AN EPIDEMIOLOGICAL STUDY OF NATURAL DEATHS IN LIMPOPO

by

Dr William Raymond Mandlenkosi Maphanga
(Student no. 19234349)

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Department of Public Health Medicine
University of Limpopo
P.O. Medunsa
Medunsa
0204

Supervisors: Dr PWG Rautenbach
Prof. FRS Maluleke

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STATEMENT OF DECLARATION

I, **Maphanga William Raymond Mandlenkosi** (Student no. 19234349) hereby declare that the dissertation **An Epidemiological Study of Natural Deaths in Limpopo** for the Master of Medicine (Community Health) degree at the University of Limpopo submitted by me is my own work and has not previously been submitted for a degree at this or any other Institution, and that all reference material has been duly acknowledged.

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Signature by candidate

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Date

DEDICATION

I dedicate this dissertation to my mother for encouraging me to go to school, my brothers and sisters who showed me how to compete, my family who loved, supported and strengthened my belief throughout the study period.

ABSTRACT

AN EPIDEMIOLOGICAL STUDY OF NATURAL DEATHS IN LIMPOPO

AIM: To establish the epidemiological and demographic profiles of natural deaths in Limpopo province.

SETTING: Limpopo province

METHOD: Data was captured from records of deaths kept by the Statistics South Africa from the 1st of January 2000 to the 31st of December 2005 excluding unnatural deaths.

FINDINGS: There were 228 626 natural deaths during the study period. The gender distribution was 48% males and 52% females. The mean age of death for the population has decreased from 50.11(95%CI: 49.82 – 50.41) in 2000 to 45.10 (95%CI: 44.88 – 45.33) in 2005. The crude mortality rate has increased from 7, 2 per 1000 in 2001 to 9, 5 per 1000 in 2005. The highest numbers of deaths are at the age group 30-44 years which contributed to 23% of all deaths. Infectious and parasitic diseases, respiratory tuberculosis as well as diarrhoea and gastroenteritis presumed infectious in origin are the major causes of death for males and females. Amongst the top 10 causes of death are combinations of infectious and parasitic, non-communicable diseases and ill defined causes. This finding suggests a double burden of disease.

CONCLUSION: Deaths are on the increase and claims the lives of the young persons in the population. The age of death is on the decline, caused by mainly ill-defined causes, parasitic and infectious diseases as well as non-communicable and perinatal conditions. This trend mirrors the HIV epidemic, and calls for further intensification of preventive, promotive and treatment programmes.

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LIST OF ABBREVIATIONS

AIDS – Acquired Immunodeficiency Syndrome

BoD – Burden of Disease

DoH – Department of Health

GBD – Global Burden of Disease

HIV – Human Immune Virus

ICD 10 – International Statistical Classification of Diseases and Related Health Problems 10th Revision

MDG – Millennium Development Goals

NIMSS – National Injury Mortality Surveillance System

STATA – A general purpose statistical software package created by StataCorp

TB – Tuberculosis

UNICEF – United Nations Children's Fund

WHO – World Health Organization

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CHAPTER 1

INTRODUCTION

1.1. BACKGROUND

In 1994 the National Department of Health (DoH) organized a meeting of research stakeholders to plan the implementation of an Essential National Health Research (ENHR)[1]. The meeting concluded that priority setting in health care should be guided by a Burden of Diseases (BoD) study. Concerns were raised about gaps in the data if the project was to be embarked upon.

The White Paper on the Transformation of the Health Systems in South Africa had made it earlier in 1993 policy of government to use BoD in priority setting and planning the delivery of health services[2].

National and provincial BoD projects were commissioned and studies have started in several provinces.

In 2004, the Limpopo Province Department of Health and Social Development commissioned a Burden of Disease Project[3]. The Department of Community Health at the University of Limpopo was tasked to do a feasibility study on the project. Recommendations about the estimated costs and methodology to be used were made to the provincial Health Department. Morbidity and mortality data collection from health facilities started in 2005. Several reports on the morbidity and mortality profiles at health facilities have been produced. This study is part of the Limpopo BoD project.

Limpopo province is one of the nine provinces in South Africa sharing its international borders with Mozambique, Zimbabwe and Botswana. It is considered a gateway to the African continent as illustrated in figure 1 below.

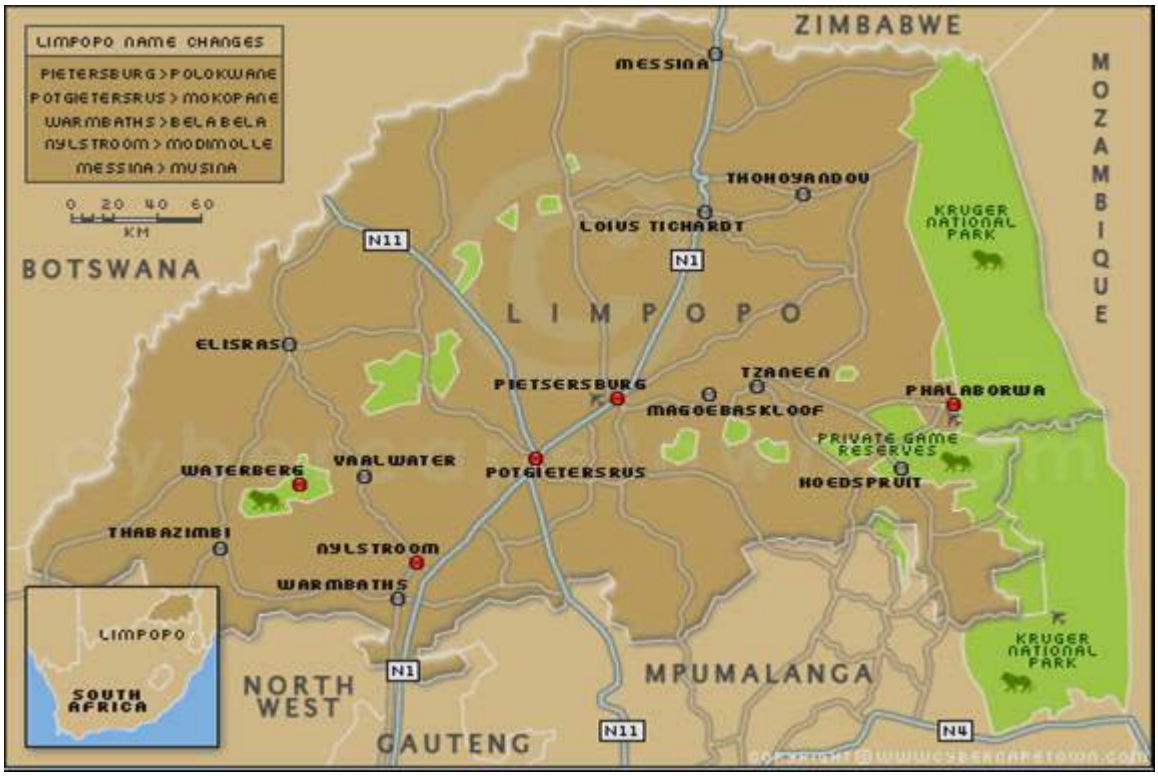


Figure 1: Limpopo Province Map

Limpopo Province will be the first to receive migrants from the north eastern parts of Africa in case of economic collapse, tourism and political instability. It has five district municipalities viz. Capricorn, Vhembe, Mopani, Waterberg and Sekhukhune. The province is largely rural and considered to be one of the poorest provinces in South Africa[4].

The province has 33 district hospitals, five regional hospitals, three specialised hospitals and a tertiary hospital complex. These institutions serve a population of estimated 5, 3 million[5]. Research shows that there has been an increase in deaths certified by a medical practitioner in 1996 to 96% compared to 80% in

1995[6]. This implies that the majority of deaths are notified by a medical practitioner who may in some way have, determined the cause of death.

Deaths which occur in a health institution are certified and notified by a medical practitioner and sent to the Department of Home Affairs for registration[7]. The data is routinely collected, then sent to Statistics South Africa and captured using the International Statistical Classification of Diseases and Health Related Problems- Tenth Revision (ICD-10) developed by the World Health Organisation (WHO). There are other sources of mortality data for Limpopo mentioned in the South African National Burden of Disease (SANBD 2000) study[8]. These include data from sentinel sites that are monitoring unnatural deaths such as, the National Injury Mortality Surveillance Study (NIMSS) which collects data of fatal injuries and external causes of death.

It should be noted that: “Concerns about the quality and uncertainty of data are not an acceptable reason for failing to provide such evidence, as decision should be made now and decision makers will not wait years for the improvement in evidence before making decisions”[9].

Historically, measures of health status have been based on mortality data[10] and consequently due to long life in the developed countries the researchers have expressed dissatisfaction with mortality as the sole index for the overall population health level. However, Limpopo is developing and will therefore need the mortality reports to make informed decisions that will improve the health status of its population.

1.2. RESEARCH PROBLEM

Limpopo province is regarded as one of the poorest provinces in South Africa, and due to the seriousness of the poverty situation it is imperative that causes of mortality are studied, thus supplying timely information that is required in order to

plan as well as implement an efficient and effective health service delivery strategy to better the health care of its citizens

1.3. THE RESEARCH QUESTION

The research question for the study was:

- Who is dying, when are they dying and what causes these deaths?

1.4. THE AIM OR PURPOSE OF THE STUDY

The aim or the purpose of the study is to establish the epidemiological and demographic profiles of deaths in Limpopo Province.

1.5. THE OBJECTIVES OF THE STUDY

The objectives of the study were

:

- To calculate the number of deaths
- To determine the gender distribution of deaths
- To determine the crude mortality rates for each year
- To determine the age distribution of natural deaths for males and females
- To establish the age at death
- To establish the 10 major ICD 10 groups of causes of death
- To establish the ICD 10 causes of natural death for each gender
- To make recommendations for health planning and possible intervention strategies

1.6. MOTIVATION FOR THE STUDY

The study was motivated by the fact that measurements of the causes of mortality still remains one of the important tools that can be used to measure the

health level of populations and that summarized research information can assist administrators with planning and evaluation of services.

1.7. SIGNIFICANCE OF THE STUDY

The study will be of benefit in the following way:

- It will be used to inform decision making in planning preventive strategies for natural deaths.
- It will be used to identify the gaps in training and resources allocation for combating diseases causing deaths in the Province.

1.8. DEFINITION OF TERMS

A ‘natural death’ in this study is death that has been certified as being due to natural causes and has been registered as such in terms of Births and Deaths Registration Act, Act 51 of 1992[11].

An ‘Underlying cause of death’ is a disease or injury that initiates the sequence leading ultimately to death. It is considered the most important piece of information that should be specified as accurately as possible[12].

‘Sputum negative TB’ occurs when microscopy cannot detect TB bacilli as at least 5 000 to 10 000 organisms per millilitre of sputum need to be present to allow visualisation[13].

CHAPTER 2
LITERATURE REVIEW

2.1. INTRODUCTION

According to the World Health Organization's 2004 World Health Report, life expectancy averages 66 years in the developing nations and is approaching 80 years in some industrial nations. The causes of these differences in life expectancy and life-cycle timing of death are profoundly shaped by the level of socio-economic development as well as the gender distribution of death[14]. Human Immunodeficiency Virus and Acquired Immune Deficiency Syndrome (HIV/AIDS) epidemics are proposed to be reducing the chances of survival and achieving the Millennium Development Goals (MDGs) and targets for many heavily burdened countries, especially in sub-Saharan Africa.

2.2. HISTORICAL BACKGROUND

Epidemiological studies date back to the scientific revolution of the 1600's. These studies indicated that orderly behaviour of the physical universe could be expressed as mathematical relationships[15]. These relationships describe, explain and analyse the physical universe. Similar relationships known as laws of mortality also exist in the biological world. This resulted in a number of old and current studies that explain relationships between man and mortality. The work of John Graunt in 1662[16] pioneered the possibilities of obtaining useful data from death records. He compiled, analysed and discussed vital statistics in his publication "Natural and Political Observations on the Bills of Mortality". During and around the same period, death registers could only distinguish between deaths caused by bubonic plague and death due to other causes. The scope of comparison of causes of death was limited; however life tables were developed that could give the probabilities of survival to each age.

In 1825 Benjamin Gompertz used his laws of mortality and derived a formula that describes the exponential rise in death rates between sexual maturity and old age and showed that death rate increases with age[17].

In 1861 the Montreal Gazette published notes on the laws of mortality; tables were drawn of population and deaths arranged according to ages, conditions, various districts even allowing for comparisons across districts[18].

In 1967, at the twentieth meeting of the World Health Assembly, the causes of death to be entered on a death certificate was defined as "all those diseases, morbid conditions or injuries which either resulted in or contributed to death and the circumstances of the accident or violence which produced such and injuries" [19]. The purpose of this definition was:

- To ensure uniformity in the recording of the causes of death;
- To ensure that all relevant information is recorded; and also
- To ensure that the certifier does not record certain conditions and rejects others[12].

The definition is broad, but does not include symptoms and modes of dying such as heart failure or respiratory failure. However, the meeting and definition signified the first step in uniform recording of health data in the world.

Today death registers and certificates give detailed information even in poor resource settings. Several recent studies have recommended an improvement in recording and reporting of deaths especially in impoverished countries because in the absence of vital registration and reliable cause of death information, evidence of the impact of diseases like HIV on child and adult mortality in very limited. The projection of health needs, planning and execution of public health programmes becomes an enormous challenge[20,21].

Civilization has brought an improvement in the collection and collation of data. Global organisations such as the United Nations (UN) and WHO are able to

report on the health of world populations using the foundation stone in data collection that were laid down by the predecessors of both the scientific and industrial revolution.

2.3. GLOBAL BURDEN OF DISEASE

In 1990, the global burden of disease (GBD) was conceptualised by WHO, the World Bank and Harvard School of Public Health[9]. By the year 1992, the GBD project was initiated as a comprehensive regional and global instrument for assessment of mortality and disability from 107 diseases, injuries and ten risk factors[22]. The aim of the study was to provide information and projections about disease burden on a global scale. This was done by assessing the available evidence, and using the best available methods at the time, to quantify the burden of diseases and injuries, its causes in terms of risk factors and broader health determinants, as well as the likely burden in the future.

By the year 2000 another GBD project was undertaken to look at the year 2000 and beyond. The specific objectives of the GBD 2000 were similar to the original objectives of 1990 as follows[19]:

- to develop internationally consistent estimates of the of mortality from 135 causes of death, disaggregated by age and sex, for the world and major geographic regions;
- to develop internationally consistent estimates of the incidence, prevalence, duration and case-fatality for over 500 sequelae resulting from the above causes;
- to quantify the burden of premature mortality and disability by age, sex, and region for 135 major causes or groups of causes;
- to analyse the contribution to the burden of major physiological, behavioural, and social risk factors by age, sex and region; and

- to develop alternative projection scenarios of mortality and non-fatal health outcomes over the next 30 years, disaggregated by cause, age, sex and region

The GBD 2000 sought to use all available data, evidence and methods to make inferences. The study categories that were used for the project were age groups, regions and cause categories.

The sources of data for population estimates were prepared by the United Nations Population Division. The sources of data for all causes of mortality were vital registration data, sample registration systems, survey data and indirect demographic techniques. Levels of adult mortality were estimated from projected trends in child mortality and the modified Brass Logit system was used in 63 countries lacking vital registration data. The cause and distribution of deaths data sources were national vital registration systems, sample registration systems, population laboratories as well as epidemiological analyses of specific conditions. They were used for the analysis of prevalence and incidence of diseases.

The results were published in the World Health Report of 2001, which showed the leading causes of death in all WHO regions. Table 1 below shows the leading causes of death from the GBD2000 published in the World Health Report (WHR) of 2001.

Table 1: Leading causes of deaths globally adapted from WHR 2001

	Leading causes of Death	% total deaths
1.	Ischaemic heart disease	12.4
2.	Cerebrovascular disease	9.2
3.	Lower respiratory infections	6.9
4.	HIV/AIDS	5.3
5.	COPD	4.5
6.	Perinatal conditions	4.4
7.	Diarrhoeal diseases	3.8
8.	Tuberculosis	3.0
9.	Road traffic accidents	2.3
10.	Trachea, bronchus &lung cancers	2.2

The emergence of cardiovascular diseases as displayed on table 1 is thought to be secondary to industrialisation in the global arena. The industrialisation process is thought to have brought a shift termed “the epidemiologic transition”, which has replaced diseases of nutritional deficiencies and infections with degenerative and cardiovascular diseases[23]. These diseases are caused by “the nutrition transition”, from high fibre to high calorie content diet. The theory in GBD study is that as the total mortality in any country decreases, due to improvement in public health programmes, there is a shift in the causes of death from group 1 to group 2 disorders[24]. Group 1 disorders are communicable, maternal, perinatal and nutritional conditions. Group 2 disorders are non-communicable diseases.

In the Unites States of America the numbers of death are categorised by cause and reported in government publications as underlying cause of death and not necessarily the immediate cause of death[10]. Death rates increased for people 45 - 54 years and for those older than 74 years of age. Death rates for those 85 years and older increased by 2.4%, the largest rate increase of any age group. The 5-14 year olds had the largest death rate drop with a reduction of 3.5%. The leading causes of death in 1999 were diseases of the circulatory system and neoplasms for both males and females[25].

In Brazil a South American country classified as developing, the mortality information system registered almost one million deaths annually. Diseases of the circulatory system (1/3 of all deaths annually) continued to be the leading cause in all regions. The mortality rate per 100,000 population were 158.4 for diseases of the circulatory system, 72.2 for external causes, 68.5 for neoplasms, and 51.9 for communicable diseases[6].

According to the European Health Report 2005[26], life expectancy has declined in the Eur-C and the mortality has differed between males and females, showing a high number of male deaths. These are 9 countries in the WHO European Region with low child mortality and high adult mortality. The health reports for

developed nations in Europe points towards an increasing life expectancy and aging populations. The diseases of affluent are the main cause of deaths.

In the World Health Report of 1999, non communicable diseases (NCD) were reported to have contributed to 59% of global mortality as compared to 43% in 1998[27]. In the high income countries, NCD are linked to lifestyle determinants such as diet, physical activity and tobacco consumption.

In low and middle income countries the situation has been different, for instance, low income and middle income countries are excessively burdened with NCD contributing 78% and 85% respectively. The burden of infectious diseases is also a major problem contributing to what is termed “a double burden of disease”. Cardiovascular diseases resulted in 34% of all deaths in women and 28% of all deaths in men[28]. Despite the changes in the causes of death, there has been an overall improvement in the health and average life expectancy at birth. Life expectancy has increased globally by almost 20 years: from 46.5 years in 1950–1955 to 65.2 years in 2002[29].

The improvement and increase has been linked to the level of economic development and social organisation[11]. In contrast, both the 2003 and 2004 World Health Reports reported that there has been a dramatic increase in adult mortality in the eastern and southern Africa attributed to the effect of HIV/AIDS epidemic in the region[12,30]. It is reported in the WHR 2004 that the epidemic undermines poverty reduction efforts by sapping economic growth, and thus hampering efforts to reach MDG 1, which is to eradicate extreme poverty and hunger. HIV/AIDS has cut annual growth rates by 2–4% per year in Africa and the cumulative long-term macroeconomic effects may be much more devastating as well as resulting in complete economic collapse in some high-burden countries[31].

2.4. SOUTH AFRICAN NATIONAL BURDEN OF DISEASE (SANBD)

The White Paper for the Transformation of the Health System in South Africa in 1997 made it policy of government to develop a national health information system. The aim of the information system was to facilitate the measurement and monitoring of the health status of the population as well as to enable the evaluation of delivery of the health services and by supporting effective management at all levels of the health service.

The health information system was established in order to ensure that the people responsible for the health status of the population are kept up to date with the information generated. The main objective for the information system was to improve health sector planning and the monitoring of health status and services[2]. Chapter 5 of the White Paper for the Transformation of the Health System in South Africa says that a national research agenda should be developed and one of its process being to identify the research agenda for the country's health problems. BoD with specific mention of disability-adjusted life years as a measure was going to be used in the priority setting process[2].

Chapter 9 of the National Health Act establishes a committee known as the National Health Research Committee (NHRC)[32] and one of its tasks is to identify and advice the Minister of Health on research priorities with regard to the BoD and the cost effectiveness of interventions aimed at reducing the BoD.

