

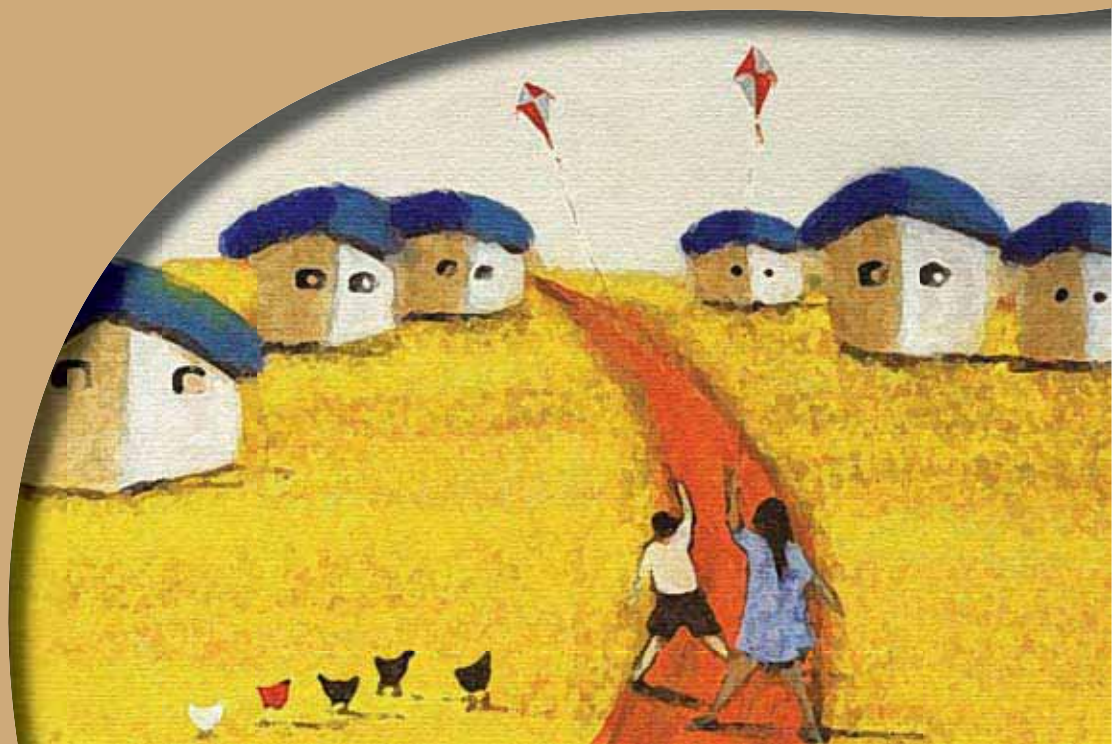
SOUTH AFRICAN NATIONAL BURDEN OF DISEASE STUDY **2000**  
**ESTIMATES OF PROVINCIAL MORTALITY**

*Summary Report, March 2006*

Debbie Bradshaw, Nadine Nannan  
Ria Laubscher, Pam Groenewald  
Jané Joubert, Beatrice Nojilana  
Rosana Norman, Desirée Pieterse  
and Michelle Schneider



Burden of Disease  
Research Unit



## Summary Report, March 2006

This Summary Report is based on *Estimates of Provisional Mortality* by Debbie Bradshaw, Nadine Nannan, Ria Laubscher, Pam Groenewald, Jané Joubert, Beatrice Nojilana, Rosana Norman, Desirée Pieterse and Michelle Schneider. It is part of the South African National Burden of Disease Study 2000.

A copy of the full report, as well as a spreadsheet with the estimates, is available on the internet at [www.mrc.ac.za/bod/reports.htm](http://www.mrc.ac.za/bod/reports.htm).

### **Acknowledgements:**

Elmien Wolvaardt and Leverne Gething are thanked for their contribution to the summary report. David Bourne and Theo Vos are sincerely thanked for their technical advice throughout the project. Sonja Swanevelder and Ehi Igumbor are thanked for critical comment of the report. Carron Cloete is thanked for the design of the report.

# Table of Contents

<b>Introduction</b> . . . . .	2
<b>Methodology</b> . . . . .	3
<b>Findings</b> . . . . .	4
Mortality rates . . . . .	4
Selected infectious diseases . . . . .	5
Selected cardiovascular and metabolic disorders . . . . .	6
Selected cancers . . . . .	7
Years of life lost by province . . . . .	8
Summary of key findings . . . . .	8
<b>Recommendations</b> . . . . .	10
<b>References</b> . . . . .	12
<b>List of tables</b>	
Table 1 (YLLs): Leading causes of premature mortality . . . . .	9
<b>List of figures</b>	
Figure 1: Provincial estimates of age-standardised death rates by broad cause group, 2000. . . . .	4
Figure 2: Provincial estimates of age-standardised death rates due to tuberculosis, lower respiratory infections, diarrhoeal disease . . . . .	5
Figure 3: Provincial estimates of age-standardised death rates due to stroke, ischaemic heart disease, hypertensive heart disease and diabetes by sex, 2000 . . . . .	6
Figure 4: Provincial estimates of age-standardised death rates due to lung, oesophageal, prostate, cervical and breast cancer by sex, 2000 . . . . .	7

# INTRODUCTION

The MRC Burden of Disease Research Unit has released *Estimates of Provincial Mortality*, the second report in the series from the South African National Burden of Disease Study 2000. For the first time ever, **cause-specific death rates** are now available for each province of South Africa. Such sub-population data are essential to identify and monitor inequalities in health status. In addition, this information is required not only to inform prioritisation of health services and research, but also to guide priorities in other sectors.

