed lower rates of hospitalisation for schizophrenia. This variable is pertinent to South Africa because of the wide spread poverty (White Paper on Social Welfare, 1997) and the expected migration of Africans from rural areas to informal settlements closer to the centres of metropolitan areas (Dor, 1994).

2.3 ACCESS TO MENTAL HEALTH CARE

After more than 40 years of apartheid, the new government came to power in 1994 and inherited a legacy of great inequity in the South African health care systems (Jinabhai & Campbell, 1995). Departments were fragmented and bureaucratic resulting in discriminatory service delivery and inequities taking on many forms. (Ntsaluba & Pillay, 1998). Much of South Africa is geographically impassable, hence making the rendering and access to health care difficult leading to significant geographical related inequities. The impact of these difficulties is aggravated in areas characterised by widespread poverty and poorly developed infrastructure. Forty percent of all South Africans live in poverty, of which 75 % live in rural areas and are chiefly of African descent (South African Yearbook 2000/01: Health, 2001).

[1] Psychosis is the 'inability to distinguish reality from fantasy; impaired reality testing, with the creation of a new reality' (Kaplan and Sadock, 1998, p281)

Personnel and resources are found to be concentrated in the urban and metropolitan areas (van Rensburg & Fourie, 1994).

The Bill of Rights does not guarantee individuals a right to health, but rather the right of access to health care services (Constitution, 1996). This is reiterated in the National Patients Rights Charter finalised in 1999 (South African Yearbook 2000/01: Health, 2001).

The Department of Health stated their objective was to ensure all South Africans have access to health resources by adopting the district-based primary health care (PHC) model. The major emphasis is the move from the curative hospital-based health care to integrated community based care (South African Yearbook 2000/01: Health, 2001). Health care is provided at 3 levels. The Primary Care Level is the point of entry into the system and embraces all general health services. The Secondary Care Level comprises more specialized services to which patients are referred by the Primary Care Services. Psychiatric institutions, offering long-term care, are found at this level. The Tertiary Care Level includes highly specialized services not normally found at the secondary level (Chetty, 1990).
South Africa has a well-developed network of public hospitals in urban areas. In practice, an ineffective system of referral between primary care facilities and hospitals has been found (Bloom & McIntyre, 1998).

The essential message – stemming originally from the World Health Organisation's Alma Ata Conference – is that health care must be provided at the site closest to where people live and work, and at a point where they are able to exert maximum control over their lives (van Rensburg, & Fourie, 1994). Utilization of facilities declines when geographical accessibility declines (Ayeni, Rushton, & McNulty, 1987). A recent survey found that more than 35 % of African residents travelled more than an hour to reach a provider of health services and 73 % had to wait between 1 and 5 hours to see a health worker once they arrived at a facility (Hirschowitz and Orkin, 1995, in Bloom & McIntyre, 1998).
The focus of this study is to examine the potential geographical accessibility of the 19 provincial hospitals. The existing public sector health services are found to be least accessible to the most vulnerable of populations. This is particularly pertinent in

mental health as the services are found to be still concentrated in the psychiatric hospitals and not in the health care clinics (Harvey, 2000). As 75 % of South Africans do not have medical aid insurance there is a great reliance on the public health services (Policy on Quality in Health Care for South Africa, 2000).

2.4 GEOGRAPHICAL INFORMATION SYSTEMS

2.4.1 INTRODUCTION

The computer based Geographical Information Systems (GIS) were first available in the late 1970's (Foote & Lynch, 1995). Since then the GIS have expanded rapidly, maturing into general-purpose information technology that is capable of addressing diverse problems in a geographical context (Longley, Goodchild, Maguire & Rhind, 1999). GIS are now used extensively in government, business, and research (Lynch, 1994). Applications are found in land resources (Foote & Lynch, 1995), fields of census mapping and socio-economic modelling, and in geodemographic applications such as marketing, health, transport and planning (Martin, 1999). Government agencies are addressing public health issues, for example capturing AIDS data into GIS databases for monitoring and modeling purposes (Chou, 1997). Two local studies used the GIS to determine potential access of health care resources (Bhana & Pillay, 1998; Zwarenstien, Krige & Wolff, 1991).

2.4.2 DEFINITION

Foote & Lynch (1995) provide a generic definition for computer based GIS: 'GIS is a special-purpose digital database in which a common spatial coordinate system is the primary means of reference'.

There are four standard operations required by a comprehensive GIS:

1. *Data input:* from maps, aerial photos, satellites, surveys, and other sources
2. *Data storage:* retrieval, and query
3. *Data manipulation:* data transformation, analysis, and modelling, including spatial statistics
4. *Data output*: data reporting, such as maps, reports, and plans (Foote & Lynch, 1995; Longley et al, 1999).

Data input:

The GIS utilises digital data to represent time and space (Longley et al, 1999). A digital representation is a model of the real world (Burrough, 1986). The relationship between the 'real' world and the representation at each stage depends not only on the accuracy of the co-ordinates and attributes, but also on the researcher's decision regarding what to include, how to measure / classify and symbolise those representations (Martin, 1999).

Data storage

The GIS database is designed to represent, model, store, and access information about spatial relationships based upon location (Foote & Lynch, 1995). The GIS database is differentiated from other database applications by the fact that all the information in the GIS is linked to a spatial reference. This refers specifically to geo-references (latitude and longitude), which are the primary means in which data / information is stored and accessed, as opposed to only location information (such as, street addresses, postal codes) (Foote & Huebner, 1996). The GIS plays an important role in integrating technology. A comprehensive GIS contains very powerful technologies within a single database, allowing mapping, modelling, queries and analysing of large quantities of data (Foote & Lynch, 1995). The GIS extends beyond merely software or hardware. It is a process. It has the potential to play a crucial role in comprehensive decision-making. The manner in which the information is captured, stored and analysed must mirror the way it is to be used in the specific research or decision making task (Foote & Lynch, 1995). Various kinds of GIS exist and each has a different purpose with different types of decision-making processes and unique functions and roles (Foote & Lynch, 1995).

Data manipulation

A model is a simplified digital representation of reality (Longley et al, 1999). The model is used to simulate a process, obtain further understanding of a situation, predict an outcome and/or analyse a problem (Association for Geographic Information, 1999).

The schematic diagram (Diagram 1) demonstrates the powerful tools provided by the GIS. It has arranged information about a certain location (a given region or city) as a set of maps. Each map displays information about one characteristic of the region. In this example, the information is useful in planning urban transportation. Each of these separate thematic maps is referred to as a coverage or layer. Each tier is carefully layered over each other ensuring that the location is precisely corresponding to the locations on all the other maps. The bottom layer of the diagram is the most important. It represents the grid of the locational reference system (such as longitude and latitude) to which all the maps have been precisely registered. Once overlaid, the information displayed on the different layers may be compared and analysed in combination (Foote & Lynch, 1995).

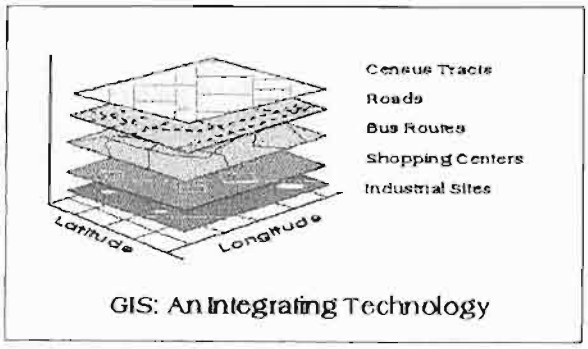


Diagram 1: Overlaying of various thematic maps of one area (Diagram from Foote & Lynch, 1995).

The GIS also provides for exploring spatial patterns and processes in one location or the entire region. Diagram 2 illustrates 'how single locations or areas can be separated from surrounding locations ... by simply cutting all the layers of the desired location from the larger map (Foote & Lynch, 1995, p3)'.

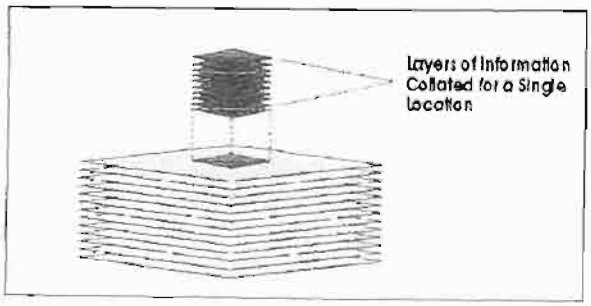
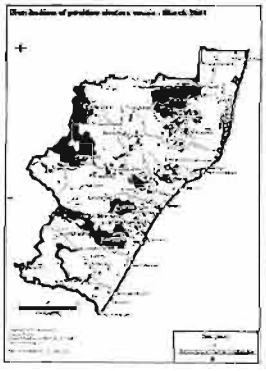


Diagram 2: GIS focusing on one area (Foote & Lynch, 1995).

Data output:

An important purpose of the GIS is to function as a decision support system. Maps are important tools in this process. Maps are ideally suited for spatial data as they assist understanding and revealing spatial relations and patterns (see map 1), and are integral parts of the spatial handling process. Complex multidimensional aspects of spatial data are effectively captured, quickly grasped and digested when displayed via the graphic methods characteristic of the GIS (Beard and Buttenfield, 1999).



Map 1: Illustration of the spread of positive cholera cases (the darkest areas) in the month of March 2002 (Geographical Information Systems Unit, 2002).

Maps also play an important role in the visual decision support as they provide a direct and interactive interface to GIS data. It is important for the user to adhere to proper map strategy to perform this important GIS aspect of interpreting and analysing them (Kraak, 1999).

2.4.3 APPLICATIONS

This study utilises the GIS process to address two questions:

1) would a geographical pattern emerge if socio-demographical variables associated with schizophrenia, were overlaid in KZN?

2) are the public hospitals offering psychiatric services in KZN, geographically accessible to specified populations?

These two specific aspects are discussed further below.

Schizophrenia sensitivity model

The GIS can be used to problem solve in a particular application area (e.g. mental health) by drawing inferences from a knowledge base attained by human expertise. These knowledge based systems, or more commonly, expert systems have formed the basis of automated map generalisations (Association for Geographic Information, 1999). The mental health knowledge base would be tapped into by approaching a number of 'experts' (professionals who have worked in the field of schizophrenia for a few years) to contribute in the process of selecting and ranking variables that increase the risk of schizophrenia (See section 3.4.2.2: Consulting the "experts").

Weighting is a scaling factor that indicates the importance of a variable in a particular operation. Weighting determines the influence that a particular layer will have on the final result (Association for Geographic Information, 1999). In this study each variable, and then, separately, each sub-definition within each variable was ranked according to importance in the modeling process. GIS practitioners tap into the knowledge base of 'experts' in the specific field of interest, to assist in identifying what information is important and to what degree (pers comm. Shannon Rushworth, 2001).

Not all analyses use all map layers simultaneously, for example, schizophrenia sensitivity model. Some researchers use the information selectively to take the relationships between specific layers into consideration. Diagram 3 illustrates one example, in which two or more layers are combined and transferred into a new layer for use in subsequent layers. These then are overlaid, forming a unique combination of overlapping socio-demographic data associated to schizophrenia. This ability of the GIS to separate information into layers and then combine some with other layers of information highlights its great potential as a research and decision-making tool. Sometimes, the process of combining and transforming information from different layers is called map 'algebra' as it involves adding and subtracting information (Foote & Lynch, 1995).

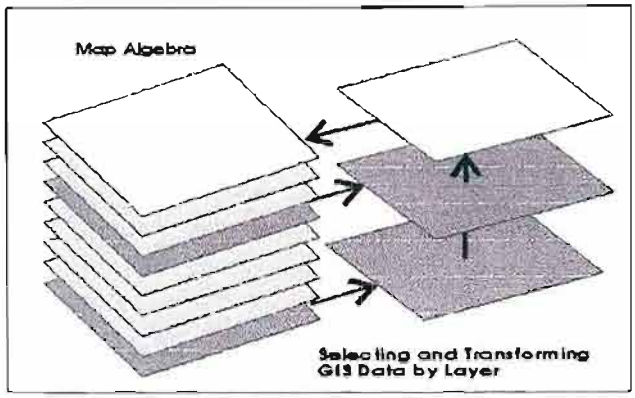
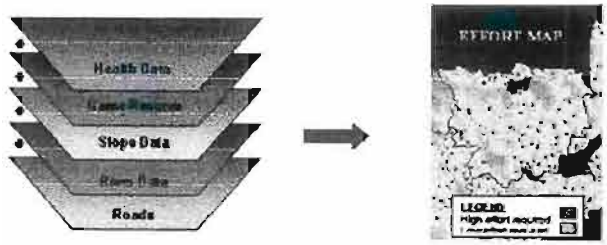


Diagram 3: Combining and transforming of data (Foote & Lynch, 1995).

Geographical accessibility model

Accessibility is the aggregate measurement to determine how reachable specific locations are from a given location (see diagram 4). It is commonly measured in distance or by cost (Association for Geographic Information, 1999). The measure of accessibility is generated easily and can play a useful role in policy and service analysis, for example, in determining the gaps in service provision and location of new facilities (Martin, 1999). In this research, the geographical accessibility of public hospitals offering psychiatric services is explored. The gravity model is the foundation of assessing geographical accessibility. The gravity model (spatial interaction model) aims at analysing movement of people or goods or services between origins and destination in terms of accessibility. This is usually based on distance and demand (Association for Geographic Information, 1999).



By using a GIS's modelling techniques, variables can be combined to create a map, which illustrates the effort it takes to move from a point to a health facility.

Diagram 4: An example of an effort map (Geographical Information Systems Unit, 2002).

Effort or cost can be described in terms of time, distance decay, impedance or other user-defined factors (Association for Geographic Information, 1999). Distance decay is a mathematical representation in spatial interaction on the accessibility and number of interactions between locations. It reflects a reduction in demand as distance increases (from the source of some supply) due, normally, to increasing travel costs (Association for Geographic Information, 1999). The following variables were used to

define accessibility in this geographical accessibility model: distance from place of residence/ referral to hospital, road access, physical obstacles in between such as major river/nature reserve, financial cost, and, walking distance to the service.

2.4.4 HEALTH GIS UNIT, KZN, DEPARTMENT OF HEALTH

There is a GIS Unit within the Department of Health, KZN (see website http://www.kznhealth.gov.za/gisinfo.htm). Its aims are to gather, maintain, assess and report on spatial data and information, with the intention of facilitating understanding in these areas relating to the health of the population of KwaZulu-Natal. It aims to make the information gathered and stored, available to individuals and organisations (internal and external) and be utilized in making recommendations and decisions on the maintenance, management and use of health resources in the Province. Shannon Rushworth (BSc Honours specializing in Geographic information Systems, University of Natal – Pietermaritzburg) is the GIS manager. Mrs Rushworth has been the intermediary between the present research project and the GIS.

2.4.5 POTENTIAL ERRORS IN USING THE GIS

There are three main groups of factors governing the errors associated with geographical information processing:

I Obvious sources of error

II Errors resulting from natural variations or from original measurements

III Errors arising through processing (Burrough, 1986).

CHAPTER THREE: METHODOLOGY

3.1 INTRODUCTION

The theoretical framework of medical geography underpins this study providing the opportunity for a spatial analysis of human problems. Epidemiological knowledge (Pyle, 1979) and basic demographic information (Mc Glashan, 1972) are essential to its study. Increasingly in South Africa, epidemiology has been utilized to provide global pictures of the possible causes and geographic locations of the concentration of illnesses in an attempt to develop a research basis that could inform policies to transform health care (Katzenellenbogen, Joubert & Yach, 1997). This research study, a pilot project, created a database of certified patients diagnosed with schizophrenia during a 2 year time period, at Fort Napier Hospital in Pietermaritzburg, Kwazulu Natal. It attempts to explore the distribution of the socio-demographic variables of schizophrenia in KZN assessing the geographical accessibility to the public hospitals with psychiatric facilities within KZN.

Physical diseases such as cholera and tuberculosis tend to have clear cause-effect relationships. Mapping these diseases is simpler in comparison to a complex mental illness such as schizophrenia. There are countless aspects of schizophrenia that are unclear, and numerous associated variables whose relationships with the actual disorder, and each other, are still not fully understood. To complicate matters further, there are a profuse number of theories trying to explain these relationships, which often contradict one another. One example is the variable of marriage. Some argue that it is a protective factor. Hence married women tend to develop schizophrenia at a later stage. In contrast, others propose that it is simply because men experience earlier onset of schizophrenia they are less likely to get married. Regardless of whether the variables are precipitating factors or consequences of the disease, these variables are consistently experienced as core components in the make up of schizophrenia. Despite many ambiguous areas being evident, it is still relevant to investigate whether a geographical pattern might emerge if pertinent variables associated with schizophrenia were found clustered together within a particular location.

The 1995 Census database (Central Statistical Services, 1995) forms a powerful current resource, yet much needed and basic information in the health sphere area is not available. The richness of data found in the files of certified patients at Fort Napier Psychiatric Hospital highlights the possibility and wealth of information that can be drawn on in the psychiatric hospitals, were they only computerized and combined with a regional/ national database. This would be of great benefit for mental health, and with regard to policies, more effective, informed decision-making.

3.2 AIMS AND HYPOTHESES

1. To gain a greater understanding of the variables affecting and possibly contributing to schizophrenia, by firstly, describing the demographic trends and deviations from international findings, and secondly, using the Geographical Information Systems (GIS) model, to overlay these individual socio-demographic variables in order to examine a potential combined effect.

2. To explore the geography of schizophrenia in terms of accessibility of the mental health services to individuals diagnosed with schizophrenia.

The following questions are proposed:

1. What is the socio-demographic profile of certified patients in KZN diagnosed with schizophrenia between the years 1995 and 1996?

2. Can a meaningful geographical model of socio-demographic variables of schizophrenia, be constructed?

1. If the many factors associated with schizophrenia (such as age, gender and marital status), that can be mapped, are co-ordinated, will a distinct pattern become obvious? Are certain populations / variables such as gender more evident in the occurrence of schizophrenia?

2. What percentage of the population in KZN is located within the areas of greater schizophrenia sensitivity?
3. Would the above model withstand statistical testing? What number of certified patients diagnosed with schizophrenia would fall into the greater areas of schizophrenia sensitivity?

3. How geographically accessible are the public psychiatric hospitals to the population? Firstly, the entire population, secondly, the population falling within the distinct patterns identified in the schizophrenia sensitivity model, and thirdly, the certified patient population with a diagnosis of schizophrenia from Fort Napier Hospital, in KwaZulu Natal (KZN)?

3.3 METHODOLOGY

3.3.1 Sample

Two samples were studied. The first entailed all those certified patients diagnosed with schizophrenia, hospitalized at Fort Napier Hospital (FNH) during the years 1995 and 1996.

The second involved only the population of the province of KZN, as defined by the National Census Data (Central Statistical Services, 1995).

3.3.2 Instruments

Microsoft Access (2000) was utilized to capture and create the database for the records of the certified patients.

IDRISI Geographic Information System (GIS) software was used in order to:

- Visually display the KZN district and public psychiatric hospitals
- Create and display a geographical model of socio-demographical variables associated with schizophrenia
- Display the accessibility of public psychiatric hospitals to the population in KZN (Chou, 1997; Martin, 1999).

3.3.3 Validity and Reliability

To ensure adequate validity in this study it is important to recognize the limitations and specific aims adopted in this study. Rosnow & Rosenthal (1996, p136) describe construct validity as being 'concerned with the psychological qualities constituting what has been characterized as the theoretical scaffolding between X and Y'. It is important to note that this project is not dealing with causation of different variables related to schizophrenia and accessibility, but rather it is an attempt to describe them. Schizophrenia is consistently associated with many variables, yet not one has been proven to be pathogenic. Very specific variables have been selected for this study. Rather than trying to comprehensively cover the entire spectrum of variables affecting schizophrenia, the variables chosen were "map-able" and accessible to electronic data capture.

It is important to note that the aim was neither to explore possible explanations / causes of schizophrenia, nor investigate the relationships with the variables used, but essentially a pilot study to explore whether a distinct geographical pattern in the province would emerge from the selected variables. It was also hoped that the study would encourage additional questions, leading to further valuable research in this area. It is evident that further research would be required in which a full range of variables be included.

3.4 THE PROCEDURE

The research procedure dealt with three major areas: 1) creating a database of certified patients with schizophrenia at Fort Napier Hospital; 2) establishing and working with the geographical pattern of socio-demographic variables; and 3) assessing geographical accessibility to the public hospitals in KZN.

3.4.1 DATABASE OF CERTIFIED PATIENTS WITH SCHIZOPHRENIA

3.4.1.1 Creating a Database of Certified Patients with Schizophrenia

The collection of the data involved accessing the files at the Fort Napier Hospital (FNH) registry. The demographic data of the relevant patients were captured directly into the researcher's database and coded for data analysis. The demographic data included: age, diagnosis, ethnic group, gender, marital status, religion, season of admission, first admission/readmission to the hospital, length of stay (date, admission and discharge dates), and place of residence / certification.