The Burden of Disease Research Unit was established by the Medical Research Council (MRC) in order to collate and analyse data relating to health status as well as other factors affecting health. The objectives were to[33]:

- to estimate and monitor the burden of disease and other indicators of population health;
- to improve health information and surveillance systems;

- to undertake methods research to support Burden of Disease and surveillance;
- to develop capacity and support;
- to make information available for health policy and planning;

The first burden of disease report was produced by the MRC and published in 2003 entitled "Initial Burden of Disease Estimates for South Africa, 2000". The methods used were adapted from the 1990 GBD in terms of the list of causes of death and the division of the causes of death into three broad groups[7]. The population for the study was the 1996 death data for South Africa projected together with the survey and census data to come up with estimates for the year. A demographic projection model was used to project the overall mortality, AIDS mortality and population estimates.

Causes of death data, the sources were[7]:

- Statistics South Africa (Stats SA) for the year 1996
- Population Register compiled by the Department of Home Affairs for 1996
- National Injury Mortality Surveillance Study (NIMSS) for years 1999 and 2000

Estimation of deaths were divided into the three broad groups and reported as follows[7]:

- Estimation of total external deaths (Group III)
- Estimation of natural deaths (Group I and II deaths)

Group 1 causes of death included communicable, maternal, perinatal and nutritional conditions. Group 2 causes of death were non-communicable diseases and Group 3 causes of death were injuries.

Several ICD 9 codes used in the estimation of natural deaths were termed garbage codes and redistributed to actual underlying causes of death. These included causes of deaths due to: heart failure, cardiac dysrrythmia, pulmonary oedema, atherosclerosis and gastric haemorrhage[7]. These codes represent

symptoms and signs of an underlying disease and not necessarily the underlying causes of death.

Deaths due to intentional and unintentional injuries for SA NBD were compared with data from Stats SA, Department of Home Affairs, NIMSS, Department of Transport, Department of Minerals and Energy, the Cape Metropole Mortality Study, the forensic audit conducted through the Department of Health in 1998, the Hlabisa and Agincourt surveillance systems[7].

The Cause of Death Profile, South Africa, 1996 describes a striking loss of male lives due to injuries, followed by infectious and parasitic conditions[34].The projected mortality profile estimated that males and female will contribute 54.5% and 45.5% respectively to the total number of deaths.

Non-Communicable Diseases accounted for 37% of the deaths, followed by HIV/AIDS, which accounted for 30% of the deaths. Females had a higher proportion of HIV/AIDS and non-communicable diseases and a lower proportion of deaths due to injuries as compared to males[35]. The mortality profile also reflected a quadruple burden of disease, these included HIV/AIDS, chronic diseases, pre-transitional conditions (communicable diseases, maternal causes, perinatal conditions and nutritional deficiencies) and injuries.

HIV/AIDS contributed 30%, cardiovascular diseases (16.6%), infectious diseases (10.3%), and intentional and unintentional injuries (13.4%)[35]. HIV/AIDS was also a main contributor of Disability-adjusted life years (DALYs), followed by infectious and parasitic diseases, then intentional and unintentional injuries as well as perinatal conditions[35]. The projected impact of AIDS deaths in 2010 derived from the SANBD was that it will contribute more than double the burden of premature mortality on age standardized[7]. The prediction from the estimates is that the near future will be laden with more AIDS deaths.

2.5. LIMPOPO BURDEN OF DISEASE

In 2004 the Limpopo Department of Health and Welfare commissioned a burden of disease study. Some of the objectives of the National Burden of Disease framework included in the Limpopo burden of disease were to:

- Promote regular Burden of Disease (BoD) surveys by the provincial Department of Health
- Build capacity in the provincial department to conduct BoD in the public health system

The Limpopo Burden of Disease Unit has not been established, but the collection of data from several sources has commenced. The SA NBD study of 2000 has produced estimates of burden of disease for Limpopo. The study used a 12% sample of deaths for 1997 -2001, also making estimates of the total number of deaths using a demographic and epidemiological model[36]. The Profile of Mortality for 2000 was done and estimated 49.1% female and 50.9% male deaths.

Half (50%) of deaths were due to group I causes including HIV/AIDS, 40% of were due to group II and 10% were due to injuries. HIV/AIDS was the leading cause of death for both males and females compared to other causes. The leading causes of death for children under five which accounted for over 70% of deaths were: HIV/AIDS, low birth weight, lower respiratory infection and protein-energy malnutrition. Stroke was a leading cause of death for persons aged 60 and over, accounting for 16% of females and 11% of males. Over 51% of the deaths were male and just above 48% were female. The analysis further showed that the highest number of deaths were in Group II and lowest was in Group III. The leading causes of death over the 5 year period were: ill-defined causes, undetermined unnatural deaths stroke and ischaemic heart disease.

The mortality profile for Limpopo reflected a unique picture, for instance Limpopo is considered one of the poorest provinces in South Africa and according to census 2001 nearly 50% of persons aged 15 to 64 years were unemployed[37].

It was surprising that the highest number of deaths was in Group II and the leading causes of death were ill-defined, undetermined, stroke and cardiovascular diseases. This is in contrast to the estimates of the SA NBD which found that Limpopo's deaths were mainly due to group 1 causes. This may be as a direct result of a population in a nutrition transition resulting in an increase in the number of cardiovascular deaths.

2.6. MILLENNIUM DEVELOPMENT GOALS FOR HEALTH

2.7.

In 2000, world leaders agreed and signed eight Goals as a vision of a future world with less poverty, hunger and disease[38]. The MDG reflected a world with:

- prospects of greater survival for mother and child;
- better educated children;
- equal opportunities for women, and;
- a healthier environment

Developed and developing countries should work in partnership for the development of all in order to realise and achieve these goals.

According to the WHO, three of the eight goals, eight of the 16 targets and 18 of the 48 indicators relate directly to health[39]. The following goals, targets and indicators are discussed in relation to this study:

2.7.1. Goal 1:Eradicate extreme poverty and hunger

The MDG is a yardstick that can be used to measure the progress of nations towards a better life for all. The MDG 2006 report has highlighted some problems for Africa. Poverty levels remain high in Sub-Saharan Africa, and people living in extreme poverty have increased by 140 million. The number of people going hungry is increasing. The effects will be disease related to hunger such as malnutrition among children. The deaths caused by these diseases are also expected to increase. The study measures deaths related to hunger and malnutrition and report on the trends in the number of deaths as well as the progress made from 2000 to 2005 to reduce deaths.

2.7.2. Goal 3: Reduce Child Mortality

The target is to reduce by two thirds, between 1990 and 2015, the under-five mortality rate. The under-five mortality rate, the infant mortality rate and the

proportion of 1year-old children immunised against measles are the indicators for this goal. These indicators relate directly to the target by measuring child survival and reflecting on social, economic and environmental conditions in which children live, including their health care. The under-five and infant mortality rates are often used to identify vulnerable populations. The under-five mortality rate also captures more than 90 percent of global mortality among children under the age of 18[40].

According to the 2006 MDG report Sub-Saharan Africa accounted for half of the 10.5 million under-5 deaths worldwide[38]. According to United Nations Children's Fund (UNICEF) report of 2006[41], South Africa's under-five mortality rate has increased from 60 per 1000 live births in 1990 to 69 per 1000 live births in 2006. The infant mortality rate has also increased from 45 per 1000 live births in 56 per 1000 live births in 2006. The SA NBD 2000 study using mortality estimates based on Actuarial Society of South Africa's findings of 2000 projected an infant mortality rate of 59 per 1000 live births and under-five mortality rate of 95 per 1000 live births. The increases are worrisome to the health planner as they indicate that the MDG target may not be achieved by 2015. This study reports the under-five mortality rate over the study period.

2.7.3. Goal 4: Improve maternal health

The target is to reduce by three quarters, between 1990 and 2015, the maternal mortality ratio. The 2006 MDG report reports that most maternal deaths occur in Sub-Saharan Africa and Southern Asia and half of the world's maternal deaths occur in Sub-Saharan Africa. It is further reported that the deliveries attended by a skilled birth attendant is 46% in the Sub-Saharan region. Lack of timely emergency obstetric care and lack of access to contraceptives are to blame for such a high mortality.

The 2006 UNICEF report for South Africa shows a maternal mortality ratio of 150 per 100 000 live births for the year 2000 to 2006, with a 92% coverage for both antenatal care and skilled birth attendant at delivery. This study reports on the causes of death associated with pregnancy, childbirth and puerperium.

2.7.4. Goal 5: Combat HIV/AIDS, Malaria and other Disease

The targets are to halve and begin to reverse the spread of HIV/AIDS, Malaria and other major diseases. In 2002, an estimated 29.4 million people in Africa were living with HIV/AIDS[42]. Literature also suggests that the impact of HIV is both primary and secondary to measles vaccine failure which can increase child mortality. Literature also suggests a strengthening of EPI programmes[43] to reduce child mortality due to infectious diseases.

Tuberculosis (TB) is predicted to kill about a third of HIV-positive individuals in high prevalence regions[44]. South Africa is considered to have the highest burden of HIV in the Sub-Saharan region. UNICEF estimated the number of people living with HIV in South Africa to be 5.5 million in 2005[41]. This means that a third of these individuals will die of TB because the HIV epidemic in South Africa is known to fuel the TB epidemic.

Malaria is a serious public health problem and efforts at eradication have not been successful. The problem with eradication of the vector, the anopheles mosquito, and the development of resistant patterns has called for innovative strategies such as an insecticide infested bed nets[45]. These efforts have not been scaled down to individuals in poor countries. Malaria has been on the increase worldwide and the numbers of deaths are the hardest to count. Plasmodium falciparum malaria is the major cause of these deaths[46]. This study reports on the deaths due to TB, Malaria, Pneumonia and HIV as well as the trends and progress in achieving the MDG 6.

2.7.5. SUMMARY

The international and national literatures searched have revealed that the availability of cause-of-death statistics has huge benefits which include monitoring of the health of the population, setting of priorities and targeting of interventions[47]. Cause-of-death statistics are a keystone of epidemiological studies. However, mortality data reflect one aspect of health and are of limited value in respect of conditions that are rarely fatal[48].

Mortality rates are commonly used as global measures of health status for populations. The under-five and infant mortality rate as well as the maternal mortality ratio are indicators of the MDG. They are increasingly being used as indicators of public health efforts to improve the health status of populations[49]. Research and practice provide compelling evidence for tracking mortality as a measure of health status, and BoD studies are an effort to estimate and quantify the causes of death in order to help prevent the causes of premature, preventable as well as avoidable deaths.

CHAPTER 3

METHODOLOGY

3.1. STUDY DESIGN

This is a quantitative analytical study, with a descriptive element, of natural causes of deaths in Limpopo province reported to Statistics South Africa from 2000 to 2005. It is quantitative because the quantitative characteristics such as numbers of deaths and the ages at death were collected. It is analytical because it compared the ages of death, the gender distribution of deaths and the trends over a period of time. It is also descriptive because an epidemiological description of the underlying causes of deaths is made and this is often the important starting point for many epidemiological studies[50, 51].

3.2. STUDY POPULATION

All records of deaths of persons which occurred in Limpopo Province for the years 2000 to 2005 from Statistics South Africa formed the study population. Deaths are combined as natural and unnatural when recorded. Descriptive studies usually make use of routinely collected data such as death records to study populations[11].

3.3. SAMPLE

The aim of a sample is the selection of individuals or a subset of a population that is genuinely representative of the population being investigated [5, 10, 11] . All records of natural deaths in Limpopo province constituted the sample for this study.

3.4. EXCLUSION CRITERIA

All records in which the underlying cause of death was not stated as well as records of unnatural deaths were excluded from further analysis of the causes of death.

3.5. DATA COLLECTION METHOD

The data collection tool was designed using some variables on the 83/BI 1663 form (see appendix 1). This form is filled by an attending practitioner or a pathologist in case a person dies. The data collection tool was designed to collect variables such as the age groups, the gender and the ICD 10 diagnosis (see appendix 2). Six databases were created on STATA to enable separation of each year and assist in the analysis.

3.6. ETHICAL CONSIDERATION

The study did not capture any names of deceased persons for the sake of confidentiality and anonymity. The identity numbers of dead persons did not form a variable of analysis for the study and therefore the dead as well as their causes of death cannot be tracked from this study. Permission to conduct the study was granted by the Department of Health and Social Development in Limpopo province. The ethical clearance for the study was granted by the University of Limpopo, Research Ethics Clearance Committee. Both the permission and ethical clearance letters are attached as appendices 3 and 4 respectively.

CHAPTER 4

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1. INTRODUCTION

The data is presented and analyzed in accordance with the objectives of the study. The data was thoroughly checked for incorrect entries and errors before presentation, analysis and interpretation was made. The variables were analyzed using Microsoft Excel and STATA statistical software programmes. The data was analysed to describe the demographic profile and underlying causes of death for the study sample. Graphs and tables are used to present the data.

4.2. NUMBER OF DEATHS

There were 228 626 natural deaths from the period 01 January 2000 to 31 December 2005. Figure 2 below is a presentation of the total numbers of deaths for each gender.

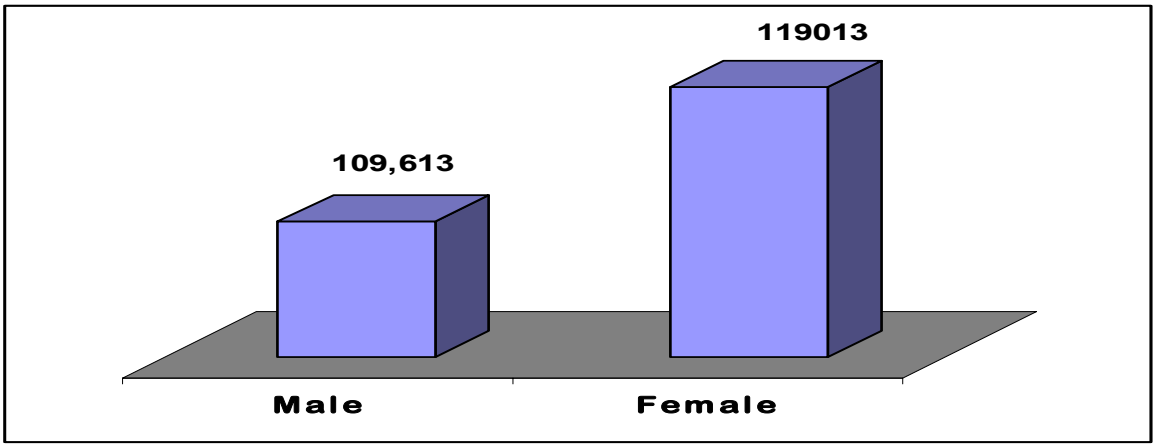


Figure 2: Number of Deaths

The figure shows that more females died as compared to males. The difference is almost 10 000 more female deaths.

4.3. GENDER DISTRIBUTION

The gender distribution of the deaths is such that 52.1% were females and 47.9% were males. Figure 3 below is the illustration of the gender distribution of the deaths.

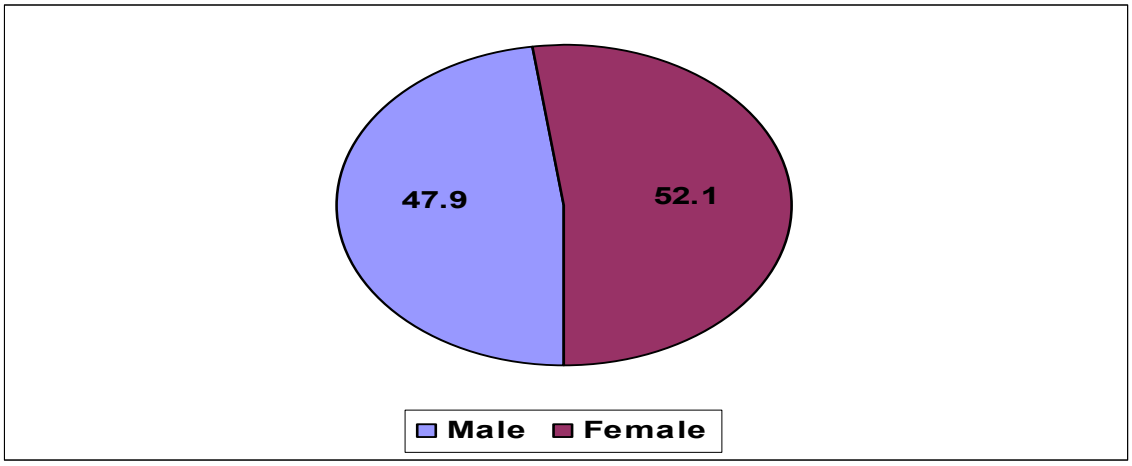


Figure 3: Gender distribution of deaths

The pie chart shows that 52% of deaths were females. This is in contrast to both the SANBD and the Mortality Profile of Limpopo studies which showed that the numbers of male deaths were more than those of females. The reason is that both studies used a sample of all deaths whereas this study used the sample of natural deaths[52].

4.4. CRUDE DEATH RATES

Table 2 below displays the crude death rates for Limpopo for the study period. The table shows that the crude death rate increased from 7, 0 per 1 000 in 2000 to 9, 50 per 1 000 in 2005.

Table 2: Crude Death Rates for Limpopo 2000 - 2005

Year	Death Rate
2000	7.0
2001	7,2
2002	7,8
2003	9,0
2004	9,3
2005	9,5

Table 2 shows that crude death rate has increased remarkably from 2000 to 2005. This is however far below the national crude death rate of South Africa which is estimated at 17.0 per 1000 persons[53]. The greatest increase was between 2002 and 2003. The crude death rate has been increasing year on year. This indicates that the increase in the number of natural deaths displayed in table 3 below is real and stems from the increase in crude death rate.

4.5. DISTRIBUTION OF THE NATURAL DEATHS BY YEAR

Table 3 below shows a frequency distribution table of natural deaths over the study period.

Table 3: Frequency of Deaths by Gender 2000- 2005

	Gender		
Year	Male	Female	Total
2000	14,268	14427	28,695
2001	15,579	16991	32,570
2002	17,205	18807	36,012
2003	20,168	21900	42,068
2004	21,140	22727	43,867
2005	21,253	24161	45,414
Total	109,613	119013	228,626

Table 3 shows that the total numbers of natural deaths have increased from 28695 in 2000 to 45414 in 2005. This represents a 58% increase in the number of deaths. The numbers of male deaths increased from 14268 to 21253, a 48% increase whereas the numbers of female deaths increased from 14427 in 2000 to 24161 in 2005, representing an increase of 68%. Figure 4 below is a bar graphical display of the year on year increase in the numbers of deaths.

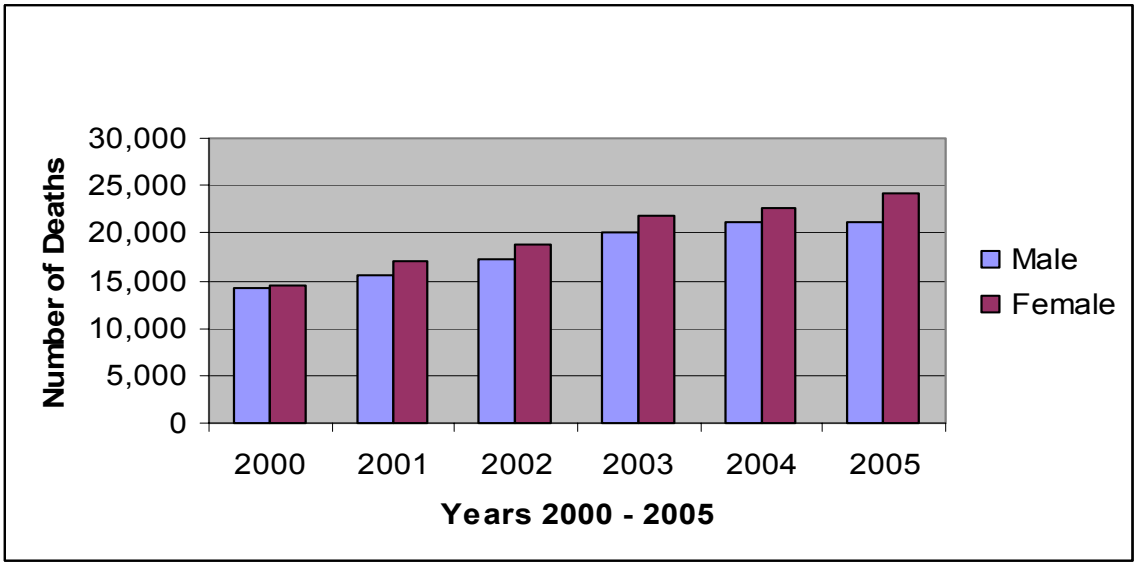


Figure 4: Male and female deaths 2000 -2005

4.6. AGE DISTRIBUTION

Table 4 below illustrates the distribution of deaths according to 17 age categories. It also illustrates the percentage contribution of each group and the cumulative percentages.