This study follows the South African National Burden of Disease Study 2000, which applied the burden of disease approach developed by the WHO, consisting of analysing available information and presenting it in a format that is relevant for planning health and other services. It signifies an important milestone in generating **burden of disease information** at provincial level, and can be used for prioritisation and as a benchmark for monitoring progress in reducing the burden of disease. This MRC Research Summary outlines the methods used and highlights selected results from the provincial mortality study. Detailed mortality profiles for each province are included in the full report. While policy is often directed from a national perspective, provincial and local governments need to respond to the specific needs of their communities.

Efforts to improve cause of death statistics in South Africa have been under way since 1994, and have resulted in better coverage of death registration. However, the statistics produced by the **vital statistics system** of South Africa need careful analysis if they are to be used to inform policy making. Demographic models, and several sources of data, have been carefully analysed to generate consistent and coherent estimates of the cause of death profile experienced in each province. The full report contains a description of the methodology and data sources, a comparison of mortality rates across the provinces, cause of death profiles for each province, age-specific profiles, and policy recommendations.

The preface of the report, written by the former World Health Organisation (WHO) liaison officer for South Africa, Dr Welile Sasha, outlines four reasons why the timing of this report is significant:

- to monitor geographic inequalities in health
- to guide priority setting
- to open opportunities for epidemiological study
- to monitor – at provincial level – progress in meeting some of the Millennium Development Goals.

*The **cause-specific death rate** gives the number of people in a population who died of a particular cause per 100 000 people in the population.*

***Burden of disease information** refers to the extent of health problems and their causes.*

*The **vital statistics system** of South Africa collects and disseminates data about vital events (births, deaths and marriages).*

# METHODOLOGY

Since not all the deaths in South Africa are registered and some misclassification of causes exists, it was necessary to estimate the total number of deaths and the number of AIDS-related deaths using a demographic and epidemiological model. For this study, the ASSA2000 AIDS and demographic model was used to estimate both the total number of deaths and the population size.

The cause of death profile, based on Statistics South Africa's (Stats SA) 15% sample of death notifications, was analysed. The number of deaths due to AIDS that had been misclassified as being due to other conditions was estimated by comparing the cause-specific death rates of 1996 and 2000 for those conditions that had increased during this period. Out of 22 causes of death investigated, there were nine that increased in the same distinct age pattern as seen in AIDS deaths: tuberculosis, pneumonia, diarrhoea, meningitis, other respiratory disease, noninfective gastroenteritis, other infectious and parasitic diseases, deficiency anaemias and protein energy malnutrition. It was concluded that these increased rates reflected HIV-related deaths. These excess deaths were then subtracted from the Stats SA figures to obtain estimates of these causes without the misclassified AIDS deaths.

The ill-defined causes of death in each province were proportionally reallocated to specified cause by age and sex according to the Global Burden of Disease methodology. The resulting cause of death profile was applied to the total number of deaths in each age/sex group by province. The National Injury Mortality Surveillance System (NIMSS) was used to estimate the national profile of the causes of fatal injuries and was applied to the total number of injury deaths by age and sex in each province.

Age-standardised mortality rates were calculated to enable a comparison of the levels of mortality experienced in each province using the WHO world standard. Years of life lost were calculated to assess the extent of premature mortality using age weighting and discounting.

# FINDINGS

## Mortality rates

Mortality levels differed among the provinces, with the average life expectancy in 2000 ranging from 63 years in the Western Cape to 52 years in KwaZulu-Natal. The age-standardised mortality rates by province are shown in Figure 1. It can be seen that the overall mortality rates were highest in KwaZulu-Natal and Mpumalanga. These were 1,5 times higher than the mortality rate in the Western Cape, which had the lowest mortality rate.

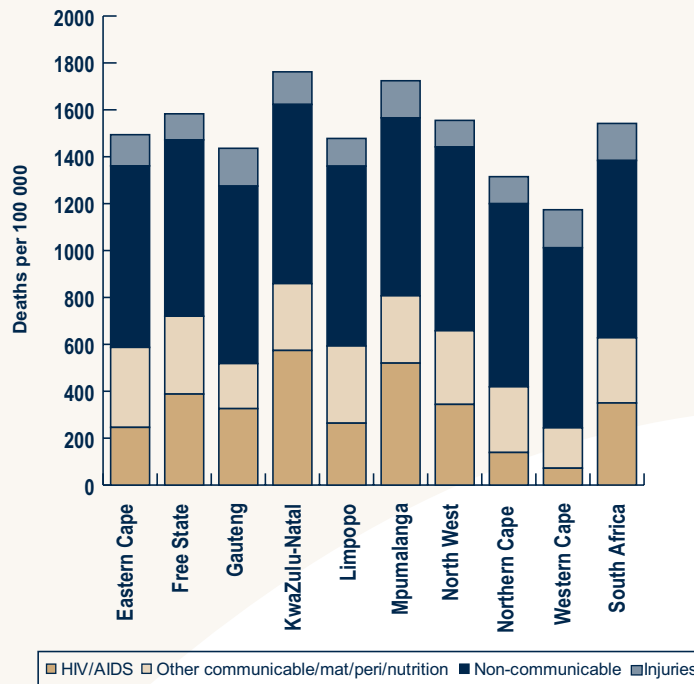


Figure 1: Provincial estimates of age-standardised death rates by broad cause group, 2000