Permission to conduct the study was obtained from the Chief Medical Superintendent of the Midlands Hospital Complex.

The following criteria were used to select the patients' files:

1. admission to FNH was between January 1995 and December 1996
2. the primary diagnosis was schizophrenia, schizophreniform, schizoaffective, schizophrenia with substance abuse, schizophrenia with alcohol abuse, schizophrenia with personality disorder, schizophreniform with substance abuse, or, schizoaffective with substance abuse
3. the patient's place of residence or place of certification referral had to be known
4. place of residence or certification was within the province of KZN.

3.4.1.2 Ethical Considerations

Anonymity

By recording only the patient's file numbers and not their names, the anonymity of the patients' records was ensured.

Confidentiality

Confidentiality of the contents of the files was secured by the researcher consciously

focusing only on the relevant data in the files pertinent to the research. The researcher was also bound by the rules of confidentiality as laid out by the codes of the Health Professions Council of South Africa for Intern Psychologists and Psychology researchers. Only people involved in the research methodology had access to the raw data.

Responsible Research

The file numbers were included in the event that additional information was required at a later stage. This was a necessary step to ensure responsible research, as one of the research objectives was to initiate a mental health database. If further variables were identified to be researched in the future, then this original database could be utilized by the files being re-accessed in order to include the additional variables rather than having to repeat the entire data capture process.

3.4.1.3 Describing the Database of Certified Patients with Schizophrenia

The sample of certified patients was described according to age, gender & race, education, marital status, seasonality of birth, employed, occupation (type of employment), religion, previous admission, length of stay, and diagnosis.

Two maps were produced capturing the patients' geographically referenced variables (town of origin / referral). The first map (Map 2) illustrated the patients' place of residence. The second (Map 3) illustrated the patients' place of certification/referral source linked to the patients' place of residence.

The bottom layer (the locational reference system grid, See Diagram 1) (Foote & Lynch, 1995) of Map 2 & 3 consisted of a map of KZN in which the 11 health districts and the 63 public provincial hospitals were displayed. The 19 hospitals offering psychiatric services are highlighted (KwaZulu Natal Department of Health, 2000).

3.4.2 GIS MODEL OF SCHIZOPHRENIA SENSITIVITY

This section was made up of three main sub-sections: describing the socio-demographic variables of KZN; collecting the data required for the model; and, working with the model's output.

3.4.2.1 Demographic details of KZN province and population

For the purpose of describing the demographic details of KZN province and population, the Census data (Central Statistical Services, 1995; calculated based on Statistics SA amended average growth rate for KwaZulu-Natal from 1996 to 2001 (Period 4.7592 Years) of 1.5834 % per annum) was cleaned by rounding the figures off to a whole number or in some instances to the first or second decimal (See Appendix 2). The relevant categories and subsections were extracted and grouped by District Councils (DCs). The population of KZN was described according to various socio-demographic variables: age, gender, internal migration, education, marital status, occupation, socio-economic status, disabilities, urban/rural location, and population density.

3.4.2.2 The model of schizophrenia sensitivity

The following steps were used to create the model investigating the geographical pattern of socio-demographic variables of schizophrenia:

1. Consulting the "experts"
    - Select a number of "experts" (professionals who have worked in the field of schizophrenia for a few years) to decide on variables that increase the risk of schizophrenia
    - Each "experts" to independently rank these variables (1-10 where 1 is the most important variable / variable of greatest risk for the individual); combine and average each of the variables' rankings

2. Selecting, defining and weighting of variables
    - Variables utilised in the study
    - Establish a map-able definition for each variable
    - Weighting within the variables
3. Data Manipulation
    - Mapping the variables
    - Layer each variable over KZN
    - Highlight the areas where several of these variables overlap and thereby visually displaying the geographical pattern of these variables concentrated together (Association for Geographic Information, 1999).

Consulting the "experts"

Certain professionals currently working in KZN with patients diagnosed with schizophrenia were approached to provide information and to gain consensus on which variables it would be useful to include in the study, the ranking of these variables[1], and to collaborate on the definitions used. The clinicians approached requested anonymity.

A questionnaire (see appendix) was drawn up to submit to the various "experts". The questionnaire listed thirteen variables identified from the literature review as variables linked to schizophrenia. In section one, the "experts" were requested to identify further relevant variables. In section two, they were asked to rank the variables according to their perception of the importance of the variables, based on their work experience in the field of schizophrenia[2]. In section three, a list of the variable definitions was provided. The "experts" were requested to add to these definitions and provide further comments. The questionnaire was faxed to two clinicians. This

[1] This was omitted in the making of the model of schizophrenia sensitivity. All the variables used were equally weighted and considered to be totally independent of the others. Some variables were broken down into several subdivisions. These subdivisions within that particular variable were then weighted in relation to each other.
[2] See footnote 1

approach, however, rendered poor information. It seems that the lack of discussion and achieving some form of consensus, the complexity of the issue of schizophrenia, and possibly an unclear questionnaire rendered unhelpful results.

Subsequently, the researcher met with another clinician and discussed and debated the purpose of the research project and questionnaire in detail, after which the "expert" completed the questionnaire independently. These results were more coherent, thorough, and in line with the study's purpose. It was therefore decided that only the input of this "expert" would be applied in the selection of the variables utilised in corroboration to the literature review (See section 2.2.1). This represents a great limitation as the knowledge base system (Association for Geographic Information, 1999) being made use of for this study is restricted to one person as opposed to collaboration of several "experts", hence weakening the reliability of the variables chosen. However, it could be argued that the literature review provides adequate support in itself for the variables selected for the study and that the 'experts' most valuable input required was to rank the variables. Eventually this ranking of the variables was not implemented, as the literature could not provide guidance in this area. Seemingly variables have been studied independently but not collectively to examine the potential combined effect of the variables as proposed by this study. The impact of ranking the variables could be explored in future studies. Hence, the limitations of the 'experts' may be argued to have minimal impact on the study.

The variables utilised in the study

The variables listed by the "expert" fell into three categories: socio-demographic (age, gender, marital status, seasonality of birth, occupation, socio-economic status, internal migration, rural/urban location, population density), past history variables (family history of mental disorder, family history of schizophrenia, maternal health, birth obstetric details, birth maturity, infant/child mal-development, infant/child ill-health), and personal habits: substance use. This study focused only on the socio-demographic variables, as these were map-able and accessible (in terms of the database) to study. The remaining variables not included in this study highlight the need for these areas to be further studied.

Definitions of the variables used

A map-able definition was then made of each identified variable being used in the study. The definitions used for the socio-demographic variables included in the study are detailed below. Table 1 provides a summary of the definitions used.

Age:

The highest ranking within the age variable was for the age group: 15 – 25 years, in which onset of schizophrenia occurs most commonly, followed by the age group: 25-55. This type of age grouping is corroborated by Kaplan and Sadock (1998).

Gender:

Males tend to present with schizophrenia earlier (15-25 years). Females tend to present with schizophrenia at a later age (25-35 years). As the prevalence of schizophrenia is equal across gender, the rankings within the gender variable were also kept the same (American Psychiatric Association, 1994).

Marital status:

Warner and de Girolamo (1995) found marital status to be associated with risk of schizophrenia in several studies. The highest internal ranking will be for those single, and then for those divorced, widowed/separated.

Location:

A strong correlation of schizophrenia and urbanisation has been found to exist (Torrey and Bowler, 1990). High rates of schizophrenia are found in urban centres in comparison to rural areas (Warner & de Girolamo, 1995). Demarcating precise

boundaries for areas considered 'urban' or rural is an ongoing problem for demographers, and the boundaries always seem arbitrary (Yaukey, 1985). Defining urban is therefore a matter of degree. 'Urban' features appear to correlate with population size and distribution characteristics. Hence an urban centre would be described as having a relatively large population, settled, and compacted in within an area surrounded by an area with less dense population. Urban places with big populations are 'more urban' than those with small populations. The most difficult and arbitrary task is to decide the cut-off point for the smallest urban place. The national census bureaus are relied upon to choose these cut-off points. This introduces a problematic lack of standardisation into international comparisons, which explains why there tends to be a greater level of confidence in the comparability of statements about cities with larger population sizes, such as 100 000 and above, or 1 million and above, as these are considered undoubtedly to be cities (Yaukey, 1985).

Population Density:

A strong correlation was found within cities that had a population of one million or more; a weaker correlation with cities of 100 000 to 500 000 people. No correlation was found in cities with less than 10 000 people (Kaplan & Sadock, 1998). As the density of the population in KZN increased so the weighting of that variable would increase.

Seasonality of birth:

In the Southern Hemisphere, people with schizophrenia are more likely born between July and September (Kaplan & Sadock, 1998). However, this variable will not be included in the map of socio-demographic variables, as the census data (Central Statistical Services, 1995) does not render the date of births of the SA population. It will be discussed under the section dealing with the data on certified patients with schizophrenia at FNH.

Socio-economic status:

The current international poverty line stands at an average per capita consumption of US$ 1.00 per day (in 1985 dollars) (Gwatkin, 2000; Poverty and Inequality in South Africa, 1998). That would be an equivalent of about R300 per month in South Africa. The first internal variable ranking is allocated to that proportion of population receiving no income, then those receiving between R1 - R200 per month, and thirdly, those receiving between R201 - R500 per month.

Occupation:

About 75 % of people with severe schizophrenia are unable to work and are unemployed (Kaplan & Sadock, 1998). Those in employment had the lower rates of all mental disorders (Andrews et al, 2001). Among men in the workforce, a regular increase in mental illness was found as the work status decreased (Timms, 1998; Ödegaard, 1956). The lowest occupation scale given by Census Data (Central Statistical Services, 1995) is that of 'elementary occupations'.

Internal migration:

Despite inconsistent findings regarding migration and schizophrenia (Warner, 1985), it is still considered an important factor in this study. It is pertinent to South Africa because of the long history of migration labour laws forcing African men to migrate from their homes to places of employment. Only those who have moved to KZN in the period 1991-1996 will be considered.

Weighting within the variables

In this model, each variable was considered to be totally independent of each other. All the variables were allocated the value of one with the exception of those variables with more than one definition (see table 1). Two examples are given to explain the

weighting process. With regards to the variable of age, the literature (2.2.3.1) found the 15-25 age group of greatest risk for schizophrenia followed by the 26-55 age group. The 15-25 age group was therefore given twice (2) the amount of weighting in relation to the 26-55 age group (1). The variable of monthly income consisted of three components. The highest risk was for those people receiving no income, and hence the value of 3 was given to it. Those receiving R1-200 per month were allocated the value 2, and those receiving between R201-500 per month were given the value of 1. Those receiving more than R500 per month were excluded and thereby given the value of 0. Table one provides a summary of the definitions of each variable used and the reciprocal weighting used.

Table 1: A summary of the definitions used for the socio-demographic variables included in the study

VARIABLES ASSOCIATED WITH SCHIZOPHRENIA	DEFINITION	WEIGHTING APPLIED WITHIN VARIABLES
Age	15 – 25	2
	26 – 55	1
Gender	Male: 15-25 years	1
	Female: 25 – 35 years	1
Seasonality of birth	Born in Winter (between July and September)	0
Socio-economic status (Monthly Income)	No income	3
	Between R1-200 per month	2
	Between R201 – 500 per month	1
Rural / urban location	Urban	1
Internal Migration	Relocated in KZN between 1991 -1996	1
Marital status	Single	2
	Divorced/ widowed/separated	1
Occupation	Elementary occupations	1
Population density	City of 1 million people or more	Weighting increased with increased density
	500 000 - 100 000 people	
	10 000 –500 000	

Variables of greater importance were assigned a higher importance weighting.

Mapping the variables

The IDRISI GIS software was utilized to layer each variable over KZN. The accessibility model was based on the continuous data of the 1995 Census database (Central Statistical Services, 1995) resulting in every pixel on the KZN map being represented.

The nature of the GIS model used in this study did not allow for individual variables or populations to be examined separately as it was in the combining of the variables that best reflected the likelihood of suffering schizophrenia. The geographical patterns of the individual variables would have to been examined prior to the modeling (This fell out of the scope of the present study). Hence it was not possible to determine which individual variable might have been more evident in the pattern of schizophrenia.

The model's output (See map 4) visually displayed the geographical pattern of these variables concentrated together. The darker areas on the map indicated the greater number of variables overlapping. The greater the amount of overlap demonstrates a greater proposed schizophrenia sensitivity of the population in that area. The model output (Map 4) is relative of nature. The 6 levels of schizophrenia sensitivity evident in the map indicate the natural breaks occurring within data of the model.

3.4.2.3 Working with the model's output

Percentage of Population Overlap

The percentage of the population in KZN that fell into each range of schizophrenia sensitivity was identified (See section 4.3.2).

Degree of Correlation

The correlation of overlap between the data of certified patients with schizophrenia and the patterns identified by the geographical model for schizophrenia sensitivity was determined (See section 4.3.3).

3.4.3 GEOGRAPHICAL ACCESSIBILITY

Ascertaining the geographical accessibility of the public hospitals to the KZN population involved deciding on the variables to be utilised in the study, mapping the variables and, working with the model's output.

3.4.3.1 Accessibility model

Defining and weighting the variables[1]

The following variables were used to define accessibility on the map:

1. distance of hospital from place of residence
2. road access
3. physical obstacles in between such as major river/nature reserve
4. financial cost (e.g. to pay for transport)
5. walking distance to the service.

Variables that posed more of a barrier in terms of hindering the accessibility to a psychiatric health facility have been given a higher friction weighting (See 2.4.3: *Geographical accessibility model)*. These variables were overlaid to create the accessibility model (See table 2). The friction costs were determined radially from the health facilities currently offering psychiatric services. The accessibility model provided only a relative indication of the difficulty in accessing the services provided (Rushworth, 2002).

[1] The GIS Unit obtained the river data from the Department of Water affairs; the Digital Elevation Model from The Department of Traditional and Local Government Affairs; Game reserves information from KZN Wildlife Services; Road input from the KZN Department of Transport; Population data was obtained from 1996 census; and the actual co-ordinates of the Health facilities were collected using hand held Geostationary Positioning Satelites (GPS).

Table 2: A summary of the variables used for the GIS accessibility model

VARIABLE	FRICTION WEIGHTING
Slopes (steepness)	Friction increases as the steepness of the slope increases.
Income (people earning less than R500-00 per month)	Friction increases with increased number of people in an area
Distance from psychiatric facility	Friction increases with distance away from facility
Major rivers	5000
Protected conservation areas	5000
District roads	100
Provincial roads	10
National roads	1

Mapping the variables

Each variable was layered over KZN by the IDRISI GIS software in which every pixel on the KZN map was represented.

The model's output (See map 5) visually displayed the geographical pattern of these variables concentrated together. The darker areas on the map indicated the greater number of variables overlapping; the darker the area, the poorer the degree of accessibility. The natural break of the data resulted in 255 ranges of access. These were then were grouped into 9 levels of access (See Table 20). The lower accessibility ranges represent easier degrees of access (Access levels 1-3 = easy access); the middle access levels 4-6 signifies average access; and the highest levels of access (7-9), symbolize difficult access.

3.4.3.2 Application of the Accessibility model

The model highlighted the areas that are geographically accessible to the population in KZN. The degree of accessibility was examined in relation to, firstly, the entire KZN population, and secondly, then to the certified patient population of schizophrenia from FNH.

CHAPTER FOUR: RESULTS

4.1 DESCRIPTION OF KWAZULU NATAL (KZN)

KwaZulu Natal (KZN) is the largest of the nine provinces that constitute the Republic of South Africa. It has a population of approximately 8.5 million people and covers an area of 92 435 square kilometres. The province consists of 11 district councils (DC): Durban, DC21, DC22, DC23, DC24, DC25, DC26, DC27, DC28, DC29, and DC43. Each DC, except for the Durban DC, is made up of several local councils (See Appendix, table 1). The district councils represent the health districts in the Public Health system. The 1995 Census Data has been used and adapted to describe the socio-demographic variables of KZN. The KZN Health Department's GIS Unit created the maps that were generated by this study.

One-third of the KZN population resides within the Durban District, and fifty-three percent of this population is female. In both the female and male age distributions, the 0-14 year age category dominates. The 15-25 and 36-65 year age categories tended to be the next highest groups. The African population group forms 82% of population. A large percentage (21%) of the population have no formal education. Twenty-nine percent of those who have attended school have attained between grades 1 – 7 educational levels, 32 % have between grades 8-12, and only 3% have tertiary education. Unemployment is high; with only one-quarter of the potential work force employed. Thirty percent of the working population practice elementary occupations. Sixty-three percent of the population receive no income, and 15 % receive between R1 – 1000. Six percent of the population have disabilities, with 0.5% being mental disabilities although this figure may be under-reported. Seventy percent of the population have never married while 25% are classified as married or living together. Seventy-seven percent of the population reported never to have moved from each respective DC.

4.2 DESCRIPTION OF PATIENT SAMPLE

The sample in this study consisted of the hospital records of male patients certified at Fort Napier Hospital (FNH) in Pietermaritzburg, having received a primary diagnosis of schizophrenia between 1 January 1995 and 31 December 1996. A total of 615 records fulfilled these criteria. The records were accessed with the permission of the Chief Medical Superintendent of the Midlands Hospital Complex and data were treated as confidential. The distribution of the patient population is described below.

4.2.1 Gender and cultural composition

The sample consisted of African[1] male patients.

4.2.2 Age

The majority of patients were between the age of 15 and 65 years (See table 3). The most prevalent age cluster was 26-35 years, followed by the age cluster 15-25 years.

Table 3: Age Distribution

Age Groups	0-14yrs	15-25yrs	26-35yrs	36-65yrs	66-119yrs	Unknown	TOTAL
N	0	248	259	103	1	4	615
%	0	40	42	17	0.3	0.7	100

4.2.3 Marital Status

Seventy-two percent of the sample was not married (see table 4). Seventeen percent were unknown while ten percent were married. A cultural marriage referred to having more than one wife.

[1] The group outlined in this study is not intended to perpetuate any racial stereotypes, but rather to take cognisance of the prevalence of schizophrenia in the identified cultural group, as patients were previously treated in segregated facilities.

Table 4: Marital status

Marital Status	Unknown	Single	Separated	Married	Divorced	Widowed	Cultural Marriage	TOTAL
N	105	441	2	64	1	1	1	615
%	17	72	0.3	10.4	0.1	0.1	0.1	100

4.2.4 Seasonality of Birth

Fifteen percent (93 cases) of the records contained dates of birth. Twenty-seven cases (4%) had the first of January with varying years given as their birth dates, whenever the actual birth date was unknown. It is common practise to allocate the first of January to people whose date of birth is unknown. The year used would give an indication of the estimated age of the person. This data was therefore regarded as unreliable and unsuitable for entry. Only 66 cases (eleven percent) of the data were used.

There were fewer people (18%) born in autumn compared to the other seasons (See Table 5). However, on closer examination discrepancies were found within each season. Both in summer and winter, the first two months (December & January; June & July, respectively) had almost twice the number of people in relation to the last month of that season, whereas there was a steady increase in the number of people born in the advancing spring months. In autumn the first month (March) contained 4 times more people than the next two autumn months. These figures are however too small for statistical analysis or substantial interpretation.

Table 5: Seasonality of Birth /Month of Birth

Seasons of the Year in Southern Hemisphere	Month	n	%
	December	7	11
	January	7	11
	February	3	5
Summer		17	27%
	March	8	12
	April	2	3
	May	2	3
Autumn		12	18%
	June	7	11
	July	7	11
	August	4	6
Winter		18	28%
	September	5	8
	October	6	9
	November	8	12
Spring		19	29%
-	TOTAL	66	100

4.2.5 Employment

Fifty three percent of the sample was not employed, whereas thirteen percent were employed (see table 6).

Table 6: Employment

Employment	Yes	No	Unknown	TOTAL
N	80	324	211	615
%	13	53	34	100

4.2.6 Occupation

The occupational data was divided into the same categories used by the National Census Data. The categories are: legislators, senior officials and managers;

professionals; technicians and associate professionals; clerks; service workers, shop and market sales workers; skilled agricultural and fishery workers; craft and related trades workers; plant and machine operators and assemblers; and elementary occupations.

There were 205 entries filled in the occupation section of the files. Ninety-eight entries were categorised according to the Census Data categories (see table 7). Of those 98 entries, 67% worked in elementary occupations, 9 % did craft and related trade work, 12% were plant and machine operators and assemblers, 5 % were either service workers, shop and market sales workers or professionals and 1% were clerks.

