Western Cape Burden of Disease Reduction Project

Volume 2 of 7

Institutionalising a mortality surveillance system in the Western Cape Province to measure the Burden of Disease and the impact of preventive interventions

Final Report 2007

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Executive Summary: Workteam One

David Bourne

Background

The main task of Workteam One in the Burden of Disease (BoD) Project has been to review the empirical data available for Burden of Disease estimation in the province and through this to examine the prospects, and prepare, for the institutionalization of mortality surveillance within the Provincial Government system, in particular within the Department of Health.

The BoD measure involves calculations using mortality and morbidity. Mortality is a crucial component of the BoD and captures a large part of the burden (with the exception of mental health disorders) and morbidity estimates can usually be derived from knowledge of morbidity/mortality ratios in the WHO Global Burden of Disease Study [Murray & Lopez, 1996].

The MRC Burden of Disease Unit, which is a contributor to the Provincial BoD Project, has produced estimates of the BoD, both for South Africa as a whole, as well as provincial estimates of mortality for the year 2000. The MRC is also currently preparing a comparative risk assessment which examines risk factors for the various components of the BoD for the year 2000 for South Africa The year 2000 estimates assisted in the identification of the reviews that have been conducted in the BoD project

Official mortality statistics are currently produced by Statistics South Africa. Since 1997 official mortality statistics have not been broken down by Province but are available on a national basis only. The current official system for processing death data is shown in schematic form in Figure 1 overleaf. In contrast, Cape Town Metropole has been collecting its own cause of death statistics which can be analysed at sub-district level. This system has been extended to the Boland/Overberg health region. The MRC/UNISA Crime, Violence and Injury Lead Programme has been collecting information from mortuaries on injury related deaths. The MRC BoD Research Unit has established a rapid mortality surveillance system based on basic details of deaths that are included on the population register.

Methods

In order to provide a more up-to-date mortality assessment, Workteam One has mainly been involved in developing systems to provide mortality data for the Western Cape that are accurate, timely, and capable of fine spatial dis-aggregation within the Province.

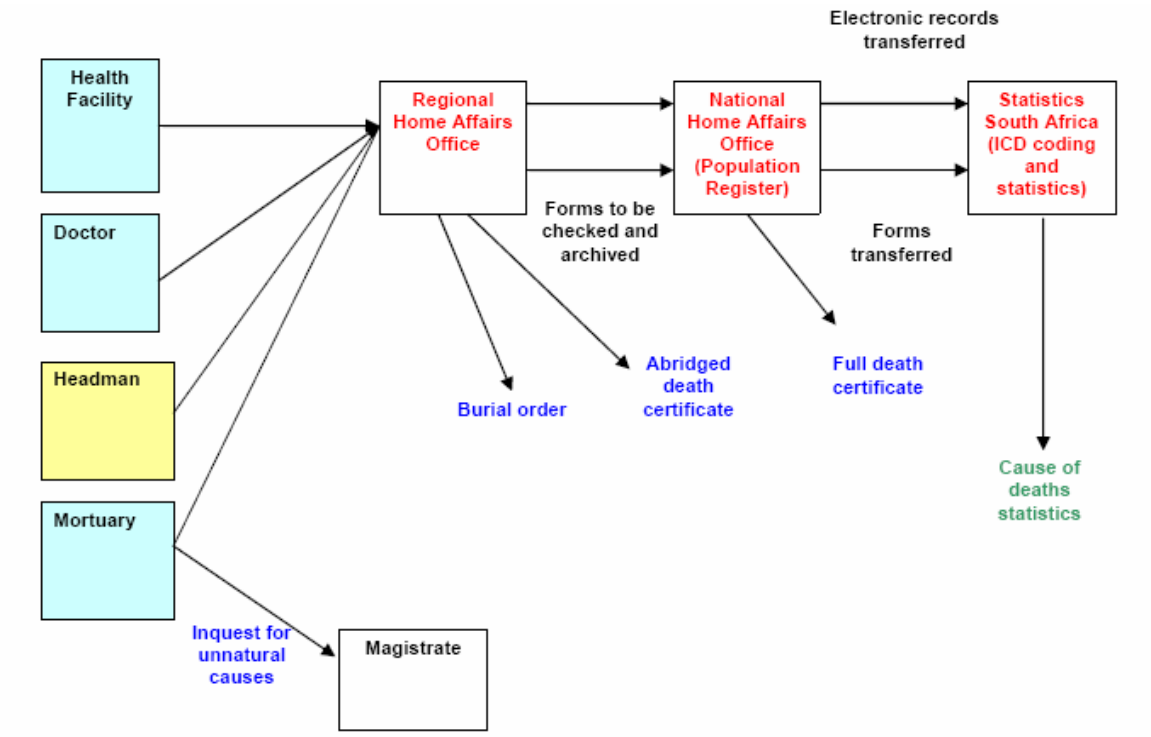

Fig 1 Current official system for processing mortality data

Workteam One has thus adopted a four-fold approach to collecting better data.

1. The first approach involves consolidating the current mortality surveillance systems and refining the system to do it in-house, as a special project involving the MRC BoD Unit, the Cape Town Metropole, the Provincial Health Department and Project members, with better quality controls for data collection and analysis. This builds on the local level mortality surveillance system that has been instituted in the Metropole for over five years as a collaborative project between the Metropole, MRC and UCT. A similar system was instituted in the Boland/Overberg Region, beginning in 2004.

   This system is illustrated in Figure 2, and shows the source of the data utilised in Paper 1 in this volume for Cape Town mortality and in Paper 2 for mortality in Boland/Overberg.

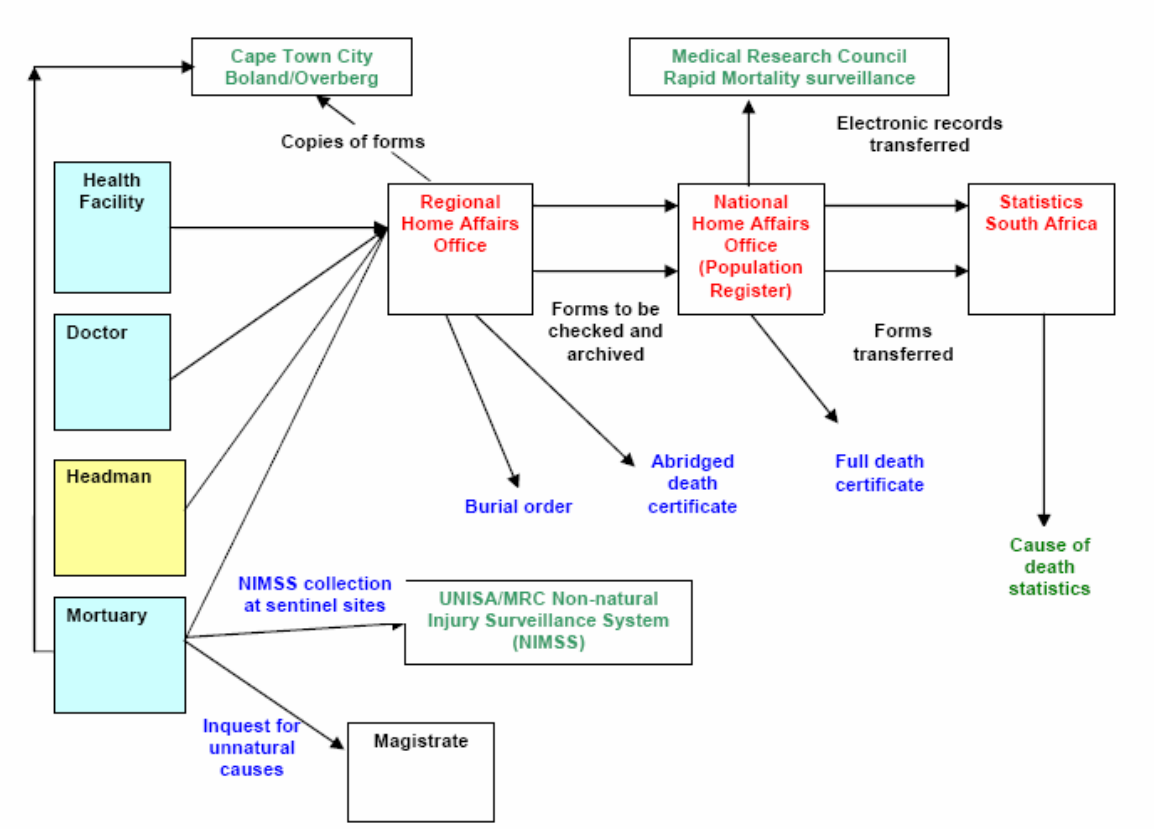

Fig 2 Current Burden of Disease Project system for processing mortality data

The BoD project has enabled a common reporting format and methodology to be established between the Metropole and the Province. This is one of the key steps in the process of institutionalising the mortality surveillance system within government. It is the intention that the Provincial Government roll out such systems to cover the four remaining health districts in the Province with the institutionalisation will involve a close and formal relation between the Provincial Department of Health and the Dept of Home Affairs.

The proposed, finally institutionalized local mortality surveillance system is shown in Figure 3 on the following page.