The **broad cause groups** are the four cause of death groups used in this study. They are: HIV/AIDS; other infectious and parasitic diseases, perinatal and maternal conditions, and malnutrition; non-communicable disease; and injuries.

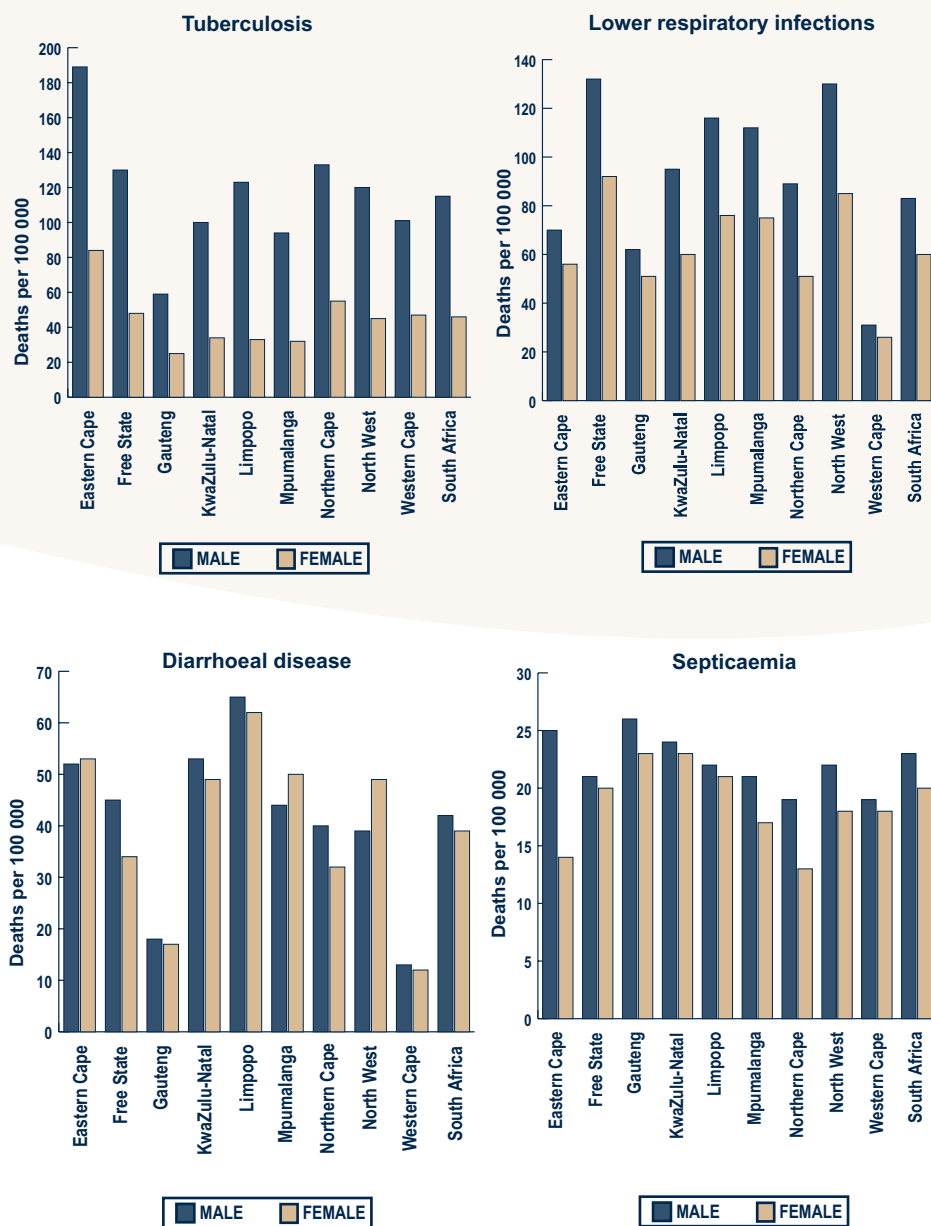
The term *double burden of disease* has been used internationally to describe the health transition experienced by many developing countries whose populations experience both diseases related to unhealthy lifestyles and diseases associated with underdevelopment. This was observed in South Africa the 1980s and early 1990s, but was accompanied by relatively high rates of injuries. This led to the South African pattern being described as the *triple burden of disease*. In recent years, the profile has rapidly changed into a **quadruple burden of disease** with the major addition of HIV and AIDS.