Table 7: Occupation

Elementary Occupations		**Plant and machine operators and assemblers**		**Craft and related trade workers**		**Service workers, shop and market sales workers**		**Clerks**		**Professionals**	
Subtype	***N***	***Subtype***	***n***	***Subtype***	***n***	***Subtype***	***n***	***Subtype***	***n***	***Subtype***	***n***
Packer	5	Driver	7	Painter	1	Cashier	1	Clerk	1	Teacher	2
General Assistant	1	Machine operator, Payloader Forklifter	2	Builder, Brick-layer Instructor	4	Store Assistants	3			Faith Healer	1
Security Guard	11			Baker	1	Reception ist	1			School principal	1
Garage Attendant	1			Carpenter	3					Traditional Healer	1
Casual	44			Foreman	1						
Labourer	23			Musician	1						
Ice Cream Vendor	1			Mines Com-pound Manager	1						
Barman	1										
Cleaner	2										
Total	**66**	**Total**	**9**	**Total**	**12**	**Total**	**5**	**Total**	**1**	**Total**	**5**

(where N = 98)

4.2.7 Religion

The section of the patients' files requiring information on their religion was seldom completed. In eighty one percent of the cases, religion was classified as unknown (see table 8). There were one or two representatives of the Islamic, Shembe, Traditional, Rastafarian religions. Four patients reported to have no religious affiliations.

Seventeen percent of the total sample was reported to belong to the Christian faith. The files indicated a number of subdivisions of the faith of Christianity: Alphews church, Anglican, Apostolic Faith, Catholic, Christian, Church of Christ, Ethiopian, Free Congregational church, Full Gospel, Lutheran, Methodist, Nazareth church, Presbyterian, St Johns' church, St Theresa, Zion Christian. For the purpose of this study, these subdivisions have been simplified into three categories. The Zionist Christians represented 17%, Catholics 23%, and a general category of Christian (church/denomination unspecified) 34% of the 103 cases.

Table 8: Religion

Religion	n	%
Islam	1	0.2
Rastafarian	1	0.2
Xhosa	1	0.2
Shembe	2	0.3
Traditional Healer	2	0.3
UCC	2	0.3
No religion	4	0.7
Christian	103	16.7
Unknown	499	81.1
TOTAL	**615**	**100**

4.2.8 Previous Admissions

Forty-four percent of the sample of patients had been previously admitted, compared with just over a third (35%) that had not been previously admitted (see table 9).
In the 26-35 year age category, almost twice the number of patients (21%) had been previously admitted to FNH in comparison with those not previously admitted (12%)

(See table 9.1). In the 15-25 year age group the proportion admitted for the first time (17%) was almost equivalent to that of patients not previously admitted (15%).

Table 9: Previous Admissions

	Previously Admitted	Not Previously Admitted	Unknown	TOTAL
n	273	212	130	615
%	44	35	21	100

Table 9.1: Previous Admission by Age

Age Groups	15-25yrs	26-35yrs	36-65yrs	66-119yrs	Unknown	Total
Previously Admitted	91 (15%)	129 (21%)	49 (8%)	0 (0%)	1 (0%)	270 (44%)
Not Previously Admitted	106 (17%)	76 (12%)	28 (5%)	0 (0%)	1 (0%)	211 (34%)
Unknown	51 (8%)	54 (9%)	26 (4%)	1 (0%)	2 (0%)	134 (22%)
Total	248 (40%)	259 (42%)	103 (17%)	1 (0.3%)	4 (0.7%)	615 (100%)

4.2.9 Month Admitted

The lowest numbers of the sample of patients were admitted during the months of November and December (See table 10). Although the figures were fairly consistent throughout the year, the highest recorded admissions were during the months of May and August, followed by January, February and June.

Table 10: Month Admitted

Month Admitted	Number of Admissions	% of Admissions
January	62	10
February	60	10
March	46	7
April	57	9
May	77	13
June	61	10
July	36	6
August	75	12
September	54	9
October	36	6
November	27	4
December	24	4
TOTAL	615	100

4.2.10 Length of Stay

Most of the patients were admitted for a period of between 15 to 99 days (see table 11). The average length of stay in hospital was between 4-6 weeks. Seldom were patients admitted for less than a week, or longer than 14 weeks.

Table 11: Length of Stay

Length of Stay (days)	1-7	8-14	15-21	22-31	32-45	46-60	61-99	100-365	Unknown	TOTAL
Number of Patients	11	65	84	105	136	85	96	32	1	615
% of Patients	2	11	14	17	22	14	16	4	0	100

4.2.11 Diagnosis

The diagnosis of schizophrenia constituted 58 % of all the diagnoses (See table 12). Schizophrenia with substance abuse comprised 18.9% of the samples diagnoses, and schizophrenia with schizophreniform disorder 16%. The remaining 3% included other schizophrenia-related diagnoses. The average length of stay did not vary much according to the diagnosis given (see table 12.1), except for schizophrenia with alcohol abuse, and unfortunately the number of patients with this diagnosis (n=2) was too small for interpretation.

Table 12: Diagnosis

Diagnoses	n	%
Schizophrenia	358	58.2
Schizophrenia with substance abuse	116	18.9
Schizophreniform disorder	100	16.3
Schizophreniform with substance abuse	18	2.9
Schizoaffective disorder	15	2.4
Schizoaffective with substance abuse	6	1.0
Schizophrenia with alcohol abuse	2	0.3
Schizophrenia with personality disorder	0	0
TOTAL	615	100

Table 12.1: Diagnosis and Average Length of Stay

Diagnoses	n	Average Length of Stay
Schizophrenia	358	44.81
Schizophreniform	100	40.76
Schizoaffective	15	42.80
Schizophrenia with substance abuse	116	41.46
Schizophrenia with alcohol abuse	2	22.00
Schizophreniform with substance abuse	18	48.78
Schizoaffective with substance abuse	6	45.16
Total	615	40.82

4.2.12 Location

It was only possible to map the location of 398 certified patients' residences (See table 13 and Map 2). Even though there were 615 patients in the database, in 55 of the records, place of residence information was omitted; of the remaining 560 records, only 398 could be correlated to the standardised list of town names required by the GIS for spatial analysis.

Most of the patients (75.5 %) were recorded as residing within the southern part of KZN (Durban DC, DC 22, DC 43 and DC 21), with just less than 40% of these within the Durban DC (See map 2). One hundred and six (68 %) of the 155 certified patients in the Durban DC came from the areas of Umlazi, KwaMashu, Inanda and Durban. Very few patients (2.5 %) were resident in the outlying DCs, namely, DC25, DC26 and DC27.

Twenty-five (43 %) of the 58 DC 22 certified patients were resident in Richmond and Imbali. Approximately 50 % of the certified patients came from Ixopo in DC 43 and Umzinto in DC 21. Durban DC and DC 42 had the highest mean of certified patients (at least twice the mean of the other DCs).

A third map was created linking the patients' place of residence and place of referral in an attempt to observe whether a particular geographical pattern would emerge (See table 13.1 and map 3). The key in Map 3 is expanded on in detail in Table 13.1. Only 243 out of the 398 patients details were utilised in the mapping procedure. These additional records had to be eliminated due to further names of certain places of referral did not match the standardised list of institutions. There were 41 places of referral. Thirty-nine percent of the institutions (16) referred a number of patients who lived outside the DC of the institution (See the highlighted institutions in Table 13.1). A.E. Haviland Provincial Clinic from DC23, for example, referred 3 patients who lived within its boundaries (Weenen) and one patient who resided in Tugela (DC29). Forty-three percent of the certified patients (105) were referred from the provincial hospitals (See the institutions written in italics in Table 13.1).

Table13: Breakdown of Places of Residence of Certified Patients

District Councils	Number of Entries (Seen as Circles on the map 2)	Number of Patients n	%	Mean of patients per DC	Towns with the Highest number of patients in each DC	
Durban	23	155	39 %	6.7	43	Umlazi
					28	KwaMashu
					20	Inanda
					15	Durban
DC 22	14	58	15 %	4.1	15	Richmond
					10	Imbali
DC 43	7	52	13 %	7.4	27	Ixopo
DC 21	13	34	8.5 %	2.6	16	Umzinto
DC 28	7	28	7 %	4	9	Eshowe
					8	Melmoth
					6	Empangeni
DC 23	5	25	6.2 %	5	17	Estcourt
DC 29	7	18	4.5 %	2.6	8	Stanger
DC 24	5	16	4 %	3.2	9	Greytown
DC 27	2	5	1.2 %	1.5	3	Ubombo KwaZulu
DC 26	2	4	1 %	2	3	Mahlabatini
Not in KZN	1	2	0.5 %	2	2	Umzimkhulu
DC 25	1	1	0.3 %	1	1	Newcastle
Total	87	398	100%	42.1	66	-

Map 2: KwaZulu-Natal Provincial Hospitals providing Psychiatric Services and Areas from which Patients Originate

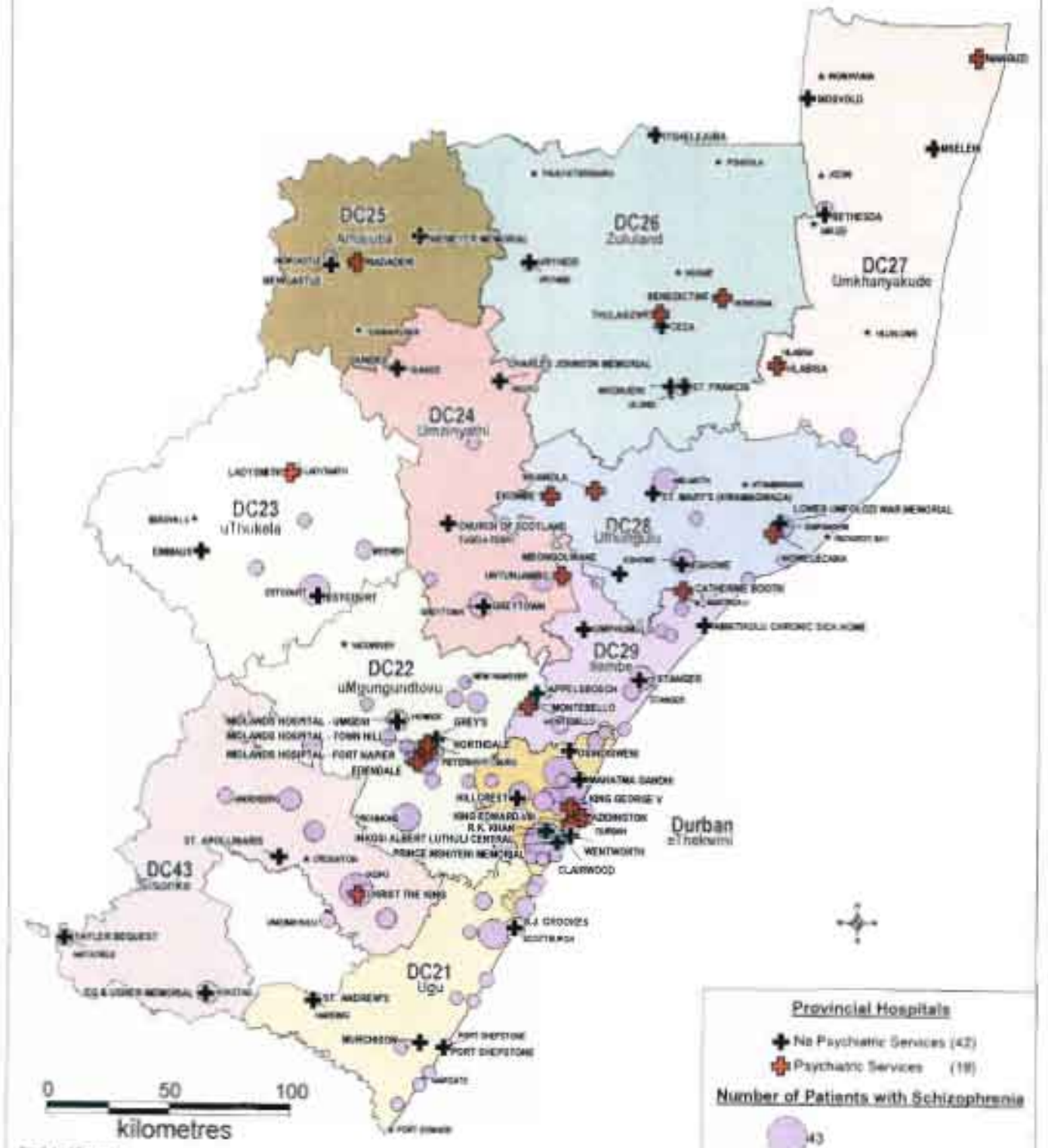
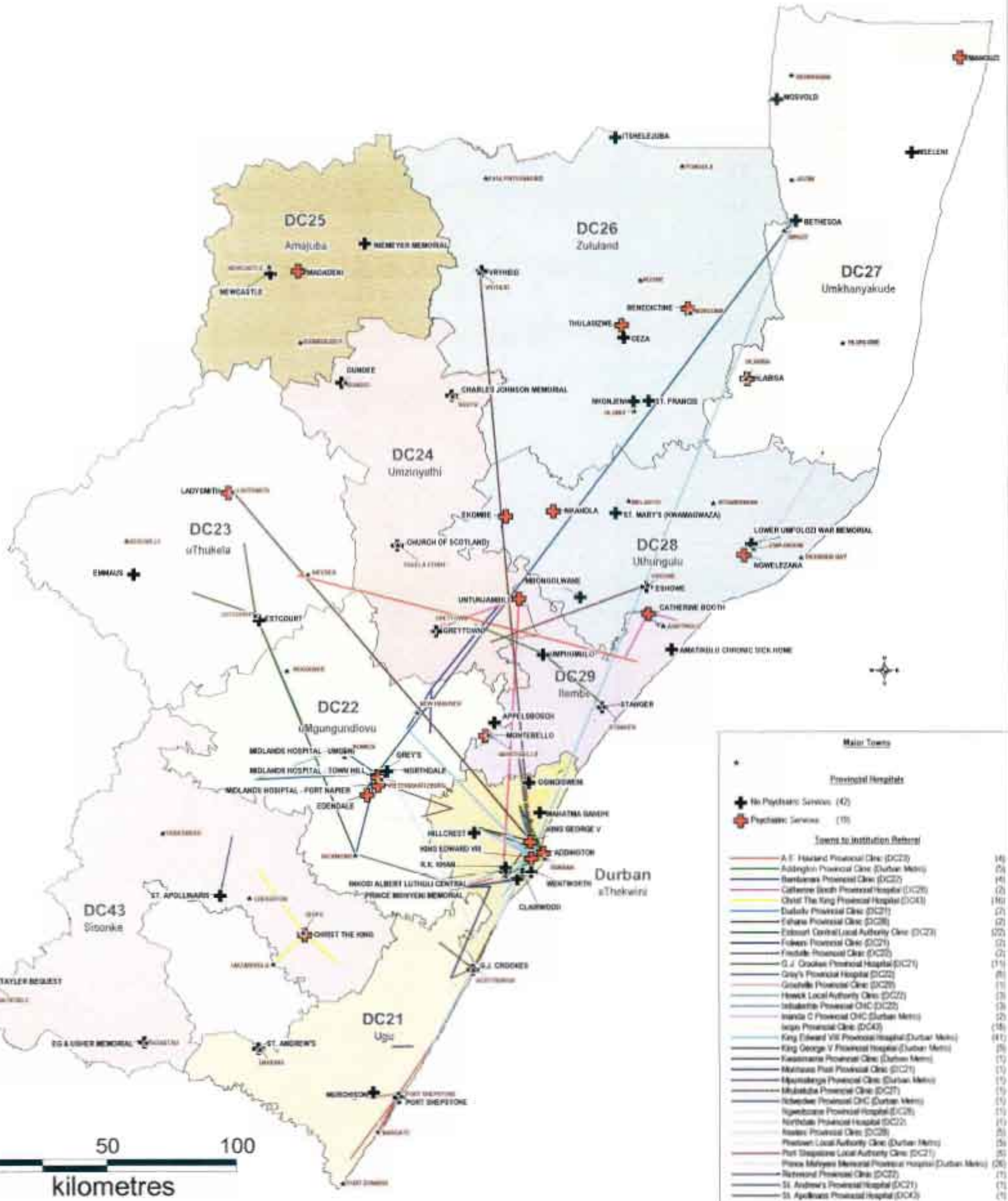


Table 13.1: Certified Schizophrenia Patients' Place of Referral & Place of Residence

Place of Referral (name, DC)	n	Place of Residence
A.E. Haviland Provincial Clinic (DC23)	4	Tugela, Weenen (X 3)
Addington Provincial Clinic (Durban DC)	5	Berea, Durban, Hillcrest, Inanda, Umlazi
Bambanani Provincial Clinic (DC 22)	4	Kranskop, Mpolweni, New Hanover, Wartburg
Catherine Booth Provincial Hospital (DC 28)	2	Gingindlovo, Mandini
Christ The King Provincial Hospital (DC 43)	16	Donnybrook (X 2), Highflats (X 2), Ixopo (X 11), Umzimkhulu
Dududu Provincial Clinic (DC 21)	2	Dududu (X 2)
Eshane Provincial Clinic (DC 28)	2	Eshowe (X 2)
Estcourt Central Local Authority Clinic (DC 23)	22	Balgowan, Colenso, Estcourt (X 17), Loskop (X 2), Richmond
Folweni Provincial Clinic (DC 21)	2	Umbumbulu, Umzinto
Fredville Provincial Clinic (DC 22)	2	Camperdown, Pietermaritzburg
G.J. Crookes Provincial Hospital (DC 21)	11	Dududu, Scottburgh, Umgababa (X2), Umkomaas, Umzinto (X 6),
Grey's Provincial Hospital (DC 22)	6	Edendale, Howick, Impendle, Pietermaritzburg, Richmond, Ubombo
Groutville Provincial Clinic (DC 29)	1	Groutville
Howick Local Authority Clinic (DC 22)	3	Howick (X 2), Impendle
Imbalenhle Provincial Chc (DC 22)	3	Imbali (X 3)
Inanda C Provincial Chc (Durban DC)	2	Inanda, Kwamashu
Ixopo Provincial Clinic (DC 43)	18	Highflats (X 2), Ixopo (X 16),
King Edward VIII Provincial Hospital (Durban DC)	41	Clermont (X 6), Durban (X 5), Hibberdene, Hillcrest (X 3), Inanda (X 8), Kwamakhutha, Kwamashu (X 6), Mpolweni, Ndwedwe, Pinetown, Ubombo Kwazulu, Umbumbulu (X 2), Umlazi (X 4), Westville
King George V Provincial Hospital (Durban DC)	9	Durban, Hillcrest, Inanda, Kwamashu (X 2), Ladysmith, Ndwedwe, Umlazi, Vryheid
Kwasimama Provincial Clinic (Durban DC)	1	Ntuzuma
Morrisons Post Provincial Clinic (DC 21)	1	Umzumbe
Mpumalanga Provincial Clinic (Durban DC)	1	Mpumalanga
Mtubatuba Provincial Clinic (DC 27)	1	Mtubatuba
Ndwedwe Provincial Chc (Durban DC)	1	Ndwedwe
Ngwelezana Provincial Hospital (DC 28)	1	Esikhawini
Northdale Provincial Hospital (DC 22)	1	Umkomaas
Nseleni Provincial Clinic (DC 28)	5	Empangeni (X 4)
Port Shepstone Local Authority Clinic (DC 21)	5	Mtwalume, Munster, Paddock, Port Shepstone, Ramsgate, Uvongo,
Prince Mshiyeni Memorial Provincial Hospital (Durban DC)	6	Adams Mission, Kwandengezi, Umbogintwini, Umbumbulu (X 2), Umlazi (X 20), Umzinto
Richmond Provincial Clinic (DC 22)	1	Umbumbulu
St. Andrew's Provincial Hospital (DC 21)	1	Harding
St. Apollinaris Provincial Hospital (DC 43)	1	Bulwer
St. Francis Provincial Hospital (DC 26)	3	Mahlabatini (X 3)
Tongaat Provincial Chc (Durban DC)	1	Tongaat
Umlazi (D) Provincial Clinic (Durban DC)	4	Umbumbulu, Umlazi (X 3)
Umlazi K Provincial Clinic (Durban DC)	1	Umbumbulu
Umphumulo Provincial Hospital (DC 29)	2	Ahrens, Stanger
Underberg Provincial Clinic (DC 43)	1	Underberg
Untunjambili Provincial Hospital (DC 24)	5	Greytown, Kranskop (X 3), Umlazi
Verulam Local Authority Clinic (Durban DC)	19	Inanda (X 4), Kwamashu (X 12), Maidstone, Tongaat (X 2)
Total	243	-

Note: Italics highlights provincial hospitals; shaded areas indicate crossing of DCs between place of referral and place of residence; Chc is abbreviation for Community Health Centre

Map 3: Referral Patterns for Psychiatric Patients



Compiled and Produced by:
The GIS Unit,
KwaZulu-Natal Health Department,
Pietermaritzburg.