Table 4: Frequency, Percent and Cumulative Percent Distribution of Deaths in Age Categories

Age Categories	Deaths	Percent	Cum.
0-4	23,321	10.2	10.2
5-9	1,994	0.87	11.07
10-14	1,600	0.7	11.77
15-19	2,841	1.24	13.02
20-24	6,712	2.94	15.95
25-29	14,035	6.14	22.09
30-34	18,815	8.23	30.32
35-39	18,729	8.19	38.51
40-44	16,397	7.17	45.68
45-49	14,068	6.15	51.84
50-54	13,203	5.78	57.61
55-59	11,382	4.98	62.59
60-64	13,009	5.69	68.28
65-69	13,184	5.77	74.05
70-74	15,143	6.62	80.67
75-79	13,150	5.75	86.42
80-100	31,039	13.58	100
Total	228,622	100	

The age group 0-4 years which includes the infant mortality rate and the under-five mortality shows that this age group contributed the largest number of deaths (10%) after the 80-100 years age group (13.6%).

The numbers of deaths declined between the ages of 5 and 14 years and began to increase in the age category 15-19 years. The steady increase began from the 20-24 age groups rising sharply to reach a peak at the age groups 30-34years.

The decline begins at 35-39 age groups to reach a trough at 55-59 years age group.

Figure 5 below is a line graph illustrating the number of deaths in each age category. The peak of deaths is clearly illustrated to be between the age groups of 30-34 years and 35-39 years.

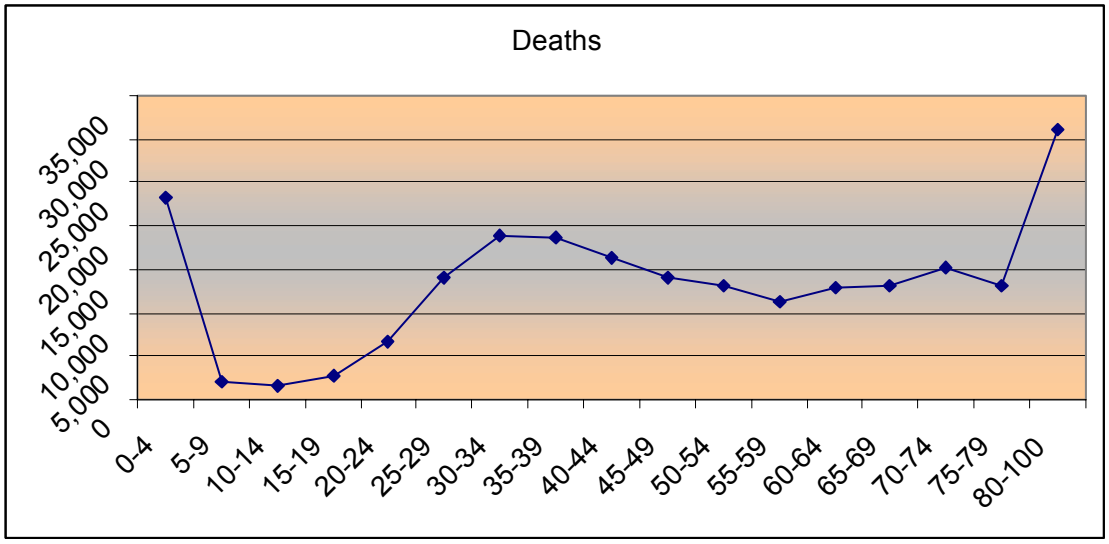


Figure 5: Number of deaths according to age categories

The second wave of death after the under-five deaths indicates that the middle aged groups die from the age of 20-49. This represents over 40% of the number of deaths.

The line graph shows that decline in mortality after the peak at 30-34 years does not reach the previous trough levels seen at 5-9 years. The reason is that diseases of lifestyle take over from infectious diseases to become the major underlying causes of death.

4.7. AGE AT DEATH

Table 5 below is an illustration of the mean age of death and the confidence intervals from 2000 to 2005.

Table 5: Measures of mean and standard error of the age of death 2000 – 2005

Year	Variable	No. of Deaths	Mean	Std. Err.	95% Confidence Interval	
2000	Age	28695	50.12	0.148	49.83	50.41
2001	Age	32570	49.92	0.137	49.65	50.19
2002	Age	36012	48.42	0.129	48.17	48.67
2003	Age	42068	48.07	0.119	47.84	48.30
2004	Age	43867	45.60	0.117	45.37	45.83
2005	Age	45414	45.10	0.115	44.88	45.33
Total		**228626**				

Table 5 shows that the mean or average age at death has declined from 50.12 (CI: 49.83-50.41) in 2000 to 45.10 (CI: 44.88-45.33) in 2005. The small standard error gives a better estimate of the population[10].

The *t*-test was used to compare the differences between the mean age of death in 2000 and the mean age of death in 2005 (see box 1 below). The age of death in 2000 was significantly higher than the age of death in 2005. This meant that in the year 2005 people were died at a younger age as compared to the year 2000.

4.7.1. Calculation of the t-value based on the Standard Error of the Difference (SED*p*) equation using the observed variances for the age of death in 2000 and 2005 is displayed in Box 1 below[10]:

$$SED = \sqrt{S2000/N2000} + \sqrt{S2005/N2005}$$

$$= \sqrt{625.86/28695} + \sqrt{603.98/45414}$$

$$= 0.00142$$

$$t = \frac{mean2000 - mean2005 - 0}{SED}$$

$$= \frac{50.12 - 45.10 - 0}{0.00142}$$

$$= 3535.21$$

Calculation of degrees of freedom for the t-test and interpretation of the t value

$$df = N2000 + N2005 - 2$$

$$= 28695 + 45414 - 2$$

$$= 74107$$

Interpretation: *For a t value of 3535.21 with ∞ degrees of freedom, p is less than 0.0005. This means that the age of death in 2000 was significantly higher than the age of death in 2005.*

Box 1: Comparison of the Mean Age of death between 2000 and 2005.

Table 6 below is an illustration of the similarities and differences in measures of central tendency and dispersion of the ages of death between 2000 and 2005. The table shows also that if the median was to be used as a measure of central tendency it will lie closer to the mean. The median comparison also confirms that the age of death has declined from 53 in 2000 to 44 in 2005.

Table 6: Measures of Central tendency Dispersion of age Death 2000 and 2005

	2000	2005
Mean	50.12	45.10
Standard Error	0.148	0.115
Median	53	44
Mode	80	80
Standard Deviation	25.02	24.58
Sample Variance	625.86	603.98

4.8. ICD 10 GROUPED CAUSES OF NATURAL DEATH FOR EACH GENDER

Table 7 below shows the gender distribution and frequencies of underlying causes of natural deaths according to broad ICD 10 groups. The table to explain these broad codes is attached as appendix 5.

Table 7: Gender Distribution of Deaths by ICD 10 Groups

ICD 10 GROUPS	GENDER		TOTAL
CODES	Male	Female	
IPD (A00-B99)	23490	23352	46842
NEO (C00-D48)	5974	6151	12125
BIM (D50-D99)	3338	4577	7915
ENM (E00-E99)	4518	5648	10166
MBD (F00-F99)	248	180	428
DNS (G00-G99)	2852	2551	5403
EAA (H00-H59)	12	12	24
EAS (H60-H99)	19	33	52
CVS (I00-I99)	16272	19106	35378
RES (J00-J99)	17700	17716	35416
DIG (K00-K99)	5932	5586	11518
SKS (L00-L99)	238	266	504
MSC (M00-M99)	500	557	1057
GUS (N00-N99)	2070	1874	3944
PCP (O00-O99)	0	363	363
CPP (P00-P99)	5399	4843	10242
MDC (Q00-Q99)	345	332	677
SYS (R00-R99)	16846	22476	39322
Total	105753	115623	221376

The ten leading underlying causes of death by broad groups in a descending order are as follows:

- Certain infectious and Parasitic Diseases (IPD (A00-B99))
- Symptoms, signs and abnormal clinical findings, NEC (SYS(R00-R99))
- Diseases of the respiratory system (RES (J00-J99))
- Diseases of the circulatory system (CVS (I00-I99))
- Neoplasms (NEO (C00-D48))
- Diseases of the digestive system (DIG (K00-K93))
- Certain conditions originating in the perinatal period (CPP (P00-P96))

- Endocrine, nutritional and metabolic disorders (ENM (E00-E90))
- Diseases of the blood and blood forming organs and certain disorders involving the immune mechanism (BIM (D50-D89))
- Diseases of the nervous system (DNS (G00-G99))

Table 7 shows that infections and parasitic diseases (A00-B99) were the most commonly occurring causes of death. It shows that there was an almost equal number of deaths which occurred amongst males (50.2%) and females (49.8%) whose underlying cause of death were infectious and parasitic diseases.

Symptoms and Signs as ill-defined causes of death (R00-R99) were the second leading underlying cause of death. This broad group of underlying cause of death was more frequently occurring amongst females (57.2%) as compared to males (42.85%).

Diseases of the respiratory system (J00-J99) were the third leading group of underlying causes of death. These diseases caused deaths almost equally in the males (49.98%) and females (50.02%).

Diseases of the cardiovascular system (I00-I99) were the fourth leading underlying causes of death. These diseases were the underlying causes of death in more females (54%) than males (46%).

Neoplasms (C00-D48) were the fifth leading underlying causes of death. Neoplasms were the underlying cause of death in almost equal proportion of females (50.7%) and males (49.3%).

Diseases of the gastrointestinal system (K00-K93) were the sixth leading underlying causes of death. There were more males (51.5%) than females (48.5%) whose underlying causes of death were diseases of the gastrointestinal system.

Perinatal conditions (P00-P96) were the seventh leading underlying causes of death. Perinatal conditions caused more deaths amongst males (52.7%) as compared to females (47.3%) in the disease group.

Endocrine, nutritional and metabolic disorders (E00-E90) were the eight leading underlying causes of death. These disorders were underlying cause of death in more females (55.6%) than male (44.4%) deaths in the disease group.

Disorders of the Blood and Immune mechanism (D50-D89) were the ninth leading underlying causes of death. These disorders were underlying causes of death in more females (57.8%) than males (52.2%) in the disease group.

The tenth leading underlying causes of death were the diseases of the nervous system (G00-G99). These diseases were underlying cause of death in more males (52.8%) than females (47.2%) in the group. The ten leading groups of underlying causes of death contributed 96.8% to all deaths.

The other 8 underlying ICD 10 groups of causes of natural death contributed only 3.2% to all deaths and are in a descending order as follows:

- Diseases of the genitourinary system (GUS (N00-N99))
- Diseases of the musculoskeletal system and connective tissue (MSC (M00-M99))
- Congenital malformations, deformations and chromosomal abnormalities (MDC (Q00-Q99))
- Diseases of the skin and subcutaneous tissue (SKS (L00-L99))
- Mental and behavioural disorders (MBD (F00-F99))
- Pregnancy, childbirth and the puerperium (PCP (O00-O99)
- Diseases of the ear and mastoid process (EAS (H60-H95))
- Diseases of the eye and adnexa (EAA (H00-H59))

The total number of deaths due to these groups of diseases was 7049.

These groups and the top ten groups will now be separately analysed and discussed to show the commonly occurring diseases in each gender group.

4.8.1. CERTAIN INFECTIOUS AND PARASITIC DISEASES

Table 8 below (page 38) shows the list of infectious and parasitic diseases in a descending order. It shows that A16 (respiratory tuberculosis, not confirmed bacteriologically or histologically) and A09 (diarrhoea and gastroenteritis presumed infectious in origin) contributed 34126 (73%) to all deaths in this group.

There were large numbers of males compared to females, year on year who died of respiratory tuberculosis. This is supported by literature which suggests that TB notification rates are higher among males as compared to females[13]. The fact that the tuberculosis is not confirmed either bacteriologically or histologically indicates that there is a large number of sputum negative tuberculosis (TB). The numbers of female deaths due to TB have doubled from 796 in 2000 to 1822 in 2005. The other forms of TB, A17 (TB of the nervous system) has tripled, A18 (TB of other organs) has gone up 3.5 times and A19 (Miliary TB) has doubled over the six year period.

Intestinal infections such as Diarrhoea and gastroenteritis of presumed infectious in origin (A09) has been increasing year on year and cause more female deaths as compared to males, whereas Typhoid and paratyphoid fevers (A01) as well as Amoebiasis (A06) have resulted in more sporadic deaths of males than of females.

Other bacterial diseases such as septicaemia (A41) and bacterial infection of unspecified site (A49) showed a year on year increase with septicaemia causing more female deaths and bacterial infection causing more male deaths.

HIV disease (B20 – B24) deaths were on a decline year on year. This may be due to physicians overlooking HIV as an underlying cause of death or opportunistic infections being preferred as the underlying cause of death. This is supported by the fact that numbers of death due to opportunistic infections related to HIV have increased year on year. Deaths due to B45 (Cryptococcosis) increased up to 7 times, B37 (Candidiasis) and B59 (Pneumocystosis) increased by up to 4 times each during the study period.

Plasmodium falciparum malaria (B50) deaths have declined since 2000 whereas unspecified malaria deaths have increased (B54). The numbers of female deaths is almost similar to male deaths due to unspecified malaria whereas for plasmodium falciparum malaria more male deaths were caused. The inherent nature of males; outdoor life and work predisposes them to more malaria infection and deaths[54].

Table 8: Gender Distribution and frequency of underlying causes of Death due to Parasitic and Infectious Diseases

UNDERLYING CAUSE OF DEATH CERTAIN INFECTIONS AND PARASITIC DISEASES (IPD) A00 – B99																					
ICD 10 CODE	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
A16	1288	796	2084	1542	944	2486	1694	1193	2887	1969	1527	3496	2109	1611	3720	2182	1822	4004	10784	7893	18677
A09	625	806	1431	778	1087	1865	899	1258	2157	1176	1580	2756	1439	1971	3410	1594	2236	3830	6511	8938	15449
A41	108	102	210	123	125	248	168	176	344	215	202	417	195	172	367	189	228	417	998	1005	2003
B20	168	223	391	158	177	335	146	182	328	148	163	311	78	84	163	58	53	108	756	882	1638
B54	101	101	202	145	146	291	151	145	296	145	141	286	117	134	251	137	133	270	796	800	1596
B33	56	100	156	101	143	244	99	167	266	127	123	249	159	166	325	149	182	331	691	881	1572
B59	21	41	62	32	60	92	57	87	144	64	88	152	128	146	274	106	146	252	408	568	976
A19	38	33	71	47	41	88	84	58	142	91	75	166	78	60	138	78	72	150	416	339	755
A17	25	15	40	28	22	50	41	23	64	38	31	69	46	46	92	83	64	147	261	201	462
B50	68	48	116	47	33	80	35	24	59	44	26	70	34	25	59	15	9	24	243	165	408
A18	11	17	28	25	19	44	26	11	37	35	22	57	30	58	88	50	50	100	177	177	354
B22	9	35	44	14	16	30	17	18	35	21	18	39	45	48	93	23	35	58	129	170	299
B45	9	3	12	13	9	22	16	13	29	27	21	48	44	41	85	43	53	83	152	140	292
B24	24	35	59	26	41	67	23	28	51	25	27	52	11	19	30	14	10	24	123	160	283
B90	21	12	33	9	3	12	24	23	47	26	12	38	47	34	81	11	2	13	138	86	224
A49	15	3	18	18	6	24	20	16	36	28	9	37	24	14	38	27	30	57	132	78	210
B37	5	10	15	6	10	16	7	17	24	12	20	32	17	32	49	33	27	60	80	116	196
B23	22	27	49	18	14	32	18	24	42	17	19	36	15	16	31	3	3	6	93	103	196
A06	8	12	20	0	1	1	12	21	33	23	41	64	4	7	11	4	3	7	51	85	136
A01	17	14	31	12	13	25	10	10	20	9	6	15	7	5	12	7	7	14	62	55	117
B99	19	15	34	8	6	14	9	10	19	13	11	24	7	10	17	2	2	4	58	54	112
B34	6	7	13	5	10	15	5	8	13	10	7	17	8	7	15	10	8	18	44	47	91
B16	10	9	19	9	10	19	2	4	6	11	4	14	6	4	10	14	1	15	52	32	84
B89	1	10	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	10	11
0THER	63	80	143	51	63	114	68	67	135	53	54	107	40	50	90	59	53	112	334	367	701
Total	2738	2554	5292	3215	2999	6214	3631	3583	7214	4327	4227	8552	4688	4760	9449	4891	5229	10104	23490	23352	46842

4.8.2. NEOPLASMS

Table 9 below (page 41) shows the list of neoplasms that were underlying causes of death during the study period.

C53 (malignant neoplasm of cervix uteri) was the leading underlying cause of death for females and showed an increase year on year. Literature suggests that cervical cancer mortality is highest among black women. This is due to the fact that screening services are not offered or available to black women and they tend to present late with advanced disease[55]. The use of combined oral contraceptive as well as an infection with human papilloma virus type 16 and 18 is associated with an increased risk of cervical cancer[56]. Cervical cancer has been recognized by the American Centers for Disease Control as an AIDS defining illness with evidence that HIV-infected women with cervical cancer present at an advanced stage of the disease[57]. The malignant neoplasms of the female genital organs, C53, C54, C55 and C56 contributed 16% to all deaths due to neoplasms.

The table also shows that malignant neoplasms of digestive organs C15, C16, C18, C20, C22 and C25 are were underlying group of malignant tumours in 29% of deaths due to neoplasms. This figure is similar to the one seen in Europe where cancers of the gastrointestinal tract account for 25-30% of cancer deaths[58]. The malignant neoplasm of the oesophagus (C15) was the second leading underlying neoplasm and caused more deaths among males in the study group.

Malignant neoplasms of respiratory and intrathoracic organs, C34 and C32 contributed 10% to deaths due to neoplasms. C34 (malignant neoplasm of bronchus and lung) was 3-4 times higher in males than females. The trend shows that it is levelling off or declining. This may be due to reduction in smoking following anti-smoking legislation or the effect of dying at a younger age before cancer can develop.

Malignant neoplasm of the prostate (C61) has not shown any significant changes in the period under study. It contributed 7.4% towards cancer deaths.

Malignant neoplasm of breast (C50) has increased steadily since 2000 showing a sharp increase in 2004 and a decline in 2005. The contribution of male breast cancer to overall breast cancers is 2.9% which is higher than findings in literature which indicates less than 1%[58]. The contribution of breast cancer to all cancer was 7% in contrast to Europe where the contribution is 20%[58].

The number of deaths attributed to Kaposi sarcoma (C46) has increased about 7 fold from 2000 to 2005. It caused deaths of more males than females. The disease has male predominance and is an AIDS index diagnosis[57].