Figure 1 also shows the age-standardised mortality rates by **broad cause group** highlighting different extents of the **quadruple burden** for each province. It can be seen that there are marked variations between the provinces in the death rates due to HIV/AIDS, reflecting different stages of the epidemic. The HIV/AIDS death rate in the Western Cape is lower than that of the other provinces while those in KwaZulu-Natal and Mpumalanga are the highest. The overall injury death rates for males are about three times higher than the rates for females. From Figure 1, it can be seen that the Western Cape and Gauteng, the most developed provinces, have the highest injury mortality rates. However, Mpumalanga also has high rates. In the case of males, homicide is the leading cause of injury death, followed by road traffic accidents, suicides and fires. For females, the leading cause of injury death is road traffic accidents, followed by homicides, fires and suicides.

Figure 1 shows that there are marked variations between provinces in the mortality rates due to the conditions associated with poverty and under-development. These conditions are: other infectious (excluding HIV) and parasitic diseases, perinatal and maternal conditions, and malnutrition. The Western Cape and Gauteng have much lower mortality rates due to these conditions, whereas less developed provinces, such as the Eastern Cape, the Free State, Limpopo and North West, have the highest rates.

## Selected infectious diseases

Figure 2 shows that specific infectious diseases followed varying provincial patterns.



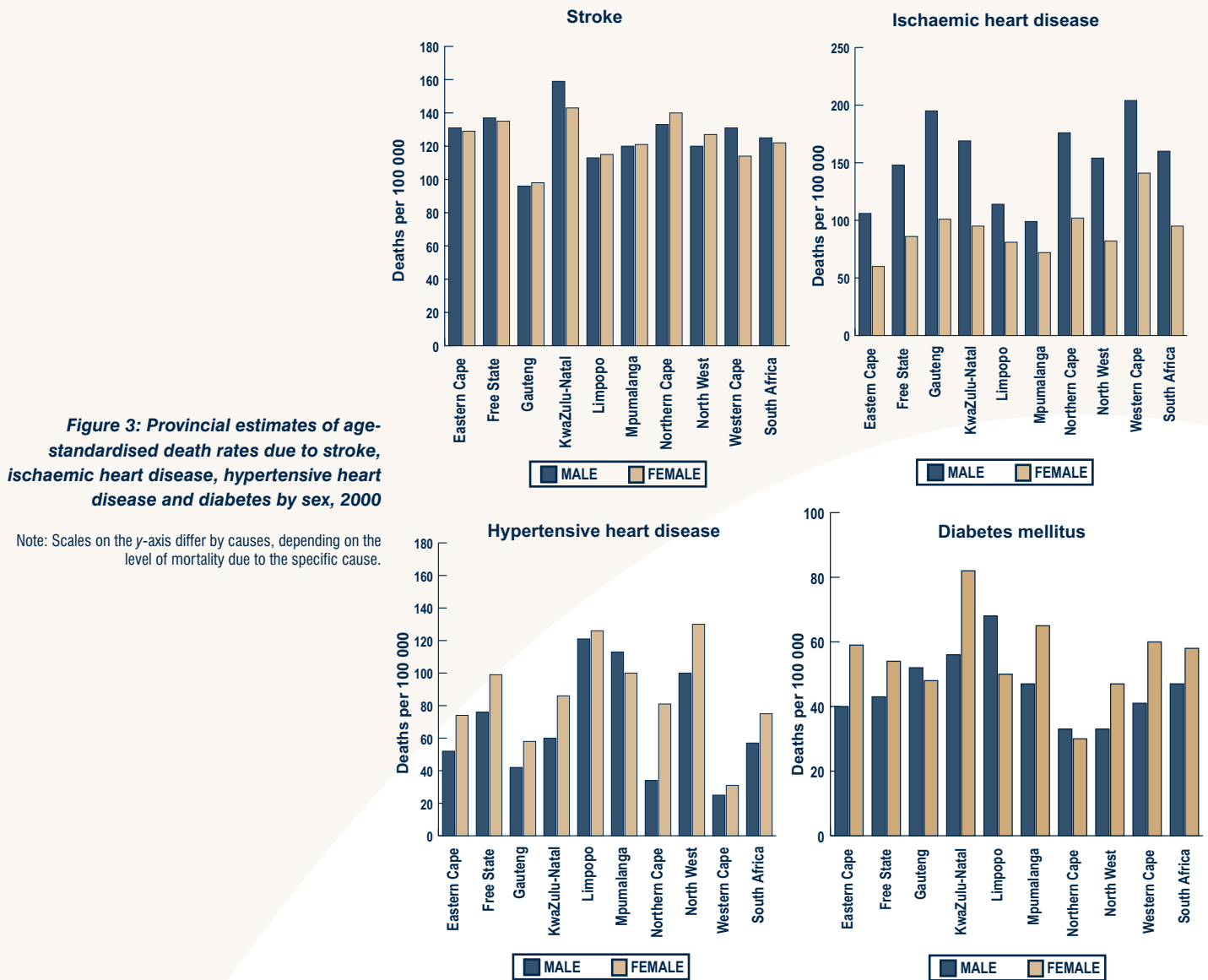
**Figure 2: Provincial estimates of age-standardised death rates due to tuberculosis, lower respiratory infections and diarrhoeal disease**

*Note:* Scales on the y-axis differ by causes, depending on the level of mortality due to the specific cause.