Date of production: 15 December 2003

Demarcation Boundaries obtained from Data World (Pty) Ltd

4.2.13 Summary

All the files between 1995 and 1996 of certified patients with schizophrenia were accessed from FNH. Due to the racial segregation measures in place at that time, they were all African, and all were male. The majority of patients were between the ages of 15 and 65 years. The most prevalent age cluster was 26-35 years, followed by those aged 15-25 years. Seventy two percent of the sample was not married while 10 % were married. Fewer subjects were born in autumn compared with other seasons. Fifty three percent of the sample was unemployed whilst thirteen percent were employed. Of the 98 entries that were categorised according to the Census Data Occupational categories, 67% worked in elementary occupations, 9 % did craft and related trade work, 12% were plant and machine operators and assemblers, 5 % were either service workers, shop and market sales workers or professionals and 1% were clerks. Seventeen percent of the total sample reported to be of the Christian faith. Forty-four percent of the patients had been previously admitted compared with just over a third (35%) that had not been previously admitted. The sample of patients was admitted at a fairly regular rate throughout the year, with the lowest number being admitted during November and December, and the highest number being admitted during May and August. The majority of the patients stayed in hospital between 15 to 99 days long, the most common length of stay being between 4-6 weeks. The diagnosis of schizophrenia constituted 58% of the sample of certified patients. The majority of patients (75.5 %) were resident in the southern part of KZN (Durban DC, DC 22, DC 43 and DC 21), with just less than 40% of these in the Durban DC. Three quarters of the referring institutions referred patients who lived within the same DC as the institution. Forty percent of the certified patients were referred from provincial hospitals.

4.3 SCHIZOPHRENIA SENSITIVITY MODEL

The purpose of the schizophrenia sensitivity model is to ascertain whether a meaningful geographical model of socio-demographic variables of schizophrenia can be built. The following areas are addressed: 1) is there evidence of a geographical pattern? 2) percentage of KZN population falling into the varying ranges of schizophrenia risk, and, 3) describing the data.

4.3.1 Is there evidence of a geographical pattern?

Five levels are displayed on the map representing 5 schizophrenia sensitivity ranges (1, 2-3, 4, 5 and 6). The schizophrenia sensitivity level 1 represented low schizophrenia risk and level 6 very high schizophrenia risk.

No distinct pattern has emerged from the schizophrenia sensitivity map (see map 4). The 2-3-sensitivity range covered a surface area of 58 % of KZN (See table 14). The low ranges (0-3) of sensitivity for schizophrenia covered a surface area of 80 % of the province of KZN. The remaining 20 % consisted of a dappled pattern of medium, high and very high ranges (4-6) of risk. These patches of ranging high risk are concentrated within DC 23 and in a broad band along the coastal border of KZN (DC 21, Durban DC and DC 29), with a cluster in DC 26. These seem to follow the pattern found in the accessibility map (see map 5).

Map 4: Schizophrenia Sensitivity

LEGEND

KwaZulu-Natal

Schizophrenia Sensitivity

- 1 - Very low
- 2 - 3
- 4
- 5
- 6 - Very high

N

50 0 50 Kilometers

Compiled and Produced by
The GIS Unit
KZN Department of Health
Pietermaritzburg

Date of Production: 10 December 2003

Table 14: Area Covered By Sensitivity Grading of Population to Schizophrenia

Sensitivity Grading of Population to Schizophrenia	Area (sq km.)	Percentage (%)
0	6 485	7.00
1	13 910	15.00
2 - 3	53 163	57.50
4	13 105	14.17
5	2 756	2.98
6	3 017	3.26
Total for Province	**92 436**	100%

4.3.2 Percentage of KZN population falling into the varying ranges of schizophrenia risk

The greatest concentration of the KZN population was found within the 6-sensitivity range (34 %), and then the 2-3-sensitivity range (28.5 %) followed closely by the 4-sensitivity range (23 %) (See table 15). Thirty-three percent of the KZN population fell within the 0-3 sensitivity ranges and 67 % fell within the 4-6 schizophrenia sensitivity ranges.

Table 15: Population Layout of Schizophrenia Sensitivity Model

Sensitivity Grading of Population to Schizophrenia	Population Occurring in this area	Percentage (%)
0	63 163	0.70
1	298 569	3.29
2-3	2 617 545	28.85
4	2 073 350	22.85
5	970 988	10.70
6	3 046 843	33.59
Total for Province	**9 070 457**	100%

4.3.3 Description of the relationship between the schizophrenia sensitivity ranges and certified patients

The degree of overlap between the schizophrenia sample collected from FNH and the schizophrenia sensitivity model was not established through statistical analysis, as the population was too small in relation to the model itself. Hence the data is only described. Only 398 certified patients' places of residence were mapped, for reasons stated earlier in section 4.2.12.

Table 16 sums up the distribution of certified patients within the 6 different sensitivity levels. Three hundred and ninety-eight certified patients were from in 87 towns in the schizophrenia sensitivity model (Also see tables 18.1 to 18.5). Just less than 40 % of the certified patients were from the 2-3-sensitivity level. Fifty-six percent of the certified patients fell within the 4-6 sensitivity ranges. Ninety percent of the patients fell within the 2-3, 4 and 6 sensitivity ranges.

Table 16: Number of towns in relation to the number of certified patients

Levels of Schizophrenia Sensitivity Grading	Number of Towns Contributing to Patient Sample	Number of Patients	
		n	%
1	9	22	5.52
2-3	36	154	38.96
4	23	83	20.85
5	9	20	5.00
6	10	119	29.89
Total	**87**	**398**	**100**

Table 17 examines the number of certified patients within the 6 different sensitivity levels and DCs. Subtotals of the high and low ranges of schizophrenia risk are given. Durban DC had the most number of patients overall (39 %) and within the high-risk ranges (a total of 30 %). Level 5 was found only in 4 DCs (DC 21, 22, 28 and Durban) and level 6 in only 3 DCs (DC 22, 29 and Durban). The total distribution of patients within the low ranges and high ranges of schizophrenia sensitivity was evenly distributed throughout the province (44 % and 56 % respectively) and within each DC except for DC 24 and 28, where the number of patients in the low range was 3 times

and greater than high range; but in the Durban DC there were 3.4 times more patients from the high range than low.

Table 17: Number of Certified Patients within Each Schizophrenia Sensitivity Level in the DCs of KZN

District Councils	Schizophrenia Sensitivity Levels							Total
	1	2-3	n (Low Ranges)	4	5	6	n (High Ranges)	
DC 21	1	13	14 (4%)	19	1	-	*20 (5%)*	34
DC 22	3	19	22 (6%)	15	5	16	*36 (9%)*	58
DC 23	-	20	20 (5%)	5	-	-	5 (2%)	25
DC 24	1	6	7 (2%)	9	-	-	9 (2%)	16
DC 25	-	1	1 (0%)	-	-	-	-	1
DC 26	-	3	3 (0.7%)	1	-	-	1 (0%)	4
DC 27	-	5	5 (1%)	-	-	-	-	5
DC 28	-	21	21 (1%)	1	6	-	7 (2%)	28
DC 29	4	1	5 (5%)	10	-	3	*13 (5%)*	18
DC 43	6	35	41 (10%)	11	-	-	11 (3%)	52
Durban	5	30	35 (9%)	12	8	100	*120 (30%)*	155
Not in KZN	1	-	2 (0.5%)	-	-	-	-	2
Total	**22** (6%)	**154** (39%)	**176** (44%)	**83** (21%)	**20** (5%)	**119** (30%)	**222** (56%)	**398** (100%)

Tables 18.1 to 18.5 illustrate the towns from which the certified patients originate in each sensitivity level. The Durban DC and DC 22 were the only two DCs that featured within all the sensitivity ranges.

In the sensitivity range 6 (See table 18.1), the DC Durban contained most of the patients (84 % of the 119). Umlazi, Kwamashu and Inanda had 76 % of the total number of patients within the SSR level 6.

In the sensitivity range 5 (See table 18.2), there was an even distribution (averaging between 1-3) of certified patients across the towns of each of the DCs except in DC 28, Empangeni provided all 6 patients.

In the sensitivity range 4 (See table 18.3), one town in most DCs had between 1 ½ to 8 times more patients than the other towns in that DC.

The sensitivity range 2-3 was represented within all the DCs (See table 18.4). This range (2-3) covered almost 60 % of the surface area of KZN (See table 14). Bulwer provided the single most patients (6) in the sensitivity range of 1 (See table 18.5).

Table 18.1: Breakdown of Schizophrenia Sensitivity Rating Level 6

District Councils	Towns Contributing to Patient Sample within DC	Number of Patients	Total Number of Patients Found within DC
Durban	Umlazi	43	100
	Kwamashu	28	
	Inanda	20	
	Clermont	7	
	Kwandengezi	1	
	Berea	1	
DC 22	Imbali	10	16
	Edendale	4	
	Mpophomeni	2	
DC 29	Ndwedwe	3	3
Total: 3 DCs	10 Towns	-	119 Patients

Table 18.2: Breakdown of Schizophrenia Sensitivity Rating Level 5

District Councils	Towns Contributing to Patient Sample within DC	Number of Patients	Total Number of Patients Found within DC
Durban	Tongaat	3	8
	Umgababa	2	
	Ntuzuma	1	
	Kwamakhutha	1	
	Chatsworth	1	
DC 28	Empangeni	6	6
DC 22	Pietermaritzburg	3	5
	Sweet Waters	2	
DC 21	Braemar	1	1
N: 4 DCs	9 Towns	-	20 Patients

Table 18.3 : Breakdown of Schizophrenia Sensitivity Rating Level 4

District Councils	Towns Contributing to Patient Sample within DC	Number of Patients	Total Number of Patients Found within DC
DC 21	Umzinto	16	19
	Port Shepstone	1	
	Paddock	1	
	Harding	1	
DC 22	Richmond	15	15
Durban	Umkomaas	5	12
	Illovo	2	
	Westville	1	
	Umbogintwini	1	
	Mpumalanga	1	
	Maidstone	1	
	Adams Mission	1	
DC 43	Kokstad	6	11
	Matatiele	3	
	Underberg	2	
DC 29	Stanger	8	10
	Nyoni	1	
	Ballito	1	
DC 24	Greytown	9	9
DC 23	Weenen	3	5
	Loskop	2	
DC 26	Vryheid	1	1
DC 28	Esikhawini	1	1
N: 10 DCs	23 Towns	-	83 Patients

Table 18.4 : Breakdown of Schizophrenia Sensitivity Rating Level 2/3

District Councils	Towns Contributing to Patient Sample within DC	Number of Patients	Total Number of Patients Found within DC
DC 43	Ixopo	27	35
	Highflats	4	
	Donnybrook	4	
Durban	Durban	15	30
	Umbumbulu	9	
	Hillcrest	6	
DC 28	Eshowe	9	21
	Melmoth	8	
	Gingindlovo	2	
	Nkwalini	1	
	Mtunzini	1	
DC 23	Estcourt	17	20
	Ladysmith	2	
	Colenso	1	
DC 22	Howick	6	19
	Wartburg	4	
	Impendle	4	
	Thornville	2	
	New Hanover	1	
	Lidgetton	1	
	Camperdown	1	
DC 21	Scottburgh	4	13
	Dududu	3	
	Mtwalume	2	
	Uvongo	1	
	Umzumbe	1	
	Munster	1	
	Hibberdene	1	
DC 24	Kranskop	4	6
	Elandskraal	1	
	Ahrens	1	
DC 27	Ubombo Kwazulu	3	5
	Mtubatuba	2	
DC 26	Mahlabatini	3	3
DC 25	Newcastle	1	1
DC 29	Tugela	1	1
N: 11 DCs	36 Towns	-	154 Patients

Table 18.5: Breakdown of Schizophrenia Sensitivity Rating Level One

District Councils	Towns Contributing to Patient Sample within DC	Number of Patients	Total Number of Patients Found within DC
DC 43	Bulwer	6	6
Durban	Pinetown Nchanga	4 1	5
DC 29	Groutville Mandini	3 1	4
DC 22	Mpolweni	3	3
Transkei	Umzimkhulu	2	2
DC 21	Ramsgate	1	1
DC 24	Muden	1	1
N: 6 DCs + Transkei	9 Towns	-	22 Patients

4.3.4 Summary

No distinct pattern emerged from the schizophrenia sensitivity map. The 2-3-sensitivity range covered 58 % of KZN. The greatest concentration of the KZN population was found within the 6-sensitivity range (34 %), and then the 2-3-sensitivity range (28.5 %) followed closely by the 4-sensitivity range (23 %). The rate of schizophrenia sensitivity risk identified by the model varied from 6.96 and 335.91 per 1000. Thirty-eight percent of the certified patients were found in the 2-3-sensitivity level. Fifty-six percent of the certified patients fell within the 4-6 sensitivity ranges. Durban DC had the most number of patients overall (39 %) and within the high-risk ranges (a total of 30 %). The total distribution of patients within the low ranges and high ranges of schizophrenia sensitivity was evenly distributed within the province (44 % and 56 % respectively) and within each DC. The Durban DC and DC 22 were the only two DCs that featured within all the sensitivity ranges.

4.4 DESCRIPTION OF ACCESSIBILITY MODEL

The main aim in the geographical accessibility aspect of this study was an exploration of the accessibility of the mental health services to persons with schizophrenia. Three areas determining the geographic accessibility of the public hospitals offering psychiatric services are described. These include,

1) access and the population of KZN,
2) access and the certified patient population with schizophrenia seen at Fort Napier Hospital, Pietermaritzburg,
3) the relationship between the accessibility and schizophrenia sensitivity ratings of the towns with the most certified patients.

4.4.1 Access and the KZN population

A broad band of poor accessibility spreads diagonally from the southwest of the Province across to the northeast, through approximately the middle of KZN (see map 5). This dark band of poor accessibility is alleviated by widening circles found around each of the identified provincial hospitals providing psychiatric services.

Accessibility[2] ranges 1 – 3 (easy access) covered a surface area of 65 % of KZN, and accessibility ranges 4-6 (average range) covered 30 % of KZN (See table 19). Accessibility range 9 covered the surface area of less than half a percent of KZN, and accessibility range 8, just over 1 %.

[2] Lower accessibility ranges mean easier access. Access levels 1-3 = easy access; access levels 4-6 = average access; access levels 7-9 = difficult access

Map 5: Accessibility to Psychiatric Health Services

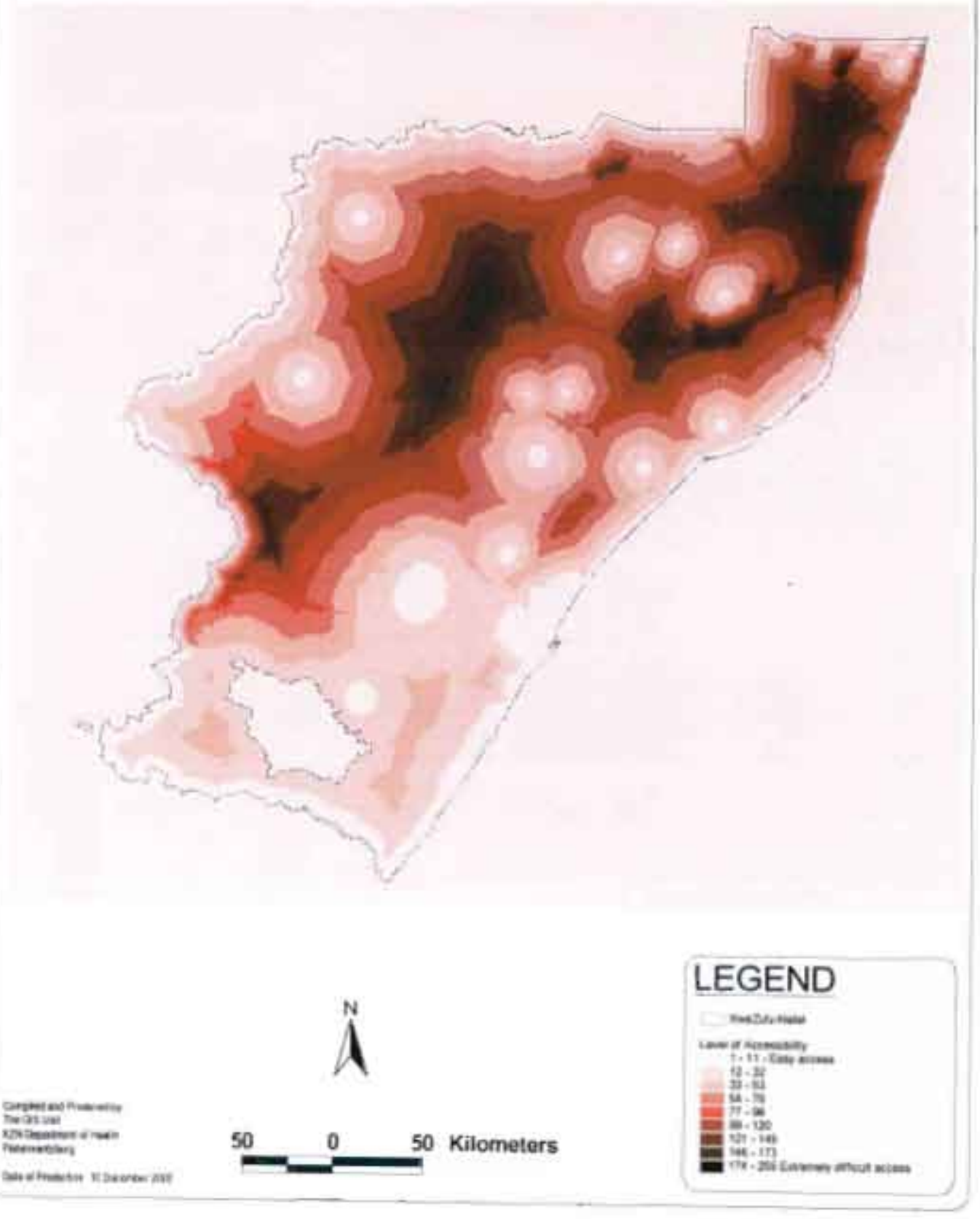


Table 19: Area Covered by Ranges of Accessibility

Accessibility Ranges in KZN	Area (sq km)	Percentage (%)
1 (1-11)	23 647	25.5
2 (12-32)	20 839	22.5
3 (33-53)	15 292	16.5
4 (54-76)	13 280	14.4
5 (77-98)	9 205	9.9
6 (99-120)	5 778	6.2
7 (121-145)	3 327	3.6
8 (146-173)	1 005	1.2
9 (174-255)	195	0.2
Total	**92 567**	**100 %**

The greatest concentration of the KZN population was found within the area representing accessibility range 1 (58 %), followed at an ever-decreasing rate of population density by accessibility ranges 2 (15 %), 3 (8 %), and 4 (6 %) (See table 20). Eighty-one percent of the KZN population fell within the 1-3 (easy access) accessibility ranges. As the degree of difficulty in accessibility increased so the population (density or per square kilometre) decreased in number.

Table 20: Population Layout of Accessibility Model

Accessibility Ranges in KZN	Population Occurring in this Area	Percentage (%)
1 (1-11)	5 254 759	57.9
2 (12-32)	1 400 021	15.4
3 (33-53)	692 489	7.6
4 (54-76)	553 090	6.1
5 (77-98)	482 959	5.3
6 (99-120)	257 923	2.8
7 (121-145)	196 565	2.2
8 (146-173)	71 740	0.8
9 (174-255)	996	0.01
No Accessibility Assigned	159 917	1.8
Total for Province	**9 070 459**	**100 %**

4.4.2 Access and the certified patient population with schizophrenia seen at Fort Napier Hospital

The degree of overlap between the schizophrenia sample collected from FNH and the accessibility model was not established through statistical analysis, as again the sample was too small in relation to the model itself. Hence the data can only be described. Three hundred and ninety-eight certified patients' places of residence were mapped (See table 21) due to certain data unavailability or incompatibility with the GIS.

Table 21 illustrates the distribution of certified patients within the 9 levels of accessibility. Three hundred and ninety-eight certified patients were from 87 towns within the accessibility model. The most noteworthy finding is that the majority of patients are located within accessibility range level 1 (47 %), followed by level 2 (31 %). Levels 6 (8 %), 3 (7 %) and 4 (6 %) follow with at least 4 times less the number of patients than the first two levels. Apart from accessibility level 6, there is a decrease in the number of patients as the degree of accessibility becomes more difficult.