Table 9: Gender Distribution and Frequency of Underlying Causes of Death due to Neoplasms

UNDERYLING CAUSE OF DEATH DUE TO NEOPLASMS (NEO) C00-D48																					
ICD 10 CODE	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
C53	0	221	221	0	232	232	0	243	243	0	276	276	0	296	296	0	328	328	0	1596	1596
C15	138	78	216	143	65	208	160	60	220	172	74	246	136	62	198	154	66	220	903	405	1308
C34	160	35	195	118	41	159	122	39	161	131	38	169	139	36	175	128	36	164	798	225	1023
C22	110	54	164	90	66	156	87	51	138	91	52	143	110	63	173	106	59	165	594	345	939
C61	131	0	131	161	0	161	124	0	124	154	0	154	169	0	169	160	0	160	899	0	899
C50	6	117	123	5	121	126	2	124	126	3	131	134	2	180	182	7	140	147	25	813	838
C80	71	48	119	45	58	103	44	48	92	47	64	101	58	73	131	44	63	107	309	354	663
C16	45	42	87	47	57	104	26	36	62	36	36	72	37	36	73	35	34	69	226	241	467
C18	35	37	72	34	27	61	27	37	64	43	28	71	36	24	60	21	25	46	196	178	374
C25	29	27	56	36	21	57	27	32	59	31	28	59	38	25	63	20	25	45	181	158	339
C67	17	17	34	19	19	38	18	10	28	18	15	33	16	22	38	18	20	38	106	103	209
C56	0	22	22	0	34	34	0	34	34	0	38	38	0	42	42	0	38	38	0	208	208
C76	4	17	21	8	14	22	12	20	32	13	24	37	17	19	36	16	35	51	70	129	199
C46	4	3	7	12	6	18	16	12	28	20	10	30	33	20	53	29	33	62	114	84	198
C85	15	9	24	12	12	24	15	17	32	20	14	34	14	19	33	16	20	36	92	91	183
C97	19	13	32	12	7	19	17	15	32	13	15	28	14	10	24	9	16	25	84	76	160
C32	20	3	23	21	7	28	21	8	29	22	1	23	25	1	26	24	1	25	133	21	154
D43	9	7	16	8	15	23	8	21	29	15	12	27	18	12	30	14	12	26	72	79	151
C95	16	10	26	7	10	17	11	10	21	14	11	25	13	5	18	8	14	22	69	60	129
C20	14	5	19	12	9	21	15	7	22	19	10	29	9	11	20	10	4	14	79	46	125
C44	3	6	9	10	7	17	2	1	3	7	4	11	11	8	19	19	8	27	52	34	86
C55	0	14	12	0	19	19	0	10	10	0	15	15	0	10	10	0	12	12	0	80	80
C14	4	2	6	14	2	16	5	4	9	10	7	17	14	3	17	11	3	14	58	21	79
C54	0	18	18	0	15	15	0	12	12	0	10	10	0	12	12	0	12	12	0	79	79
C41	5	3	8	10	8	18	7	5	12	10	5	15	10	5	15	3	5	8	45	31	76
OTHER	164	112	276	94	68	162	163	131	294	152	132	284	147	125	272	149	126	275	869	694	1563
TOTAL	1019	920	1947	918	940	1858	929	987	1916	1041	1050	2082	1066	1119	2185	1001	1135	2136	5974	6151	12125

4.8.3. DISEASES OF THE BLOOD AND BLOOD-FORMING ORGANS AND CERTAIN DISORDERS INVOLVING THE IMMUNE MECHANISM

Table 10 (page 43) below shows the list of diseases of the blood and blood forming organs and certain disorders involving the immune mechanism that were underlying causes of death for the study period.

Certain disorders involving the immune mechanism, D83 (Common variable immunodeficiency), D84 (Other immunodeficiencies) and D86 (Sarcoidosis) were the common underlying causes of death. D84 (other immunodeficiencies), was the single most common underlying cause of death and contributed 76% to the deaths in the group. The lack of information on the classification of immunodeficiencies has hampered further analysis from the data. The two types of immunodeficiencies i.e. primary and secondary would have assisted in interpreting the origin of the immunodeficiencies. These disorders caused more female as compared male deaths.

Aplastic and other anaemias D61 (other aplastic anaemias) and D64 (other anaemias) were the second leading underlying causes of death in this group of diseases. They contributed 19% to the deaths.

Coagulation defects, Purpura and other haemorrhagic conditions, D65 (disseminated intravascular coagulation), D66 (hereditary factor VIII deficiency), D68 (other coagulation defects) and D69 (Purpura and other haemorrhagic conditions) contributed 1.4% to the deaths in the group.

Nutritional anaemias such D50 (iron deficiency) and D53 (other nutritional anaemias) contributed 1% to the deaths.

Table 10: Gender Distribution and frequency of Underlying Causes of Death for Diseases of the Blood and Blood Forming Organs and Certain Disorders involving the Immune Mechanism

UNDERLYING CAUSES OF DEATHS FOR DISEASES OF THE BLOOD AND BLOOD FORMING ORGANS AND CERTAIN DISORDERS INVOLVING THE IMMUNE MECHANISM D50-D89																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
D84	314	330	644	346	416	762	437	544	981	537	697	1234	510	640	1150	533	679	1212	2677	3306	5983
D64	44	120	164	62	145	207	75	191	266	90	188	278	90	163	253	74	160	234	435	967	1402
D61	9	8	17	7	8	15	9	12	21	14	13	27	12	19	31	18	24	42	69	84	153
D83	1	2	3	1	9	10	10	13	23	13	15	28	10	14	24	4	5	9	39	58	97
D53	4	8	12	3	8	11	6	7	13	4	9	13	4	5	9	2	2	4	23	39	62
D69	4	3	7	3	6	9	3	5	8	0	5	5	7	4	11	4	7	11	21	30	51
D65	2	2	4	2	2	4	0	5	5	0	2	2	2	5	7	2	5	7	8	21	29
D50	1	3	4	1	3	4	1	2	3	4	4	8	0	2	2	4	1	5	11	15	26
D68	0	2	2	1	2	3	1	2	3	1	2	3	1	1	2	3	1	4	7	10	17
D58	0	3	3	1	1	2	0	2	2	2	1	3	1	0	1	0	3	3	4	10	14
D75	0	2	2	0	1	1	2	2	4	1	0	1	1	0	1	0	1	1	4	6	10
D86	1	2	3	0	0	0	0	2	2	2	1	0	1	1	2	0	0	0	4	6	10
D66	0	0	0	3	1	4	3	0	3	0	0	0	2	0	2	1	0	1	9	1	10
OTHER	24	4	6	3	3	6	8	2	10	6	8	14	5	6	11	3	1	4	49	24	73
TOTAL	382	489	871	433	605	1038	555	789	1344	674	945	1616	646	860	1506	648	889	1537	3338	4577	7915

4.8.4. ENDOCRINE, NUTRITIONAL AND METABOLIC DISEASES

Table 11 below (page 45) shows that diabetes mellitus (E10, E11 and E14) caused 67% of deaths in this group of endocrine, nutritional and metabolic disorders. The most common type of diabetes leading to death was unspecified diabetes mellitus (E14). It was common among females and has increased year on year as the underlying cause of death. Non-insulin dependent diabetes mellitus (E11) caused more deaths than insulin dependent diabetes mellitus (E10). These types of diabetes caused deaths among females.

Metabolic disorders (E78, E80, E83, E86, E87 and E88) contributed to 12.8% of deaths in this group. Volume depletion is the common underlying cause of death in metabolic disorders resulting in deaths of more males than females.

Malnutrition (E40, E41, E42, E43 and E45) contributed to 7.3% of deaths in this group. Kwashiokor (E40) was the common underlying cause of death and showed increases in the first and last two years. In eradicating extreme hunger and poverty, the target is to halve between 1990 and 2015 the proportion of people who suffer from hunger[38]. The data showed that malnutrition related deaths are increasing. This could indicate an underlying hunger problem especially among children in the province

Table 11: Gender Distribution and Frequency of Underlying Causes of Death due to Endocrine, Nutritional and Metabolic Diseases

UNDERLYING CAUSES OF DEATH FOR ENDOCRINE NUTRITIONAL AND METABOLIC DISEASES E00-E90																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
E14	367	496	863	394	525	919	383	560	943	470	652	1122	541	667	1208	538	787	1325	2693	3687	6380
E86	61	43	104	58	60	118	78	73	151	89	85	174	89	107	196	109	104	213	484	472	956
E46	49	48	97	37	53	90	54	55	109	55	43	98	60	67	127	0	0	0	255	266	521
E16	41	27	68	19	23	42	28	35	63	52	43	92	55	41	96	55	54	109	250	223	473
E40	26	24	50	25	31	56	21	25	46	20	21	41	36	31	67	29	36	65	157	168	325
E11	25	27	52	15	50	65	18	31	39	5	18	23	25	35	60	26	18	44	114	179	293
E87	10	11	21	24	33	57	20	19	39	26	24	50	20	20	40	30	28	58	130	135	265
E10	14	21	35	11	10	21	13	24	37	18	27	45	15	6	21	9	12	21	80	100	180
E41	7	14	21	17	9	26	9	8	17	14	10	24	22	23	45	18	14	32	87	78	165
E45	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	48	51	99	49	51	100
E42	6	13	19	2	5	7	5	4	9	8	2	10	13	9	22	11	6	17	45	39	84
E43	4	7	11	4	4	8	6	5	11	3	5	8	8	7	15	10	8	18	35	36	71
E66	3	7	10	1	7	8	2	9	11	5	6	11	6	11	17	6	8	14	23	48	71
E05	1	9	10	0	11	11	0	4	4	3	3	6	0	4	4	1	5	6	5	36	41
E52	3	6	9	0	2	2	4	4	8	4	5	9	4	2	6	1	1	2	16	20	36
E88	4	0	4	0	1	1	4	3	7	5	4	9	1	3	4	4	3	7	18	14	32
E15	0	2	2	0	0	0	0	0	0	3	2	5	7	5	12	5	7	12	15	16	31
E78	3	1	4	1	1	2	2	1	3	1	0	1	4	0	4	3	0	3	14	3	17
E80	0	1	1	5	1	6	1	2	3	1	1	2	1	0	1	2	0	2	10	5	15
E03	0	4	4	0	2	2	0	2	2	0	3	3	0	2	2	0	1	1	0	14	14
E04	0	3	3	0	0	0	0	2	2	0	3	3	0	1	1	0	2	2	0	11	11
E83	0	1	1	1	0	1	1	1	2	1	1	2	1	1	2	2	1	3	6	5	11
OTHER	6	7	13	1	7	8	5	7	12	7	3	10	7	12	18	6	6	12	32	42	74
TOTAL	630	772	1402	615	835	1450	655	874	1519	790	961	1748	915	1054	1968	913	1152	2065	4518	5648	10166

4.8.5. MENTAL AND BEHAVIOURAL DISORDERS

Table 12 below (page 47) shows the list of mental and behavioural disorders that were underlying causes of death for the study period.

The table showed that organic, including symptomatic mental disorders (F00-F09) are the common (53%) underlying causes of death in this diseases group. These disorders were common among females. Unspecified dementia (F03) was the common underlying cause of death.

Mental and behavioural disorders due to psychoactive substance (F10-F19) use were the second leading underlying cause of death in this group. These disorders were common in males with a male to female ratio of 3:1 for alcohol and 13:1 for tobacco. This is because more men use alcohol and tobacco than women[59]. Mental and behavioural disorders due to use of alcohol (F10) were 9 times more common than mental and behavioural disorders due to use of tobacco (F17) as underlying causes of death.

Schizophrenia, schizotypal and delusional disorders (F20-F29) were the third leading underling causes of death in persons with mental and behavioural disorders. Unspecified nonorganic psychosis (F29) was more common in females (54.3%) whereas schizophrenia (F20) was more common in males (55.6%) as an underlying cause of death.

Table 12: Gender Distribution and Frequency of Underlying Causes of Death due to Mental and Behavioural Disorders

UNDERLYING CAUSES OF DEATH FOR MENTAL AND BEHAVIOURAL DISORDERS F00-F99																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
F03	10	8	18	10	23	33	16	15	31	17	24	41	11	22	33	16	26	42	80	118	198
F10	20	6	26	10	8	18	20	7	27	16	3	19	15	4	19	9	5	14	90	33	123
F29	6	3	9	4	8	12	6	6	12	10	11	21	9	14	23	8	9	17	43	51	94
F20	3	3	6	7	3	10	6	6	12	7	7	14	5	1	6	2	4	6	30	24	54
F32	1	1	2	0	2	2	1	3	4	0	1	1	4	2	6	4	2	6	10	11	21
F05	0	2	2	0	2	2	1	0	1	2	2	4	4	1	5	3	1	4	10	8	18
F99	1	1	2	1	1	2	0	2	2	4	0	4	0	3	3	1	2	3	7	9	16
F17	5	0	5	3	0	3	4	0	4	0	0	0	0	1	1	1	0	1	13	1	14
F06	2	0	2	1	0	1	3	0	3	1	0	1	1	2	3	0	0	0	8	2	10
F50	3	1	4	0	0	0	1	1	2	1	2	3	0	1	1	0	0	0	5	5	10
Other	8	6	14	4	5	9	6	8	14	8	7	15	3	8	11	3	2	5	32	36	68
TOTAL	49	23	72	30	29	59	48	33	81	49	33	82	41	37	78	31	25	56	248	180	428

4.8.6. DISEASES OF THE NERVOUS SYSTEM

Table 13 below (page 49) shows the list of diseases of the nervous system that were underlying of death for the study period.

The table shows that inflammatory diseases of the central nervous systems (G00-G09) were the common (51%) underlying causes of death in this disease group. Meningitis due to other and unspecified causes (G03) was the leading cause of death in females.

Episodic and paroxysmal disorders (G40-G47) were the second leading underlying causes of death contributing 26%. Epilepsy (G40) and status epilepticus (G41) caused more male deaths than females, with ratios in males to females of 1.5:1 and 1.8:1 respectively.

Cerebral palsy and other paralytic syndromes (G80-G83) were the third leading underlying causes of death contributing 7%. Paraplegia and tetraplegia (G82) as well as infantile cerebral palsy (G80) being more common causes of death in males than females.

Other disorders of the nervous system (G90-G99), such as other disorders of the brain (G93) caused deaths equally in males and females.

Table 13: Gender Distribution and Frequency of Underlying Causes of Death due to Diseases of the Nervous System

UNDELYING CAUSES OF DEATH FOR DISEASES OF THE NERVOUS SYSTEM G00-G99																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
G03	84	87	171	147	149	296	152	176	328	214	214	428	257	249	506	275	328	603	1129	1203	2332
G40	113	68	181	127	78	205	100	86	186	130	103	233	115	75	190	123	65	188	708	475	1183
G93	21	21	42	17	20	37	23	23	46	27	27	54	28	31	59	31	26	57	147	148	295
G00	12	7	19	13	9	22	7	14	21	22	24	46	23	24	47	33	28	61	110	106	216
G04	11	9	19	15	17	32	17	13	30	19	23	42	22	11	33	17	34	41	101	107	208
G41	20	13	33	24	13	37	22	6	28	19	13	32	24	13	37	20	15	35	129	73	202
G82	17	11	28	21	10	31	16	11	27	23	8	31	16	13	29	14	8	22	107	61	168
G80	11	7	18	11	12	23	10	10	20	23	12	35	14	15	29	8	7	15	77	63	140
G30	6	2	8	2	6	8	6	8	14	5	10	15	13	14	27	14	24	38	46	64	110
G81	5	7	12	4	2	6	7	9	16	11	8	19	8	5	13	2	5	7	37	36	73
G06	9	4	13	6	5	11	3	5	8	7	5	12	9	2	11	8	6	14	42	27	69
G61	5	3	8	3	2	5	2	3	5	9	5	14	3	3	6	4	3	7	26	19	45
G20	7	8	15	3	0	3	4	5	9	5	2	7	1	3	4	2	1	3	22	19	41
G12	0	1	1	4	2	6	11	0	11	3	2	5	10	1	11	2	2	4	30	8	38
G83	3	3	6	3	1	4	1	1	2	5	3	8	2	7	9	3	4	7	17	19	36
G62	1	1	2	2	1	3	2	2	4	3	3	6	3	9	12	4	3	7	15	19	34
G31	2	1	3	3	1	4	1	1	2	5	1	6	4	4	8	3	4	7	18	12	30
G92	2	7	9	0	0	0	1	0	1	2	1	3	1	1	2	0	0	0	6	9	15
G71	1	0	1	3	1	4	1	0	1	1	2	3	1	0	1	4	0	4	11	3	14
Other	5	1	6	10	15	25	11	5	16	12	15	27	16	16	32	20	28	48	74	80	154
TOTAL	335	261	595	418	344	762	397	378	775	545	481	1026	570	496	1066	587	591	1168	2852	2551	5403

4.8.7. DISEASES OF THE EYE AND ADNEXA

Table 14 below (page 51) shows the list of diseases of the eye and adnexa that were underlying causes of death for the study period.

Disorders of the orbit (H05) were the common underlying causes of death in males followed by blindness and low vision (H54)in females.

Glaucoma caused 1 female death.

It is important to note that; Hordeolum and chalazion (H00), other disorders of the cornea (H18) and blindness and low vision (H54) are not known to cause death[12].

Table 14: Gender Distribution and Frequency of Underlying Causes of Death due to Diseases of the Eye and Adnexa

EAA H00-H59																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
H05	2	0	0	0	0	0	1	0	1	0	1	1	0	2	2	3	1	4	6	4	10
H54	0	1	1	1	1	2	0	0	0	0	2	2	0	1	1	1	0	1	2	5	7
H18	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	1	1	2	3	1	4
H00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
H34	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1
H40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
TOTAL	2	1	1	1	1	2	2	0	2	0	4	4	1	3	4	6	3	9	12	12	24

4.8.8. DISEASES OF THE EAR AND MASTOID PROCESS

Table 15 below (page 53) shows the list of diseases of the ear and mastoid process that were underlying causes of death for the study period. The table shows that diseases of the middle ear and mastoid (H65-H75) were the major causes of death in persons with diseases of the ear and mastoid process.

Suppurative and unspecified otitis media (H66) was the common underlying cause of death among females. Mastoiditis and related conditions (H70) caused only 2 male deaths. Eustachian tube salpingitis and obstruction (H68) caused 1 male death.

Otitis externa (H60) caused 1 female death but is not known to cause death[12].

Table 15: Gender Distribution and Frequency of Underlying Causes of Death due to Diseases of the Ear and Mastoid Process

EAS H60-H95																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
H66	3	1	4	2	2	4	1	9	10	2	4	6	3	7	10	5	8	13	16	31	47
H60	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
H70	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
H68	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1
TOTAL	5	4	7	5	3	8	4	9	13	3	9	12	5	10	15	13	13	26	35	48	83

4.8.9. DISEASES OF THE CIRCULATORY SYSTEM

Table 16 below (page 55) shows the list of diseases of the circulatory that were underlying causes of death for the study period.

Cerebrovascular diseases (I60-I69) were the leading causes of death in this disease group. Stroke, not specified as haemorrhage or infarction (I64) was the underlying cause of death especially among females and alone contributed 27% to deaths due to cerebrovascular diseases.

Other forms of heart disease (I30-I52) such as heart failure (I50) contributed 23% to deaths in persons with diseases of the circulatory system. These were second leading causes of deaths and showed a female predominance. Cardiac threats that occur with epidemiological transitions and increase the incidence of heart failure are infectious diseases, coronary heart diseases and HIV/AIDS with re-emergence of TB[60].

Hypertensive diseases (I20-I25) were the third leading underlying causes of death and contributed 18% to the deaths in this group. Essential hypertension (I10) and hypertensive heart disease (I11) also showed a female predominance.

Table 16: Gender Distribution and Frequency of Underlying Causes of Death for Diseases of the Circulatory System

UNDERLYING CAUSES OF DEATH DUE TO DISEASES OF THE CIRCULATORY SYSTEM I00 –I99																				
2000	2001			2002			2003			2004			2005			TOTALS			2000		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
I64	514	737	1251	548	858	1406	646	936	1582	763	1158	1921	748	1050	1798	733	1150	1883	3952	5889	9841
I50	479	503	982	455	560	1015	585	648	1233	593	763	1356	851	937	1788	719	894	1613	3682	4305	7987
I11	462	426	888	444	493	937	192	260	452	301	340	641	303	341	644	159	188	347	1861	2048	3909
I10	84	124	208	94	158	252	119	170	289	130	172	302	196	246	442	344	358	702	967	1228	2195
I25	250	247	497	118	108	226	138	122	260	220	134	354	209	168	377	168	133	301	1103	912	2015
I21	201	112	313	175	119	394	166	117	283	196	148	344	176	121	297	161	134	295	1075	751	1826
I42	119	123	242	105	123	228	119	140	259	122	172	294	105	128	233	119	116	235	689	802	1491
I46	232	242	474	49	72	121	88	101	189	56	51	107	37	40	77	35	49	84	497	555	1052
I67	32	43	75	43	68	111	41	51	92	48	62	110	47	80	127	49	86	135	260	390	650
I61	57	54	111	48	59	107	45	34	79	44	57	101	40	57	97	37	40	77	271	301	572
I80	10	14	24	12	21	33	14	26	40	71	98	169	65	67	132	18	32	50	190	258	448
I27	42	27	69	33	28	61	48	18	66	50	26	76	57	16	73	38	19	57	268	134	402
I51	22	30	52	24	27	51	22	21	43	26	36	62	31	31	62	30	39	69	155	184	339
I12	31	33	64	18	21	39	29	11	40	20	15	35	19	19	38	18	14	32	135	113	248
I26	12	25	37	12	33	45	15	15	30	22	17	39	13	37	50	8	14	22	82	141	223
I62	25	18	43	15	10	25	33	20	53	28	14	42	17	4	21	13	4	17	131	70	201
I71	14	17	31	16	10	26	15	17	32	16	15	31	13	12	25	10	3	13	84	74	158
I38	10	14	24	22	23	45	15	14	29	8	7	15	9	8	17	9	5	14	73	71	144
I63	12	20	32	9	29	38	12	10	22	11	13	24	9	10	19	3	6	9	56	88	144
I31	9	8	17	15	27	42	19	9	28	8	10	18	6	8	14	13	5	18	70	67	137
I69	12	6	18	7	6	13	4	8	12	6	5	11	20	23	43	13	8	21	62	56	118
I60	14	14	28	9	7	16	6	5	11	7	14	21	4	10	14	4	5	9	44	55	99
I40	6	5	11	5	4	9	2	2	4	4	4	8	2	4	6	2	5	7	21	24	45
I49	6	2	8	1	4	5	6	2	8	4	4	8	1	8	9	2	4	6	20	24	44
OTHER	79	91	170	91	91	182	88	131	219	94	88	182	96	68	164	76	97	173	524	566	1090
TOTAL	2734	2935	5669	2368	2959	5427	2467	2888	5355	2848	3423	6271	3074	3493	6567	2781	3408	6189	16272	19106	35378

4.8.10. DISEASES OF THE RESPIRATORY SYSTEM

Table 17 below (page 57) shows the list of diseases of the respiratory system that were underlying causes of death for the study period.