Tuberculosis mortality not related to HIV was consistently higher among males than females, and was lowest in the provinces of Gauteng, Mpumalanga, Limpopo and KwaZulu-Natal. The tuberculosis mortality rates in the Eastern Cape, Northern Cape and Western Cape were higher than might be expected on the basis of socio-economic conditions alone. This reflects the multiple factors likely to determine the TB mortality pattern, including smoking, exposure to mining and access to health services. Mortality due to lower respiratory infections (including pneumonia) was highest in the provinces of North West and the Free State. Diarrhoeal disease mortality was highest in the Eastern Cape, KwaZulu-Natal and Limpopo, and lowest in Gauteng and the Western Cape. The provinces with the highest diarrhoea death rates were also the provinces with the lowest household income. Septicaemia rates ranged from 16 to 25 per 100 000. Interestingly, the septicaemia death rate for males in Eastern Cape was much higher than that for females.

## Selected cardiovascular and metabolic disorders

There is surprisingly little variation between the provinces in the overall age-standardised death rate due to non-communicable diseases (Figure 1). The less developed provinces have similar levels to those of the more developed provinces – all at about 750 deaths per 100 000 population. However, there are variations in the death rates for specific conditions, with stroke and ischaemic heart disease being the most common cardiovascular causes of death (Figure 3).



In contrast, stroke death rates for males were similar to the rates for females. The stroke death rates were particularly high in KwaZulu-Natal. Provincial death rates due to hypertensive heart disease showed marked variations between the provinces, and higher rates for females than for males in all provinces except Mpumalanga. North West, Limpopo and Mpumalanga had the highest rates of hypertensive heart disease, while the Western Cape and Gauteng had the lowest rates.

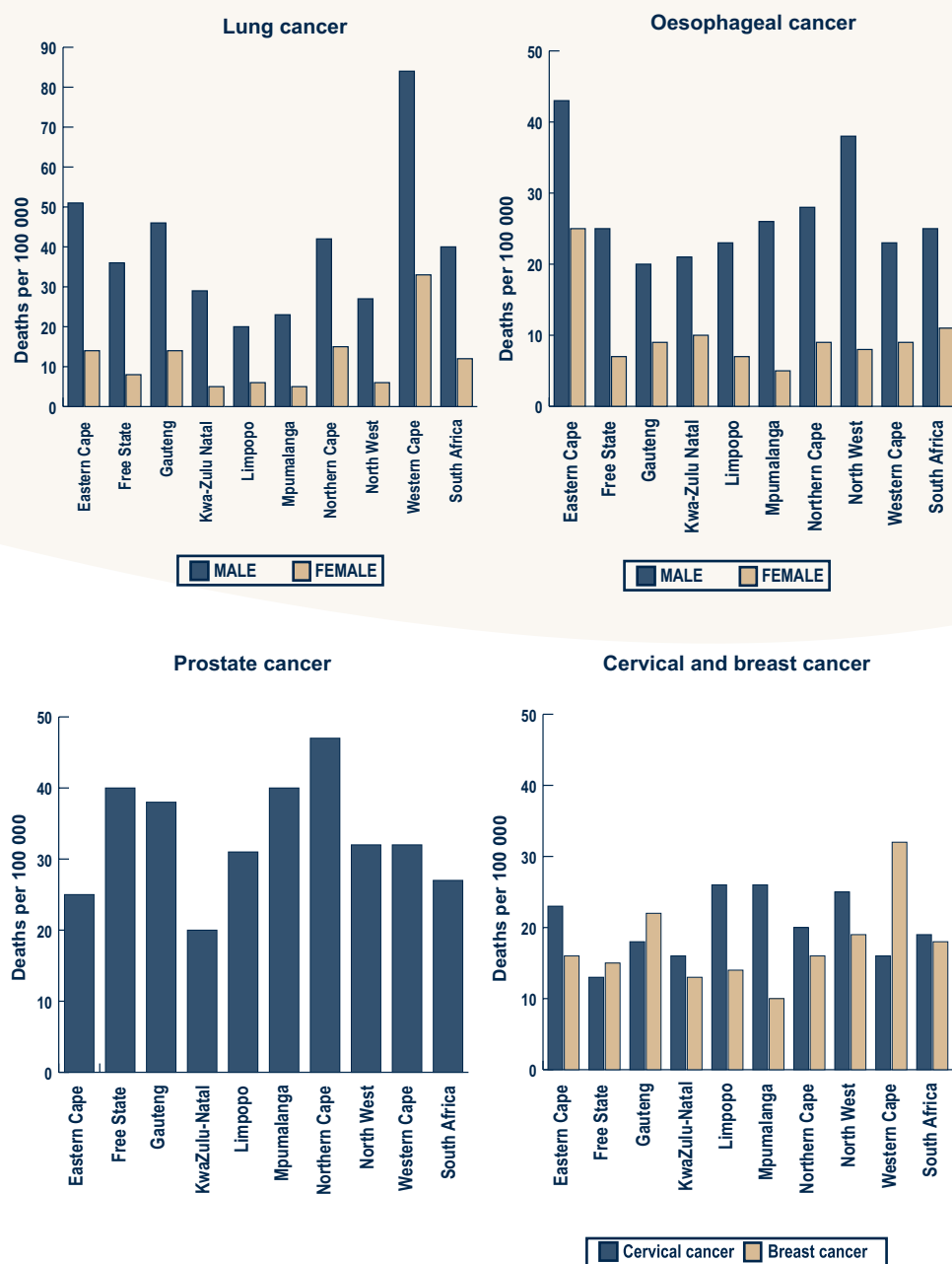
The Western Cape and the Northern Cape had a pattern of high rates of ischaemic heart disease and stroke, but low rates of hypertensive heart disease. Limpopo and Mpumalanga had patterns of low rates of ischaemic heart disease and stroke, but high rates of hypertensive heart disease. The ischaemic heart disease rate was consistently higher for males than females, while hypertensive heart disease was lower in Mpumalanga.