2. The second approach has been to utilise data from Statistics South Africa, which has generated Paper 3 for Western Cape mortality as a whole. These data have been specially tabulated on a complete provincial basis, though not with any further spatial disaggregation. This data is still available for analysis up to 2002, although data up to 2005 will become available later this year. The results of analysis of these data have been somewhat disappointing, in that, although they have indicated a considerable and rapid change in mortality in

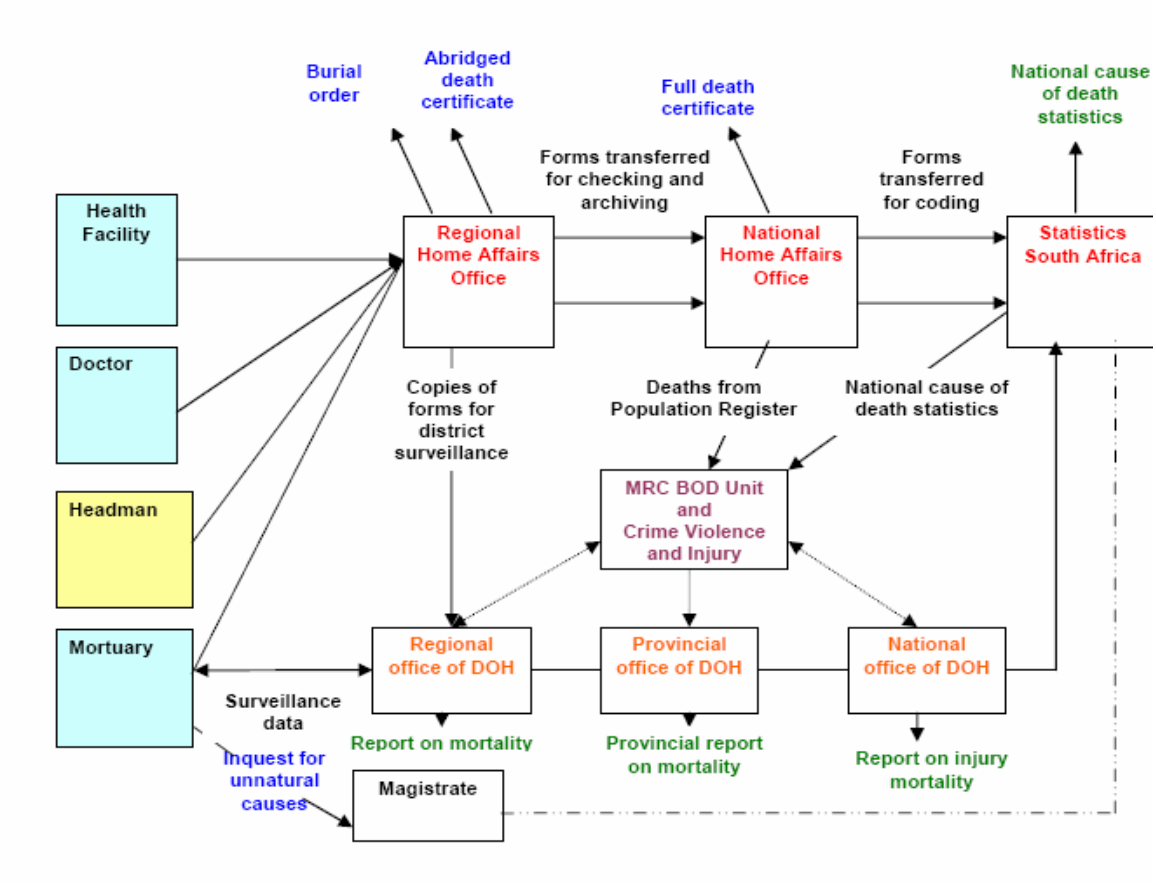

Fig 3. Proposed Western Cape system for processing mortality data

the province, the data are temporally very far behind those that can be collected directly using the first approach above. The absence of detailed spatial breakdown below the provincial level is a serious drawback, as is the lack of information regarding the causes of injury deaths. There have also been serious errors detected in the coding of causes of death among infants, which makes much of the Statistics SA data for this age group invalid.

3. The third approach has been to obtain data directly from the Population Register of the Dept of Home Affairs. This data is not publicly available. It has the disadvantage of only recording those deaths which have an official ID number, which has nevertheless proved generally adequate. It is also the most up-to-date of all systems discussed above with data being available within a month or two after death. There are problems with the cause-of-death classification and it has proved possible to use only a crude classification, separating causes of death into natural and non-natural (i.e. external) categories.

   Spatial disaggregation is limited by the distribution of the various offices of the Department of Home Affairs. It does however have considerable utility as an audit tool for checking the completeness of the data currently being collected in the Metropole and Boland/ Overberg. Ongoing analysis of these data, which is not yet

complete, has led to very up to date information on provincial post-neonatal mortality rates, revealing a likely effect of the Provincial Prevention of Mother-To-Child Transmission (PMTCT) intervention programme to interrupt vertical HIV transmission. Childhood diseases have been identified by this Project as one of the top 5 contributors to the BoD. Consequently, linking this source of mortality data to registered births (which are known at municipal level) can lead to extremely useful and rapid information on neonatal, infant and child mortality, as well as maternal mortality and the situation with regard to orphans.

4. The fourth approach is to integrate data from the mortuaries in the Western Cape (now a Provincial responsibility falling under the Department of Health) into these other systems to provide a level of detail on violent death not currently obtainable in the national systems. The UNISA/MRC Non-natural Injury Surveillance System is an example of an existing system based on mortuary data.

Thus a combination of data collected directly from Home Affairs coded and analysed within the province, with input from UCT and the MRC, combined with an audit from the population register, and injury data from the mortuaries will provide the province with an institutionalized and integrated rapid mortality surveillance system, as depicted in Figure 3 that can not only be used for Burden of Disease estimates, but also for monitoring and evaluation of Provincial inequity and interventions intended to reduce the Provincial BoD. This remains the principal aim of the Provincial BoD project.

Workteam One is currently working on the improvement of estimates for morbidity arising from mental health disorders as this BoD category has a larger morbidity component than a mortality component.

Selected Results

Cape Town

The Cape Town routine local mortality surveillance system provides a wealth of data on the health of the population in Cape Town. This data has provided an opportunity to assess priority health intervention programmes in terms of mortality, where appropriate, for the first time.

Cape Town is experiencing a changing pattern of mortality.

For females, while the overall age standardized mortality rate has not changed during these 4 years, there has been an **increase in HIV/AIDS mortality** and a decrease in the non-communicable disease death rate.

The overall age standardized **mortality rate for males is much higher than that for females** and has also declined slightly during this period. The death rates from injuries and from non-communicable disease have decreased while there has been **an increase in the HIV/AIDS mortality** rates.

The differential pattern of mortality between the various subdistricts is marked, and shows the still existing **patterns of inequity in the City**. Such **differentials can be masked** when mortality measures are aggregated, making the point that it is essential that health information be collected at the lowest or smallest possible level of spatial disaggregation.

While **HIV/AIDS mortality has increased dramatically since 2001**, it appears to have **stabilised in 2004**, possibly demonstrating the **impact of the PMTCT and ARV programmes** (the Cape Town data for 2005 is not yet complete)

The data for 2001 to 2004 show that **HIV mortality has become the leading cause of premature mortality** in the city, and that **TB remains in third place**. HIV/AIDS and TB are now closely linked. Aside from TB being one of the indicator conditions for AIDS, there is **clear evidence that the TB epidemic is being fuelled by the HIV epidemic.** These data therefore reflect the impact of the dual HIV/AIDS and TB epidemics in this province. Where HIV/AIDS and TB were reported on the death certificate the underlying cause was assume to be HIV/AIDS in accordance with ICD 10 guidelines. However, for TB programme purposes this co-morbidity was recorded.

Cape Town (Contd.)

Mortality due to injuries is extremely high although there is evidence of a declining trend. However, injury mortality rates particularly homicide and **road traffic fatalities** are still **amongst the highest in the world**, particularly amongst men. Of particular concern are the high homicide and road traffic injury fatality rates among the **male youth**. This is linked to **alcohol** and other **substance abuse** but limited routine data is collected in this area. Urgent attention needs to be given to identifying and implementing strategies to prevent injuries.

Diabetes, stroke and ischaemic heart disease are all among the leading causes of premature mortality and have **shifted rankings** over this short period of surveillance with **diabetes going from 8th in 2001 to 5th place** in 2004. Mortality rates due to non communicable diseases are high with variations along the lines of the epidemiological transition. Non communicable diseases account for a high proportion of premature mortality in adult women. **Smoking** rates are high in the "coloured" population especially among females.

Child mortality appears to have remained **constant** over this period but there is an **unexpected increase in mortality from low birth weight** that needs further investigation. There is a suggestion that **child mortality due to HIV/AIDS has started decreasing**. However, as indicated above, the study period over which this has been observed covers only the beginning of the full scale PMTCT roll out.

The **absence of the impact of mental health disorders** is noted when using only mortality data.

As a consequence of the information emerging from the Cape Town mortality surveillance system, **emerging health issues and vulnerable groups can be identified and targeted for interventions**. Moreover, interventions can be monitored using these same data.

Khayelitsha and Nyanga have a considerably higher BoD than other sub-districts in the Metropole. However, despite an increase in HIV/AIDS mortality in Khayelitsha, overall mortality has decreased in this sub-district, mainly due to a reduction in injury mortality. This may be partly due to a **multisectoral intervention** led by the Department of Safety and Security, which prioritised certain police stations, including Khayelitsha, for additional resources and attention In Khayelitsha, for example, an operational centre and 2 new police stations were built and resourced, sector policing was introduced, community partnerships were forged and shebeen trading hours were restricted.

Boland /Overberg

Boland/Overberg is experiencing an even more rapid changing pattern of mortality.

In the Boland/Overberg region or district **changing mortality is noticed over even a very short period.** The top four causes of death have remained the same between 2004 and 2005 but **the ranking has changed.** **Tuberculosis** has become the leading cause of premature mortality in 2005 after ranking second to homicide in 2004. Homicide now ranks third after **HIV/AIDS** in second place, with road traffic accidents ranking fourth. These top four conditions account for 40% of the premature mortality in the region.

Spatial variation between sub-districts is marked for many conditions.

Some highlights of the findings for the Boland/Overberg region are:

Tuberculosis is the leading cause of mortality in the region with mortality rates much **higher than** those experienced in **Cape Town:**
(86 per 100 000 vs 50 per 100 000 in 2004).

HIV/AIDS mortality rates have continued to increase, but are **lower than those in Cape Town** (50 per 100 000 vs 80 per 100 000). The increase in mortality in Witzenberg, due to a significant increase in HIV/AIDS mortality and a marked increase in mortality due to tuberculosis, is cause for concern.