Table 21: Number of Towns in relation to the number of certified patients

Accessibility Level	No of Towns Contributing to Patient Sample	Number of Patients	
		n	%
1 (1-11)	40	187	47
2 (12-32)	23	123	31
3 (33-53)	10	27	7
4 (54-76)	5	22	6
5 (77-98)	2	5	1
6 (99-120)	5	30	8
7 (121-145)	1	3	0.7
8 (146-173)	1	1	0.3
9 (174-255)	0	0	0
N	87	398	100

Tables 22.1- 22.8 illustrate the distribution of certified patients within the towns and DCs of each accessibility range.

In accessibility level one, 55 % of the patients were from Durban DC (See table 22.1). Within the nineteen towns of the Durban DC, 61 % of those patients were resident in Kwa Mashu (28 patients), Inanda (20 patients) and Durban (15 patients). Cumulatively DC's 43, 21, and 22 provide 42 % of the remaining patients (30, 28, 21 of 187 patients respectively). Ixopo provided 90 % of DC 43's patients (27 patients); Umzinto 57 % of DC 21's (16 patients) and Imbali 57 % (10) of its district's patients (DC 22).

In accessibility level 2, 37 % of the patients were sourced from Durban DC, 22 % from DC 22, 14 % from DC 28, 11 % from DC 29 (See table 22.2). Umlazi provided 96 % (43) of its DC's patients, Richmond 56 % (15 patients), Eshowe 53 % and Stanger 62 %.

In accessibility level 3, Umbumbulu provided 33 % (9 patients) of its DC's patients (See table 22.3).

In accessibility level 4, 68 % of the patients were found in Greytown (9 patients) and Bulwer (6 patients) (See table 22.4).

Estcourt provided 56 % (17) of patients in accessibility level 6, followed by Melmoth with 27 % (8) of patients (See table 22.5).

Table 22.1: Access Level One (1-11)

District Councils	Towns Contributing to Patient Sample within DC (number of patients)	Number of Schizophrenia Sensitivity Ratings
Durban	Kwamashu (28), Inanda (20), Clermont (7), Berea,	6
	Kwandengezi	6
	Tongaat (3), Umgababa (2), Chatsworth,	5
	Kwamakhutha, Ntuzuma	5
	Illovo(12), Umkomaas (5), Umbogintwini	4
	Westville, Maidstone, Adams Mission	4
	Hillcrest (6), Durban (5)	3
	Pinetown (4)	1
N	19 towns (101cases)	-
DC 43	Matatiele (3)	4
	Ixopo (27)	3
N	2 towns (30 cases)	-
DC 21	Umzinto (16), Port Shepstone,	4
	Hibberdene, Uvongo, Mtwalume (2),	3
	Scottburgh (4), Munster, Umzumbe	3
	Ramsgate	1
N	9 towns (28 cases)	-
DC 22	Imbali (10), Edendale (4)	6
	Pietermaritzburg (3), Sweet Waters (2)	5
	Thornville (2)	3
N	5 [towns] (21) [cases]	-
DC 23	Ladysmith (2)	3
N	1 town (2 cases)	-
DC 28	Esikhawini	4
	Mtunzini	3
N	2 towns (2cases)	-
DC 29	Ballito	4
N	1 town (1case)	-
Transkei	Umzimkhulu (2)	1
N	1 town (2 cases)	-
N	40 Towns (187 cases)	-

Table 22.2: Access Level 2 (12-32)

District Councils	Towns Contributing to Patient Sample within DC (number of patients)	Schizophrenia Sensitivity Ratings
Durban	Umlazi (43)	6
	Mpumalanga	4
	Inchanga	1
N	3 towns (45 cases)	-
DC 22	Richmond (15)	4
	Howick (6)	3
	Mpolweni (3)	1
	Mpophomeni (2)	6
	Camperdown	3
N	5 towns (27 cases)	-
DC 28	Eshowe (9)	3
	Empangeni (6)	5
	Gingindlovo (2)	3
N	3 towns (17 cases)	-
DC 29	Stanger (8)	4
	Groutville (3)	1
	Nyoni, (1)	4
	Tugela	3
N	4 towns (13 cases)	-
DC 43	Kokstad (6)	4
	Highflats (4)	3
N	2 towns (10 cases)	-
DC 21	Dududu (3)	3
	Braemar	5
	Harding,Paddock	4
N	4 towns (6 cases)	-
DC 24	Kranskop (4)	3
N	1 town (4 cases)	-
DC 25	Newcastle	3
N	1 town (1 case)	-
N: 8 DCs	23 Towns (123 cases)	-

Table 22.3: Access Level 3 (33-53)

District Councils	Towns Contributing to Patient Sample within DC (number of patients)	Schizophrenia Sensitivity Ratings
Durban	Umbumbulu (1)	3
N	1 town (1 case)	-
DC 43	Donnybrook (4)	3
	Underberg (2)	4
N	2 towns (6 cases)	-
DC 22	Wartburg (4)	3
	New Hanover	3
	Lidgetton	3
N	3 towns (6 cases)	-
DC 29	Ndwedwe (4)	6
	Mandini	1
N	2 towns (4 cases)	-
DC 23	Colenso	3
N	1 town (1 case)	-
DC 24	Ahrens	3
N	1 town (1case)	-
N	10 Towns (27 cases)	-

Table 22.4: Access Level 4 (54-76)

District Councils	Towns Contributing to Patient Sample within DC (number of patients)	Schizophrenia Sensitivity Ratings
DC 24	Greytown (9)	4
DC 43	Bulwer (6)	1
DC 22	Impendle (4)	3
DC 27	Mtubatuba (2)	3
DC 28	Nkwalini	3
N	5 Towns (22 cases)	-

Table 22.5: Access Level 5 (77-98)

District Councils	Towns Contributing to Patient Sample within DC (number of patients)	Schizophrenia Sensitivity Ratings
DC 23	Weenen (3)	4
DC 23	Loskop (2)	4
N	2 Towns (5 cases)	-

Table 22.6: Access Level 6 (99-120)

District Councils	Towns Contributing to Patient Sample within DC (number of patients)	Schizophrenia Sensitivity Ratings
DC 23	Estcourt (17)	3
DC 28	Melmoth (8)	3
DC 27	Ubombo Kwazulu (3)	4
DC 24	Muden	1
DC 26	Vryheid	3
N	5 Towns (30 cases)	-

Table 22.7: Access Level 7 (121-145)

District Councils	Towns Contributing to Patient Sample within DC (number of patients)	Schizophrenia Sensitivity Ratings
DC26	Mahlabatini (3)	3
N	1 Town (3 cases)	-

Table 22.8: Access Level 8 (146-173)

District Councils	Towns Contributing to Patient Sample within DC (number of patients)	Schizophrenia Sensitivity Ratings
DC 24	Elandskraal	3
N	1 Town (1 case)	-

4.4.3 Relationship between the accessibility rating and schizophrenia sensitivity ratings

Sixty six percent (264) of the 398 patients that had sufficient data to map came from 20 towns (See table 23). Towns that had more than 10 patients were ranked within the high schizophrenia sensitivity range and the easy accessibility ranges except for two towns, Ixopo and Estcourt. Fifty-five percent of the towns with 5-9 patients were ranked within the high schizophrenia sensitivity range, and 73 % within the easy accessibility ranges.

Table 23: Relationship between the accessibility and schizophrenia sensitivity ratings of the towns with the most certified patients

Range of Patients	Towns (No. of patients)	DC	SSL*	AL**
10 and above	Umlazi (43)	Durban	6	2
	Kwamashu (28)	Durban	6	1
	Ixopo (27)	DC 43	3	1
	Inanda (20)	Durban	6	1
	Estcourt (17)	DC 23	3	6
	Umzinto (16)	DC 21	4	1
	Richmond (15)	DC 22	4	2
	Illovo(12)	Durban	4	1
	Imbali (10)	DC 22	6	1
N	9 Towns (188)	5 DCs represented	3 levels represented	3 levels represented
5 – 9	Eshowe (9)	DC 28	3	2
	Greytown (9)	DC 24	4	4
	Stanger (8)	DC 29	4	2
	Melmoth (8)	DC 28	3	6
	Clermont (7)	Durban	6	1
	Hillcrest (6)	Durban	3	1
	Howick (6)	DC 22	3	2
	Kokstad (6)	DC 43	4	2
	Empangeni (6)	DC 28	5	2
	Bulwer (6)	DC 43	1	4
	Umkomaas (5)	Durban	4	1
N	11 Towns (76)	6 DCs represented	5 levels represented	4 levels represented
N	20 Towns (264)	8 DCs represented	5 levels represented	4 levels represented

*Schizophrenia Sensitivity Level; **Accessibility Level

4.4.4 Summary

The accessibility model map illustrated 65 % of KZN as having 'easy access' to the provincial hospitals providing mental health services. The greatest concentration (81%) of the KZN population was found within the easy (1-3) accessibility ranges. In accessibility level one, 55 % of the patients were from Durban DC. In accessibility level two, 37 % of the patients originated from Durban DC, and 22 % from DC 22. In accessibility level three, 33 % of its DC's patients resided in Umbumbulu. In accessibility level 4, 68 % of the patients were found in Greytown and Bulwer. Estcourt provided 56 % of patients in accessibility level 6. Most of the towns from which 10 or more certified patients originated, ranked within the high schizophrenia sensitivity range, and the easy accessibility ranges. Towns with 5-9 patients were ranked predominantly within the easy accessibility range, but only 55 % ranked within the high sensitivity range.

CHAPTER FIVE: DISCUSSION

5.1 DISCUSSION OF KWAZULU NATAL (KZN)

Many people in KwaZulu Natal (KZN) are exposed to disadvantaged socio-economic circumstances, for example, living in low social class positions, having little or no education, not having work / working in elementary occupations, receiving low or no income. These factors contribute toward a large number of the population in KZN being vulnerable to the risk of psychiatric disorder (Andrews et al, 2001; Jablensky et al., 2000; WHO International Consortium in Psychiatric Epidemiology, 2000; Muntaner et al., 1998; Timms, 1998; Torrey and Bowler, 1990). These factors are considered likely to promote the conditions for schizophrenia to emerge.

5.2 DISCUSSION OF PATIENT SAMPLE

5.2.1 Gender and cultural composition

Only African male patients were sampled, as previously (under the apartheid government), FNH was classified as a black psychiatric hospital and males dominated these particular psychiatric admissions. It is recognised that this data is skewed according to gender with males being over-represented in the population sample, as schizophrenia is found equally in males and females (Kaplan and Sadock, 1998).

5.2.2 Age

The majority of the sample of patients were aged between 15 and 65 years. This confirms Kaplan and Sadock's (1998) findings that 90% of patients with schizophrenia usually present for treatment between the ages of 15 and 55 years. The most prevalent age cluster was 26 - 35 years, followed by those aged 15-25 years.

These findings also correlate with the literature in that at least half of the patients with schizophrenia present with onset prior to the age of 25, implying that the other half present after the age of 25 (American Psychiatric Association, 1994). It is important however not to consider schizophrenia as a young-adult disease due to early onset, as schizophrenia is currently predominantly perceived as chronic in nature. The diagnosis has a permanent impact on family life, social interaction, work relations, self-esteem, and quality of life in general (Goeree et al, 1999). It should be taken into consideration that the admission criteria to FNH is more likely to have contributed to the fact that no patients under the age of 16 years were admitted rather than there being an absence of such cases. Furthermore, patients who may have been readmitted were included in the data; therefore assumptions of age of onset cannot be accurately deduced with this sample.

5.2.3 Marital Status

The high percentage of unmarried patients supports the international findings that marriage is considered to be a protective factor for those with schizophrenia (Jablensky et al., 2000; Warner and de Girolamo, 1995).
There were very few reported cultural marriages. This is more likely to be indicative of the lack of awareness or acceptance of such marriages, or the psychotic state of patients on admission, resulting in inaccuracies in biographical data.

5.2.4 Seasonality of Birth

The sub-sample with actual date of births (11%) showed a fairly even distribution throughout winter, spring and summer. These findings did not fully correspond with international reports that people with schizophrenia were born predominantly in winter and early spring (Kaplan & Sadock, 1998; Eaton et al, 1988). One explanation for this discrepancy is the small sample with actual birth dates, rendering these findings too insignificant for substantial interpretation. This problem is particularly evident in the African population as a result of the disadvantages experienced under

the apartheid government (for example: illiteracy, poor access to government departments to register births especially in the rural areas). For the 1994 elections in South Africa, there was a drive for all South African citizens to obtain an identity document to ensure they could vote and hence, ensure that most people have dates of birth. Hopefully this will also set a trend in which all citizens in the future born will be registered and be given a birth certificate. Another explanation for the poor number of dates of birth could be that on admission, the patients were too psychotic to provide reliable or coherent personal information.

5.2.5 Employment

The high number of unemployed patients in this sample is consistent with international studies that show the highest rates of psychiatric disorders among those not employed (Jablensky et al., 2000; Timms, 1998; Warner, 1985). This further highlights costs as only small numbers of people with schizophrenia manage to work in the open labour market (Knapp, 1997). In addition, it is significant that the generally high unemployment rate in South Africa will mean that persons with mental illness are less likely to obtain employment than others (White Paper on Social Welfare, 1997). The social burden of schizophrenia is exacerbated by the social structures in which the mentally ill are excluded from the employment market (Jablensky et al., 2000). With such high general rates of unemployment in the open labour market, work for people with schizophrenia will rarely be an option (Kelly et al, 1998). Alternate forms of employment, such as a greater number of protective and sheltered workshops should ideally be made available by the government to counteract the negative effects of unemployment (Warner, 1985).

5.2.6 Occupation

Patients were engaged in all levels of occupation although over half of the employed sample, were in the low status occupations. These findings correlate with international findings that schizophrenia occurs among all social classes (Jablensky et al., 2000;

Warner & de Girolamo, 1995) although there is a greater prevalence among those in lower social status (Jablensky et al., 2000; Torrey & Bowler, 1990; Eaton, 1985; Ödegaard, 1956). Caution must be taken in interpreting these results, as cognisance needs to be taken of the fact that the sample was drawn from a public hospital. Certainly some individuals with higher incomes and occupational status would be receiving private mental health care.

Wiggers & Sanson-Fisher (1997) identified a problematic issue in which patients experience possible discrimination in treatment provided, based on their occupational status. General practitioners have been identified as playing a central role in the service provision and support network of people with schizophrenia (Knapp, 1997; Lang, Johnstone & Murray, 1997b). Wiggers & Sanson-Fisher (1997) carried out a study in the UK, that found an occupational status differential in the duration of general practice consultation. This finding suggested that socio-economically disadvantaged patients may not be receiving the health care they require and that occupationally disadvantaged patients received less care from practitioners. This is of great concern in regard to patients with schizophrenia, as many tend to be socio-economically disadvantaged. In addition this mental illness often manifests in the patient being socially inept, and could potentially expose the patient to further discrimination in service provision.

5.2.7 Religion

Of the 19% (n=116) of religious responses, 17% (103) were reported to be of the Christian faith. There were one or two representatives of the Islamic, Shembe, Traditional, and Rastafarian religions. Four patients reported to have no religious affiliations. It is difficult to make any observations of possible interesting / pertinent population characteristics with such a small portion of the sample.

The paucity of data within this section could be as a consequence of the sample's use of certified patients' records, who were probably psychotic on admission and hence provided unreliable information. It could also indicate the low priority religion is

given by those completing the patients' files, as it may not be seen to be directly related to the patients' well-being. It may also be a reflection of the former ethnocentric, predominantly Christian value system that may have overshadowed other possible belief systems. This highlights the importance of training and feedback to hospital personnel on the importance of such demographic data for future research.

5.2.8 Previous Admissions

The high rate of readmission (44%) corresponds to the chronic nature of schizophrenia (Barbato, 1998). This is further demonstrated when previous admission is analysed by age group. The data reveals that the only instance where the number of patients admitted for the first time equals the number of patients being readmitted is in the 15-25 year age category. In the following two age categories (26-35 years and 36-65 years), the number of patients being readmitted is almost double to those being admitted for the first time. This supports the international findings that onset of schizophrenia in males occurs predominantly between the ages of 15-25 years (American Psychiatric Association, 1994). It may also be indicative of the lack of resources in the province. If there were better community structures to support the patients with chronic illnesses, it would be feasible to argue that there would be less admissions.

Relapse is relatively common in patients with chronic schizophrenia, often followed by re-hospitalisation (Knapp, 1997; Mason, Harrison, Glazebrook, Medley & Croudace, 1996). '*Costs of relapse*' was explored in a meta-analysis of relapse studies (Davies & Drummond, 1994). It was found in the US that although the cost of first-episode in-patient care was estimated at $2.3 billion, the direct costs of re-admission in the two years following the first episode were about $2 billion (Davies & Drummond, 1994). Relapse is costly. Davies & Drummond (1994) explain that 63% of that relapse cost was due to the loss of medication response, and 37% to medication non-compliance. A number of side-effects associated with classical neuroleptic therapy (notably extrapyramidal symptoms) has been closely linked to non-compliance and subsequent psychotic relapse as they add further distress to the

patient's life, being inconvenient, embarrassing, painful and life-threatening (Kemp & David, 1996). With the increasing advances made in the understanding of the brain's neurochemical transmitters and receptor sites, new antipsychotic drugs are being developed, ensuring more effective and cost-effective antipsychotic treatment (Jonsson, & Wålinder, 1995; Kane & Freeman, 1994). In an attempt to save on costs, chiefly cheaper drugs (which often tend to have greater side effects) are being prescribed in spite of the fact that the proportion of the total direct costs of schizophrenia incurred by drug therapy is relatively modest. This tends to be a shortsighted cost saving strategy in the light of the many other costs incurred by non-compliance and resulting multiple re-hospitalisations (Knapp, 1997).

5.2.9 Month Admitted

As the sample of patients was admitted at a fairly regular rate throughout the year except for the months of November and December, no evidence of seasonal variation was noted. The drop in admissions during the last 2 months of the year could possibly be indicative of the holiday season that may in some way protect patients from psychotic breakdown. Another explanation is that mental health services and some community resources may be less available during this period.

5.2.10 Length of Stay

The average length of stay varied between 4-6 weeks. Research elsewhere in the world has shown this period of hospitalisation to be generally effective (Kaplan & Sadock, 1998). The long period of hospitalisation and high rate of readmission (44%) supports the international findings regarding the great cost incurred by schizophrenia (Department of Health, 1998, Warner & de Girolamo, 1995, Davies & Drummond, 1994). It has been argued that community care is more cost-effective in comparison with hospital care (Knapp, 1997) and internationally policy has been directed towards community-based care (Kelly, McCreadie, MacEwan, & Carey, 1998; Knapp, 1997; Lang, Forbes, Murray & Johnstone, 1997a). The Department of Health, South Africa,

has followed suit and endorsed district-based primary health care (KwaZulu Natal Department of Health, 2000). This promises a significant impact on the management of patients with a chronic illness such as schizophrenia. Knapp (1997) suggests that cost-effectiveness in relation to chronic mental illness should be carefully interpreted, arguing that patients with chronic mental disease tend to have unique needs in relation to those with acute illness.

Kelly et al (1998) described various areas of difficulties experienced by patients who spent more of their time outside hospital:

a) supervision, was bound to have been less, with a corresponding decrease in compliance with drugs
b) patients outside hospital had to face up to the problems of everyday living, which are known to exacerbate schizophrenia
c) they were exposed to greater social isolation and few employment opportunities which lead to anxiety and depression,
d) potential increased access to alcohol and street drugs, could lead to exacerbating symptoms of the disease and make treatment more difficult.

Success of community-based care can only be ensured if there are sufficient resources to adequately support the service. Häfner (1987, p121) describes a comprehensive community mental health service as one that provides well co-ordinated services at five levels:

1) psychiatric treatment;
2) residential care (psychiatric homes, group homes etc.);
3) occupation and rehabilitation;
4) social contacts and
5) leisure activities'.

Psychiatric treatment refers to more than just administering antipsychotic medication. Drug therapy is rarely sufficient in maximal clinical treatment. This highlights the importance for clinicians to take the psychosocial factors affecting schizophrenia into account (Kaplan & Sadock, 1998) and multifactorial treatment to be adopted. Adjunctive psychotherapy effectively augments pharmacotherapy, showing a

remarkable increase in patients' functioning (Huxley, Rendall, & Sederer, 2000). It is especially hoped that psychological therapies would decrease non-compliance by improving the patient's attitude to medication. Family interventions could also increase the promise of cost-effectiveness in treatment (Knapp, 1997).

In addition to the obvious cost of the hospital admission, there are many indirect and intangible costs as well (Suleman et al, 1997; Torrey, 1998). In particular the Disability Adjusted Life Years (DALY) index is very severe for schizophrenia since very few lead economically productive lives. This highlights the need for multifaceted financing, managing and treatment of schizophrenia in which the overlapping economic, resource and personal burdens as a result of this illness are shared and holistically addressed. Schizophrenia is a costly illness and reducing its financial burden is not a simple matter.