Influenza and pneumonia (J00-J18) were the most predominant underlying causes of death in this disease group. Pneumonia, organism unspecified (J18) caused 67.4% of all deaths in this group and accounted for 10% of all deaths. Literature indicates that age and comorbid diseases are risk factors for pneumonia and it occurs more frequently in HIV-infected individuals than in the general population[61,62]. The numbers of pneumonia deaths have tripled from 2000 to 2005. The data shows that pneumonia deaths were most common in females.

Chronic lower respiratory diseases (J40-J47) were second leading underlying causes of death in persons with disease of the respiratory system. These diseases showed a decline as underlying causes of death, after rising to the peak between 2002 and 2003. Asthma (J45) was the leading cause of death in persons with chronic lower respiratory diseases and was most common in males.

Table 17: Gender Distribution and Frequency of Underlying Causes of Death due to Diseases of the Respiratory System

UNDERLYING CAUSES OF DEATH DUE TO DISEASES OF THE RESPIRATORY SYSTEM J00-J99																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
J18	1022	922	1944	1283	1428	2711	1717	1942	3659	2193	2604	4797	2406	2796	5202	2495	3068	5563	11116	12760	23876
J45	134	95	229	134	131	265	161	138	299	153	130	283	197	155	352	159	127	286	938	776	1714
J44	182	51	233	211	57	268	214	56	270	223	62	285	180	44	224	180	43	223	1190	313	1503
J40	33	20	53	43	35	78	86	88	174	136	121	257	104	87	191	136	73	209	538	424	962
J98	56	42	98	63	45	108	76	53	129	89	55	144	91	81	172	112	81	193	487	357	844
J84	33	20	53	33	40	73	42	36	78	63	62	125	133	138	271	109	132	241	413	428	841
J22	20	21	41	49	42	91	57	49	106	95	70	165	101	77	178	105	122	227	427	381	808
J42	80	60	140	105	84	189	75	55	130	75	66	141	38	24	62	31	24	55	404	313	717
J11	36	46	82	68	72	140	23	47	70	35	56	91	54	55	109	60	85	145	276	361	637
J46	27	38	65	41	43	84	33	33	66	36	38	74	58	62	120	57	59	116	252	273	525
J96	16	18	34	30	26	56	37	32	69	32	27	59	43	51	94	41	62	103	199	216	415
J43	56	29	85	46	26	72	35	17	52	34	11	45	25	7	32	19	8	27	215	98	313
J90	14	12	26	26	23	49	26	31	57	30	25	55	30	24	54	30	27	57	156	142	298
J69	15	10	25	28	22	50	29	18	47	39	21	60	30	19	49	41	18	59	182	108	290
J81	21	12	33	19	20	39	16	20	36	15	13	28	26	23	49	41	55	96	138	143	281
J20	13	7	20	23	19	42	15	19	34	14	19	33	15	15	30	16	24	40	96	103	199
J15	4	3	7	17	25	42	23	18	41	12	20	32	15	30	45	8	13	21	79	109	188
J80	9	1	10	15	8	23	7	7	14	7	10	17	16	11	27	15	17	32	69	54	123
J85	20	6	26	11	5	16	10	2	12	15	6	21	22	9	31	9	5	14	87	33	120
J03	8	8	16	7	14	21	9	5	14	8	10	18	5	5	10	7	13	20	44	55	99
J47	8	6	14	8	11	19	8	4	12	11	8	19	10	8	18	10	6	16	55	43	98
J12	4	9	13	5	14	19	6	10	16	7	14	21	3	1	4	1	3	4	26	51	77
Other	48	30	78	26	23	49	78	29	107	58	29	87	51	23	74	52	41	93	313	175	488
TOTAL	1859	1466	3325	2291	2213	4504	2783	2709	5492	3380	3477	6857	3653	3745	7398	3734	4106	7840	17700	17716	35416

4.8.11. DISEASES OF THE DIGESTIVE SYSTEM

Table 18 below (page 59) shows the list of diseases of the digestive system that were underlying causes of death for the study period.

The table shows that diseases of the liver (K70-77) were the major underlying causes of death in this group. Other diseases of the liver (K76) and hepatic failure, not elsewhere classified (K72) were among the major underlying causes of death in this category. Liver diseases were more common in males than females, with a male to female ratio of 1.6: 1.

Non-infective enteritis and colitis such as non-infective gastroenteritis and colitis (K52) were the second leading underlying causes of death in this disease group. These diseases were common underlying causes of death in females with female to male ratio of 1.6:1.

Diseases of the oesophagus, stomach and duodenum were the third leading underlying causes of death. Gastritis and duodenitis (K29) followed by peptic ulcer (K27) were the most common. Both diseases had a female predominance.

Table 18: Gender Distribution and Frequency of Underlying Causes of Death due to Diseases of the Digestive System

UNDERLYING CAUSES OF DEATH FOR DISEASES OF THE DIGESTIVE SYSTEM K00-K93																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
K52	66	107	173	132	184	316	165	239	404	235	353	588	266	471	737	250	420	670	1114	1774	2888
K76	99	66	165	120	71	191	121	61	182	147	93	240	131	78	209	107	92	199	725	461	1186
K72	97	52	149	93	64	157	107	81	188	104	83	187	124	84	208	108	98	206	633	462	1095
K29	31	36	67	77	86	163	89	100	189	112	139	251	77	97	174	58	106	164	444	564	1008
K74	142	55	197	141	43	184	133	61	194	102	47	149	93	41	134	92	47	139	703	294	997
K27	35	40	75	60	74	134	57	52	109	70	61	131	83	84	167	35	46	81	340	357	697
K75	18	20	38	46	44	90	59	46	105	55	44	99	56	61	117	92	47	139	326	262	588
K31	84	118	202	59	183	242	7	12	19	20	16	36	10	19	29	18	23	41	198	371	569
K56	36	30	66	48	34	82	46	20	66	66	33	99	65	38	103	69	47	116	330	202	532
K65	13	3	6	22	25	47	40	44	84	50	49	99	51	56	107	45	57	102	221	234	455
K92	27	9	36	30	18	48	34	24	58	50	27	77	49	24	73	47	42	89	237	144	381
K83	12	6	18	10	6	16	9	8	17	8	10	18	22	13	35	21	17	38	82	60	142
K70	20	7	27	15	4	19	17	9	26	12	10	22	9	6	15	15	3	18	88	39	127
K85	9	1	10	17	4	21	15	4	19	16	11	27	11	5	16	10	13	23	78	38	116
K25	10	7	17	8	6	14	4	4	8	11	11	22	13	8	21	8	6	14	54	42	96
K35	5	4	9	6	2	8	4	1	5	4	1	5	7	6	13	6	9	15	32	23	55
K55	1	3	4	5	2	7	2	0	2	3	2	5	5	3	8	9	5	14	25	15	40
K22	3	3	6	3	3	6	6	3	9	3	2	5	5	6	11	1	1	2	21	18	39
K59	1	2	3	2	2	4	4	3	7	3	4	7	5	0	5	6	7	13	21	18	39
OTHER	47	24	71	35	33	68	34	23	57	37	38	75	53	27	80	37	42	79	243	187	430
TOTAL	759	601	1350	933	890	1823	954	795	1749	1110	1036	2146	1138	1132	2270	1038	1132	2170	5932	5586	11518

4.8.12. DISEASES OF THE SKIN AND SUBCUTANEOUS TISSUE

Table 19 below (page 61) shows the list of diseases of the skin and subcutaneous tissue that were underlying causes of death for the study period.

The table shows that the decubitus ulcer (L89) was the single most common underlying cause of death contributing 35% to the deaths of persons with diseases of the skin and subcutaneous tissue. It is caused by pressure on the skin leading to ischaemic necrosis of the skin and impaired mobility is an important contributor[63].

Infections of the skin and subcutaneous tissue (L00-L08) were the leading causes of death in persons with diseases of the skin and subcutaneous tissue contributing 36%. Cellulitis (L03) was the common underlying cause of death in persons with this subgroup of infectious skin conditions.

Other disorders of the skin and subcutaneous tissue (L80-L99) were the third leading underlying causes of death.

Table 19: Gender Distribution and Frequency of Underlying Causes of Death due to Diseases of the Skin and Subcutaneous Tissue

UNDERLYING CAUSES OF DEATH DUE TO DISEASES OF THE SKIN AND SUBCUTANEOUS TISSUE L00-L99																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
L89	19	27	46	13	12	25	17	19	36	17	15	32	6	10	16	10	11	21	82	94	176
L03	3	9	12	10	10	20	6	8	14	7	8	15	16	18	34	13	9	22	55	62	117
L02	3	6	9	4	5	9	3	6	9	2	7	9	8	3	11	6	4	10	26	31	57
L98	3	2	5	2	3	5	3	2	5	1	5	6	10	6	16	9	3	12	28	21	49
L30	0	2	2	0	1	1	0	1	1	4	4	8	2	3	5	3	0	3	9	11	20
L51	2	2	4	2	0	2	1	2	3	1	4	5	1	0	1	0	2	2	7	10	17
L97	2	1	3	1	2	3	3	1	4	2	1	3	1	0	1	3	0	3	12	5	17
L08	2	0	2	0	2	2	1	0	1	1	1	2	0	0	0	0	0	0	4	3	7
Other	2	8	10	0	3	3	4	0	4	6	7	13	3	6	9	0	5	5	15	29	44
TOTAL	36	57	93	32	38	70	38	39	77	41	52	93	47	46	93	44	34	78	238	266	504

4.8.13. DISEASES OF THE MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE

Table 20 below (page 63) shows the list of diseases of the musculoskeletal system and connective tissue that were underlying causes of death for the study period.

The table shows that arthropathies (M00-M25) especially inflammatory polyarthropathies (M05-M14) were the commonest underlying causes of death and contributed 69% to the deaths in persons with diseases of the musculoskeletal system and connective tissue. Other rheumatoid arthritis (M06) contributed over 58% in this group of arthropathies and showed equal distribution in males and females.

Soft tissue disorders (M60-M79) were the second leading underlying causes of death contributing 19.4% to the deaths of persons with diseases of the musculoskeletal system and connective tissue.

Table 20: Gender Distribution and Frequency of Underlying Causes of Death for due to Diseases Musculoskeletal System and Connective Tissue

UNDERLYING CAUSES OF DEATH FOR MSC M00-M99																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
M06	100	72	172	86	86	172	50	60	110	69	81	150	0	8	8	3	1	4	308	308	616
M79	3	8	11	17	14	31	8	8	16	9	9	18	22	32	54	22	39	61	81	110	191
M13	0	4	4	4	4	8	3	9	12	3	12	15	5	13	18	15	14	29	30	56	86
M19	1	1	2	2	4	6	0	0	0	0	1	1	3	1	4	4	6	10	10	13	23
M86	3	2	5	1	0	1	2	0	2	1	1	2	3	1	4	1	3	4	11	7	18
M54	1	0	1	0	0	0	0	0	0	1	1	2	3	1	4	4	3	7	9	5	14
M62	1	0	1	4	0	4	0	0	0	1	0	1	0	2	2	2	4	6	8	6	14
M32	1	1	2	0	2	2	0	1	1	0	1	1	1	4	5	0	1	1	2	10	12
Other	7	2	9	8	4	12	5	7	12	10	9	19	5	13	18	6	7	13	41	42	83
TOTAL	117	90	207	122	114	236	68	85	153	94	115	209	42	75	117	57	78	135	500	557	1057

4.8.14. DISEASES OF THE GENITOURINARY SYSTEM

Table 21 below (page 65) shows the list of diseases of the genitourinary system that were underlying causes of death for the study period.

Renal failure (N17-N19) was the commonest underlying cause of death in persons with diseases of the genitourinary system contributing over 73% to the deaths. Unspecified renal failure (N19) was more common followed by chronic renal failure (N18) and acute renal failure (N17). The deaths were predominant among males.

The second leading underlying causes of death were glomerular diseases (N00-N08) contributing 5.6%. Unspecified nephritic syndrome (N05) was the most common with an almost equal gender distribution.

The third leading underlying causes of death were renal tubulo-interstitial diseases (N10-N16) contributing 5.2%.

Table 21: Gender Distribution and Frequency of Underlying Causes of Death due to Diseases of the Genitourinary System

UNDERLYING CAUSES OF DEATH FOR GUS N00-N99																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
N19	98	75	173	84	66	150	102	66	168	177	176	353	172	147	319	242	268	510	875	798	1673
N18	53	53	106	58	48	106	56	50	106	61	61	122	76	81	157	76	49	125	380	342	722
N17	30	27	57	56	48	104	38	31	69	47	37	84	60	47	107	57	39	96	288	229	517
N12	5	4	9	3	4	7	8	5	13	27	36	63	12	12	24	17	22	39	72	83	155
N05	4	6	10	10	4	14	16	13	29	12	15	27	9	5	14	2	7	9	53	50	103
N73	0	10	10	0	14	14	0	19	19	0	21	21	0	14	14	0	15	15	0	93	93
N40	14	0	14	13	0	13	14	0	14	17	0	17	10	0	10	19	0	19	87	0	87
N39	4	3	7	5	1	6	11	8	19	10	10	20	7	5	12	8	8	16	45	35	80
N04	5	7	12	2	3	5	3	1	4	4	3	7	8	5	13	7	10	17	29	29	58
N13	5	3	8	3	3	6	5	2	7	8	5	13	10	2	12	4	1	5	35	16	51
N28	3	2	5	7	2	9	3	2	5	6	3	9	3	3	6	9	2	11	31	14	45
N03	1	4	5	5	8	13	2	1	3	3	4	7	2	1	3	6	1	7	19	19	38
N00	1	1	2	4	1	5	1	2	3	3	2	5	1	0	1	1	3	4	11	9	20
OTHER	22	16	38	23	22	45	19	25	44	26	30	56	29	32	61	26	32	58	145	157	302
TOTAL	245	211	456	273	224	497	278	225	503	401	403	804	399	354	753	474	457	931	2070	1874	3944

4.8.15. PREGNANCY, CHILDBIRTH AND THE PUERPERIUM

Table 22 below (page 67) shows the list of conditions of pregnancy, childbirth and the puerperium that were underlying causes of death for the study period.

The table shows that oedema, proteinuria and hypertensive disorders in pregnancy, childbirth and the puerperium (O10-O16) were the leading underlying causes of death contributing 30% to deaths in pregnancy, childbirth and the puerperium. Eclampsia (O15) was the major underlying cause of death for the group of oedema, proteinuria and hypertensive disorders and a leading underlying cause of death for all pregnancy, childbirth and puerperal conditions.

Complications predominantly related to the puerperium (O85-O92) were the second leading underlying causes of death for pregnancy, childbirth and the puerperium contributing 18.2%. Puerperal sepsis (O85) was the second leading cause of death after eclampsia.

Pregnancy with abortive outcomes (O00-O08) was the third leading underlying causes of death related to pregnancy, child birth and the puerperium. Ectopic pregnancy (O00) and unspecified abortion (O06) contributed 17.6% to the deaths in this group of disorders.

Table 22: Frequency of Underlying Causes of Death in Pregnancy, Childbirth and the Puerperium

UNDERLYING CAUSES OF DEATH FOR PCP O00-O99																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
O15	0	13	13	0	7	7	0	6	6	0	16	16	0	20	20	0	15	15	0	77	77
O85	0	8	8	0	6	6	0	17	17	0	12	12	0	8	8	0	8	8	0	59	59
O00	0	10	10	0	0	0	0	4	4	0	11	11	0	12	12	0	9	9	0	46	46
O99	0	5	5	0	4	4	0	4	4	0	6	6	0	10	10	0	8	8	0	37	37
O26	0	3	3	0	3	3	0	1	1	0	6	6	0	3	3	0	6	6	0	22	22
O75	0	6	6	0	2	2	0	3	3	0	4	4	0	2	2	0	3	3	0	20	20
O06	0	5	5	0	2	2	0	5	5	0	2	2	0	0	0	0	4	4	0	18	18
O14	0	4	4	0	1	1	0	0	0	0	3	3	0	4	4	0	5	5	0	17	17
O71	0	4	4	0	3	3	0	2	2	0	3	1	0	1	1	0	3	3	0	16	16
O45	0	4	4	0	2	2	0	2	2	0	5	5	0	2	2	0	0	0	0	15	15
O16	0	1	1	0	2	2	0	3	3	0	2	2	0	2	2	0	3	3	0	13	13
O90	0	0	0	0	2	2	0	2	2	0	0	0	0	1	1	0	2	2	0	7	7
OTHER	0	11	11	0	6	6	0	13	13	0	20	20	0	13	13	0	30	30	0	93	93
TOTAL	0	61	61	0	33	33	0	56	56	0	74	72	0	58	57	0	81	81	0	363	363

4.8.16. CERTAIN CONDITIONS ORIGINATING IN THE PERINATAL PERIOD

Table 23 below (page 69) shows the list of certain conditions originating in the perinatal period that were underlying causes of death for the study period.

The table shows that the respiratory and cardiovascular disorders specific to the perinatal period (P20-P29) contributed 42.3% to the perinatal deaths. Congenital pneumonia (P23) was the most common cause of death. It resulted in deaths almost equally in males and females.

Digestive system disorders of the fetus and newborn (P75-P78) were the second leading causes of perinatal deaths. Other digestive system disorders (P78) were most common in males.

Other disorders originating in the perinatal period (P90-P96) such as feeding problems of the newborn (P92) and other conditions originating in the perinatal period (P96) were the third leading underlying causes of perinatal deaths.

Disorders related to length of gestation and fetal growth (P05-P08) included disorders related to short gestation and low birth weight, not elsewhere classified (P07) as well as infections specific to the perinatal period (P35-P39) such as bacterial sepsis of the newborn (P36) and other congenital infectious and parasitic diseases (P37) were also underlying causes of perinatal deaths.

Perinatal mortality is a useful indicator if the quality of antenatal and obstetric care[64]. The rise in perinatal deaths may indicate improved data collection or deteriorating antenatal and obstetric care. However, the analysis is inconclusive as data on total live births over the period is lacking.