Homicide mortality rates decreased between 2004 and 2005, amongst males. The **profile of homicide is quite different** from that found in Cape Town: the use of firearms is very limited in the Boland/Overberg and homicide rates amongst females are almost double those experienced in Cape Town. (This differentiation of the causes of violent death is not possible when using Statistics South Africa data).

Overall, mortality rates due to non-communicable diseases in Boland Overberg are slightly lower than those in Cape Town (577 vs 626 per 100 000). There are however differences in the profile, with mortality rates due to cardiovascular conditions and cancers being similar whilst **mortality due to respiratory conditions is higher in the Boland/Overberg** than in Cape Town, and **diabetes mortality rates are lower**.

Infant mortality has remained fairly **constant** in the Boland Overberg since 1997 with the suggestion of a downward trend. However, there is **marked variation between sub-districts** with Witzenberg having the highest rates. Infant mortality rates in the Boland Overberg (about 31 per 1000 LB) are higher than in Cape Town (24 per 1000 LB). **Prematurity and low birth weight are the leading cause of neonatal deaths while the leading cause of death in infants is diarrhoea.** Ill-defined deaths rank second and account for a high proportion of deaths in late neonatal and post-neonatal infants.

Western Cape Province (from Statistics South Africa Data)

In spite of its lack of timeliness, and spatial disaggregation, this analysis of a special tabulation of data for the Western Cape, supplied by Statistics South Africa has revealed much about the mortality in the province. It is clear that the **mortality profile is somewhat different from the national profile**. The Western Cape also experiences the quadruple burden that has been described as the combination of pre-transitional conditions related to under-development, non-communicable diseases, injuries and HIV/AIDS. However, this data shows that the **HIV/AIDS epidemic is at a lower scale** than in other provinces and that **injuries and non-communicable diseases are more pronounced.**

There are **pronounced gender differences** in the registered deaths. There are consistently more male deaths than females, with the province having more females than males. **Child mortality is generally higher for males** than for females, which is also reflected in the Western Cape data. In the age groups over 5 years, the **high injury burden** contributes substantially to the higher numbers of male deaths. However, in 1997 there was also a consistently higher number of **male deaths** from **natural causes** across all ages. This appears to be a result of the higher number of **TB** deaths among males as well as **cardiovascular and respiratory causes** which would be related to the higher **tobacco** and **alcohol** use among males. Over the period 1997 to 2002, there was a **rapid increase in the number of young adult deaths** between 20 and 59 in males and 15 and 49 in females, resulting from increases in **HIV/AIDS** and related conditions. By 2002, the number of natural **deaths among women aged 20- 29 years exceeded the number of deaths among males**. In the 60+ age group the numbers of male and female deaths are similar, but the female deaths occur at much older ages than males. The nature of non-communicable diseases differs between males and females. **Stroke is a major cause of death in the province**. However, males appear to have the occurrence of ischaemic heart at younger ages while females have diabetes at younger ages. It will be important to calculate age specific rates in the older ages to assess the trends.

Nevertheless, the data collected directly from Home Affairs data (currently for Cape Town and the Boland/Overberg region) provides very much better quality than that which can be supplied by Statistics South Africa, and should continue to be the primary source of mortality data.

Conclusions and Recommendations

Some progress has been made during the first year of the Provincial BoD Project in institutionalising an integrated mortality surveillance system drawing from all available sources of mortality data in the most appropriate manner for the task at hand.

The richness of the information arising from mortality data for the Province and the value that has already been added and could be added on an ongoing basis into the future are illustrated by the 3 papers produced by Workteam 1. This work provides a substantial and concrete basis for an intelligence function of government which may be repeatedly used to establish where the Province is with regard to its health status, and to monitor and evaluation governmental and other intervention programmes aimed at the reduction of the BoD over time. There is also possibility for transforming the pattern or profile of the BoD based on this type of intelligence system.

The BoD project is small while the mortality surveillance task is large. During the course of this first year it became obvious that the Project resources are not able to substitute for Provincial Government institutionalisation in operating this surveillance system. A strong recommendation from Workteam 1 is that the Provincial Department of Health create the appropriate permanent and routine structures and allocate the necessary resources to sustainably roll out the integrated mortality surveillance system (as depicted in Figure 3) to all 6 districts over the next few years. The role of Project members in this process became increasingly clear over the past year as that of guidance, support and training in the collection and processing of quality data allowing valid information on the state and trends for mortality in the Province. Additionally, the project members are able to assist with analysis of these improved data and with the further institutionalisation of analytic methods and the production of appropriate indicators by Provincial staff.

For Year 2 Workteam 1 envisages aligning its activities with those listed at the end of the Overview Chapter of the full Report. Specifically, this includes continuing with the Provincial institutionalisation of mortality surveillance through the rollout of the rapid mortality surveillance system to more districts. It is also hoped that Workteam 1 can become involved together with the other members of the Project in an integrated intervention in a multiply deprived setting as outlined at the end of the Overview Chapter.

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Reports which follow in Volume 2

Groenewald P, Bradshaw D, Daniels J, Matzopoulos R, Bourne D, Shaikh N, Blease D, Naledi NT. (2007) Report on cause of death and premature mortality in Cape Town, 2001-2004

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REPORT 1

Cause of death and premature mortality in Cape Town, 2001-2004

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May 2007

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Abstract

This report covers detailed cause of death data for the Cape Town Metropole for the period 2001 to 2004 (data for 2005 were incomplete). Local mortality surveillance is required as mortality reports published by Statistics South Africa are not released below a national level. The information in this report has been collected directly from the local offices of the Department of Home Affairs and supplemented by information collected from local mortuaries. The cause of death coding has been done by trained clerks at the City of Cape Town. Deaths are analysed by age, cause and gender for 11 sub-districts. Premature mortality and age-standardised rates are calculated and compared across sub-districts. Temporal trends are given for major cause groupings. Up-to-date population estimates for each sub-district and estimates of the completeness of death registration were calculated.

The Cape Town routine local mortality surveillance system provides a wealth of data on the health of the population in Cape Town. For the first time, these data have provided an opportunity to assess priority programmes in terms of mortality, where appropriate. In addition, emerging health issues and vulnerable groups can be identified and targeted for interventions.

HIV/AIDS mortality has increased dramatically since 2001; however, it appears to have stabilised in 2004, possibly demonstrating the impact of the prevention of mother-to-child transmission (PMTCT) and antiretroviral (ARV) programmes.

Mortality due to injuries is extremely high although, there is evidence of a declining trend. However, injury mortality rates - particularly homicide and road traffic injuries - are still among the highest in the world, particularly in men. Of particular concern are the high homicide and road traffic injury fatality rates among the male youth. This is linked to alcohol and other substance abuse, but limited routine data are collected on this aspect. Urgent attention needs to be given to identifying and implementing strategies to prevent injuries.

Mortality rates due to non-communicable diseases are high, with variations along the lines of the epidemiological transition. Non-communicable diseases account for a high proportion of premature mortality, particularly among adult women. Smoking rates are particularly high in the coloured population, especially among females.

Child mortality appears to have remained constant over this period, but there is a peculiar increase in mortality from low birthweight that needs further investigation. There is a suggestion that child mortality due to HIV/AIDS has started decreasing (however, this study period covers only the beginning of the full-scale PMTCT roll-out).

Analysis of the 2001 mortality data for the City of Cape Town highlighted the differentials in levels of mortality across the city, as well as the quadruple burden of disease (infectious diseases; injuries, especially among young adults; non-communicable diseases later in life; and the growing HIV/AIDS epidemic) that is

experienced across all the sub-districts. Interventions to address the high burden of violence and homicide must be planned, implemented, monitored and evaluated multi-sectorally. Efforts to curb the HIV/AIDS epidemic, as well as tuberculosis, need to continue to be strengthened. The emerging epidemic of non-communicable diseases must be tackled through strengthening primary care management on the one hand and promoting healthy lifestyles on the other. Finally, equity must be prioritised in resource allocation between the sub-districts.

Introduction

The burden of disease in a population is a reflection not only of the health problems in the community but also of the amount of health care already being provided and the effects of all other actions that protect or damage health. These actions and effects include smoking, safe water, safe roads, alcohol and nutrition as well as more upstream factors such as education and poverty. The availability of timeous and accurate cause of death statistics is an essential component for planning, monitoring and evaluating interventions to address the burden of disease in a population.

The City of Cape Town has collected cause of death statistics for more than 100 years as part of its public health programme. In recent years an evaluation of the system identified the need for standardization of the coding and a more public health-oriented analysis of the statistics. The cause of death and premature mortality study done in the Cape Town Metropole in 2001[1] highlighted the fact that HIV/AIDS had created a quadruple burden of disease together with injuries, the degenerative, chronic diseases and childhood illnesses and other infectious diseases, particularly tuberculosis (TB). There were marked variations in the levels of mortality across the city, with some sub-districts having rates that were twice as high as others. These disparities reflected socio-economic differences embedded in the city.

In line with National Policy[2] and the specific burden of disease in the Western Cape Province, the City of Cape Town and the Provincial Department of Health have identified the following programme priorities for the Western Cape:[3]

1. HIV/AIDS
2. TB
3. Chronic Diseases
4. Child Health
5. Woman's Health

Together with these programmes, the establishment of a District Health System, the effective functioning of District Hospitals and the establishment of community-based services to form a local safety net and to complement the facility-based services in a seamless continuum of care have been identified as health system priorities.

Significant public resources are used to achieve health outcomes related to these key priorities. Therefore, analysis of the trend in causes of death and premature mortality with a focus on the five programme priorities will help identify key successes and failures, and inform further planning and prioritization of

interventions at a local level. In the context of limited resources and disparity in health outcomes, sub-population data become critical to identify and monitor inequalities in health status and to inform the process of prioritisation of interventions, services and research at a local level. This report presents the key findings from the trend analysis of the cause of death statistics for Cape Town Metropole and the 11 old sub-districts for 2001-2004.