5.2.11 Diagnosis

Schizophrenia constituted almost 60% of the diagnoses whereas just fewer than 20% comprised either schizophrenia with substance abuse or schizophreniform disorder. These findings correlate with findings of a previous study carried out at the Midland Psychiatric Hospitals (MacPherson, 1995). Schizophrenia is one of the most prominent mental disorders requiring hospitalisation as patients presenting for the first time often show acute psychotic symptoms (delusions, hallucinations, paranoia) require prompt hospitalisation; and as relapse is relatively common in patients with chronic schizophrenia, re-hospitalisation is frequent (Knapp, 1997; Mason et al, 1996). The direct costs incurred by people with repeated episodes of schizophrenia, requiring hospitalisation or intensive community care, tend to be more than 100 times greater than the cost of treating a single episode (Davies & Drumond, 1994).

Many professionals consider schizophrenia as a group of disorders made up of a constellation of signs and symptoms, with different aetiologies and outcomes (American Psychiatric Association, 1994; Sue et al., 1994; Andreasen & Carpenter, 1993). Andreasen & Carpenter (1993) address the limitations of the concept of

schizophrenia and argue that the definition of schizophrenia can only be considered as provisional. There are many limitations in making the diagnosis of schizophrenia (Maj, 1998), and methods to improve this clinical dilemma are being investigated (Klosterkötter, Albers, Steinmeyer, Hensen, & Saß, 1995). One of the major goals of WHO mental health programmes over the past three decades has been to develop reliable and cross-culturally applicable diagnostic criteria and instruments for assessing mental health disorders (Janca, Üstün & Sartorius, 1994). This would be of great value to the management of schizophrenia as there is an absence of a biological marker. Health professionals are currently reliant on a mental status examination, which usually involves a clinical interview and observation of the patient's behaviour (Sue et al, 1994). This exposes the diagnosis to subjectivity (subjective bias). This is an important factor to consider in that many people with schizophrenia may have been omitted from treatment schedules.

The value of the diagnostic system is dependent on consistent and appropriate use. Clinicians have been found not to follow the classification guidelines thereby decreasing its validity and worth (Harding and Zahniser, 1994), and this is highlighted by the tendency to over diagnose schizophrenia in some ethnic groups (American Psychological Association, 1994). As this study only included African males, it is not possible to test this observation.

As there is no single *sine qua non* behavioural symptom for schizophrenia (Millon, 1994), considerable variability needs to be built into each category. An important problem in classifying schizophrenia is that of changing criteria. Broader definitions of schizophrenia were used in DSM-I and DSM-II, but since then, the DSM-III-R and DSM-IV criteria have become the most restrictive among the classification systems. The mode of onset of schizophrenia may be acute or insidious (American Psychiatric Association, 1994; Barbato, 1994). It is difficult to diagnose a person as having schizophrenia on first admission because of the chronological criterion of the DSM-IV in which the disorder must have lasted for at least 6 months previously, and been evident for 1 month at the time of diagnosis (Maj, 1998; Sue et al, 1994). This criterion may obscure the figures of first admission and readmissions of this study, perhaps giving lower figures of first admission than might be appropriate. The changes in the criteria for schizophrenia may increase the reliability and validity of the diagnosis, but makes comparing different studies over a period of time in the same

country, as well as international cross-cultural comparisons increasingly difficult (Sue et al, 1994).

5.2.12 Location

It could be anticipated that a high concentration of patients reside in Durban DC, as one-third of the population resides in that DC and hence it has the highest population density in KZN (See appendix). DC22 followed by DC21 are the second and third most densely populated DCs in KZN. A high number of patients are found in the more densely populated DCs. This is in line with international findings that the greater the population density, the greater the likelihood of schizophrenia in that area (Kaplan & Sadock, 1998). The many patients living in areas where there are hospitals could be an indication that the area is developed enough to justify a hospital. It also could give indication that the easier the accessibility to the health facility, the more readily it is used.

Urbanisation is a pressing issue in the country. Fifty-nine percent of the population is now urbanised and approximately 7 million urban-dwellers are informal settlers (squatters) (Dawes & Donald, 1994). Migration to the cities continues, following the removal of political restrictions on the mobility of African people thus creating increased pressure on the urban housing situation (Dawes & Donald, 1994). It is also likely to be an issue of concern for persons with schizophrenia. There is a direct regional correlation of insanity and schizophrenia with urbanisation (Torrey & Bowler, 1990). Several theories (e.g. social drift, social cause, social residue) attempt to explain this phenomenon.

The *social drift theory* can be used to explain the presence of schizophrenia by describing both movement down the socio-economic scale; and geographical movement to more deprived urban areas. Social drift refers to the migration of those affected by psychiatric morbidity to areas of a particular kind, where social demands on them may be less (Freeman, 1994). The inner-city areas are said to attract these affected individuals where cheap, single-person accommodation and opportunities for casual but lowly paid work, without a cumbersome well-knit social structure tend to

be found. The implication of being resident in a poor environmental area is not an aetiological factor in itself, but rather one associated with the development of the disorder (Freeman, 1994).

In the *social residue theory*, the mentally healthy are said to migrate away from socially and environmentally undesirable areas, leaving the relatively incompetent behind (Freeman & Alpert, 1986a).

The social causation hypothesis explains how environmental factors are seen as either causative of schizophrenia or as having to be present for a predisposed individual to become ill. Many of the other theories have mostly focused on the individual rather than on environmental factors when attempting to explain the uneven distribution of schizophrenia, both in environments and among the social class (Eaton, 1990).

Freeman (1994) concludes that the phenomenon is best explained by combining the aspects of the various social processes, particularly the social drift and social cause theories. This would mean that schizophrenia and tendencies for patients to originate in areas of urban deprivation could be explained by assuming a link between the disease and an early environment of socio-economic deprivation. He also elaborated on a seemingly distinct urban factor, other than socio-economic drift, involved in producing the geographical disparity in insanity and schizophrenia. Some suggested explanations include: Social factors, such as rural-community pressure resulting in increasing difficulty to commit a patient involuntarily; stress and crowding factor; genetic factors (i.e. genetic disposition with stress factors which could lead to schizophrenia); biological factors (e.g. nutritional factors that lead to the exposure to lead); and, environmental contaminants (such as air-polluting gases and infectious diseases).

These issues are of great concern with the increasing move towards de-institutionalisation, particularly if there is inadequate provision for community residences for patients with schizophrenia. Such patients, on leaving the mental hospitals, tend to drift to the poorest parts of cities (Goldman, 1983).

A high number of certified patients (43 %) were referred from provincial hospitals. This seems to support Harvey's findings (2000) that mental health services are still concentrated in the psychiatric services and not in the health care clinics. However, the fact that the sample population of certified patients were hospitalised in 1995-

1996, needs to be acknowledged. In 2002, the referral procedures may have changed radically to be in line with the primary health care policy adopted by the Department of Health. Replication of the study may yield different results, as 1995 may have been too soon after the new South Africa and the New S.A. Constitution (The Constitution of the Republic of S.A., 1996) and health policies (e.g. Policy on Quality in Health Care for South Africa (September 2000); Mental Health Care Act (2000); White Paper on Transforming Public Service Delivery (October 1997); Policy on Quality in Health Care (April 1997); White Paper on the Transformation of the Health System of South Africa (April 1997) were ushered in, and thus not enough time had elapsed to implement these changes.

Cooper and Sartorius (1977) proposed that schizophrenia has emerged as a major disorder in the 20^{th} century due to the large populations that accumulated on a hitherto unprecedented scale, mainly through migration. Fifty-nine percent of the population is now urbanised and approximately 7 million urban-dwellers are informal settlers (squatters) (Dawes & Donald, 1994). The migration to the cities continues following the removal of restrictions on the mobility of African people creating increased pressure on the urban housing situation (Dawes & Donald, 1994). Freeman (1994) proposed that cases of severe mental illness had previously been widely dispersed in rural societies, but because of the migration to the cities, had subsequently become aggregated in such numbers in the urban areas, and came to represent a major public health factor in the population. This may explain the high number of certified patients (68 %) coming from for example, Umlazi, KwaMashu, Inanda and Durban, in the Durban DC.

Only 8 % of the patients were referred from institutions outside the DC in which they lived. This is a minimal amount. If it had been a greater number, migration could have possibly explained the movement in the province or the lack / lack of accessibility of referring institutions resulting in the patients needing to travel out of their DC for help. However, this does not appear to be the case. Fifty-eight percent of the patients, who were referred out of their DC of abode, had come from towns from which other patients had been referred from institutions within the same DC. Perhaps the patients were simply on holiday or given incorrect information on admission due to their psychotic state on presentation.

Only 65 % of the original certified patients database was utilised in the maps due to poor data collection. The information within the files was often poor due to either illegible writing, unfamiliar abbreviations used, unknown (not on GIS standardised list of town names) towns listed. If the socio-demographic data were to be captured on hospital admission, it would be more reliable and consistent if, (a) the staff member's professional experience could be utilised, and, (b) possible clarification from the patient or collateral from those persons in accompaniment could ensure more accurate information being recorded in the database.

5.3 DISCUSSION OF SCHIZOPHRENIA SENSITIVITY MODEL

The focus of recent research is to identify the variables of risk in relation to schizophrenia and to enable early intervention (Cornblatt, Obuchowski, Schnur, O'Brien, 1998; Yung et al, 1998) to prevent or minimize later ill-health (Yung et al, 1998), as the earlier the intervention, the more successful the outcome (Yung et al, 1998; McGlashan & Johannessen, 1996). Kaplan & Sadock (1998) described a risk factor as disorder-associated factor that could possibly uphold a causal connection. As little is understood about the causes of schizophrenia, the model is attempting to establish the relative risk of schizophrenia, i.e. the risk factors which are likely to occur in a specific environment such as KZN. The schizophrenia sensitivity model aims to identify some people in KZN who may be vulnerable to the psychotic disorder.

5.3.1 Is there evidence of a geographical pattern?

No distinct pattern was evident in the map of the model as one could expect for a physical disease such as cholera or lung cancer in which the cause and effect are well established and clearly mapped. The schizophrenia sensitivity model was in essence an experimental exercise. This type of project has not, to the researcher's knowledge, been attempted before in mental health let alone with schizophrenia. Much research has been focused on isolated variables associated with schizophrenia. As yet, no one had taken the many variables and overlaid them to examine the combined effect, which could potentially hold the alchemists key to unravelling the illusive disease of schizophrenia. There were many obvious limitations to the study. Firstly, the variables used to create the model were from the 1995 Census Data (Central Statistical Services, 1995). They were crude in terms of sensitivity to schizophrenia highlighting the need for the finding to be interpreted with caution. Secondly, the population sample was too small and no statistical analysis could be performed due to GIS incompatibility. If this study were to be repeated this needs to be addressed, ensuring

that the geographical references be linked to the standardised lists used by the GIS. Only one 'expert' was accessed to contribute to the creating of the model. Usually, a group of experts' knowledge is tapped into and a consensus out of that pool of knowledge to inform the process of model making. However, the variables utilised were substantiated by the literature in the field.

This project attempted to utilize the GIS to explore the geographical patterns of schizophrenia. Previously GIS has been ably applied to infectious diseases such as cholera and tuberculosis (Geographical Information Systems Unit, 2002). However, there are limitations in applying GIS to mental illness. In contrast to infectious disease, mental illness have less clearly defined signs and symptoms, and are not restricted to the realm of biology; etiological factors are not necessarily understood; nor does diagnosis automatically implicate specific etiology or treatment (Kaplan & Sadock, 1998; Carson & Butcher, 1992). Many of the contributing variables (biological, social, psychological) associated with the disorder have not been included in this study. This could well explain the lack of distinct pattern evident in the KZN schizophrenia model.

5.3.2 Percentage of KZN population falling into the varying ranges of schizophrenia risk

It would seem that the high schizophrenia sensitivity levels are linked to areas of greater population density as the high schizophrenia sensitivity risk ranges took up almost four times less surface area (20 %) than the low risk ranges (72 %), and yet contain twice the amount of population (67 %). The model suggests that the greater the population density the greater the schizophrenia sensitivity risk.

5.3.3 Description of the relationship between the schizophrenia sensitivity ranges and certified patients

Throughout KZN and within most of the DCs, the high and low schizophrenia

sensitivity ranges occur almost equally (56 %, 44 % respectively). The implication of this finding is that there is a 50 % risk of schizophrenia throughout the province. This figure is extremely high especially when considering that the lifetime risk of schizophrenia falls within the range of 0.50 – 1.72 % and that little variation have been noted across diverse populations and cultures (Jablensky et al., 1992).
Durban DC exhibited 3 times more high schizophrenia sensitivity ranges than low ranges. Durban DC has at least 3 times more population than the other DCS. DC 24 had the smallest population quota and also had 3 times more low schizophrenia sensitivity ranges. DC 28 also had 3 times more low schizophrenia sensitivity ranges and contained 3 times less population as DC Durban. This again seems to point to the role that population distribution may be playing in the patterns of the model. It needs to be queried whether this is due to schizophrenia or possibly extraneous non-aetiological influence instead.
It would seem that it would be beneficial to include additional variables in the model to increase its sensitivity to schizophrenia vulnerability. Some of the high-risk studies focused on genetic relatedness to define risk (Hodges et al, 1999; Yung & McGorry, 1996). Cornblatt et al (1998) found that neurocognitive deficits and clinical symptoms were independent classes of risk indicators. Hodges et al (1999) found significant differences in high-risk groups in the social parameters (childhood isolation, interpersonal sensitivity, social isolation and restricted affect). These studies highlight the diversity of risk variables affecting vulnerability to schizophrenia. This present study took only at socio-demographic variables (e.g. age, marital status) into consideration and omitted social (social isolation), past history variables (history of mental disorder, birth obstetric details), and biological factors (genetic factors, neurocognitive factors), psychological (family interactions) and other environmental factors (air pollution). By taking more of these factors into account, the model will only be enriched and fine-tuned to the schizophrenia risk.

5.3.4 Summary

The schizophrenia sensitivity model is crude in its identification of individuals vulnerable to schizophrenia. However, potential for further development in the model for both schizophrenia and mental illness in the future, has been highlighted, especially for planning and managing of the mental illnesses and policymaking.

5.4 ACCESSIBILITY MODEL

South Africa has a legacy of great inequity in the health care system (Jinabhai & Campbell, 1995). Discriminatory service delivery (Ntsaluba & Pillay, 1998) has been exacerbated by the geographical inequities. The Bill of Rights (Constitution of the Republic of South Africa, 1996) states that access to health care services are a right. The degree of accessibility to the 19 provincial hospitals providing psychiatric services has been explored in the accessibility model.

5.4.1 Access and the KZN population

The majority (95 %) of KZN surface area and population fall within the easy to average range of accessibility. As the degree of accessibility becomes more difficult, so the population decrease. The model suggests that accessibility to the provincial hospitals offering psychiatric services is not a problem in KZN. However, caution needs to be heeded in these findings, as it does not correlate with the real world. This model is only describing the physical distance between the service and the person requiring the service. There are many qualitative issues that may form a barrier to the person requiring the service. Schizophrenia itself may be a barrier. Paranoia and suspicion, characteristics of schizophrenia can become rife as the psychotic symptoms set in, and this may result in preventing the patient treatment to seek treatment. The GIS map is a digital representation of the world (Burrough, 1986). The relationship between the 'real' world and the representation at each stage depends not only on the accuracy of the co-ordinates and attributes, but also on the researcher's decision regarding what to include, how to measure / classify and symbolise those representations (Martin, 1999). The variables utilised within this model may not be sensitive enough to the accessibility needs of this region or pertinent variables omitted, and hence, representing the degree of accessibility inaccurately. If consideration is taken of the high levels of poverty especially concentrated within the rural areas, it seems likely that the too little emphasis was made on the cost of travelling. The patient requiring the service, regardless of how nearby in proximity the

person is to the provincial hospital, will not be able to get there if he or she has no money to pay for transport. It is important to recognise that this model identifies the physical or locational accessibility. There are many other issues related to access to health care over and above physical accessibility, such as, revealed accessibility and quality of service provided (Phillips, 1990). Locational accessibility is simply a measure of proximity. It assumes that because a facility exists, it may be used. This is also referred to as 'potential' accessibility. Another pertinent issue deals with the argument of quantity of facilities is not the same as quality of service rendered (Phillips, 1990). A study done in western Guatemala, (Annis, 1981) illustrated the powerful effect on utilisation of the services determined by the quality of service provided. In spite of there being reasonably good access to health services, even taking the bad roads and slow travel times into account, Annis (1981) argued that only those who lived within short distances of the facility made use of it because of the people's expectation to receive dissatisfactory service. Annis (1981) went on to describe poor service in terms of understaffed personnel, poorly trained staff, badly equipped and a reputation of not being effective in healing the people.

5.4.2 Access and the certified patient population with schizophrenia seen at Fort Napier Hospital

The number of patients was too small to perform any statistical analysis. As with the KZN population, more patients were found in the easy levels of access, and less patients as the access became more difficult with the exception of accessibility level 6, namely, Estcourt (DC 23) and Melmouth (DC 28). However, the overall picture implies that the degree of accessibility for the certified patients was good. Again caution needs to be taken with interpreting these results for various reasons. This relationship between the levels of accessibility and certified patients could not be statistically analysed due to the small numbers of patients. This study would need to be repeated to gain confidence in the outcome. Also, it must be acknowledged that the model is measuring physical access and not taken into account the many issues related to actual utilisation of the hospitals.

5.4.3 Relationship between the accessibility rating and schizophrenia sensitivity ratings

A vast majority of patients (66 %) come from a selected few towns (20 %) within each DC. Most of the towns (7 out of the 9) that had 10 or more patients allocated to them, fell into high schizophrenia sensitivity ranges and within the easy accessibility ranges.

However, those towns (11) that had 5 - 9 patients allocated to them displayed a less distinct pattern. Seventy-three percent of the towns fell into the easy accessibility range while only 55 % towns (6) fell into the high schizophrenia sensitivity ranges. The latter pattern reflects the findings found in Results 5.3.4 in which throughout KZN and most of the DCs, the high and low sensitivity risk ranges were evenly distributed. The former pattern reflects the DC of exception, Durban DC, in which there were 3 times more high sensitivity risk ranges than low. Four (44 %) out of the 9 towns were from the Durban DC. It would be valuable to investigate what common factor between these towns could feasibly explain the high number of patients corresponding to the increase in schizophrenia sensitivity levels. Those DCs falling with the distinct pattern (Durban, 22 and 21) have the three highest population densities in KZN. This is in line with international findings that the greater the population density, the greater the likelihood of schizophrenia in that area (Kaplan & Sadock, 1998). Another common factor these towns have is that they are predominantly informal townships, occupied mainly with the African population group. The high number of people migrating the urban areas, and settling at a rapid rate within these informal townships (Freeman, 1994; Cooper and Sartorius, 1977) may explain the increase in schizophrenia in these areas. Caution must be implemented in interpreting these findings as yet it is unclear whether the model is showing merit in certain circumstances or whether there is an uncontrolled for, external variable (such as population density) to explain this pattern. A larger patient sample is required to give statistical validity to the findings.

5.4.4 Summary

According to the accessibility model, the majority of KZN population is said to be within easy to average range of accessibility to the provincial hospitals offering psychiatric services. This is problematic and the model will need to be refined to ensure that it is more sensitive to the plight of many of the people in KZN. The model is describing the proximal distance to the provincial hospital from their place of residence and does not deal with other issues of accessibility such as, the actual utilisation of the services, cost of transport, quality of the services provided, which has been argued to have great impact on issues of accessibility.

CHAPTER 6: CONCLUSION

Schizophrenia is a debilitating, chronic mental illness (Kaplan & Sadock, 1998; Warner & de Girolamo, 1995) that is both emotionally and financially incapacitating to the individual, and their family, as well as economically costly in terms of a country's resources (Moscarelli, 1994). Medical geography combining epidemiological knowledge (Pyle, 1979) and basic demographic information (Mc Glashan, 1972) provides an opportunity for the spatial analysis of human problems and can be graphically displayed and interpreted utilizing Geographic Information Software (GIS).

The aims of this pilot study were to gain a greater understanding of the variables affecting and possibly contributing to schizophrenia, by firstly, describing the demographic trends and deviations from international findings, and secondly, using the Geographical Information Systems (GIS) model, to overlay these individual socio-demographic variables in order to examine a potential combined effect; and to explore the geography of schizophrenia in terms of accessibility of the mental health services to individuals diagnosed with schizophrenia.

It was found that the socio-demographic profile of the certified patients at FNH, and presentation of schizophrenia resembled that of most international findings.

Overall, the pattern produced by the schizophrenia sensitivity model was unclear other than high and low schizophrenia sensitivity ranges being evenly spread throughout KZN. Only in the Durban DC did the high schizophrenia sensitivity ranges occur three times more than the low. These findings should be interpreted very cautiously. The model could be refined further to amplify its sensitivity to schizophrenia risk using variables such as biological (genetics and neuropathology), psychological (family interactions) and environmental factors (socio-political issues). Each of these variables would enhance the model greatly.