Table 23: Gender Distribution and Frequency of Underlying Causes of Death due to Certain Conditions originating in the perinatal period

UNDERLYING CAUSES OF DEATH FOR CPP P00-P96																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
P23	148	138	286	163	156	319	163	216	379	252	218	470	292	289	581	332	373	705	1350	1390	2740
P78	146	108	254	131	118	249	172	150	322	205	191	396	306	273	579	373	296	669	1333	1136	2469
P96	52	43	95	55	53	108	70	71	141	112	99	211	169	150	319	219	185	404	677	601	1278
P07	25	49	74	26	27	53	40	33	73	49	38	87	43	42	85	33	38	71	216	227	443
P22	24	21	45	22	19	41	29	26	55	38	30	68	54	53	107	66	56	122	233	205	438
P28	19	21	40	17	20	37	20	29	49	25	30	55	46	41	87	43	46	89	170	187	357
P21	15	16	31	16	13	29	30	15	45	41	19	60	48	25	73	61	37	98	211	125	336
P36	21	17	38	16	17	33	29	21	50	38	30	68	27	31	58	28	31	59	159	147	306
P24	24	14	38	16	14	30	26	21	47	26	13	39	37	18	53	51	29	80	180	109	289
P37	15	8	23	11	4	15	23	16	39	21	16	37	18	15	33	30	42	72	118	101	219
P74	9	5	14	9	12	21	22	10	32	22	12	34	12	8	20	17	10	27	91	57	148
P02	9	10	19	8	6	14	24	14	38	16	18	34	13	11	24	11	6	17	81	65	146
P29	12	6	18	7	6	13	8	18	26	11	6	17	11	8	19	8	13	21	57	57	114
P00	13	5	18	4	11	15	11	5	16	11	8	19	11	2	13	10	4	14	60	35	95
P92	1	1	2	1	4	5	3	0	3	6	3	9	10	11	21	13	15	28	34	34	68
P20	3	5	8	5	5	10	4	0	4	6	5	11	9	4	13	7	3	10	34	22	56
Other	74	67	141	69	39	108	69	58	127	47	70	117	66	61	107	70	50	120	395	345	740
TOTAL	610	534	1144	576	524	1100	743	703	1446	926	806	1732	1172	1042	2192	1372	1234	2606	5399	4843	10242

4.8.17. CONGENITAL MALFORMATIONS, DEFORMATIONS AND CHROMOSOMAL ABNORMALITIES

Table 24 below (page 71) shows the list of congenital malformations, deformations and chromosomal abnormalities that were underlying causes of death for the study period.

The table shows that congenital malformations of the circulatory system were the leading underlying causes of death. Other congenital malformations of the heart (Q24) and congenital malformations of the septa (Q21) were the main causes of death. These conditions were more common in females than males and contributed 18% to the deaths due to congenital malformations and deformations.

Congenital malformations of the nervous system (Q00-Q07) were the second leading underlying causes of death contributing 16% to the deaths of person with congenital malformations, deformations and chromosomal abnormalities. Anencephaly and similar malformations (Q00), congenital hydrocephalus (Q03) and spina bifida (Q05) were the main underlying causes of death. The gender distribution of congenital malformations of the nervous system was equal.

Other congenital malformations (Q80-Q89) such as other congenital malformations, not elsewhere classified (Q89) and chromosomal abnormalities, not elsewhere classified (Q90-Q99) such as Down's syndrome (Q90), together contributed 19% with almost equal gender distribution.

Table 24: Gender Distribution and Frequency of Underlying Causes of Death due to Congenital Malformations, Deformations and Chromosomal Abnormalities

UNDERLYING CAUSES OF DEATH FOR MDC Q00-Q99																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Q24	8	11	19	3	11	14	7	5	12	6	2	8	8	6	14	11	13	24	43	48	91
Q89	3	4	7	4	5	9	9	8	17	6	10	16	8	7	15	12	12	24	42	46	88
Q03	4	1	5	0	7	7	8	6	14	8	9	17	7	2	9	4	5	9	31	30	61
Q90	3	7	10	2	1	3	7	4	11	2	2	4	1	4	5	4	4	8	19	22	41
Q05	4	3	7	0	3	3	4	4	8	2	2	4	2	4	6	5	2	7	17	18	35
Q21	3	2	5	1	2	3	2	2	4	4	3	7	2	6	8	3	3	6	15	18	33
Q44	3	1	4	3	2	5	1	1	2	4	5	9	3	0	3	5	0	5	19	9	28
Q00	2	0	2	1	1	2	3	1	4	0	0	0	0	2	2	0	2	2	6	6	12
OTHER	16	8	24	20	14	34	21	22	43	21	19	40	31	31	62	44	41	85	153	135	288
TOTAL	46	37	83	34	46	80	62	53	115	53	52	105	62	62	124	88	82	170	345	332	677

4.8.18. SYMPTOMS, SIGNS AND ABNORMAL CLINICAL AND LABORATORY FINDINGS, NOT ELSEWHERE CLASSIFIED

Table 25 below (page 73) shows the gender distribution and frequencies of symptoms, signs and abnormal laboratory findings, not elsewhere classified that were underlying causes of death for the study period.

The table shows that ill-defined and unknown causes of mortality (R95-R99) were the major underlying causes of death. Other ill-defined and unspecified causes of mortality (R99) contributed 12.8% to the total number of deaths in the study as well as 74.4% in the group. These ill-defined and unspecified causes of mortality showed a female preponderance.

General symptoms and signs (R50-R69) were the second leading underlying causes of death contributing 23% in this group. Senility (R54) was the common underlying cause of death and was predominant in females.

Table 25: Gender Distribution and Frequency of Underlying Causes of Death due to Symptoms, Signs and Abnormal Clinical and Laboratory Findings, NEC

UNDERLYING CAUSES OF DEATH FOR SYS R00-R99																					
	2000			2001			2002			2003			2004			2005			TOTALS		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
R 99	1418	1682	3100	2004	2566	4570	2424	3081	5305	2458	3072	5530	2347	2719	5066	2474	3016	5490	13125	16136	29261
R 54	526	1094	1620	568	1066	1634	405	812	1217	539	886	1425	498	895	1393	496	843	1339	3032	5596	8628
R 5	7	8	15	10	8	18	36	23	59	32	30	62	12	12	24	8	5	13	105	86	191
R 10	12	20	32	8	9	17	8	11	19	19	43	62	7	7	14	3	6	9	57	96	153
R 11	3	5	8	3	5	8	9	13	22	7	13	20	6	10	16	7	6	13	35	52	87
R 63	1	2	3	0	3	3	11	9	20	14	18	32	7	4	11	3	5	8	36	41	77
R 51	3	4	7	4	5	9	2	3	5	12	13	25	6	3	9	7	3	10	34	31	65
R 52	2	5	7	1	8	9	4	6	10	8	9	17	4	11	15	3	4	7	22	43	65
R 9	12	8	20	4	2	6	9	5	14	6	2	8	1	3	4	3	1	4	35	21	56
R 6	3	2	5	5	1	6	7	7	14	9	7	16	3	4	7	2	1	3	29	22	51
R 57	4	5	9	4	2	6	9	5	14	5	9	14	1	3	4	1	2	3	24	26	50
R 2	7	6	13	2	3	5	6	4	10	9	4	13	1	2	3	4	1	5	29	20	49
R 64	1	0	1	1	1	2	5	9	13	8	6	14	4	5	9	2	5	7	21	26	47
R 7	2	4	6	1	1	2	2	5	7	8	11	19	1	1	2	5	1	6	19	23	42
R 50	4	6	10	3	1	4	4	4	8	5	7	12	3	3	6	0	1	1	19	22	41
R 56	2	4	6	2	1	3	5	4	9	9	5	14	1	4	5	2	1	3	21	19	40
R 60	2	0	2	0	4	4	3	5	8	3	10	13	4	6	10	0	0	0	12	25	37
R 4	6	2	8	1	2	3	6	0	6	3	0	3	4	0	4	2	1	3	22	5	27
R 58	4	1	5	3	3	6	2	1	3	2	3	5	1	0	1	1	4	5	13	12	25
R 73	1	1	2	1	0	1	1	5	6	1	1	2	4	0	4	3	0	3	11	7	18
Other	24	34	58	20	24	44	33	34	67	32	32	64	17	26	43	19	17	36	145	167	312
	2044	2893	4937	2645	3715	6360	2991	4046	6836	3189	4181	7370	2932	3718	6650	3045	3923	6968	16846	22476	39322

4.9. SUMMARY

The data analysis, presentation and interpretation have revealed that:

- the numbers of deaths are increasing;
- more females than males are dying of natural causes;
- the crude deaths rates are increasing;
- younger people are dying;
- deaths due to tuberculosis are increasing;
- deaths due to gastroenteritis are mainly infectious in origin;
- deaths due to opportunistic infections have increased despite a decline in HIV deaths;
- unspecified malaria deaths are increasing;
- deaths due to malignant neoplasms of cervix uteri are increasing;
- deaths due to diabetes mellitus are common in females;
- deaths due to psychoactive substance use are common in males;
- meningitis was a more common cause of death in females than males;
- deaths due to diseases of the circulatory system are common in females;
- pneumonia caused more female deaths whereas asthma caused more male deaths;
- liver diseases caused more male deaths than female;
- renal failure caused more male deaths than females;
- eclampsia, puerperal sepsis and ectopic pregnancy were leading causes of maternal deaths;
- respiratory and cardiovascular disorders of the perinatal period were major causes of perinatal deaths;
- symptoms, signs and abnormal laboratory findings contributed 17.2% to the total number of deaths;

CHAPTER 5

5. DISCUSSION

5.1. INTRODUCTION

The data was presented, analysed and interpreted according to the objectives of an epidemiological study of natural deaths in Limpopo. The following discussion is based on the findings of the study. The epidemiology of natural deaths will be discussed and the research question will be answered at conclusion of the discussion.

5.2. WHO IS DYING?

The number of female deaths is higher than that of males. This is not surprising because according to the 2001 census 52.2% of the population in Limpopo was female and predominant in the adult age group[36]. Internal labour migration for Limpopo men has reduced the population of men in the province[65]. The other reason for this high number of female deaths due to natural causes may be due to the fact that fewer women die from unnatural causes of death as compared to males[7]. Figure 2 shows that the percentage of female deaths corresponds to the size of the female population.

The crude death rate for Limpopo province has increased from 7.0 per 1000 persons to 9.5 per 1000 persons, year on year. The crude death rate of Limpopo reached the 2008 global crude death rate way back in 2005. The sudden increase in crude death rate over a short period of time is a cause for concern. The distribution of the increases in number of deaths is displayed in table 3 and figure 2. The increase calculated shows that the number of male and female deaths increased by 48% and 68% respectively over the six year period.

Table 4 shows that the under-five mortality contributed about 10% of the total number of natural deaths. The next wave of increase in the number of deaths is seen between the ages of 20 and 54 years. This indicates that 44.6% of the deaths during the study period occurred between the ages of 20 and 54 years. This is both an economically active and sexually reproductive age group. The large number of deaths is also shown to occur after the age of 80 years and contributed 13% to the total number of deaths as a single age group.

Table 5 illustrates the negative change in the mean age of death from 2000 through to 2005. It shows that the population has lost a mean difference of about 5 years in the age of death from 2000 to 2005. Table 6 shows the differences in the means and the modes between 2000 and 2005. The measures of central tendency and dispersion are clearly displayed. Box 1 is a calculation used to compare the means age of death. The finding was that the mean age of death has changed and these were statistically significant changes.

5.3. WHAT ARE THE PRIMARY CAUSES OF DEATHS?

The 10 leading groups of causes of deaths are discussed as the primary causes of death in Limpopo. This is due to the high contribution of 96.8% towards the total number of deaths. The other causes of death will be included as part of the conclusions and recommendations.

Infectious and parasitic diseases were the leading causes of death. Indicating that Limpopo is a developing province and a large numbers of deaths are contributed by infectious diseases[36]. There are also a large number of deaths whose causes are ill-defined or unknown.

Tuberculosis is a major underlying cause of death in persons with infectious and parasitic diseases. It has increased resulting in deaths of more males than females and has doubled in both genders since 2000. A large number of TB deaths are not diagnosed bacteriologically and histologically. The assumption derived from this is that TB is related to HIV. The literature has confirmed that, diagnosis of TB in HIV positive persons is rendered more difficult by an increased frequency of sputum smear negative disease[13]. These deaths may mirror an underlying HIV epidemic which is fuelling a TB epidemic. The increase in the number of extra-pulmonary TB infections year on year is also a cause for concern.

There is an increase in diarrhoea and gastroenteritis presumed infectious in origin. Diarrhoea continues to be a leading killer of young children despite advances in prevention and treatment. Rotavirus has been implicated in literature[66]. It was the second leading underlying cause of death among deaths caused by infectious diseases. It has been increasing causing more deaths of females than males. Waterborne diseases have not increased among intestinal infectious diseases despite knowledge that public health control measure such as water and sanitation are not in place in Limpopo.

Unspecified malaria deaths have increased which suggests that specific diagnostic tests are not used to diagnose malaria or an introduction of plasmodium other than falciparum has occurred in the community. The increasing number of unspecified malaria deaths may indicate that presentations to the health services are delayed after a malaria infection, thereby delaying diagnosis and treatment. Malaria results in 1 million deaths in sub-Saharan Africa and accounts for about 20% of the under-five deaths[66]. The targets of MDG 5 are to halve and begun to reverse the spread of HIV/AIDS, Malaria and other major diseases however the table shows that deaths due to these diseases have increased year on year. The targets of MDG 5 are to halve and begin to reverse the spread of HIV/AIDS, malaria and other major diseases, however, deaths due to these diseases have increased from 2000 to 2005 in Limpopo province.

There was an increase in deaths due to opportunistic infections despite a decline in HIV deaths, suggestive of an underlying HIV epidemic with inappropriate recording of the underlying causes of death by medical practitioners.

Symptoms, signs and abnormal laboratory findings, not elsewhere classified are the second leading causes of death. Ill-defined and unspecified causes of mortality were the major cause of dearth; contributing about 13% to the total number of deaths. Senility was the second leading cause of death in this category. The deaths are more common in females and indicate that many of the old age female deaths are undiagnosed.

This finding is contrary to literature that indicates that there has been an increase in deaths certified by a medical practitioner from 80% in 1995 to 96% in 1996 in Limpopo province[Error! Bookmark not defined.]. These ill-defined causes of death indicate that the quality of the diagnosis for the underlying causes of death is poor or that the deaths were not attended to by medical practitioners or pathologists and therefore, a diagnosis could not be made.

This discrepancy in the number of deaths certified by medical practitioners could have been caused by a decline in the number of medical practitioners in the province over the time period, resulting in a 9% drop in the diagnosis of deaths.

Pneumonia of unspecified organism was the predominant underlying cause of death among persons with diseases of the respiratory system affecting more females than males. The large numbers of pneumoniae which go undiagnosed poses a challenge of determining the offending organisms and the presence of resistant organisms if any. The fact that these are infectious pneumoniae compounds on infectious diseases thereby increasing the number of persons who die of infectious diseases. Pneumonia caused more female than male deaths. Staphylococcus pneumonia, pneumonia in HIV infected patients and hospital acquired pneumonia have higher mortalities if not treated appropriately[67].

Chronic diseases such as asthma are the second leading underlying causes of death among persons with respiratory diseases. The mortality rate is estimated at more than 2000 per year in the UK. The acute severe type of asthma carries a significant mortality. Asthma caused more male than female deaths in this study.

Stroke, not specified as haemorrhage or infarction, heart failure and hypertensive disease are the leading causes of death in females with diseases of the circulatory system. These diseases are related to a population profile of cardiovascular risk factors. The two factors implicated in the rise of deaths due to diseases of the circulatory system are;

- over nutrition with a high fat content in the diet;
- health transition of the population that is moving away from problems of infectious diseases and marginal nutrition[68];

Neoplasms of the female genital organs are the leading underlying causes of death in persons with neoplasms. Cancer of the cervix is the leading cause of

death. This finding is consistent with literature which indicates that cervical cancer is the leading cause of cancer death among black women and is recognized as an AIDS defining illness[68,69].

Neoplasms of the digestive organs are the second leading causes of death in this category, of which cancer of the oesophagus is the most common with a male predominance. The third leading cause of death is neoplasms of the intrathoracic cavity. Cancer of the bronchus and lung is 3 to 4 times higher in males as compared to females.

Cancer of the prostate contributed 7.4% to cancer deaths. The male breast cancer is the higher than one would anticipate from the literature. Kaposi sarcoma is rising and causing more male deaths.

It is estimated that one third of the cancers are preventable and one third are curable if detected early, and the financial savings for such actions are enormous for developing countries[70, 71] .

Liver diseases were the major underlying causes of death and showed a male predominance. These liver diseases are mainly undiagnosed. Non-infective gastroenteritis and colitis in patients with reduced T cell counts are usually caused by organisms of limited virulence, difficult to diagnose and respond poorly to treatment[72]. This may be the reason for occurrence of these death especially in persons infected with HIV.

Respiratory and cardiovascular disorders are the major underlying causes of death of the perinatal period. Congenital pneumonia is the common underlying cause of death for males and females in the perinatal period. Digestive system disorders of the fetus and the newborn were second leading underlying causes of death. Feeding problems and prematurity were the third and fourth leading causes of death respectively.

The objective of MDG 4 is to reduce child mortality and perinatal deaths. In this study perinatal deaths contributed over 43% of the under-5 deaths which is higher than the global estimates of 38% contribution to child deaths[73]. The main direct causes of neonatal deaths are estimated to be preterm deaths, severe infections and asphyxia. Maternal complications in labour carry a high risk of neonatal deaths, and poverty is also associated with an increased risk[73]. The increase year after year in perinatal deaths indicates deterioration in maternal health status.

The majority of pregnant women died of oedema, proteinuria and hypertensive disorders of pregnancy, childbirth and the puerperium. Eclampsia was the common underlying cause of death. Puerperal sepsis was the second leading cause of maternal death. Ectopic pregnancy was a third leading cause of maternal death.

The objective of MDG 5 is to improve maternal health by reducing maternal mortality by 75% between 1990 and 2015 and one of its indicators in the maternal mortality ratio. The above mentioned conditions continue to cause maternal deaths and are all related to pregnancy and the puerperium. Research has shown that maternal deaths mirrors neonatal deaths and occur in the third trimesters and the first two days after birth. Stillbirths in the last 12 weeks of pregnancy are directly linked to maternal mortality[74], and maternal mortality is not the only outcome with which progress towards MDG-5 should be judged.

The wider continuum of non-fatal results of pregnancy and childbirth are also important[20]. This means that MDG 4 and 5 are interlinked, and achievement of MDG 5 will result in a significant improvement in MDG 4. Maternal mortality has been selected by 189 countries as the target for substantial reduction by 2015 and reflects on the progress towards the provision of antenatal care and emergency obstetric services.

The common underlying cause of death due to endocrine, nutritional and metabolic disorders is unspecified diabetes mellitus followed by volume depletion and malnutrition. Insulin dependent diabetes mellitus shows less contribution to the number of deaths as compared to non-insulin dependent diabetes mellitus. Diabetes mellitus caused significant female deaths whereas volume depletion caused more male deaths. Malnutrition deaths have increased indicating an underlying hunger problem or poor feeding associated with HIV.

Disorders of the immune system are the common underlying causes of death for persons with diseases of the blood, blood forming organs and certain disorders involving the immune mechanism. Other immunodeficiencies are the commonest causes of death followed by anaemias and coagulation defects. Females are more affected by diseases of the blood and blood forming organs and certain disorders involving the immune mechanism.

Inflammatory diseases of the nervous system, meningitis due to other and unspecified causes are predominant in females. Episodic and paroxysmal disorders, epilepsy and status epilepticus is common in males. Paraplegia, tetraplegia and infantile cerebral palsy are also common underlying causes of death in males with diseases of the nervous system.

CHAPTER 6
LIMITATIONS, CONCLUSION AND RECOMMENDATIONS

6.1. LIMITATIONS

The data is part of routine health information in South Africa and Statistic South Africa collects mortality data[75]. This data was aggregated by the Epidemiology Unit of the National Institute for Occupational Health and made available for the study. The data was not collected for the purpose of the study and therefore, some information was missing with regards to the age, gender and underlying ICD 10 diagnosis of the deceased persons. The study may also have been limited by the fact that only one source was used, therefore the information could not be verified and missing data could not be traced.

6.2. CONCLUSION

However, despite these limitations the data was analysed and the following conclusions could be drawn from the study:

- There are high numbers of female deaths.
- The numbers of deaths are increasing every year.
- The under-five mortality contributed about 10% to the total proportion of deaths
- The highest proportion of deaths is between the ages of 20 and 49.
- The mean age of death has declined by almost 5 years.
- Infectious and parasitic diseases are the major causes of death.
- Respiratory TB not confirmed bacteriologically or histologically is increasing as the underlying cause of death among males and females.
- Diarrhoea and gastroenteritis presumed infectious in origin is the major underlying cause of death in females with infectious diseases.