Death rates due to diabetes mellitus showed interesting regional variations, with the rates in KwaZulu-Natal, Limpopo, the Free State and Mpumalanga being the highest and the rate in the Northern Cape being the lowest (Figure 3). Since diabetes is associated with an urban lifestyle, the more rural provinces might be expected to have lower rates. However, genetic factors play a role in the development of the disease, and the death rates are ameliorated by access to good-quality health services.



## Selected cancers

The death rates due to leading causes of cancer among males and females are shown in Figure 4, according to province.



**Figure 4: Provincial estimates of age-standardised death rates due to lung, oesophageal, prostate, cervical and breast cancer by sex, 2000**

Note: Scales on the y-axis differ by causes, depending on the level of mortality due to the specific cause.

Lung cancer is the leading fatal cancer in South Africa, with much higher rates among men than women. From Figure 4 it can be seen that the lung cancer death rate among men in the Western Cape was extremely high. Prostate cancer was highest in the Northern Cape, followed by the Free State, Mpumalanga and Gauteng. Oesophageal cancer death rates were also higher among men than women. Men and women in the Eastern Cape had particularly high rates of oesophageal cancer, as did men in North West province. Nationally, cervical cancer and breast cancer death rates were at similar levels. However, there were considerable provincial variations. The Western Cape had much higher breast cancer rates, while Mpumalanga, Limpopo, the Eastern Cape and North West had much higher cervical cancer rates. Appropriate screening for cervical cancer has been adopted as policy and would be expected to reduce the mortality rates.

*Years of life lost are the number of years a person died before the end of his or her expected lifespan (as given in the standard life-expectancy table). The standard lifespan for females is on average 2,5 years longer than for males*

## Years of life lost by province

When the age at which the death occurred is taken into account and the **years of life lost** (YLL) are summed, the provincial differences in mortality translate into wider variations in premature mortality. Based on YLLs per 100 000 population, the premature mortality in KwaZulu-Natal is double that in the Western Cape, the province with the lowest premature mortality. Table 1 shows the leading ten causes of years of life lost in each province.

HIV/AIDS, homicide, tuberculosis, diarrhoea, road traffic accidents, and lower respiratory infections consistently feature among the leading causes of premature mortality in all provinces. HIV/AIDS is the leading cause of premature mortality in 2000 in all provinces, but ranges from 14% of the total in the Western Cape to 51% of the total in KwaZulu-Natal.

### Summary of key findings

- Overall mortality rates differ across provinces: life expectancy in KwaZulu-Natal and Mpumalanga is about ten years lower than in the Western Cape, the province with the lowest mortality rate.
- HIV/AIDS is the leading cause of premature mortality for all provinces.
- Mortality due to causes related to poverty and underdevelopment, such as diarrhoeal disease, tuberculosis and nutritional deficiencies, are more pronounced in the poorer and more rural provinces.
- In contrast, non-communicable disease mortality is similar across all provinces, although the cause profiles differ among provinces.
- Injury mortality rates are particularly high in the Western Cape, Gauteng and Mpumalanga. The injury rates for males are double those for females.