The collection of cause of death statistics developed in the City of Cape Town has been extended to the Boland/Overberg and has played an important role in monitoring and planning for that health region.[4] Plans are currently under way for the system to be implemented in the other health regions of the province. This analysis of the Cape Town data forms the first of a series of reports which will eventually cover mortality in all the health districts of the Western Cape using a common methodology of data collection and analysis**.**

Methods and data quality

Cause of death data

Cape Town has a well established system of routinely compiling death statistics. Local health authorities collect copies of death certificates from the Department of Home Affairs. The underlying cause of death is identified and coded using a shortlist based on ICD-10[5] (Table 2 webversion only, http://www.who.int/bulletin), captured and processed by the local municipality. The shortlist is based upon the most prevalent conditions in Cape Town as well as diseases of public health importance. The list also allows for the capture of selected combinations of diseases such as diabetes and ischaemic heart disease (IHD), which are difficult to attribute to a single cause. Deaths attributed to HIV on the death certificates or obvious euphemisms for AIDS were coded to HIV as the underlying cause. The combination of HIV and TB on the death certificate is captured as a combination but analysed with HIV as underlying cause for general comparison. Similarly, when diabetes is recorded in association with a cardiovascular co-morbidity, diabetes is identified as the underlying cause in the general analysis.

The mortality data for 2001 – 2004 were obtained electronically from the Cape Town City Health Department. The data were cleaned and analysed using Microsoft Excel and Stata software. Stillbirths were excluded prior to any analysis. In addition, duplicate records, those where gender was missing and records where the cause of death code was inappropriate for the age or gender were excluded from further analysis (see Appendix 1).

The completeness of death registration for adults in the City of Cape Town during the period 2001 until 2004 was estimated to be 96%, about 55% for children 0 – 4 years, and about 70% for infants (see Appendix 2).[6] The total number of injury deaths registered by the City of Cape Town comprised more than 90% of the injury fatalities reported by the National Injury Mortality Surveillance System (NIMSS)[7] for the City of Cape Town for all the years under study except 2003, where only 84% of the injury deaths reported by NIMSS were registered by the City of Cape Town (see Appendix 3). One would expect the NIMSS to have slightly more deaths registered than the City of Cape Town, since the City only registers deaths for residents whereas NIMSS registers all injury deaths occurring in the Metropole. However, there are variations in the profile of the manner of death. Homicide deaths registered on the City system account for more than 90% of the homicide deaths registered on NIMSS, and are therefore likely to be fairly complete. However, the number of deaths due to road traffic injuries and suicide are lower (approximately 80% of NIMSS deaths), while deaths due to unintentional injuries in the City system are higher than the number reported by NIMSS.

After cleaning, the shortlist cause of death codes were aggregated according to the South African National Burden of Disease Study,[8] based on an adapted version of the 1990 Global Burden of Disease Study.[9] The Groups are:

Group I: the pre-transitional causes - communicable diseases, maternal causes, perinatal conditions, and nutritional deficiencies. (HIV/AIDS is part of Group I but is kept separate in the South African National Burden of Disease analysis due to the size of the burden that it contributes in South Africa.)

Group II: the non-communicable causes.

Group III: the injuries.

The deaths at unknown ages were redistributed proportionally by age and sex for each cause of death. The ill-defined cardiovascular deaths (heart failure) were redistributed by age and sex across rheumatic heart disease, IHDs, hypertensive heart diseases, pulmonary heart diseases and other cardiovascular diseases. The ill-defined respiratory deaths (respiratory failure) were redistributed proportionally by age and sex across COPD, asthma and other respiratory diseases. The deaths coded to ill-defined natural causes were redistributed proportionally by age and sex across all pre-transitional and non-communicable causes. The ill-defined injury deaths were redistributed proportionally by age and sex across all intentional and unintentional causes.

The data were analysed for Cape Town and for each of the previous 11 sub-districts within Cape Town (Figure 1). The boundaries of the sub-districts have been changed twice since 2001 and will be referred to as “old”, “interim” and “current”. Preliminary analysis of the death data by the interim sub-districts suggested that the inequities in mortality rates that are so evident in the old sub-districts are masked or diluted. Nyanga sub-district is a very good example of this. According to the new boundaries, the former Nyanga sub-district is divided between the new sub-districts of Klipfontein and Mitchell’s Plain. As can be seen from Table 1, the socio-economic conditions in Klipfontein are much better than for the old Nyanga sub-district. Because of this, and the time required to convert the data into the current sub-districts, it was decided to stick to the old sub-districts for this report.

Figure 1: Map showing old health sub-districts in the Cape Metropole

Table 1: Socio-economic indicators for Cape Town by old and interim sub-districts[10,11]

SUB-DISTRICT	% Not on Medical Aid	% Informal dwelling	% No electricity	% No piped water in dwelling or on site	% Not completed Matric	% Unemployed of the employable	% Households below poverty line
Old sub-districts							
Athlone	75	4	1	1	75	25	24
Blaauwberg	57	8	9	6	64	20	24
Central	52	7	9	5	44	17	21
Helderberg	66	14	8	8	57	18	18
Khayelitsha	97	80	32	26	86	47	55
Mitchells Plain	81	6	4	5	80	24	18
Nyanga	**97**	**64**	**54**	**29**	**85**	**50**	**57**
Oostenberg	57	18	13	11	67	20	18
South Peninsula	52	8	5	4	60	17	16
Tygerberg East	55	7	6	5	54	18	16
Tygerberg West	68	4	2	1	69	22	17
Interim sub-districts							
Central	45	6	7	4	8	16	19
Eastern	70	14	9	8	16	20	18
Khayelitsha	99	80	32	26	26	47	55
Klipfontein	84	23	20	15	20	36	37
Mitchell's Plain	88	41	23	21	20	33	30
N. Panorama	41	12	10	9	16	18	20
Southern	58	10	7	5	15	19	17
Tygerberg	49	4	2	0	15	22	17
Total	69	20	13	10	17	26	25

Population estimates for the health sub-districts

Population censuses were conducted by Statistics South Africa in 1996 and 2001, making it necessary to use projected population estimates for the years 2001 - 2004. It was decided against using the population estimates and projections from the provincial Department of Health, since although based on the official statistics from Statistics South Africa, these had not adjusted for undercount in specific age groups. Alternative estimates were used that are consistent with the annual estimates of the total population for the Cape Town Metropole from the demographic projections undertaken by the University of Cape Town Centre for Actuarial Research for the City of Cape Town.[12] These yearly estimates were projected using the ASSA (Actuarial Society of South Africa) model from 1985 to 2004, having made adjustment to the 1996 and 2001 census data and allowing for the impact of AIDS.

As mentioned earlier, the health sub-districts of Cape Town have been changed twice since 2001. In the first instance, population estimates by age and sex were estimated for each of the eight interim health sub-districts. The populations by age and sex for each of the interim health sub-districts were obtained from the community profile data sets for the 1996 and 2001 census and adjusted proportionately to match the total population estimates derived by Dorrington[12] for these years. It should be noted that the 1996 census had unspecified ages by sex which were reapportioned to all the ages above 20, based on the assumption that age reporting below 20 is more accurately and completely reported. The populations in the interim health sub-districts were then interpolated and projected by age and sex to 2004 using the ratio method, assuming an exponential rate of change in the percent distributions between the two censuses and reaching stability in the population after 60 years from 1996. The population was effectively adjusted, on a pro rata basis, so that the sum of the projected population by age and sex in the eight interim health sub-districts equalled the projected total populations of the interim health sub-districts in the ASSA model.

In the second instance, the populations for the old health sub-districts were estimated from those of the interim health sub-districts, based on an extrapolation of the proportional composition of the old health districts when compared to the interim sub-districts (by age and sex group). The common census sub-place names were identified for each of the old health sub-districts compared to the interim health sub-districts to calculate the proportions in 1996 and 2001 for each age and sex group. These proportions were extrapolated beyond 2001 and used to estimate the old health sub-districts from the estimates of the interim health sub-districts.