- HIV deaths are declining despite an increase in deaths due to opportunistic infections.
- Unspecified malaria deaths are increasing.
- The halting and reversing of TB and malaria was not achieved in the first six years of the establishment of MDG 5.
- Malignant neoplasm of the cervix uteri is increasing as the underlying cause of death in females with neoplasms.
- Malignant neoplasm of the oesophagus was the second leading underlying cause of death and shows a male predominance in persons with neoplasms.
- Malignant breast neoplasms as an underlying cause of death in males is higher compared to global trends.
- Immunodeficiencies were predominant underlying cause of death in females with disorders of the immune mechanism.
- Diabetes mellitus was the leading underlying cause of death in persons with endocrine, nutritional and metabolic disorders and shows a female predominance.
- Volume depletion is the common underlying cause of death in males with metabolic disorders
- Malnutrition and kwashiorkor have increased in the first and the last 2 years
- Reduction by half the proportion of people who suffer from hunger, target 1c of MDG 1 was not achieved as hunger deaths were not eliminated in the first 6 years of the MGD 1.
- Organic, including symptomatic mental disorders are underlying causes of death common in females with mental and behavioural disorders.
- Mental and behavioural disorders due to psychoactive substance use are common underlying causes of death in males and are secondary to alcohol and tobacco use.

- Unspecified nonorganic psychosis is a common underlying cause of death in females whereas schizophrenia is common in males.
- Meningitis due to other and unspecified causes is the leading disease of the nervous system as well as a common underlying cause of death in female.
- Epilepsy and status epilepticus are diseases of the nervous system common in males as the underlying causes of death.
- Cerebral palsy and other paralytic syndromes predominate in males.
- Disorders of the orbit are the most diseases of the eye and adnexa resulting in death.
- Suppurative and unspecified otitis media are the most common diseases of the ear and mastoid process resulting in death.
- Stroke, not specified as haemorrhage or infarction, is one of the common diseases of the circulatory system and results in significantly more deaths in females than males.
- Heart failure as an underlying cause of death is more common in females and males.
- Hypertensive diseases such as hypertensive heart disease and essential hypertension show preponderance in females.
- Pneumonia is the most common underlying cause of death in persons with diseases of the respiratory system and has been increasing every year.
- Asthma is the second leading chronic lower respiratory disease predominant as the underlying cause of death in persons with diseases of the respiratory system.
- Liver diseases are the most common underlying causes of death in persons with diseases of the digestive system.
- Non-infective enteritis and colitis are common underlying causes of death in female with diseases of the digestive system.

- Gastritis, duodenitis and peptic ulcer are the underlying causes of death in females with diseases of the oesophagus, stomach and duodenum.
- Decubitus ulcer or pressure sore is the underlying cause of death in person with diseases of the skin and subcutaneous tissue.
- Cellulitis was the second most common underlying cause of death in person with diseases of the skin and subcutaneous tissue.
- Arthropathies were the most common cause of cause of death in persons with musculoskeletal and connective tissue disorders.
- Renal failure was the most common underlying cause of death in persons with diseases of the genitourinary system affecting more males than females. .
- Eclampsia was the leading underlying cause of death in pregnancy, childbirth and the puerperium.
- Puerperal sepsis was the second leading underlying cause of death in pregnancy, childbirth and the puerperium.
- Ectopic pregnancy was the third leading underlying cause of death in pregnancy, childbirth and the puerperium.
- Maternal deaths have not declined in the first 6 years of MDG 5 citing a critical lack of skilled health workers in the delivery of services to reduce deaths related to eclampsia, puerperal sepsis and ectopic pregnancy.
- Congenital pneumonia is a respiratory disorder of the perinatal period, and the leading underlying cause of death in males and females in this category.
- Digestive disorders of the newborn are second most common conditions leading to death in the perinatal period.
- Feeding problems of the newborn are third most common conditions leading to death in the perinatal period.

- Disorders related to the short gestation and low birth weight as well as bacterial and parasitic infections are fourth leading causes of death in the newborn female.
- The increase in perinatal deaths indicates that the Millennium Development Goal for child survival has not been met from 2000 to 2005.
- Congenital malformations of the circulatory system such as congenital malformations of the heart and septa are the common underlying causes of death in person females with congenital malformations, deformations and chromosomal abnormalities.
- Congenital malformations of the nervous system such as anencephaly, congenital hydrocephalus and spina bifida are the second leading underlying causes of death in persons with congenital malformations, deformations and chromosomal abnormalities.
- Other congenital malformations and chromosomal abnormalities such as Down's syndrome are third leading causes of death with an equal gender distribution.
- Ill-defined and unknown causes of mortality such as ill-defined and unspecified mortality are leading underlying causes of death in the study.

6.3. RECOMMENDATIONS

The following recommendations can be made from the findings and conclusions of this study:

- The services be planned and implemented to respond to increasing number of orphans as a result of the high number of deaths in the 20 to 49 years age group.

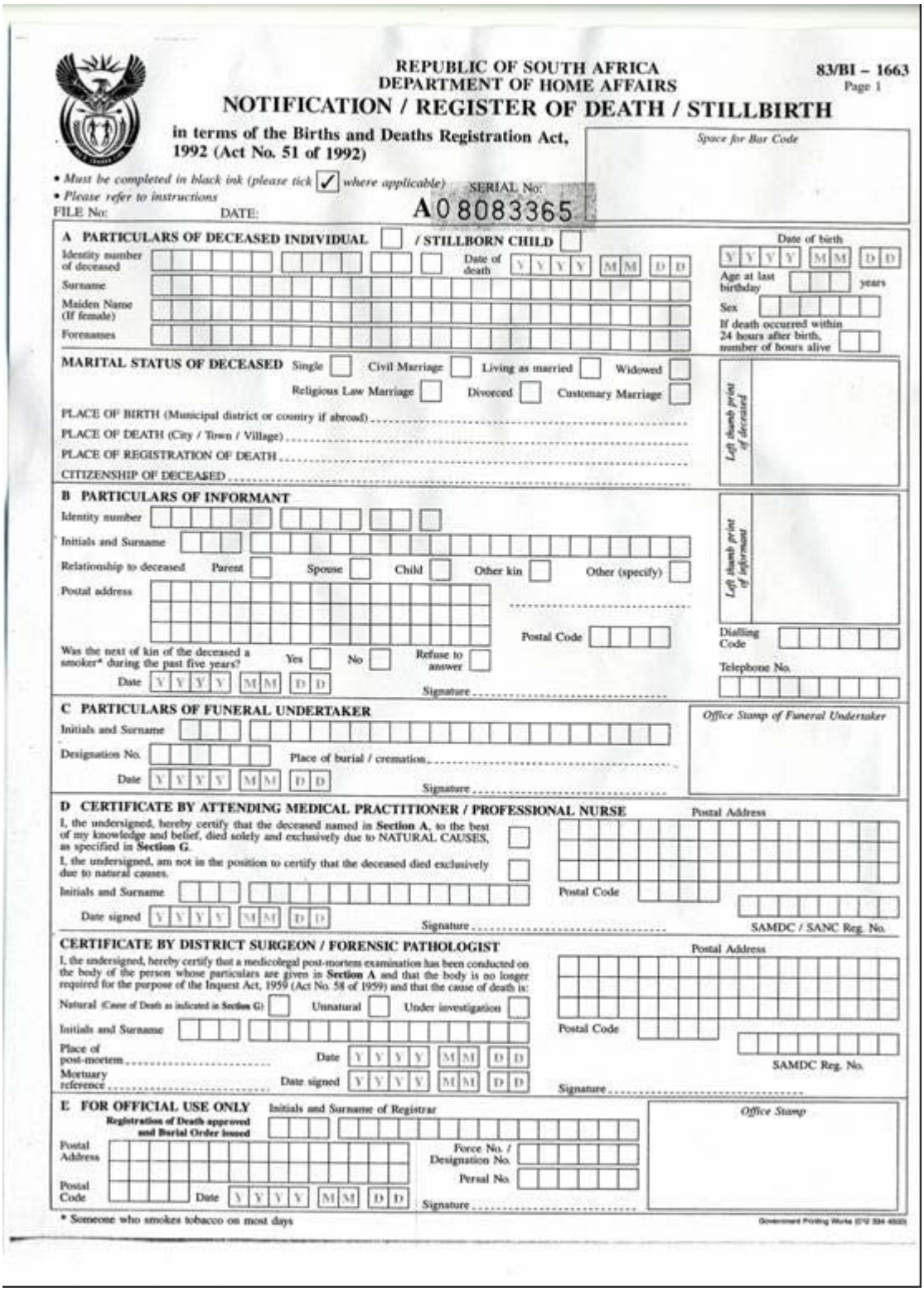
- Health promotion and preventive services should be intensified and targeted to the under-20 age groups in order to prevent HIV/TB and other infectious diseases.
- The municipal health services should plan and manage the provision of water, sanitation and funeral services such burial grounds, coffins and tombstones.
- The TB programme should be monitored and evaluated in terms of achieving the aims and goals of the National TB Control Programme.
- The public health programme of the province should be strengthened in order to respond to the infectious diseases such as malaria, infectious diarrhoea and gastroenteritis.
- The achievement of the Millennium Development Goal for halting and beginning to reverse infectious diseases should receive high priority.
- An epidemiological study should be conducted to investigate the profile of women dying due to cancer of the cervix.
- Efforts aimed at early detection and management of cervical cancer should be strengthened with revised screening programmes recommended by the above study and responding to the HIV epidemic.
- Health promotion and prevention of alcohol and tobacco use in order to combat malignant neoplasms of the digestive, respiratory, intrathoracic organs as well as mental and behavioural disorders.
- Increasing screening efforts aimed at early detection of breast cancer and promotion of breast cancer awareness in males.
- Early detection and management of Kaposi sarcoma.
- To establish a tertiary haematology unit to investigate and manage the high number of immunodeficiencies, aplastic anaemias, coagulation defects and other haemorrhagic conditions.
- Nutritional interventions to promote good balanced nutrition in order to combat diabetes and diabetes related deaths.

- A tertiary or provincial endocrine centre should be established in order to do research and other work aimed at prevention and management of diabetes.
- A nation-wide campaign aimed at fluid management at home should be embarked on in order to reduce the number of deaths related to fluid depletion.
- Origins of malnutrition related deaths should be traced and interventions aimed at eliminating deaths caused by hunger be established in all communities.
- Achievement of MDG 1 should be a priority for government, business and the community.
- Health care workers should be trained to identify underlying diseases resulting in mental and behavioural disorders.
- Health care workers and community awareness of meningitis should be heightened.
- Current epilepsy and status epilepticus protocols should be revised and continuous research into prevention and treatment modalities encouraged and supported.
- Outreach to train health workers about the early identification and referral of disorders of the orbit should be done.
- Protocols to manage suppurative otitis media should be revised in order to eliminate mortality related to otitis media.
- Prevention and management of hypertension in the community should be established with activities aimed at treatment, reducing salt and fat intake, promotions of exercise and fruit as well as vegetable intake.
- Pneumonia management protocols should be evaluated for effectiveness and relevance in the HIV era.
- Asthma management protocol should be aligned to successful global evidence based trends.

- A tertiary gastroenterology unit should be established to treat and advise on management of non-infective gastroenteritis, colitis, diseases of the oesophagus, stomach and duodenum.
- Prevention and management of cellulitis and pressure sores at home and health facilities should receive high priority in immobile persons.
- A tertiary rheumatology unit should be established to treat and advise on management of diseases of the musculoskeletal system and connective tissue
- Health promotion programmes should be established that will target prevention of renal failure in the community and encourage kidney donation.
- A tissue bank should be established in order to preserve organs needed for transplants.
- A renal transplant unit should be established as part of the renal unit in order to deal with patients who need kidney transplant.
- Maternal Health Programmes should be monitored and evaluated in terms of progress towards the achieving the MDG 5.
- Protocols for early detection and management of eclampsia should be established.
- Protocols for puerperal sepsis including home based care and follow up of new mothers should be established.
- Emergency obstetric services should be established in health centres and hospitals in order to deal with blood and operative requirements.
- Antenatal care services should be scaled up to reach rural areas and areas not accessible by health services. The reintroduction of the traditional birth attendant in difficult to reach areas should be established.
- Facilities should be established to respond to the prevention and management of congenital pneumonia, digestive system disorders of the fetus and newborn, feeding problems of the newborn, disorders related to short gestation, low birth weight and infections specific to the perinatal period.

- Neonatal care services should be scaled up to community level and integrated with health services delivery.
- Child health programmes should be monitored and evaluated in terms of progress towards achieving MDG 4.
- A Birth Defect Surveillance System and Resource Centres should be established in order do research, determine the causes, monitor, help prevent as well as develop services for congenital malformations, deformations and chromosomal abnormalities.
- Pathology services should be expanded to include performance of post-mortems where natural causes of death are suspected but the cause cannot be determined.
- An effort should be made to improve the quality of data captured on the death certificates in order to reduce the high number of ill-defined causes of death and the number of diagnoses that do not cause death.

APPENDIX 1A: SMPLE OF 83/BI-1663 FORM



REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF HOME AFFAIRS

83/BI – 1663
Page 1

NOTIFICATION / REGISTER OF DEATH / STILLBIRTH

in terms of the Births and Deaths Registration Act, 1992 (Act No. 51 of 1992)

Space for Bar Code

• Must be completed in black ink (please tick ✓ where applicable)
• Please refer to instructions

SERIAL No: A08083365

FILE No: DATE:

A PARTICULARS OF DECEASED INDIVIDUAL / STILLBORN CHILD

Identity number of deceased
Date of death (Y Y Y Y M M D D)
Date of birth (Y Y Y Y M M D D)
Age at last birthday ____ years
Surname
Maiden Name (If female)
Forenames
Sex
If death occurred within 24 hours after birth, number of hours alive

MARITAL STATUS OF DECEASED Single Civil Marriage Living as married Widowed Religious Law Marriage Divorced Customary Marriage

PLACE OF BIRTH (Municipal district or country if abroad)
PLACE OF DEATH (City / Town / Village)
PLACE OF REGISTRATION OF DEATH
CITIZENSHIP OF DECEASED

Left thumb print of deceased

B PARTICULARS OF INFORMANT

Identity number
Initials and Surname
Relationship to deceased Parent Spouse Child Other kin Other (specify)
Postal address
Postal Code
Was the next of kin of the deceased a smoker* during the past five years? Yes No Refuse to answer
Date (Y Y Y Y M M D D) Signature

Left thumb print of informant

Dialling Code
Telephone No.

C PARTICULARS OF FUNERAL UNDERTAKER

Initials and Surname
Designation No.
Place of burial / cremation
Date (Y Y Y Y M M D D) Signature

Office Stamp of Funeral Undertaker

D CERTIFICATE BY ATTENDING MEDICAL PRACTITIONER / PROFESSIONAL NURSE

I, the undersigned, hereby certify that the deceased named in **Section A**, to the best of my knowledge and belief, died solely and exclusively due to NATURAL CAUSES, as specified in **Section G**.

I, the undersigned, am not in the position to certify that the deceased died exclusively due to natural causes.

Initials and Surname
Date signed (Y Y Y Y M M D D) Signature

Postal Address
Postal Code
SAMDC / SANC Reg. No.

CERTIFICATE BY DISTRICT SURGEON / FORENSIC PATHOLOGIST

I, the undersigned, hereby certify that a medicolegal post-mortem examination has been conducted on the body of the person whose particulars are given in **Section A** and that the body is no longer required for the purpose of the Inquest Act, 1959 (Act No. 58 of 1959) and that the cause of death is:

Natural (Cause of Death as indicated in **Section G**) Unnatural Under investigation

Initials and Surname
Place of post-mortem
Date (Y Y Y Y M M D D)
Mortuary reference
Date signed (Y Y Y Y M M D D)
Signature

Postal Address
Postal Code
SAMDC Reg. No.

E FOR OFFICIAL USE ONLY

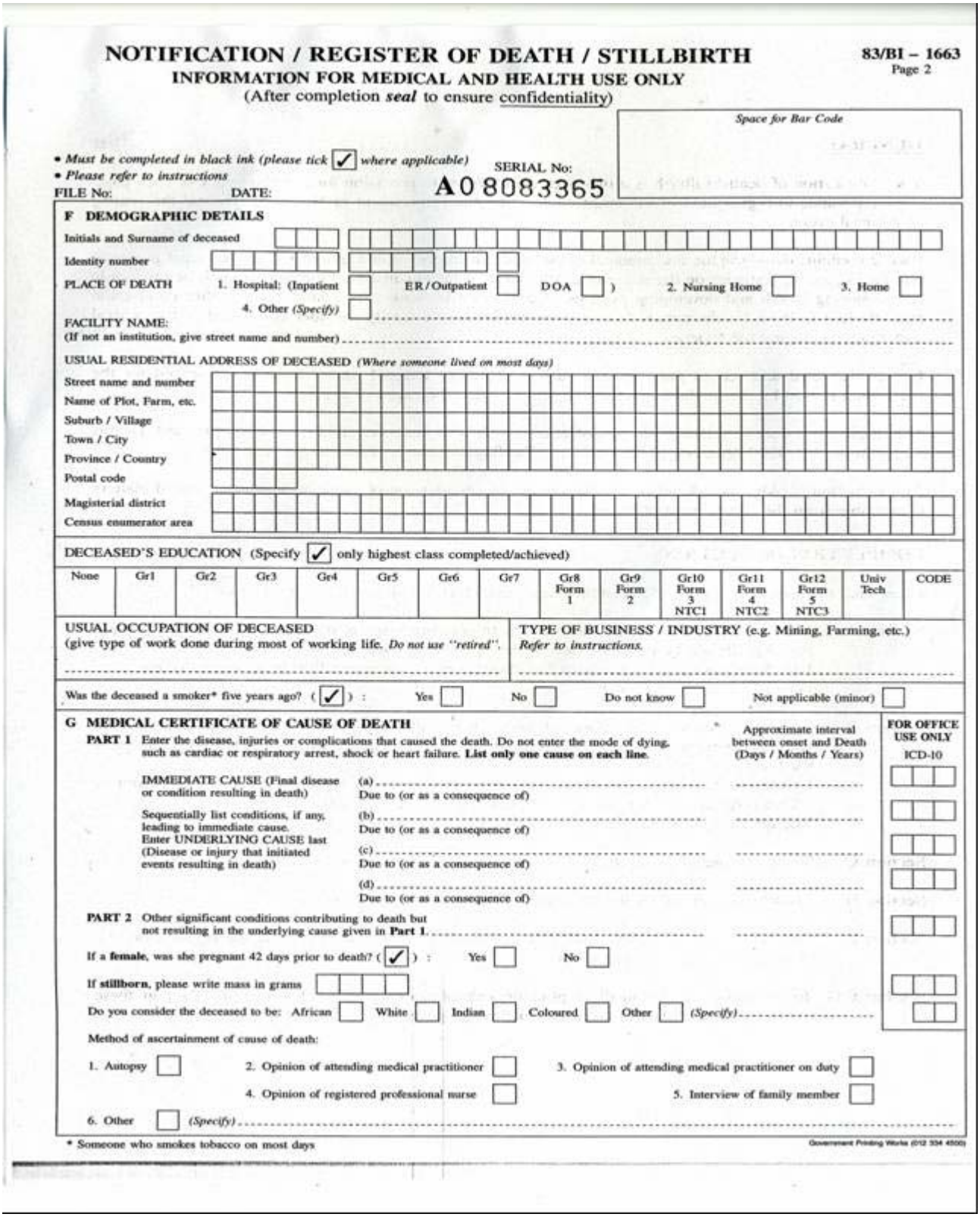
Registration of Death approved and Burial Order issued

Initials and Surname of Registrar
Postal Address
Postal Code
Date (Y Y Y Y M M D D)
Force No. / Designation No.
Persal No.
Signature

Office Stamp

* Someone who smokes tobacco on most days

APPENDIX 1B: SAMPLE OF 83/BI-1663 FORM



NOTIFICATION / REGISTER OF DEATH / STILLBIRTH — 83/BI – 1663, Page 2

INFORMATION FOR MEDICAL AND HEALTH USE ONLY

(After completion *seal* to ensure confidentiality)

Space for Bar Code

- *Must be completed in black ink (please tick ✓ where applicable)*
- *Please refer to instructions*

SERIAL No: A0 8083365

FILE No: DATE:

F DEMOGRAPHIC DETAILS

Initials and Surname of deceased

Identity number

PLACE OF DEATH 1. Hospital: (Inpatient ☐ ER / Outpatient ☐ DOA ☐) 2. Nursing Home ☐ 3. Home ☐

4. Other *(Specify)* ☐

FACILITY NAME:

(If not an institution, give street name and number)

USUAL RESIDENTIAL ADDRESS OF DECEASED *(Where someone lived on most days)*

Street name and number

Name of Plot, Farm, etc.