**Table 1. Leading ten causes of premature mortality (YLLs)**

Rank	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	Northern Cape	North West	Western Cape	South Africa
1	HIV/AIDS (28.3%)	HIV/AIDS (42.9%)	HIV/AIDS (42.8%)	HIV/AIDS (51.4%)	HIV/AIDS (33.4%)	HIV/AIDS (49.8%)	HIV/AIDS (21.4%)	HIV/AIDS (39.6%)	HIV/AIDS (14.1%)	HIV/AIDS (39.0%)
2	Diarrhoeal diseases (7.3%)	Tuberculosis (5.9%)	Homicide & violence (8.3%)	Homicide & violence (4.7%)	Diarrhoeal diseases (7.2%)	Homicide & violence (5.7%)	Tuberculosis (8.0%)	Lower respiratory infection (5.6%)	Homicide & violence (12.9%)	Homicide & violence (6.8%)
3	Tuberculosis (5.9%)	Lower respiratory infection (5.5%)	Road traffic (4.4%)	Diarrhoeal diseases (4.2%)	Homicide & violence (5.7%)	Diarrhoeal diseases (4.1%)	Homicide & violence (7.2%)	Homicide & violence (5.2%)	Tuberculosis (7.9%)	Tuberculosis (4.7%)
4	Homicide & violence (5.8%)	Homicide & violence (4.5%)	Ischaemic heart disease (3.5%)	Lower respiratory infection (3.7%)	Lower respiratory infection (5.1%)	Lower respiratory infection (4.0%)	Diarrhoeal diseases (5.4%)	Tuberculosis (5.1%)	Road traffic (6.9%)	Diarrhoeal diseases (4.2%)
5	Lower respiratory infection (4.3%)	Diarrhoeal diseases (3.7%)	Tuberculosis (2.9%)	Road traffic (2.8%)	Tuberculosis (3.5%)	Road traffic (3.5%)	Ischaemic heart disease (4.9%)	Diarrhoeal diseases (4.3%)	Ischaemic heart disease (5.9%)	Lower respiratory infection (3.9%)
6	Road traffic (3.6%)	Stroke (3.3%)	Lower respiratory infection (2.7%)	Stroke (2.5%)	Road traffic (3.4%)	Tuberculosis (2.3%)	Stroke (4.4%)	Road traffic (3.0%)	Stroke (4.6%)	Road traffic (3.7%)
7	Stroke (2.9%)	Road traffic (2.7%)	Stroke (2.7%)	Tuberculosis (2.3%)	Hypertension heart disease (3.0%)	Stroke (1.9%)	Lower respiratory infection (4.2%)	Stroke (2.9%)	Trachea/bronchi /lung (2.7%)	Stroke (2.8%)
8	Protein-energy malnutrition (2.4%)	Ischaemic heart disease (2.3%)	Diarrhoeal diseases (1.5%)	Ischaemic heart disease (2.1%)	Low birth weight (2.3%)	Low birth weight (1.7%)	Road traffic (4.0%)	Ischaemic heart disease (2.8%)	Lower respiratory infection (2.4%)	Ischaemic heart disease (2.5%)
9	Low birth weight (2.2%)	Low birth weight (2.0%)	Suicide (1.5%)	Low birth weight (1.5%)	Protein-energy malnutrition (2.1%)	Ischaemic heart disease (1.4%)	Low birth weight (2.5%)	Hypertensive heart disease (2.2%)	Suicide (2.3%)	Low birth weight (1.7%)
10	COPD (1.8%)	Protein-energy malnutrition (1.8%)	Diabetes mellitus (1.4%)	Diabetes mellitus (1.4%)	Stroke (2.1%)	Hypertensive heart disease (1.4%)	Protein-energy malnutrition (2.3%)	Low birth weight (1.9%)	Diarrhoeal diseases (2.3%)	Protein-energy malnutrition (1.5%)

# Recommendations

## The need for further research

The variations between the provinces in levels and causes of mortality identified in this study highlight extensive scope for epidemiological studies. Such differences may be related to levels of wealth and development, to population group differences and demographic features of the province, to geographical differences and environmental exposures, or to people's access to health services or other basic services. Risk factors such as indoor exposure to smoke and poor access to health care services may be related to the increased mortality in the poorer provinces, whereas the chronic diseases associated with overweight, hypertension, high cholesterol and physical inactivity may affect the more developed provinces. Considering the levels of extrapolation required to derive the estimates for this study, it is important to validate the findings against other epidemiological data.

A comparative risk factor assessment is underway to quantify the contribution of 16 selected risk factors on the burden of disease experienced at a national level in 2000. The study will be completed in 2006 and the results will be important to inform policy responses to reduce the burden of disease in South Africa. A reliable and comparable analysis of risks to health is essential to guide the health sector response to prevent disease and injury. This has been recognized by the South African Government as an important strategy to improve the health of the nation.

By comparing provincial mortality rates, this study has demonstrated inequalities in health status in South Africa. However, it is important to realise that the average profile of a province obscures the variability within that province. Studies assessing the mortality experienced by the different population groups, social classes and ethnic groups and for small areas, such as health districts, would provide useful insight into inequalities and social determinants of health.

## Improving cause of death information

This study signifies an important milestone in generating burden of disease information at provincial level by providing mortality estimates for the provinces. However, these estimates are based on extrapolations from a variety of data sources. There is an urgent need for further improvement to the cause of death data system to provide timely and accurate cause of death statistics. Based on the analysis of the cause of death data, it is clear that the following issues need to be addressed:

- The lack of details about the manner of death in the case of fatal injuries needs urgent attention. A mechanism to build the mortuary surveillance system (NIMSS) in all provinces and link the information to the vital registration system should be put in place.
- The quality of information on the underlying cause of death needs to be improved so as to reduce the number of deaths certified with insufficient information, which results in a high proportion of deaths being classified as 'ill-defined'. This will require investigating how reliable cause of death details for the cases certified by traditional headmen can be obtained as well as improvements in the quality of medical certification. It is essential to increase the awareness about the public health importance of such information through continued professional education programmes and basic training.
- Systems to ensure timely access to information at health district level need to be developed. The viability of the method of collecting death data used for Cape Town needs to be considered together with alternative models for collecting cause of death statistics for health districts.