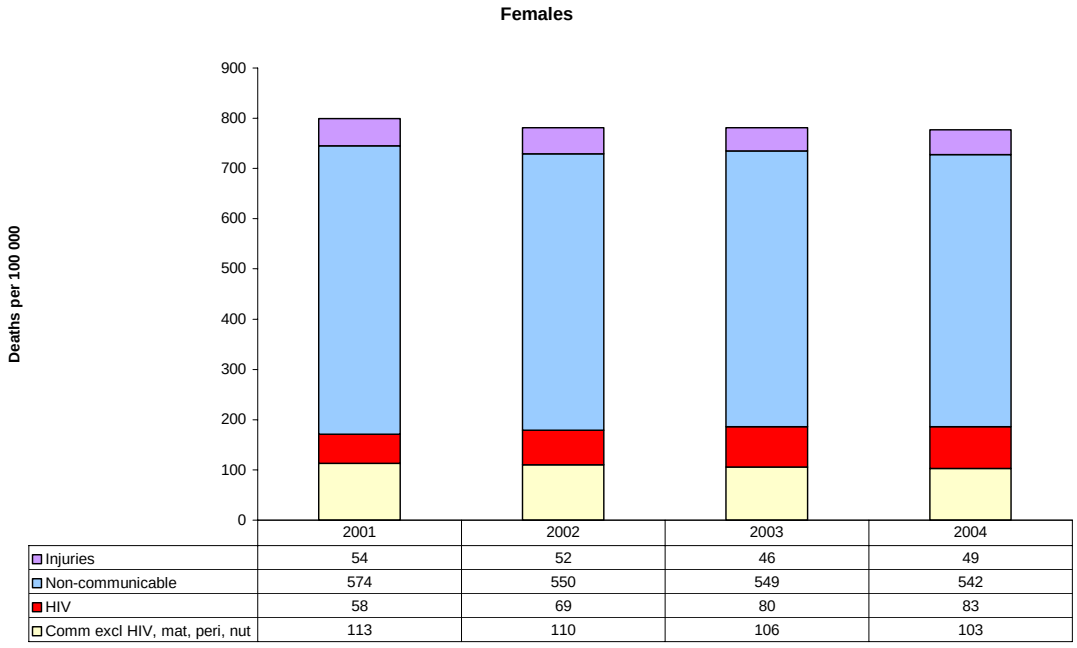
Mortality in Cape Town

Overview of mortality

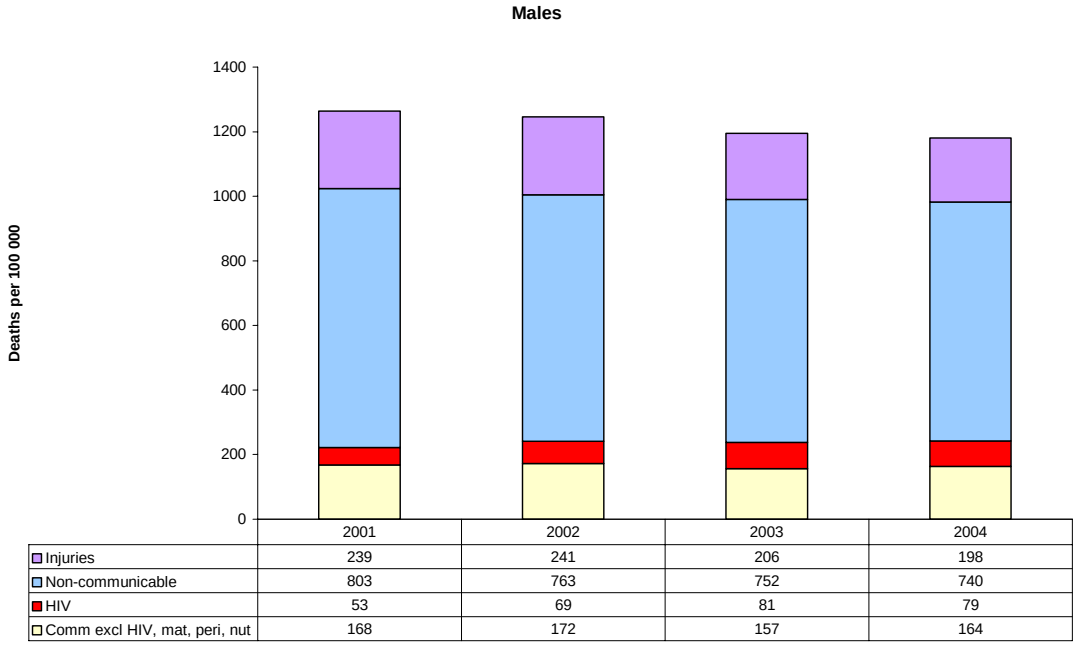
The age pattern of deaths in Cape Town in 2004 is shown for males and females in Figure 2. This pattern is very similar to that observed in 2001,[1] and is typical of the quadruple burden of disease experienced by societies undergoing a transition in their mortality patterns[8]: infectious disease mortality, primarily among young children; high levels of mortality due to violence and injuries among young adults; non-communicable diseases later in life; and the growing HIV/AIDS epidemic impacting on young adults and young children. There are considerable gender differences, with young adult males experiencing much larger numbers of deaths than females, mainly due to violence and injuries. HIV/AIDS accounts for a large proportion of deaths in young women.

Figure 3 shows the trend in the age-standardised mortality rates. The overall age-standardised mortality rate for females did not change during the 4 years. However, there was an increase in HIV/AIDS mortality and a decrease in the non-communicable disease death rate. The overall age-standardised mortality rate for males is much higher than that for females and declined slightly during this period. The death rates from injuries and from non-communicable disease decreased while there was an increase in HIV/AIDS mortality rates.

Age standardisation. A technique which eliminates differences in observed mortality rates caused by differences in the age structure of the population in different areas, rather than by differences in the force of the underlying mortality.



	2001	2002	2003	2004
Injuries	54	52	46	49
Non-communicable	574	550	549	542
HIV	58	69	80	83
Comm excl HIV, mat, peri, nut	113	110	106	103



	2001	2002	2003	2004
Injuries	239	241	206	198
Non-communicable	803	763	752	740
HIV	53	69	81	79
Comm excl HIV, mat, peri, nut	168	172	157	164

Figure 2: Age distribution of deaths by cause group and gender, Cape Town, 2004

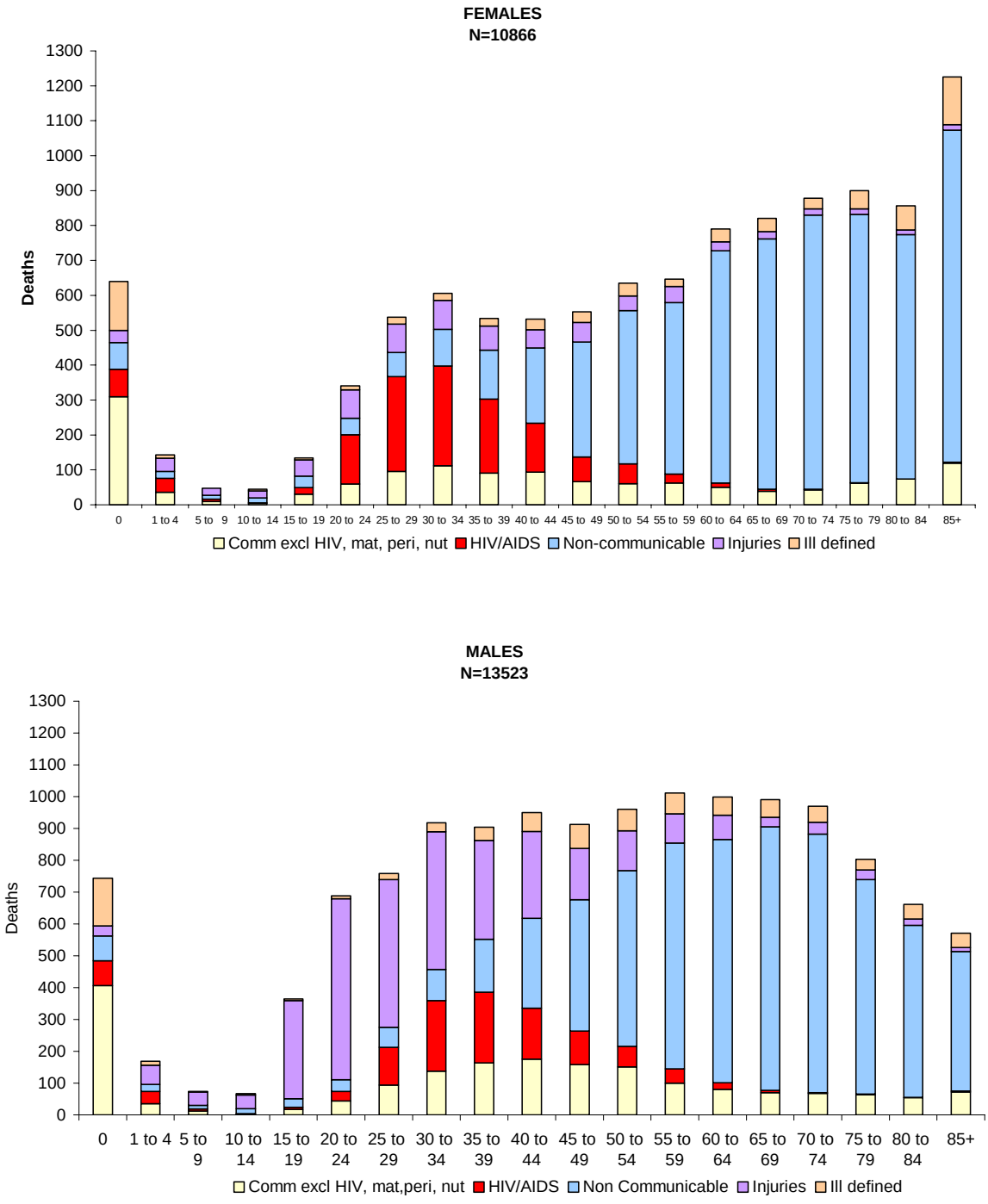


Figure 3: Age-standardised mortality rate by broad cause group by sex for Cape Town, 2001-2004

Trends in premature mortality

A comparison of the leading causes of premature death over the period 2001-2004 shows that since 2001 violent deaths have declined, but deaths due to HIV/AIDS have increased, with HIV/AIDS now replacing violence as the leading cause of death (see Figure 4). The four leading causes of death in Cape Town, namely homicide, HIV/AIDS, TB and road traffic injuries, accounted for 43.6% of all premature mortality in 2004.