Although statistical significance could not be established, the accessibility model suggested that large parts of KZN fall within the range of easy accessibility in relation to the 19 provincial hospitals that provide a psychiatric service. Broader aspects of

accessibility need to be incorporated into the study of accessibility, such as utilisation and quality of the mental health services.

The schizophrenia sensitivity model and accessibility model, in spite of the rudimentary and incomplete variables utilised, confirmed its potential as a powerful tool to collect (from surveys and other databases), store (retrieval and query), manipulate (transforming data, analysis and modelling) and produce data output (data reporting, such as maps and reports) (Foote & Lynch, 1995).

The limitations of this study included using crude variables in the models which led to losing a degree of sensitivity and comprehensiveness of the purpose of the model. Only one 'expert' was utilised in the development of the models, although the current literature provided corroboration. Difficulties experienced in the data capture process, such as not all the of the patient sample being used in the mapping process; and, the patient sample being too small to allow for statistical analysis, resulted in all the findings having to be treated with caution.

It would be beneficial to repeat this study in order to achieve a time series longitudinal data base, to establish whether changes in departmental policies have made an impact on the quality of the patients' treatment, and to create a database in which the sociodemographic variables of the patients could be used to map future planning and management of the mental health services.
Thus it is recommended that,

- a provincial computerised database be established in which more efficient and standardised hospital and clinic records be kept. This could provide valuable information for further research in the field of mental health.
- further studies be conducted to refine the models and that the major findings be verified at local site studies.
- future surveys of patients should include private hospitals and clinics to ensure a more holistic picture of the socio-demographic profile of the patient sample in KZN.
- A larger patient sample needs to be studied to statistical analysis can be applied.

It is strongly recommended that there be greater collaboration between mental health services and the GIS Unit, Department of Health and that the GIS be utilised to assist in planning and decision-making in mental health services. The researcher should be predominantly involved in liasing with the GIS department in order to get basic training on the GIS to ensure a solid foundation of understanding and conceptual background to use the GIS as effectively and efficiently as possible.

It is evident that people with schizophrenia experience many obstacles in their every day living. This research project has highlighted the negative and unsupportive context in KZN. To make a difference in these patients' lives, the quality of the lives of the majority of the population in KZN needs to be improved. This would include ensuring a basic education, increased employment opportunities, and raising the standard of living of the majority of South Africans to above the international poverty line. By creating an environment that is supportive of basic living standards for the majority of the people, the repercussions can only be positive on those with chronic mental illness. Resources need to be allocated for patients' unique needs, to ensure appropriate accommodation and accessible alternate employment opportunities for those unable to work in the open labour market. This can only promote mental health in South Africa.

REFERENCES

Adams, W. & Kendell, R.E. (1999). Annual variation in birth rate of people who subsequently develop schizophrenia. *British Journal of Psychiatry*, **175**, 522-527

American Psychiatric Association (1994). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.). Washington, DC: American Psychiatric Association

Andreasen, N.C. & Carpenter, Jr., W.T. (1993). Diagnosis and classification of schizophrenia. *Schizophrenia Bulletin*, **19**, 199-211

Andrews, G., Henderson, S. & Hall, W. (2001). Prevalence, comorbidity, disability and service utilization. *British Journal of Psychiatry*, **178**, 145-153

Annis, S. (1981). Physical access and utilization of health services in rural Gautemala. *Social Science and Medicine*, 15D, 515-523

Association for Geographic Information (1999).*GIS Dictionary: Spatial Analysis and modelling related terms.* URL: http://www.geo.ed.ac.uk/

Ayeni, B. Rushton, G., & McNulty, M.L. (1987). Improving the geographical accessibility of health care in rural areas: a Nigerian case study. *Social Science and Medicine*, **25**, 10, 1083 – 1094

Barbato, A. (1998). *Schizophrenia and public health*. Division of Mental Health and Prevention of Substance Abuse; Nations for Mental Health. World Health Organisation: Geneva. [On-line]. Available: http://www.who/msa/nam/97.6

Barham, P. & Hayward, R. (1990). Schizophrenia as a life process. In Bentall, R.P. (ed) *Reconstructing schizophrenia*. Routledge: New York

Beard, M.K. & Buttenfield, B.P. (1999). Detecting and evaluating errors by geographical methods. In Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W. (eds). *Geographical Information Systems: Principles and technical issues* (Volume 1). John Wiley & Sons, Inc: New York

Bhana, A. & Pillay, Y.G. (1998). The use of the Geographical Information System (GIS) to determine potential access and allocation of public mental health resources in KwaZulu-Natal. *South African Journal of Psychology*, **28** (4), 222-233

Bloom, G. & McIntyre, D. (1998). Towards equity in health in an unequal society. *Social Science & Medicine*, 47 (10), 1529-1538

Burrough, P.A. (1986). *Principles of geographical information systems for land resources assessment*. Clarendon Press: Oxford

Carson, R.C. & Butcher, J.N. (1992). *Abnormal psychology and modern life*. Harper Collins Publishers

Central Statistical Services (1995). *Population census*. Pretoria: Central Statistical Services

Chetty, K. (1990). The provision of hospitals and clinics in South Africa: some steps to redress the problems. *Critical Health*, 21-23

Chou, Y. (1997). *Exploring spatial analysis in geographic information systems*. Santa Fe: Onward Press

Constitution of the Republic of South Africa, Act 108 of 1996

Cooper, J.E. & Sartorius, N. (1977). Cultural and temporal variations in schizophrenia. *British Journal of Psychiatry*, **130**, 50-55

Cornblatt, B., Obuchowski, M., Schnur, D. & O'Brien, J. D. (1998). Hillside study of risk and early detection in schizophrenia. *British Journal of Psychiatry*, **172** (supp 33), 26-32

Davidson, L. (1992). Developing an empirical-phenomenological approach to schizophrenia research. *Journal of Phenomenological Psychology*, **23** (1), 3-15

Davies, L.M. & Drummond, M.F. (1994). Economics and schizophrenia: The real cost. *British Journal of Psychiatry*, **165** (suppl 25), 18-21

Dawes, A. & Donald, D. (1994). Understanding the psychological consequences of adversity. In Dawes, A. & Donald, D. (Eds). *Childhood & adversity: Psychological perspectives from South African research*. David Philip: Cape Town

Department of Health (1998). Provincial Health Policy Bill. URL: http://www.gov.za/

Dor, G. (1994). New settlements, growing communities: the increasing need for health care. *Critical Health*, **46**, 6-13

Eaton, W.W., Day, R. & Kramer, M. (1988). The use of epidemiology for risk factor research in schizophrenia: An overview and methodological critique. In *Handbook of schizophrenia. Vol. 3: Nosology, epidemiology and genetics.* Tsuang M.T., & Simpson J.C., (eds.). Elsevier: Amsterdam

Eaton, W.W. (1985). Epidemiology of schizophrenia. *Epidemiological reviews*, 7, 105-126

Fennig, S., Putnam, K., Bromet, E.J. & Galambos, N. (1995). Gender, premorbid characteristics and negative symptoms in schizophrenia. *Acta Psychiatr Scand*, **92**, 173-177

Folnegovic, Z., Folnegovic-Smalc, V. & Kulcar, Z. (1990). The incidence of schizophrenia in Croatia. *British Journal of Psychiatry*, **156**, 363-365

Foote, K. E. & Huebner, D. J. (1996). Database Concepts. *The Geographer's Craft Project,* Department of Geography, The University of Colorado at Boulder.Url: http://www.colorado.edu/geography/gcraft

Foote, K. E. & Lynch, M. (1995). Geographic Information Systems as an Integrating Technology: Context, Concepts, and Definitions. *The Geographer's Craft Project,* Department of Geography, The University of Colorado at Boulder. Url: http://www.colorado.edu/geography/gcraft

Freeman, H. (1994). Schizophrenia and City residence. *British Journal of Psychiatry*, **164** (suppl 23), 39-50

Freeman, M. (1991). Mental health for all - moving beyond rhetoric. *South African Journal of Psychology*, **23** (3), 141-147

Freeman, H. & Alpert, M. (1986). Prevalence of schizophrenia in an urban population. British *Journal of Psychiatry*, **149,** 603-611

Gangat, A.E.(2000). *Psychosis and schizophrenia.* Valentine Bedford – Durban, South Africa.

Geographical Information Systems Unit, Health Department (2002). URL: http://www.kznhealth.gov.za/gisinfo/htm

Goeree, R., O'Brien, B.J., Goering, P., Blackhouse, G., Agro, K., Rhodes, A. & Watson, J. (1999). The economic burden of schizophrenia in Canada. *Canadian Journal of Psychiatry*, **44** (5), 464-473

Goldman, H.H. (Ed.) (1983). International perspectives in deinstitutionalisation. *International Journal of Mental Health*, **11**, 3-165

Gureje, O. (1991). Gender and schizophrenia: age at onset and sociodemographic attributes. *Acta Psychiatr Scand*, **83**, 402-405

Gwatkin, D.R. (2000). Health inequalities and the health of the poor: what do we know? What can we do? *Bulletin of the World Health Organisation*, **70** (1), 3-18

Häfner, H. (1987). Do we still need beds for psychiatric patients? An analysis of changing patterns of mental health care. *Acta Psychiatr Scand*, **75**, 113-126

Harding, C.M. & Zahniser, J.H. (1994). Empirical correction of seven myths about schizophrenia with implications for treatment. *Acta Psychiatr Scand*, **90** (suppl 384), 140-146

Hare, E. (1986). Aspects of epidemiology of schizophrenia. *British Journal of Psychiatry*, **149**, 554-561

Harvey, M. (2000). *Mental health is the stepchild of healthcare*. Http://www.iclinic.co.za/oct00/editorial/mental2.htm

Hodges, A., Byrne, M., Grant, E. & Johnstone, E. (1999). People at risk of schizophrenia. Sample characteristics of the first 100 cases in the Edinburgh high-risk study. *British Journal of Psychiatry*, **174**, 546-553

Hopa, M., Simbayi, L.C. & du Toit, C.D. (1998). Perceptions on integration of traditional and western healing in the new South Africa. *South African Journal of Psychology*, **28** (1), 8-14

Huxley, N.A., Rendall, M. & Sederer, L. (2000). Psychosocial treatments in schizophrenia: a review of the past 20 years. *Journal of Nervous and Mental Disease*, **188**, 187-201

Jablensky, A., McGrath, J., Herrman, H., Castle, D., Gureje, O., Evans, M., Carr, V., Morgan, V., Korten, A. & Harvey, C. (2000). Psychotic disorders in urban areas: an overview of the study on low prevalence disorders. *Australian and New Zealand Journal of Psychiatry*, **34**, 221-236

Jablensky, A, Sartorius, N., Ernberg, G., Anker, M., Korten ,A., Cooper, J.E., Day, R., & Bertelsen A. (1992). Schizophrenia: Manifestations, incidence and course in different cultures: A World Health Organization ten-country study. *Psychological Medicine Monograph Supplement 20*, Cambridge, Cambridge University Press

Janca, A, Üstün, T.B. & Sartorius, N. (1994). New versions of World Health Organization instruments for the assessment of mental disorders. *Acta Psychiatr Scand*, **90**, 73-83

Jinabhai, C. & Campbell, L. (1995). The need for equitable resource distribution: The case of KwaZulu/Natal. *Critical Health*, **47**, 42-46

Jonsson, D. & Wålinder, J. (1995). Cost-effectiveness of clozapine treatment therapy-refactory schizophrenia. *Acta Psychiatr Scand*, **92**, 199-201

Kane, J.M. & Freeman, H.L. (1994). Towards more effective antipsychotic treatment. *British Journal of Psychiatry*, **165** (suppl 25), 22-31

Kaplan, H.I. & Sadock, B.J. (1998). *Synopsis of Psychiatry. Behavioural Science / Clinical psychiatry*. Balitmore: Williams and Wilkins

Katzenellenbogen, J.M., Joubert, G. & Yach, D. (Eds) (1997). *Epidemiology: A manual for South Africa*. Cape Town: Oxford University Press Southern Africa

Kawachi,, I. & Kennedy, B.P. (1997). The relationship of income inequality to mortality: does the choice of indication matter? *Social Science and Medicine*, **45** (7), 1121-1127

Kelly, C., McCreadie, R., G., MacEwan, T., & Carey, S. (1998). Nithsdale schizophrenia surveys 17: Fifteen year review. *British Journal of Psychiatry*, **172**, 513-517

Kemp, R.W. & David, A. (1996). Psychological predictors of insight and compliance in psychotic patients: randomised control trial. *British Journal of Psychiatry*, **169**, 444-450

Klosterkötter, J., Albers, M., Steinmeyer, E.M., Hensen, A. & Saß, H. (1995). Positive or negative symptoms – which are more appropriate as diagnostic criteria for schizophrenia ? *Acta Psychiatr Scand*, **92**, 321-326

Knapp, M. (1997). Costs of schizophrenia. *British Journal of Psychiatry*, **171**, 509-518

Kraak, M.J. (1999). Visualising spatial distributions. In Longley, P.A., Goodchild, M.F., Maguire, D.J. & Rhind, D.W. (eds). *Geographical Information Systems: Principles and technical issues* (Volume 1). John Wiley & Sons, Inc: New York

KwaZulu Natal Department of Health (2000). URL: http://healthweb.kzntl.gov.za/

Lang, F.H., Forbes, J.F., Murray, G.D. & Johnstone, E.C. (1997a). Service provision for people with schizophrenia.. 1. Clinical and economic perspective. *British Journal of Psychiatry*, **171**, 159-164

Lang, F.H., Johnstone, E.C. & Murray, G.D. (1997b). Service provision for people with schizophrenia. II Role of the general practitioner. *British Journal of Psychiatry*, **171**, 165-167

Last, J.M. (1988). *Dictionary of Epidemiology*. Oxford University Press: New York

Lilienfeld, A.M. & Lilienfeld, D.E. (1980). *Foundations of Epidemiology*. New York: Oxford University Press

Longley, P.A., Goodchild, M.F., Maguire, D.J. & Rhind, D.W. (Eds) (1999). *Geographical Information Systems: Principles and technical issues* (Volume 1). John Wiley & Sons, Inc: New York

Lynch, M. (1994). Ethical Issues in Electronic Information Systems. *The Geographer's Craft Project,* Department of Geography, The University of Colorado at Boulder. URL: http://www.colorado.edu/geography/gcraft

MacMahon, B. & Pugh, T.F. (1970). *Epidemiology: Principles and Methods*. Little, Brown and Company: Boston

MacPherson, A. (1995). *Schizophrenia in KwaZulu Natal. A GIS survey of patients treated at the Midlands Complex from 1990 - 1995*. Unpublished master's dissertation, University of Natal (Pietermaritzburg).

Maj, M. (1998). Critique of the DSM-IV operational diagnostic criteria for schizophrenia. *British Journal of Psychiatry*, **172**, 458-460

Martin, D.J.(1999). Spatial Representation: The social scientist's perspective. In Longley, P.A., Goodchild, M.F., Maguire, D.J. & Rhind, D.W. (eds). *Geographical Information Systems: Principles and technical issues* (Volume 1). John Wiley & Sons, Inc: New York

Mason, P., Harrison, G., Glazebrook, C., Medley, I. & Croudace, T. (1996). The course of schizophrenia over 13 years. *British Journal of Psychiatry*, **169**, 580-586

McGlashan, T.H. (1998). Early detection and intervention of schizophrenia: rationale and research. *British Journal of Psychiatry*, **172**, 3-6

McGlashan, N.D. (1972). Medical Geography: an Introduction. In McGlashan, N.D. (Ed). *Medical Geography: Techniques and Field Studies*. Methuen & Co Ltd: London

McGlashan, T.H. & Johannessen, J.O. (1996). Early detection and intervention with schizophrenia: rationale. *Schizophrenia Bulletin*, **22**, 201-222

Mental Health Act (1973). Act 18 of 1973

Mental Health Care Act (2000). Government Gazette No. 20848, February 2000

Miller, T. & Swartz, L. (1992). Psychology and epidemiology: and uncomfortable alliance? *South African Journal of Psychology*, **28** (1), 8-14

Millon, T. (1999). *Personality – Guided Therapy*. John Wiley & Sons, Inc.: New York

Moscarelli, A. (1994). Health and economic evaluation in schizophrenia: implications for health policies. *Acta Psychiatr Scand*, **89** (suppl 382), 84-88

Mowry, B.J., Lennon, D.P. & De Felice, C.N. (1994). Diagnosis of schizophrenia in a matched sample of Australian aborigines, *Acta Psychiatr Scand*, **90**, 337-341

Muntaner, C., Eaten, W.W., Diala, C., Kessler, R.C. & Sorlie, P.D. (1998). Social class, assets, organizational control and the prevalence of common groups of psychiatric disorders. *Social Science and Medicine*, **47** (12), 2043-2055

Myers, J.K., Weissman, M.M., Tischler, G.L., Holzer, C.E., Leaf, P.J., Orvaschel, H., Anthony, J.C., Boyd, J.H., Burke, J.D., Kramer, M. & Stoltzman, R. (1982). Six-month prevalence of psychiatric disorders in three communities: 1980 to 1982. *Archives of General Psychiatry*, **41**, 959-967

Narita, K., Sasaki, T., Akaho, R., Okazaki, I., Kusumi, I., Kato, T., Hashimoto, O., Fikuda, R., Koyama, T., Matsuo, K., Okabe, Y., Nanko, S., Hohjoh, H. & Tokunga, K., (2000). Human leukocyte antigen and season of birth in Japanese patients with schizophrenia. *American Journal of Psychiatry*, **157**, 7,1173-1175

Ntsaluba, A. & Pillay, Y. (1998). Reconstructing and developing the health system – the first 1000 days. *South African Medical Journal*, **88**, 33-36

Ödegaard, Ö. (1956). The incidence of psychosis in various occupations. *International Journal of Social Psychiatry*, **2**, 85-104

Parry, C. & Swartz, L. (1997). Psychiatric epidemiology. In Katzenellenbogen, J.M., Joubert, G., & Karim, S.S.A. (Eds). *Epidemiology: A manual for South Africa*. Cape Town: Oxford University Press Southern Africa

Pederson, C.B. & Mortensen, P.B. (2001). Family history, place and season of birth as risk factors for schizophrenia in Denmark: a replication and reanalysis. *British Journal of Psychiatry*, **179**, 46-52

Peters, D.G. (1999). *Attitude, coping and outcome in schizophrenia*. Unpublished master's dissertation, University of Natal (Pietermaritzburg).

Pyle, G.F. (1979). *Applied medical Geography*. V.H. Winstons & Sons: Washington, D.C.