Timely and accurate cause of death statistics are an essential component of the information needed for planning and monitoring health services and responding to the health needs of the population. Several aspects still need to be addressed to improve the quality of the data collected in South Africa: the poor registration of child deaths, the quality of medical certification of the cause of death, and information regarding the manner of death in the case of injuries. In addition, a mechanism to provide district level cause of death statistics must be established.

## Practical steps

Provincial and local level planners are urged to make use of the findings of this study to modify the emphasis of national policies. The quadruple burden that is experienced in all provinces requires a broad range of interventions, including improved access to health care, ensuring that basic needs such as water and sanitation are met, and the active promotion of a healthy lifestyle. Some of the provincial differences can be accounted for by the variations in wealth, highlighting the need for policies to address poverty and reduce the inequalities in South Africa.

HIV infection has spread very rapidly in South Africa, resulting in a pandemic of major proportions that must receive special attention. The ASSA2002 model projects that, in 2004, the total number of deaths from all causes was more than 700 000 and that 44% of them were due to HIV and AIDS. This highlights the urgency of addressing the problems posed by HIV and AIDS by, inter alia:

- accelerating the treatment programme approved by Cabinet in September 2003
- bolstering the tuberculosis control programmes that are currently not meeting the targeted levels of successful treatment
- strengthening efforts to prevent the spread of the epidemic
- ensuring that sufficient social systems exist to support individuals infected and affected by HIV and AIDS.

South Africa clearly faces major challenges to improve the health of the nation. The provincial estimates will serve as a benchmark against which to monitor the success of meeting these challenges.

### Summary of recommendations

- The quadruple burden experienced in all provinces requires a broad range of interventions, including improved access to health care; ensuring that basic needs, such as those related to water and sanitation, are met; the active promotion of a healthy lifestyle over the entire life-course; broad-range disease and injury prevention; and a reduction of risk factors associated with major contributors to disease burden.
- The high death rates due to HIV and AIDS highlight the urgency to accelerate the implementation of the comprehensive plan for the treatment and prevention of HIV and AIDS.
- Some of the differences between provinces may be associated with socio-economic conditions, highlighting the need to address poverty and reduce inequalities.
- There is an urgent need to improve the cause of death data system so that it can routinely provide reliable cause of death statistics at health district level. In the meantime, policy makers are urged to make use of the burden of disease estimates of provincial mortality that have been based on detailed analyses of several sources of data to derive consistent and coherent estimates of the mortality experienced in the provinces.

## REFERENCES

- <sup>1</sup>Bradshaw D, Nannan N, Laubscher L, Groenewald P, Joubert J, Nojilana B, Norman R, Pieterse D, Schneider M. *South African National Burden of Disease Study 2000: Estimates of Provincial Mortality*. Cape Town: Medical Research Council 2004. Available: <http://www.mrc.ac.za/bod/bod.htm> [2005, 15 April].
- <sup>2</sup>Bradshaw D, Nannan N, Laubscher L, Groenewald P, Joubert J, Nojilana B, Norman R, Pieterse D, Schneider M. Provincial mortality in South Africa, 2000 – Priority setting for now and a benchmark for the future. *S Afr Med J* (In press).
- <sup>3</sup>Dorrington R, Bradshaw D, Johnson L, Budlender D. The Demographic Impact of HIV/AIDS in South Africa: *National Indicators for 2004*. UCT, Medical Research Council and Actuarial Society of SA. ISBN: 1-920015-17-5. 2004 <http://www.mrc.ac.za/bod/bod.htm> [2005, 31 March].
- <sup>4</sup>Groenewald P, Nannan N, Bourne D, Laubscher R and Bradshaw D. Identifying deaths from AIDS in South Africa. *AIDS* 2005; 19: 193-201.
- <sup>5</sup>Burrows S, Bowman B, Matzopoulos R, Van Niekerk A, eds. A profile of fatal injuries in *South Africa 2000: Second annual report of the National Injury Mortality Surveillance System (NIMSS) 2000*. MRC/UNISA Crime, Violence and Injury Lead Programme. Cape Town: South African Medical Research Council. 2001.
- <sup>5</sup>Minister of Health. Budget speech, May 2003.
- <sup>7</sup>Mathers CD, Ma Fat D, Inoue M, Rao C, Lopez AD. Counting the dead and what they died from: an assessment of the global status of cause of death data. *Bull World Health Organisation* 2005; 83: 171-177.
- <sup>8</sup>Dorrington R, Bradshaw D, Johnson L, Budlender D. The Demographic Impact of HIV/AIDS in South Africa: *National Indicators for 2004*. UCT, Medical Research Council and Actuarial Society of SA. ISBN: 1-920015-17-5. 2004 <http://www.mrc.ac.za/bod/bod.htm> [2005, 31 March].

## NOTES



SOUTH AFRICAN NATIONAL BURDEN OF DISEASE STUDY  
ESTIMATES OF PROVINCIAL MORTALITY 2000