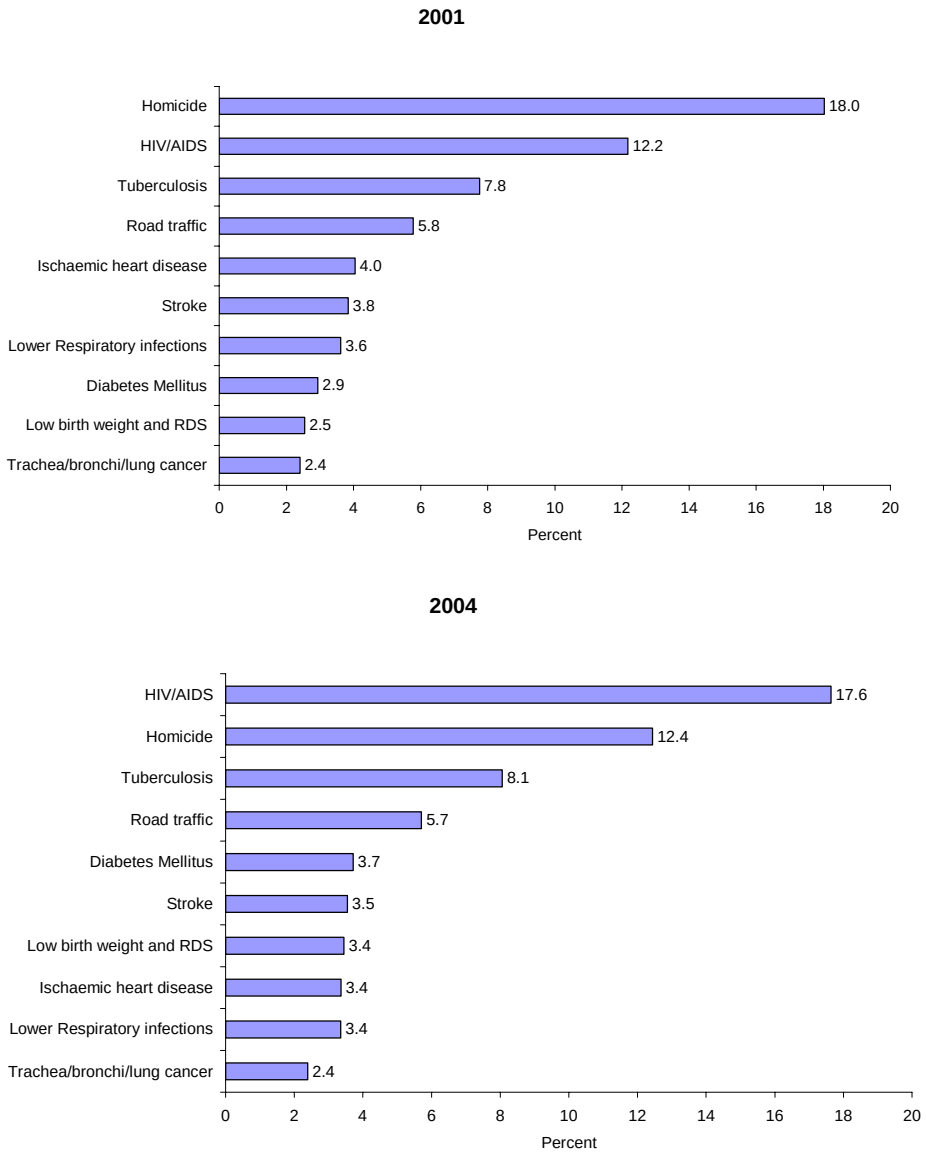


Figure 4: Top 10 causes of premature mortality (YLLs) for Cape Town, 2001 and 2004

Figure 5 shows the leading causes of premature mortality for males and females in 2001 and 2004. Although homicide continues to be the leading cause of premature mortality for males, it accounts for a lower proportion in 2004 compared with 2001. HIV/AIDS remains the leading cause for females. During

this period HIV/AIDS accounts for an increasing proportion of the YLLS and deaths during the perinatal period, rising in the ranking of the causes.

YLL Years of life lost

Premature mortality has been estimated using the standard Global Burden of Disease (GBD) approach to calculate years of life lost (YLLs)[9]. Age weighting, time discounting of 3% per annum and standard life expectancies based on the West model levels 25 and 26 (considered to a maximum life expectancy) have been used. The younger the age of death the greater the years of life lost[1].

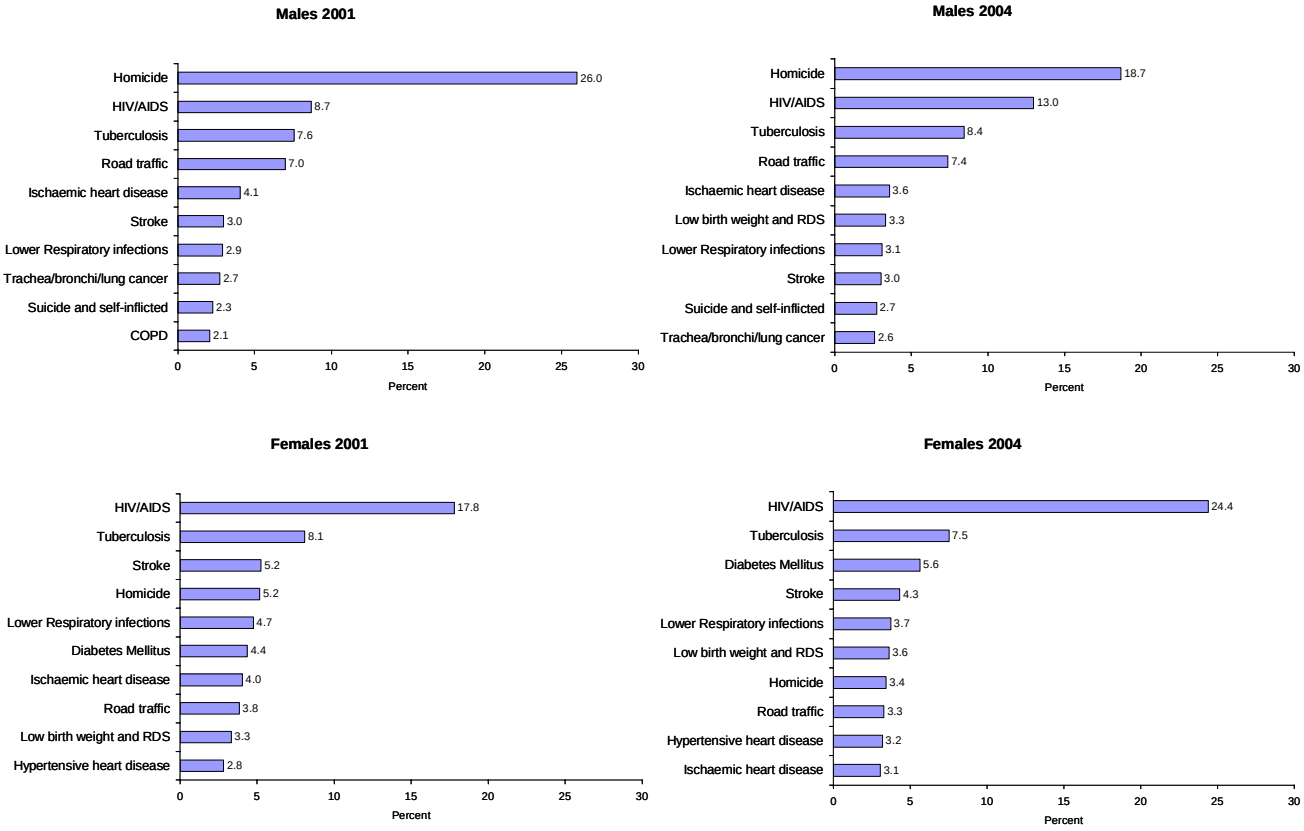


Figure 5: Top 10 causes of premature mortality (YLLs) by sex for Cape Town, 2001 and 2004

Table 2 shows the ranking of conditions based on YLLS for each health sub-district in 2004, and Figure 6 shows the YLL rates in 2001 and 2004 by sub-district. It can be seen that HIV/AIDS was the number one cause of premature death in all sub-districts except Athlone, where diabetes was the leading cause of death, Mitchell's Plain, where homicide was the leading cause, and Tygerberg West, where TB was the leading cause. HIV/AIDS ranks much lower in Athlone (4th) and Tygerberg West (7th). The reason for this is not clear.

The impact of HIV/AIDS is most prominent in Khayelitsha and Nyanga sub-districts, where it accounted for almost 30% of premature mortality. This mirrors the antenatal HIV prevalences in these sub-districts which are the highest in the province. Khayelitsha and Nyanga were among the first sub-districts to have access to the public sector ARV programme in 2001. By the year 2004, 2327 patients were on ARVs at 16 sites in the province, most of which were in Khayelitsha and Nyanga. Even though this was a significant achievement for the province, it was not able to mitigate the impact of HIV/AIDS. TB, which is often HIV/AIDS-related, is the third cause of premature death in most sub-districts. HIV/AIDS and TB account for about a quarter of all premature mortality in the City.

Homicide accounts for a significant burden of disease throughout Cape Town, and ranks second in leading causes of premature death in all the sub-districts in the City, except in Mitchell's Plain - where it ranks first. This picture is reflective of the prevalent culture of gang violence in the province, compounded by poverty, unemployment and substance abuse. Road traffic injuries are the fourth leading cause of premature mortality in more than half of the sub-districts. One in five people in the City die prematurely due to homicide or road traffic injuries.

Athlone, more than any of the other sub-districts, shows a sub-district in a health transition that is dominated by non-communicable diseases; Athlone is followed closely by Mitchell's Plain (Figure 6). Non-communicable diseases have traditionally been associated with increasing wealth. However, as has also been shown in previous reports, these conditions have a significant impact on poor communities as well. If we consider diabetes mellitus, IHD, stroke and hypertensive heart disease together, it is evident that the greatest impact of these conditions is in Athlone, Mitchell's Plain and Tygerberg West.