Suburb / Village

Town / City

Province / Country

Postal code

Magisterial district

Census enumerator area

DECEASED'S EDUCATION (Specify ✓ only highest class completed/achieved)

None	Gr1	Gr2	Gr3	Gr4	Gr5	Gr6	Gr7	Gr8 Form 1	Gr9 Form 2	Gr10 Form 3 NTC1	Gr11 Form 4 NTC2	Gr12 Form 5 NTC3	Univ Tech	CODE

USUAL OCCUPATION OF DECEASED
(give type of work done during most of working life. *Do not use "retired".*)

TYPE OF BUSINESS / INDUSTRY (e.g. Mining, Farming, etc.)
Refer to instructions.

Was the deceased a smoker* five years ago? (✓) : Yes ☐ No ☐ Do not know ☐ Not applicable (minor) ☐

G MEDICAL CERTIFICATE OF CAUSE OF DEATH

PART 1 Enter the disease, injuries or complications that caused the death. Do not enter the mode of dying, such as cardiac or respiratory arrest, shock or heart failure. **List only one cause on each line.**

Approximate interval between onset and Death (Days / Months / Years)

FOR OFFICE USE ONLY ICD-10

IMMEDIATE CAUSE (Final disease or condition resulting in death) (a) ..... Due to (or as a consequence of)

Sequentially list conditions, if any, leading to immediate cause. Enter UNDERLYING CAUSE last (Disease or injury that initiated events resulting in death)

(b) ..... Due to (or as a consequence of)

(c) ..... Due to (or as a consequence of)

(d) ..... Due to (or as a consequence of)

PART 2 Other significant conditions contributing to death but not resulting in the underlying cause given in **Part 1**.

If a **female**, was she pregnant 42 days prior to death? (✓) : Yes ☐ No ☐

If **stillborn**, please write mass in grams ☐☐☐☐

Do you consider the deceased to be: African ☐ White ☐ Indian ☐ Coloured ☐ Other ☐ *(Specify)* .....

Method of ascertainment of cause of death:

1. Autopsy ☐ 2. Opinion of attending medical practitioner ☐ 3. Opinion of attending medical practitioner on duty ☐

4. Opinion of registered professional nurse ☐ 5. Interview of family member ☐

6. Other ☐ *(Specify)* .....

* Someone who smokes tobacco on most days

Government Printing Works (012 334 4500)

APPENDIX 2

Data collection tool

Date of death	Age	Gender	Diagnosis	ICD 10 code	ICD 10 Grouping

APPENDIX 3

APPENDIX

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH AND SOCIAL DEVELOPMENT

Enquiries: Ramalivhana NJ/ Malomane EL

Ref: 4/2/2

11 July, 2008
Dr WRM Maphanga
Department of Community Health
Polokwane Campus
0700

Dear Dr WRM Maphanga

An epidemiological study of natural deaths in Limpopo

- Permission is hereby granted to Dr WRM Maphanga to conduct a study as mentioned above
- The Department of Health and Social Development will expect a copy of the completed research for its own resource centre after completion of the study.
- The researcher is expected to avoid disrupting services in the course of his study
- The Researcher/s should be prepared to assist in interpretation and implementation of the recommendations where possible
- The Institution management where the study is being conducted should be made aware of this,
- A copy of the permission letter can be forwarded to Management of the Institutions concerned

HEAD OF DEPARTMENT
HEALTH AND SOCIAL DEVELOPMENT
LIMPOPO PROVINCE

Private Bag X9302 Polokwane
18 College Str., Polokwane 0700 • Tel: 015 293 6000 • Fax: 015 293 6211 • Website: http/www.limpopo.gov.za
The heartland of southern Africa - development is about people

APPENDIX 4

APPENDIX 4

UNIVERSITY OF LIMPOPO

Medunsa Campus

MEDUNSA RESEARCH & ETHICS COMMITTEE

CLEARANCE CERTIFICATE

P O Medunsa
Medunsa
0204
SOUTH AFRICA

Tel: 012 - 521 4000
Fax: 012 - 560 0086

MEETING: 04/2008

PROJECT NUMBER: MREC/M/75/2008: PG

PROJECT :

Title:	An Epidemiological study of natural deaths in Limpopo
Researcher:	Dr W. Maphanga
Supervisor:	Dr P. Rautenbach
Co-supervisor:	Prof F.R.S. Maluleke
Hospital Superintendent:	Dr B.A. Benganga (Dr George Mukhari Hospital)
Department:	Community Health
School:	Medicine
Degree:	M Med (Comm Health)

DECISION OF THE COMMITTEE:

MREC approved the project.

DATE: May 07, 2008

RESEARCH & PARTNERSHIP
2008 -05- 07
MEDUNSA CAMPUS

PROF OA OGUNBANJO
CHAIRPERSON MREC

Note:

i) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.

ii) The budget for the research will be considered separately from the protocol.

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

APPENDIX 5: ICD 10 CODES TABLE

CERTAIN INFECTIOUS AND PARASITIC DISEASES (A00 – B99)		
	A01	Typhoid and paratyphoid fevers
	A06	Amoebiasis
	A08	Viral and other specified intestinal infections
	A09	Diarrhoea and gastroenteritis presumed infectious origin
	A16	Respiratory TB not confirmed bacteriologically or histologically
	A17	Tuberculosis of nervous system
	A18	Tuberculosis of other organs
	A19	Miliary TB
	A41	Other Septicaemia
	A49	Bacterial infection of unspecified origin
	A86	Unspecified viral encephalitis
	B16	Acute hepatitis B
	B20	HIV resulting in infectious and parasitic diseases
	B22	HIV resulting in other specified disease
	B23	HIV disease resulting in other conditions
	B24	Unspecified HIV disease
	B33	Other viral diseases, NEC
	B34	Viral infection of unspecified site
	B37	Candidiasis
	B45	Cryptococcosis
	B50	Plasmodium falciparum malaria
	B54	Unspecified malaria
	B59	Pneumocystosis
	A89	Unspecified parasitic diseases
	B90	Sequelae of TB
	B99	Other and unspecified infectious disease

NEOPLASMS (C00 –D48)		
	C14	Malignant neoplasm of other and ill-defined sites in the lip, oral cavity and pharynx
	C15	Malignant neoplasm of oesophagus
	C16	Malignant neoplasm of stomach
	C18	Malignant neoplasm of colon
	C20	Malignant neoplasm of rectum
	C22	Malignant neoplasm of liver and intrahepatic bile ducts
	C25	Malignant neoplasm of pancreas
	C32	Malignant neoplasm of larynx
	C34	Malignant neoplasm of lung and bronchus
	C41	Malignant neoplasm of bone and articular cartilage of other and unspecified sites
	C44	Other malignant neoplasm of skin
	C46	Kaposi's sarcoma
	C50	Malignant neoplasm of breast
	C53	Malignant neoplasm of cervix uteri
	C54	Malignant neoplasm of corpus uteri
	C55	Malignant neoplasm of uterus , part unspecified
	C56	Malignant neoplasm of ovary
	C61	Malignant neoplasm of prostate
	C67	Malignant neoplasm of bladder
	C76	Malignant neoplasm of other and ill-defined sites
	C78	Secondary malignant neoplasm of respiratory and digestive organs
	C79	Secondary malignant neoplasm of other sites
	C80	Malignant neoplasm without specification of site
	C85	Other and unspecified types of non-Hodgkin's lymphoma
	C95	Leukemia of unspecified cell type
	C97	Malignant neoplasm of independent multiple sites
	D43	Neoplasm of uncertain or unknown behaviour of brain and central nervous system

DISEASES OF THE BLOOD AND BLOOD FORMING ORGANS AND CERTAIN DISORDERS INVOLVING THE IMMUNE MECHANISM (D50 –D89)		
	D50	Iron deficiency anaemia
	D51	Vitamin B12 deficiency anaemia
	D53	Other nutritional anaemias
	D58	Other hereditary haemolytic anaemias
	D59	Acquired haemolytic anaemia
	D60	Acquired pure red cell aplasia
	D61	Other aplastic anaemias
	D64	Other anaemias
	D65	Disseminated intravascular coagulation
	D66	Hereditary factor VIII deficiency
	D68	Other coagulation defects
	D69	Purpura and other haemorrhagic conditions
	D71	Functional disorders of polymorphonuclear neutrophils
	D72	Other disorders of white blood cells
	D73	Diseases of spleen
	D75	Other diseases of blood and blood forming organs
	D76	Certain diseases involving lymphoreticular tissue and reticulohistiocytic system
	D81	Combined Immunodeficiencies
	D83	Common variable immunodeficiency
	D84	Other immunodeficiencies
	D86	Sarcoidosis

ENDOCRINE, NUTRITIONAL AND METABOLIC DISEASES (E00 – E90)		
	E03	Other hypothyroidism
	E04	Other non toxic goitre
	E05	Thyrotoxicosis
	E10	Insulin-dependent diabetes mellitus
	E11	Non-insulin-dependent diabetes mellitus
	E14	Unspecified diabetes mellitus
	E15	Nondiabetic hypoglycaemic coma
	E16	Other disorders of pancreatic internal secretion
	E40	Kwashiorkor
	E41	Nutritional Marasmus
	E42	Marasmic kwashiorkor
	E43	Unspecified severe protein-energy malnutrition
	E45	Retarded development following protein-energy malnutrition
	E46	Unspecified protein-energy malnutrition
	E52	Niacin deficiency (Pellagra)
	E66	Obesity
	E78	Disorders of lipoprotein metabolism and other dyslipidaemias
	E80	Disorders of porphyrin and bilirubin metabolism
	E83	Disorders of mineral metabolism
	E86	Volume depletion
	E87	Other disorders of fluid, electrolyte and acid-base balance
	E88	Other metabolic disorders

MENTAL AND BEHAVIOURAL DISORDERS (F00-F99)		
	F01	Vascular dementia
	F05	Delirium, not induced by alcohol and other psychoactive substances
	F06	Other mental disorders due to brain damage and dysfunction and to physical disease
	F09	Unspecified organic symptomatic mental disorder
	F10	Mental and behavioural disorders due to use of alcohol
	F17	Mental and behavioural disorders due to use of tobacco
	F20	Schizophrenia
	F23	Acute and transient psychotic disorders
	F29	Unspecified nonorganic psychosis
	F32	Depressive episode
	F44	Dissociative (conversion) disorders
	F50	Eating disorders
	F79	Unspecified mental retardation
	F99	Mental disorder, NES

DISEASES OF THE NERVOUS SYSTEM(G00 – G99)		
	G00	Bacterial meningitis, NEC
	G03	Meningitis due to other and unspecified causes
	G04	Encephalitis, myelitis and encephalomyelitis
	G06	Intracranial and intraspinal abscess and granuloma
	G12	Spinal muscular atrophy and related syndromes
	G20	Parkinson's disease
	G30	Alzheimer's disease
	G31	Other degenerative diseases of nervous system, NEC
	G40	Epilepsy
	G41	Status epilepticus
	G45	Transient cerebral ischaemic attacks and related syndromes
	G61	Inflammatory polyneuropathy
	G62	Other polyneuropathies
	G71	Primary disorders of muscle
	G80	Infantile cerebral palsy
	G81	Hemiplegia
	G82	Paraplegia and tetraplegia
	G83	Other paralytic syndromes
	G91	Hydrocephalus
	G92	Toxic encephalopathy
	G93	Other disorders of the brain

	G95	Other diseases of spinal cord
	G97	Postprocedural disorders of nervous system, NEC

DISEASES OF THE EYE AND ADNEXA (H00 – H59)		
	H00	Hordeolum and chalazion
	H05	Disorders of orbit
	H18	Other disorders of cornea
	H34	Retinal vascular occlusion
	H40	Glaucoma
	H54	Blindness and low vision

DISEASES OF THE EAR AND MASTOID PROCESS (H60-H95)		
	H60	0titis externa
	H66	Suppurative and unspecified Otitis media
	H68	Eustachian salpingitis and obstruction
	H70	Mastoiditis and related conditions

DISEASES OF THE CIRCULATORY SYSTEM (I00-I99)		
	I10	Essential (primary) hypertension
	I11	Hypertensive heart disease
	I12	Hypertensive renal disease
	I21	Acute myocardial infarction
	I25	Chronic ischaemic heart disease
	I26	Pulmonary embolism
	I27	Other pulmonary heart disease
	I31	Other diseases of pericardium
	I38	Endocarditis, valve unspecified
	I40	Acute myocarditis
	I42	Cardiomyopathy
	I46	Cardiac arrest
	I49	Other cardiac arrhythmias
	I50	Heart failure
	I51	Complications and ill-defined descriptions of heart disease
	I60	Subarachnoid haemorrhage
	I61	Intracerebral haemorrhage
	I62	Other nontraumatic intracranial haemorrhage
	I63	Cerebral infarction
	I64	Stroke not specified as haemorrhage of infarction
	I67	Other cerebrovascular disease
	I69	Sequelae of cerebrovascular disease
	I71	Aortic aneurysm and dissection

	I80	Phlebitis and thrombophlebitis

DISEASES OF RESPIRATORY SYSTEM (J00 – J99)		
	J03	Acute tonsillitis
	J11	Influenza, virus not identified
	J12	Viral pneumonia, NEC
	J15	Bacterial pneumonia, NEC
	J18	Pneumonia, organism unspecified
	J20	Acute bronchitis
	J22	Unspecified acute lower respiratory infection
	J40	Bronchitis, not specified as acute or chronic
	J42	Unspecified chronic bronchitis
	J43	Emphysema
	J44	Other chronic obstructive pulmonary disease
	J45	Asthma
	J46	Status asthmaticus
	J47	Bronchiectasis
	J69	Pneumonitis due to solids and liquids
	J80	Adult respiratory distress syndrome
	J81	Pulmonary oedema
	J84	Other interstitial pulmonary diseases
	J85	Abscess of lung and mediastinum
	J90	Pleural effusion, NEC
	J94	Other pleural conditions
	J96	Respiratory failure, NEC
	J98	Other respiratory disorders

DISEASES OF THE DIGESTIVE SYSYEM (K00 – K93)		
	K22	Other diseases of oesophagus
	K25	Gastric ulcer
	K26	Duodenal ulcer
	K27	Peptic ulcer, site unspecified
	K29	Gastritis and duodenitis
	K31	Other diseases of stomach and duodenum
	K35	Acute appendicitis
	K37	Unspecified appendicitis
	K52	Other noninfective gastroenteritis and colitis
	K55	Vascular disorders of intestine
	K56	Paralytic ileus and intestinal obstruction without hernia
	K57	Diverticular disease of intestine
	K59	Other functional intestinal disorders
	K63	Other diseases of intestine
	K65	Peritonitis
	K70	Alcoholic liver disease
	K72	Hepatic failure, NEC
	K73	Chronic hepatitis, NEC
	K74	Fibrosis and cirrhosis of liver
	K75	Other inflammatory liver disease
	K76	Other diseases of liver
	K83	Other diseases of biliary tract
	K85	Acute pancreatitis
	K86	Other disorders of pancreas
	K92	Other diseases of digestive system

DISEASES OF SKIN AND SUBCUTANEOUS TISSUE (L00 – L99)		
	L02	Cutaneous abscess, furuncle and carbuncle
	L03	Cellulitis
	L08	Other local infections of the skin and subcutaneous tissue
	L30	Other dermatitis
	L51	Erythema multiforme
	L89	Decubitus ulcer
	L97	Ulcer of lower limb, NEC
	L98	Other disorders of skin and subcutaneous tissue, NEC

DISEASES OF THE MUSCULOSKELETAL SYSTEM AND CONNECTIVE TISSUE (M00 – M99)		
	M06	Other rheumatoid arthritis
	M13	Other arthritis
	M19	Other arthrosis
	M32	Systemic lupus erythematosus
	M54	Dorsalgia
	M62	Other disorders of muscle
	M79	Other soft tissue disorders, NEC
	M86	Osteomyelitis

DISEASES OF THE GENITOURINARY SYSTEM (N00 – N990		
	N00	Acute nephritic syndrome
	N03	Chronic nephritic syndrome
	N04	Nephrotic syndrome
	N05	Unspecified nephritic syndrome
	N06	Isolated proteinuria with specified morphological lesion
	N10	Acute tubulo-interstitial nephritis
	N12	Tubulo-interstitial nephritis, not specified as acute or chronic
	N13	Obstructive and reflux Uropathy
	N17	Acute renal failure
	N18	Chronic renal failure
	N19	Unspecified renal failure
	N28	Other disorders of kidney and ureter, NEC
	N39	Other disorders of urinary system
	N40	Hyperplasia of prostate
	N73	Other female pelvic inflammatory diseases

PREGNANCY, CHILDBIRTH AND THE PUERPERIUM (O00 – O99)		
	O00	Ectopic pregnancy
	O07	Failed attempted abortion
	O14	Gestational hypertension without significant proteinuria
	O15	Eclampsia
	O16	Unspecified maternal hypertension
	O26	Maternal care for other conditions predominantly related to pregnancy
	O45	Premature separation of placenta [abruptio placentae]
	O71	Other obstetric trauma
	O72	Postpartum haemorrhage
	O75	Other complications of labour and delivery, NEC
	O85	Puerperal sepsis
	O98	Maternal infectious and parasitic diseases classifiable elsewhere but complicating pregnancy, childbirth and the puerperium

	O99	Other maternal diseases classifiable elsewhere but complicating pregnancy, childbirth and the puerperium

CERTAIN CONDITIONS OCCURING IN THE PERINATAL PERIOD (P00 –P96)		
	P96	Other Conditions originating in the Perinatal Period
	P00	Fetus and Newborn affected by maternal conditions that may be unrelated to present pregnancy
	P02	Fetus and Newborn affected by complications of placenta, cord & membranes
	P07	Disorders related to short gestation and Low Birth Weight, NEC
	P20	Intrauterine Hypoxia
	P21	Birth Asphyxia
	P22	Respiratory distress of the Newborn
	P23	Congenital Pneumonia
	P24	Neonatal Aspiration Syndromes
	P28	Other Respiratory Conditions
	P29	Cardiovascular disorders originating in the Perinatal Period
	P36	Bacterial Sepsis of Newborn
	P37	Other congenital infectious and parasitic diseases
	P74	Other transitory Neonatal Electrolyte and Metabolic Disturbances
	P78	Other Perinatal Digestive System Disorders
	P92	Feeding problems of newborn
	P95	Stillborn
	P96	Other conditions originating in the perinatal period

CONGENITAL MALFORMATIONS, DEFORMATIONS AND CHROMOSOMAL ABNORMALITIES (Q00 – Q99)		
	Q00	Anencephaly and similar malformations
	Q03	Congenital hydrocephalus
	Q05	Spina bifida
	Q21	Congenital malformations of the cardiac septa
	Q24	Other congenital malformations of the heart
	Q44	Congenital malformations of gall bladder, bile ducts and the liver
	Q89	Other congenital malformations, not elsewhere classified
	Q90	Down's syndrome

SYMPTOMS, SIGNS AND ABNORMAL CLINICAL FINDINGS AND LABORATORY FINDINGS, NOT ELSEWHERE CLASSIFIED (R00 – R99)		
	R 02	Gangrene, not elsewhere classified
	R 04	Haemorrhage from respiratory passages
	R 05	Cough
	R 06	Abnormalities of breathing
	R 07	Pain in the throat and chest
	R 09	Other symptoms and signs involving the CVS and RES
	R 10	Abdominal and pelvic pain
	R 11	Nausea and vomiting
	R 50	Fever of unknown origin
	R 51	Headache
	R 52	Pain, not elsewhere classified
	R 54	Senility
	R 56	Convulsions, not elsewhere classified
	R 57	Shock. not elsewhere classified
	R 58	Haemorrhage, not elsewhere classified
	R 60	Oedema, not elsewhere classified
	R 63	Symptoms and signs concerning food and fluid intake
	R 64	Cachexia
	R 73	Elevated blood glucose
	R 99	Other ill-defined and unspecified causes of mortality

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