Policy on Quality in Health Care for South Africa; National Department of Health, Pretoria, Quality Assurance, 29 September 2000

Policy on Quality in Health Care, April 1997, Government Gazette No 17910

Poverty and Inequality in South Africa (1998): *Report prepared for the Office of the Executive Deputy President and the Inter-Ministerial Committee for Poverty and Inequality:* Summary Report: 13 May, 1998

Rosnow, R.L. & Rosenthal, R. (1996). *Beginning behavioural research: A conceptual primer*. Prentice Hall: New Jersey

Rushworth, (2002). *Geographical Information Systems Unit*, Health Department. Url: http://www.kznhealth.gov.za/gisinfo/htm

Sethi, B.B., Gupta, S.C., Mahendru, R.K., & Kumari, P. (1974). Mental health and urban life: A study of 850 families. *British Journal of Psychiatry*, **124**, 243-246

South African Yearbook 2000/01 (2001). URL: http://www.gov.za/yearbook/health.htm

Strömgren, E. (1987). Changes in the incidence of schizophrenia? *British Journal of Psychiatry*, **150**, 1-7

Sue, D., Sue, D. & Sue, S. (1994). *Understanding abnormal behavior*. Houghton Mifflin Company: Toronto

Suleman, T.G., Ohaeri, J.U., Lawal, R.A., Haruna, A.Y. & Orija, O.B. (1997). Financial cost of treating out-patients with schizophrenia in Nigeria. *British Journal of Psychiatry*, **171**, 364-368

Thara, R., Henrietta, M., Joseph, A., Rajkumar, S. & Eaton, W.W. (1994). Ten-year course of schizophrenia – the Madras longitudinal study. *Acta Psychiatr Scand*, **90**, 329-336

Thara, R., Sucharitakul, D., Mendis, N., & Islam, H. (2001). Schizophrenia: Youth's greatest disabler. *World Health Organization*. http://whqlibdoc.who.int/searo/2001/SEA_Ment_117.pdf

Timms. D. (1998).Gender, social mobility and psychiatric diagnoses. *Social Science and Medicine*, **46** (9), 1235-1247

Torrey, E.F. & Bowler, A. (1990). Geographical distribution of insanity in America: evidence for an urban factor. *Schizophrenia Bulletin*, **16** (4), 591-604

Torrey. E.F. (1988). *Surviving schizophrenia: A family manual*. Perennial Library: Harper & Row, Publishers: New York

Van Rensburg, H.C.J. & Fourie, A. (1994). Inequalities in South African health care. Part I. The problem –manifestations and origins. *South African Medical Journal*, **84**, 95-99

Vázquez-Barquero, J.L., Cuesta, M.J., Castanedo, S.H., Lastra, I., Herrán, A. & Dunn, G. (1999). Cantabria First-episode schizophrenia study: three-year follow-up. *British Journal of Psychiatry*, **174**, 141-149

Warner, R. & de Girolamo, G. (1995). *Epidemiology of mental disorders and psychosocial problems: Schizophrenia*. World Health Organisation: Geneva

Warner, R. (1994). *Recovery from schizophrenia: Psychiatry and political economy*. (Second edition). Routledge and KeganPaul: London

Warner R. (1985). *Recovery from schizophrenia: psychiatry and political economy.* Routledge and Kegan Paul: London

Weiden & Olfson, (1995). Cost of relapse in schizophrenia. *Schizophrenia Bulletin*, **21**, 419-429

White Paper on Social Welfare (1997). URL: http://www.gov.za/whitepaper/1997

White Paper on the Transformation of the Health System of South Africa, April 1997, Government Gazette No.17910

White Paper on Transforming Public Service Delivery, October 1997, Government Gazette No. 18340

Wiggers, T.H. & Sanson-Fisher, R. (1997). Duration of general practice consultations: Association with patients occupational and educational status. *Social Science Medicine*, **44** (7), 925-934

World Health Organisation International Consortium in Psychiatric Epidemiology (2000). Cross-national comparisons of the prevalences and correlates of mental disorders. *Bulletin of the World Health Organisation,* **78** (4), 413-426

Yaukey, D. (1985*). Demography: The study of human population*. St. Martin's Press: New York

Yung, A.R., Phillips, L.J., McGorry, P.D., McFarlane, C.A., Francey, S., Harrigan, S., Patton, G.C. & Jackson, H.J. (1998). *British Journal of Psychiatry*, **172** (suppl 33), 14-20

Zwarenstien, M., Krige, D., & Wolff, B. (1991). The use of a geographical information system for hospital catchment area research in Natal/KwaZulu. *South African Medical Journal*, **80**, 497-500

APPENDIX 1: QUESTIONAIRE GIVEN TO THE 'EXPERTS'

NAME (OPTIONAL): _____

MODELLING A COST MAP OF SENSITIVE POPULATIONS FOR SCHIZOPHRENIA IN KZN

A.1. Identifying ten of the most important variables of risk in developing schizophrenia.

The variables below have been listed randomly. These variables are to be seen as totally independent of each other. Please feel free to discuss and debate this section with others.

- age
- gender
- education
- marital status
- seasonality of birth
- occupation
- socio-economic status
- internal migration (e.g. have they moved in last year)
- rural/urban location
- population density : cities of 1million/ 100 000/ 10 000/ less
-
-
-
-

A.2. Ranking the variables:

Each person needs to rank these variables independently i.e. without discussion. Where 1 is the most important variable in terms of developing schizophrenia; 10 is the least.

VARIABLE	RANKING
Age	
Gender	
Education	
Marital status	
Seasonality of birth	
Occupation	
Socio-economic status	
Internal Migration	
Rural / urban location	
Population density	

A.3. Defining the variables:
These definitions will then be put into map format.
Please feel free to add further definitions and to make comments. Remember that many terms used are subjective and need to be defined to make them more objective.

VARIABLE of RISK	DEFINITION
Age	15 – 25 ++ 26 – 55 +
Gender	Male: 15-25 years Female: 25 – 35 years
Education	No education +++ Elementary education (Grade I to 7) ++
Marital status	Single and divorced
Seasonality of birth	Born between July and September
Occupation	Unemployed / unskilled
Socio-economic status	Low
Internal Migration	Relocated to another area rural – urban +++ Relocated to another area rural- rural / urban-urban ++
Rural / urban location	Urban
Population density	City of 1 million people +++ 500 000 - 100 000 people ++ 10 000+

MODELLING A COST FRICTION SERVICE MAP IN KZN

B.1. Accessibility: Cost Friction Service Map:
In order to create the above map which aims to investigate the potential access for all of KZN people to clinics and hospital, per district; the term 'access' needs to defined. These definitions will then be put into map format.
The variables that have been included are directed at the general public, could you could think of any more that may be more specifically related to psychiatric population (especially people with schizophrenia.

- distance to hospital
- number of hospital and clinics
- road access
- physical obstacles in between s.a. major river/nature reserve
- financial cost (travelling costs; hospital costs)
- define effort (points allocated to above); decide cut off point where effort too much
-
-
-

Thank you kindly for your time, assistance and co-operation.

Andrea Enslin
18-11-01

APPENDIX 2: TABLES OF KZN CENSUS DATA

1. DESCRIPTION OF KWAZULU NATAL (KZN)

The province consists of 11 district councils (DC): Durban, DC21, DC22, DC23, DC24, DC25, DC26, DC27, DC28, DC29, and DC43. Except for Durban DC, each DC is made up of several local councils (See table 1).

Table 1: Local Councils within each District Council of KZN

District Council	Local Councils
Durban	-
DC21	KZ211, KZ212, KZ213, KZ214, KZ215, KZ216
DC22	KZ221, KZ222, KZ223, KZ224, KZ225, KZ226, KZ227, KZDMA22
DC23	KZ232, KZ233, KZ234, KZ235, KZ236, KZDMA23
DC24	KZ241, KZ242, KZ244, KZ245
DC25	KZ252, KZ253, KZ254
DC26	KZ261, KZ262, KZ263, KZ265, KZ266
DC27	KZ271, KZ272, KZ273, KZ274, KZ275, KZDMA27
DC28	KZ281, KZ282, KZ283, KZ284, KZ285, KZ286
DC29	KZ291, KZ292, KZ293, KZ294
DC43	KZ5a1, KZ5a2, KZ5a3, KZ5a4, KZ5a5, KZDMA43

2 DISTRIBUTION OF THE KZN SOCIO-DEMOGRAPHIC VARIABLES

2.1 Population distribution in KZN

Thirty three percent of the population were from Durban DC and 10 % from DC21. Each of the remaining DCs had less than 10% population (See table 2). This means that a third of the KZN population resided within the Durban DC.

Table 2: Population Distribution in KZN

District Council	Population
Enumerator Area overlaps boundary of KZN	691
Durban	2964276
DC21	693926
DC22	948069
DC23	597443
DC24	460401
DC25	442676
DC26	768791
DC27	542953
DC28	821551
DC29	577073
DC43	252607
Total	**9070457**

2.2 Population density in KZN

Examining the distribution of population in terms of density gives a different picture. The distribution of population is still unequal in KZN (see table 1). However, three groupings are evident. The most dense district was found in the Durban DC, followed closely by DC22, and then DC21. DC 29 and 28 were intermediate in terms of density, with just over 500 people per square kilometre. The rest displayed a density of less than 400 people per square kilometre, with DC43 less than 150 people per square kilometre.

Table 3: Population Density in KZN

District Council	Density (People per sq km)	Population
Durban	1292	2964277
DC21	909	693926
DC22	1156	948069
DC23	372	597443
DC24	234	460401
DC25	245	442676
DC26	260	768791
DC27	283	542953
DC28	646	821551
DC29	737	577073
DC43	140	252607

2.3 Distribution of Gender in KZN

Fifty-three percent of the KZN population is female (See table 4). Overall, there are 6 % more females in KZN than males. This distribution is seen throughout KZN.

Table 4: Gender Distribution in KZN

District Council	Male	Female	Total
Enumerator Area overlaps boundary of KZN	310	381	690
Durban	1444653	1519624	2964277
DC21	314520	379407	693926
DC22	447792	500277	948069
DC23	273411	324032	597443
DC24	203360	257041	460401
DC25	210959	231717	442676
DC26	351175	417616	768791
DC27	247668	295285	542953
DC28	376832	444719	821551
DC29	271237	305837	577073
DC43	115304	137303	252607
Total	4257218	4813240	9070457

2.4 Distribution of Gender and Age in KZN

In both the female and male age distributions, the 0-14 year age category dominated overall and within each DC (See table 5 and 6 respectively). The 15-25 and 36-65 year categories tended to be the next highest categories with the 26-35 age category falling slightly lower. In the female distributions, the 15-25 and 36-65 age categories

tended to be of the same size, whereas in the male distribution, the 15-25 age category tended to be consistently higher than the 36-65 age category.

Table 5: Distribution of Females by Age in KZN

District Council	0-14yrs	15-25yrs	26-35yrs	36-65yrs	66-119yrs	Unspecified yrs	Total yrs
Enumerator Area overlaps boundary of KZN	135	68	34	70	17	4	329
Durban	338336	273392	222308	340770	57936	12427	1245169
DC21	122067	71802	43723	76946	21542	3432	339511
DC22	100127	79299	54181	86848	18973	5050	344478
DC23	88495	53953	34225	51904	11697	5436	245710
DC24	90809	51135	29706	48473	14258	6233	240613
DC25	76045	50344	32523	48473	8923	2526	218834
DC26	156613	87359	48394	71522	18727	4809	387424
DC27	112389	60786	35242	46788	12688	4744	272636
DC28	148193	86338	54779	80437	19476	4240	393463
DC29	74218	46738	31995	47855	10480	2862	214147
DC43	48472	26455	16038	27138	6622	1268	125992
%	34	22	15	23	2	4	100

Table 6: Distribution of Males by Age in KZN

District Councils	0-14yrs	15-25yrs	26-35yrs	36-65yrs	66-119yrs	Unspecified yrs	Total yrs
Enumerator Area overlaps boundary of KZN	139	60	24	37	12	3	275
Durban	335260	260956	204987	305307	37707	13022	1157239
DC21	120720	63041	31060	51653	12727	3354	282555
DC22	100476	73150	45587	71578	11420	4629	306840
DC23	86930	47465	24772	37115	6117	5405	207804
DC24	90635	42794	17358	28572	6178	5174	190712
DC25	75753	45950	23969	38850	5248	2385	192154
DC26	156198	74353	31720	48053	10058	4553	324935
DC27	111696	51677	22014	31324	7308	4474	228493
DC28	147234	74194	39069	58509	9749	4979	333733
DC29	73439	41968	25550	38556	6137	2564	188214
DC43	48978	23191	11128	17932	3298	1271	105798
%	38	23	14	21	1	3	100

2.5 Population Groups in KZN

The African population group dominates in KZN population and 6 DCs (See table 7).

Table 7: Distribution of Population Groups in KZN

District Councils	African	Coloured	Indian	White	Unspecified	Total
Enumerator Area overlaps boundary of KZN	649	3	7	26	5	690
Durban	1873638	78856	645735	340627	25422	2964277
DC21	619265	5590	28624	36879	3568	693926
DC22	752334	19061	82362	87196	7115	948069
DC23	553526	3119	18252	17893	4654	597443
DC24	435432	2277	8299	10769	3624	460401
DC25	394260	2859	13698	29601	2259	442676
DC26	745618	1237	551	17583	3802	768791
DC27	534465	726	392	4863	2507	542953
DC28	759392	3518	10721	38675	9244	821551
DC29	510986	2110	42872	10509	10596	577073
DC43	235251	7750	690	6897	2018	252607
Total	14828982	254209	1704400	1203009	149624	18140224
%	82	1	9	7	1	100

2.6 Employment

Just less than 30 % KZN work force is employed. In the DCs outside of Durban, the percentage of employment varies from 7 to 23 %. Throughout KZN, a range of 9 to 14 % of people are unemployed, 27 – 38 % are not working, and between 30 – 46 % were within the unspecified category.

Table 8: Employment Distribution within KZN

District Councils	Employed	Unemployed	Not Working	Unspecified	Total
Enumerator Area overlaps boundary of KZN	43	34	275	339	691
Durban	852940	409906	814051	887377	2964274
DC21	92116	67414	252844	281561	693935
DC22	216110	133391	274791	323749	948041
DC23	75348	70749	207092	244244	597434
DC24	38953	49480	173194	198809	460437
DC25	83074	57154	133590	168861	442678
DC26	69711	86410	264853	347807	768782
DC27	40116	46920	205744	250174	542954
DC28	106910	86969	282691	344975	821545
DC29	97277	63452	200390	215967	577086
DC43	34990	25375	82050	110179	252594
Total	1707547	1097219	2891292	3373702	9069761
%	19	12	32	37	100

2.7 Education in KZN

The range of those without education in KZN varied from 12-35 % (mean=24), between 25-38 % for those with grade 1-7 to 17-44 % (mean=27), for those with

grade 8-12, and 1-5 % (mean=2) for those with post-matric qualifications (See table 9).

Table 9: Breakdown of Education in KZN

District Councils	No Schooling	Gr 1-7	Gr 8-12	Post-matric	Other Qualifications	Unspecified	Less than 5 years old	Total
Enumerator Area overlaps boundary of KZN	196	269	99	7	2	16	101	690
Durban	354473	733486	1309038	127515	27396	129465	279410	2960783
DC21	164260	246961	162556	10037	3075	21486	85100	693476
DC22	166415	264071	345166	30349	7652	40623	93031	947306
DC23	134941	189367	163583	6882	1437	25904	74605	596720
DC24	153488	137279	86359	4001	1136	15763	61957	459983
DC25	73690	137323	152338	9470	2587	13658	53252	442318
DC26	205141	253802	171455	7008	2570	22298	105805	768079
DC27	192542	164590	91321	2769	1116	12574	77682	542594
DC28	216607	250146	196781	13175	3013	34557	106612	820890
DC29	142818	188032	145255	5845	1702	23317	69425	576394
DC43	56880	96272	54236	2827	821	8383	32863	252282
Total	1861449	2661599	2878187	219886	52506	348028	1039842	9061516
%	21	29	32	1	2	4	11	100

2.8 Occupational Categories in KZN

Elementary occupations (30 %) is the dominant occupational category within KZN (See table 10).

Table 10: Occupational Categories in KZN

District Councils	Legislator, senior officials and managers	Professionals	Clerk	Technicians and associate professionals	Service workers, shop and market sales workers	Skilled agricultural and fishery workers	Craf and related trade workers	Plant and machine operators and assemblers	Elementary occupations	Total
Dbn	33559	82179	73838	63102	72121	8753	106981	77786	172444	690763
DC21	2565	7621	4797	3626	7236	6001	10348	6113	29277	77584
DC22	5700	19661	13622	11622	17364	11332	22432	17430	59484	178647
DC23	1816	6831	3293	2788	5350	2779	9114	8392	18501	58865
DC24	951	4396	1629	1432	3101	3269	3385	2441	11890	32497
DC25	2066	7714	3987	3753	6585	2469	14341	9271	18963	69149
DC26	1255	7833	4082	2621	6048	5513	7644	4950	19094	59039
DC27	750	4573	1519	1381	3860	3522	4542	2591	10534	33272
DC28	2760	11464	6599	5417	7871	4452	11824	9303	25070	84759
DC29	1846	5553	3570	2793	6052	5086	11541	10200	34040	80681
DC43	781	2342	1520	986	2502	4346	2761	2316	12588	30142
Total	54051	160175	118459	99523	138093	57526	204916	150795	411898	1395436
%	4	11	8	7	10	4	15	11	30	100

Note: Enumerator Area overlaps boundary of KZN category has been omitted

2.9 Income in KZN

The category of no income (63 %) is at least six times greater than all the other categories.

Table 11: Percentage Distribution of Income in KZN

District Council	NONE	R1-200	R201-500	R501-1000	R1001-1500	R1501-2500	R2501-3500	R3501-4500	R4501-6000	R6001-8000	R8001-11000	R11001-16000	R16001-30000	R30001 and above	Unspecified	Total
Overlap*	75.1	2.6	6.4	1.0	0.8	1.3	0.7	0.4	0.4	0.2	0.2	0.1	0.1	0.0	10.7	100
Durban	53.8	2.0	6.8	5.9	6.1	5.4	3.1	2.0	1.8	1.0	0.7	0.4	0.2	0.1	10.8	100
DC21	68.9	2.7	10.9	3.4	2.0	1.9	1.0	0.6	0.5	0.3	0.2	0.1	0.0	0.0	7.6	100
DC22	55.1	3.0	9.4	4.7	3.7	3.3	1.9	1.2	1.1	0.6	0.4	0.2	0.1	0.0	15.3	100
DC23	65.5	2.1	7.6	3.3	2.2	1.8	0.8	0.5	0.6	0.2	0.1	0.0	0.0	0.0	15.2	100
DC24	74.0	2.7	8.6	1.9	1.2	1.0	0.6	0.3	0.4	0.1	0.1	0.0	0.0	0.0	9.0	100
DC25	66.2	2.7	8.5	4.4	2.9	2.4	1.4	0.9	0.8	0.4	0.2	0.1	0.0	0.0	9.0	100
DC26	77.1	2.5	7.2	2.1	1.4	1.2	0.6	0.4	0.3	0.1	0.1	0.0	0.0	0.0	6.8	100
DC27	81.1	2.5	6.6	2.0	1.4	1.0	0.4	0.2	0.2	0.1	0.0	0.0	0.0	0.0	4.5	100
DC28	67.6	1.9	8.2	2.7	1.9	1.7	1.0	0.7	0.7	0.3	0.2	0.1	0.1	0.0	12.7	100
DC29	64.9	2.6	10.8	4.7	2.4	1.7	0.8	0.5	0.5	0.2	0.1	0.1	0.0	0.0	10.7	100
DC43	65.1	4.7	10.2	2.6	1.5	1.2	0.6	0.4	0.3	0.2	0.1	0.0	0.0	0.0	13.1	100
Total	63.4	2.4	8.1	4.1	3.4	3.0	1.7	1.1	1.0	0.5	0.3	0.2	0.1	0.0	10.7	100

*Enumerator Area overlaps boundary of KZN category

2.10 Distribution of Disabilities in KZN

Each form of disabilities is fairly evenly distributed among the DCs.

Table 12: Disabilities in KZN

District Councils	Sight	Hearing	Physical	Mental	Type of disability is not specified	Total
Overlap*	8	5	5	2	3	23
Durban	61858	20949	34312	12074	15720	144913
DC21	14032	6162	9830	4411	4240	38675
DC22	20642	7894	12677	5072	5972	52257
DC23	14967	6800	15010	3775	2971	43523
DC24	7918	3833	6561	2562	2347	23220
DC25	14665	4967	8251	2452	1962	32297
DC26	18276	8858	16169	4162	4186	51652
DC27	9127	6405	8851	2343	2500	29226
DC28	17028	7549	12965	3956	3883	45382
DC29	13754	6071	10846	3383	2946	36999
DC43	5990	2372	4433	1551	1506	15852
Total	198266	81866	139909	45743	48236	514020

*Enumerator Area overlaps boundary of KZN category

2.11 Marital Status

The majority of the people within KZN have never been married (See table 13).

Table 13: Marital Status

District Councils	Never Married	Married: Civil/ Religious	Married: Traditional	Living Together	Widower/ Widow	Divorced/ seperated	Unspecified	NA: Institution	Total
Enumerator Area overlaps boundary of KZN	496	66	50	32	16	2	4	24	691
Durban	1874250	668229	95896	108455	92373	51671	22521	50897	2964292
DC21	489486	96107	53057	15257	21947	4344	4371	9345	693915
DC22	634199	166560	46486	24868	29014	11429	7184	28312	948053
DC23	439574	72870	37247	16824	16732	3034	5631	5524	597435
DC24	341245	38128	30284	24798	15248	1609	4320	4803	460433
DC25	322933	69703	12685	13778	10483	3180	2987	6914	442663
DC26	586422	64040	59802	21340	17263	2170	4760	12992	768791
DC27	417244	27606	41733	31602	14369	2263	1846	6282	542945
DC28	607821	84478	65197	23079	19098	3567	5860	12458	821559
DC29	415034	64410	39605	31155	15145	3167	6669	1886	577072
DC43	177802	32402	19750	7610	7268	1421	1532	4814	252600
Total	6306507	1384599	501792	318799	258956	87858	67686	144252	9070450
%	70	15	6	4	3	2	1	1	100

2.12 Year Moved

Twenty percent of the entire KZN population moved within 1991-1996. Most of that mobility occurred within the Durban DC (See table 14).

Table 14: Internal migration within 1991-1996

District Councils	Durban	21	22	23	24	25	26	27	28	29	43	N
n	905326	89619	219771	76550	34857	84516	62025	28427	87179	69036	33694	1690999
%	54	5	13	5	2	5	4	2	5	4	2	100