Sub-district variations

Table 2: Leading 10 causes of premature mortality (YLLs) for Cape Town and old sub-districts, 2004

Rank	Athlone	Blaawberg	Central	Helderberg	Khayelitsha	Mitchells Plain	Nyanga	Oostenberg	South Peninsula	Tygerberg East	Tygerberg West	Cape Town
1	Diabetes mellitus (8.7%)	HIV/AIDS (14.4%)	HIV/AIDS (16.2%)	HIV/AIDS (14.9%)	HIV/AIDS (27.3%)	Homicide (11.8%)	HIV/AIDS (28.5%)	HIV/AIDS (18.3%)	HIV/AIDS (9.7%)	HIV/AIDS (16.6%)	Tuberculosis (7.1%)	HIV/AIDS (17.6%)
2	Homicide (8.3%)	Homicide (11.8%)	Homicide (10.1%)	Homicide (11%)	Homicide (16.9%)	HIV/AIDS (10.3%)	Homicide (18.6%)	Homicide (12%)	Homicide (6.9%)	Homicide (10.2%)	Homicide (6.8%)	Homicide (12.4%)
3	Ischaemic heart disease (6.3%)	Tuberculosis (8.1%)	Tuberculosis (5.4%)	Tuberculosis (9.5%)	Tuberculosis (10.8%)	Diabetes mellitus (7.7%)	Tuberculosis (8.5%)	Tuberculosis (9.2%)	Ischaemic heart disease (6.0%)	Tuberculosis (9.0%)	Stroke (6.4%)	Tuberculosis (8.1%)
4	HIV/AIDS (5.9%)	Road traffic (7.4%)	Ischaemic heart disease (4.5%)	Ischaemic heart disease (6.9%)	Road traffic (5.6%)	Low birth weight and RDS (5.7%)	Road traffic (5.2%)	Road traffic (8.5%)	Tuberculosis (5.5%)	Road traffic (6.3%)	Road traffic (6.0%)	Road traffic (5.7%)
5	Tuberculosis (5.7%)	Ischaemic heart disease (5.3%)	Road traffic (4.5%)	Lower respiratory infections (5.4%)	Diarrhoeal Diseases (4.6%)	Tuberculosis (5.6%)	Lower respiratory infections (3.9%)	Suicide (4.1%)	Diabetes mellitus (5.3%)	Low birth weight and RDS (5.1%)	Diabetes Mellitus (5.9%)	Diabetes Mellitus (3.7%)
6	Road traffic (5.6%)	Low birth weight (3.5%)	Diabetes mellitus (4.4%)	Road traffic (5.2%)	Lower respiratory infections (3.5%)	Road traffic 4.8%)	Diarrhoeal diseases (3.4%)	Ischaemic heart disease (3.9%)	Stroke (4.5%)	Ischaemic heart disease (3.5%)	Ischaemic heart disease (5.6%)	Stroke (3.5%)
7	Stroke (5.4%)	Stroke (3.3%)	Stroke (4.1%)	Fires (4.3%)	Low birth weight and RDS (2.9%)	Stroke (4.7%)	Low birth weight and RDS (3.0%)	Lower Respiratory infections (3.6%)	Road traffic (4.1%)	Stroke (3.5%)	HIV/AIDS (5.3%)	Low birth weight (3.4%)
8	Hypertensive heart disease (5.3%)	COPD (2.9%)	Lower respiratory infections (3.7%)	Stroke (3.8%)	Fires (2.1%)	Ischaemic heart disease (4.2%)	Fires (2.4%)	Stroke (3.2%)	Lung cancer (3.8%)	Diabetes mellitus (3.2%)	Low birth weight and RDS (5.2%)	Ischaemic heart disease (3.4%)
9	COPD (4.6%)	Lower respiratory infections (2.6%)	Low birth weight and RDS (3.3%)	Suicide (2.5)	Stroke (1.7%)	Lung cancer (3.6 %)	Hypertensive heart disease (2.3%)	Diabetes mellitus (3.1%)	Low birth weight and RDS (3.1%)	Lower Respiratory infections (2.8%)	Lung cancer (5.0%)	Lower Respiratory infections (3.4%)
10	Lung cancer (4.3%)	Lung cancer (2.4%)	Hypertensive heart disease (3.1%)	Diarrhoeal diseases (2.4%)	Diabetes mellitus (1.7%)	Lower respiratory infections (2.9%)	Stroke (2.1%)	Low birth weight and RDS (2.7%)	Lower respiratory infections (3.1%)	Lung cancer (2.7%)	Hypertensive heart disease (4.5%)	Lung cancer (2.4%)

Premature mortality due to childhood illness is most prevalent in Khayelitsha and Nyanga, depicting the relative poverty associated with these sub-districts.

As shown in the league table above, the poorest communities are often those worst affected by the quadruple burden of disease. Addressing this burden is challenging and requires unprecedented multi-sectoral partnerships to reduce it.

From Figure 7 it can be seen that Khayelitsha and Nyanga continue to have the highest burden of premature mortality per 100 000 population, even though the rates in Khayelitsha have dropped since 2001. The rates in Blaauwberg and Tygerberg East have increased during this period. In the case of Blaauwberg, deaths are underreported across all conditions in 2001 due to staff changes in that year (Figure 6). In Tygerberg East there is an increase in HIV/AIDS and other type 1 conditions (not defined in this report yet) (Figure 6). The YLL rates in Central have declined from these conditions, resulting in an overall decline. There has also been a decline in the YLL rates in Athlone, largely from injuries and deaths due to non-communicable diseases.

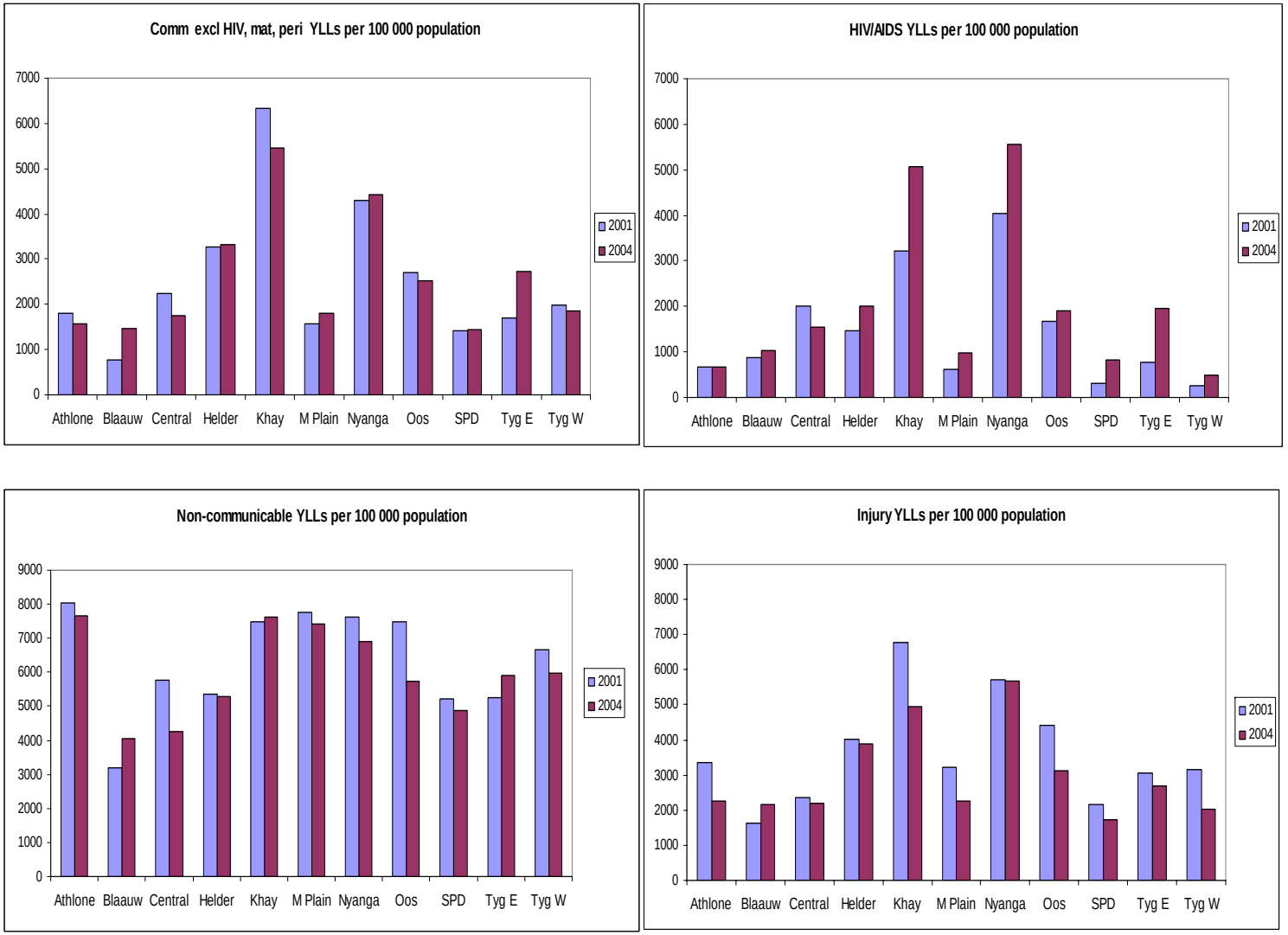
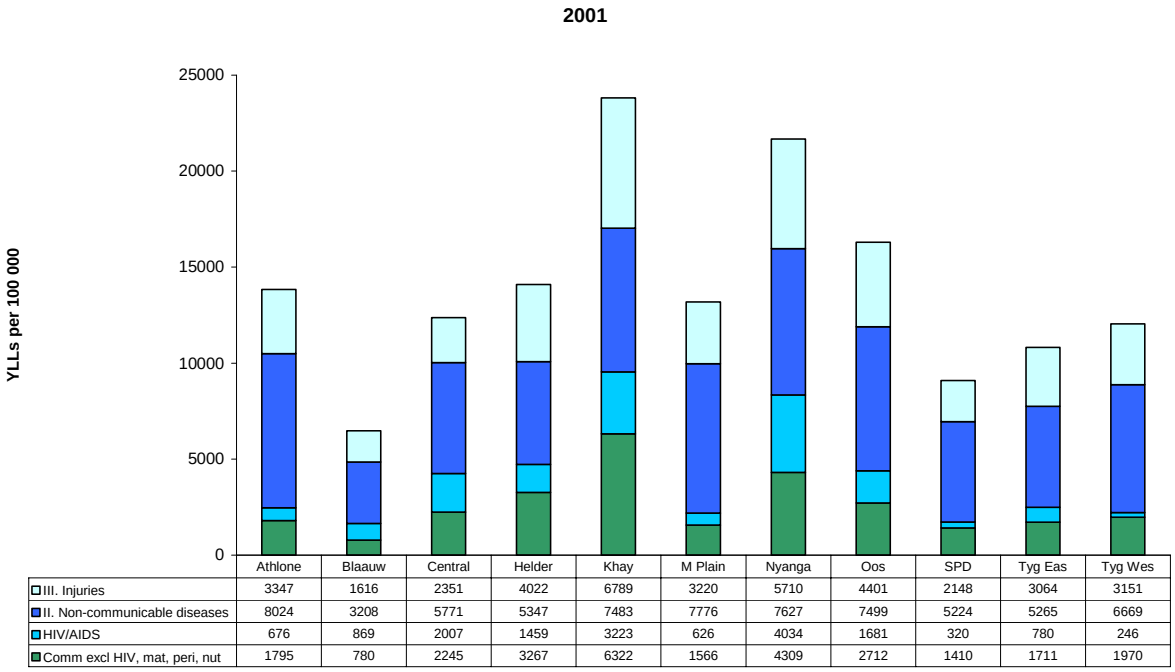
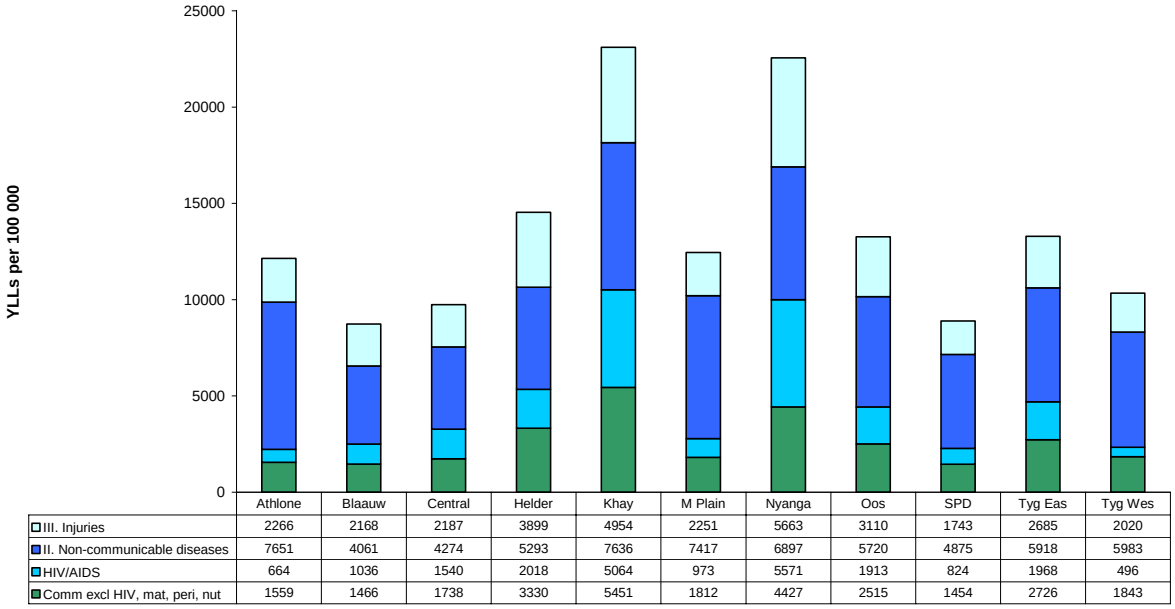


Figure 6: Age-standardised premature mortality rates per 100 000 by broad cause group for Cape Town sub-districts, 2001 and 2004



	Athlone	Blaauw	Central	Helder	Khay	M Plain	Nyanga	Oos	SPD	Tyg Eas	Tyg Wes
III. Injuries	3347	1616	2351	4022	6789	3220	5710	4401	2148	3064	3151
II. Non-communicable diseases	8024	3208	5771	5347	7483	7776	7627	7499	5224	5265	6669
HIV/AIDS	676	869	2007	1459	3223	626	4034	1681	320	780	246
Comm excl HIV, mat, peri, nut	1795	780	2245	3267	6322	1566	4309	2712	1410	1711	1970



	Athlone	Blaauw	Central	Helder	Khay	M Plain	Nyanga	Oos	SPD	Tyg Eas	Tyg Wes
III. Injuries	2266	2168	2187	3899	4954	2251	5663	3110	1743	2685	2020
II. Non-communicable diseases	7651	4061	4274	5293	7636	7417	6897	5720	4875	5918	5983
HIV/AIDS	664	1036	1540	2018	5064	973	5571	1913	824	1968	496
Comm excl HIV, mat, peri, nut	1559	1466	1738	3330	5451	1812	4427	2515	1454	2726	1843

Figure 7: YLLs per 100 000 by cause group and HIV/AIDS for Cape Town and sub-districts, 2001 and 2004

Important conditions

HIV and TB

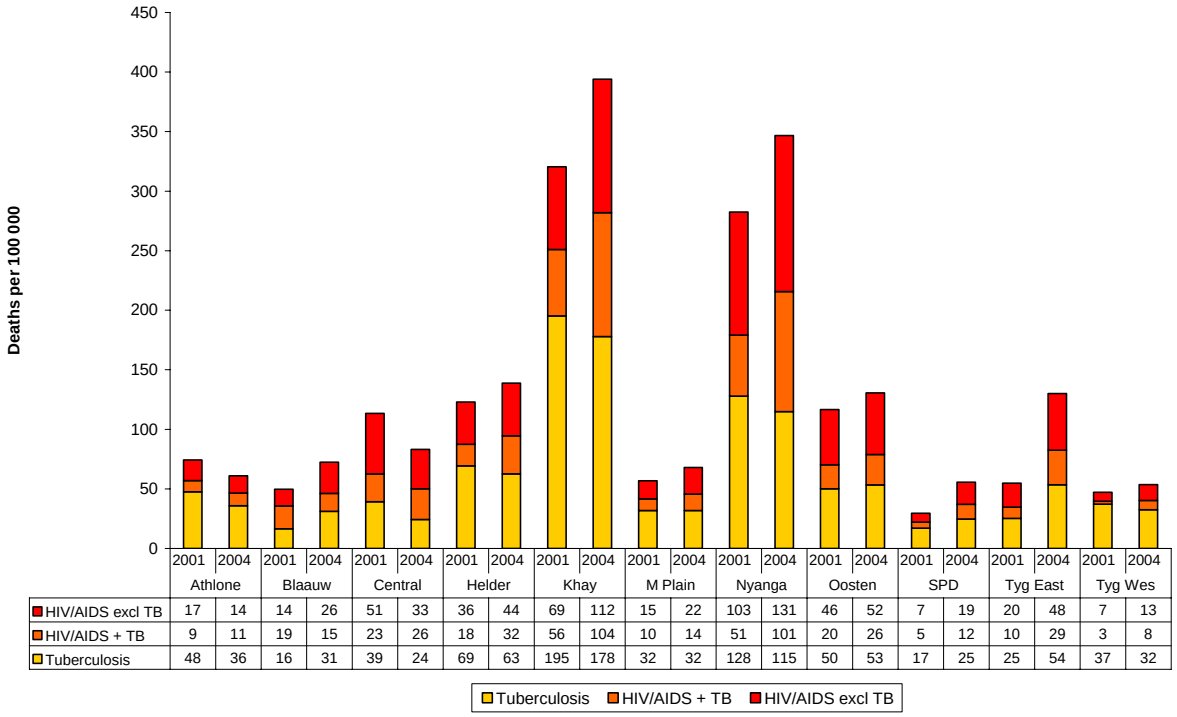
The data for 2001 - 2004 show that HIV mortality has become the leading cause of premature mortality in the city, and that TB remains the third. HIV/AIDS and TB are now closely linked. Aside from TB being one of the indicator conditions for AIDS, there is clear evidence that the TB epidemic is being fuelled by the HIV epidemic. These data therefore reflect the impact of the dual HIV/AIDS and TB epidemics in this province. Where HIV/AIDS and TB were reported on the death certificate the underlying cause was assume to be HIV/AIDS, in accordance with ICD 10 guidelines.13 However, for TB programme purposes this co-morbidity was recorded, and has been reported in Figure 6 as "HIV/AIDS excluding TB" and "HIV/AIDS + TB". In the rest of the document figures reported for HIV/AIDS include both of the above. TB refers to deaths certified with TB as the underlying cause with no mention of HIV/AIDS.

Variation between sub-districts

As with HIV prevalence patterns, there is evidence of wide differentials in the HIV-related mortality rates by age, gender and geographic area.[14] The HIV-related mortality rates at the health sub-district level in the City of Cape Town vary in terms of both magnitude and trends (Figure 8). In 2004 deaths due to HIV/AIDS excluding TB ranged from the lowest rate of 14/100 000 in the Athlone sub-district to the highest in Nyanga (131/100 000). In 2004 the South Peninsula sub-district (25/100 000) reported the lowest mortality rates for TB excluding HIV/AIDS and Khayelitsha the highest at 178/100 000. Death rates due to both HIV/AIDS and TB were highest in the Nyanga (101/100 000) and Khayelitsha (104/100 000) sub-districts respectively, and lowest in the Tygerberg West (8/100 000) and Athlone (11/100 000) sub-districts in 2004.

Mortality trends due to HIV/AIDS and/TB showed an increase in nine of the 11 health sub-districts in the Cape Metropolitan area. The Nyanga health sub-district not only reported the highest levels of mortality due to HIV/AIDS, but also showed a dramatic increase, from 51/100 000 in 2001 to 101/100 000 in 2004.

Underlying cause of death. In accordance with ICD 10 guidelines[13], HIV/AIDS was selected as the underlying causes when both tuberculosis and HIV/AIDS appeared on the death certificate.



	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004
	Athlone		Blaauw		Central		Helder		Khay		M Plain		Nyanga		Oosten		SPD		Tyg East		Tyg Wes	
HIV/AIDS excl TB	17	14	14	26	51	33	36	44	69	112	15	22	103	131	46	52	7	19	20	48	7	13
HIV/AIDS + TB	9	11	19	15	23	26	18	32	56	104	10	14	51	101	20	26	5	12	10	29	3	8
Tuberculosis	48	36	16	31	39	24	69	63	195	178	32	32	128	115	50	53	17	25	25	54	37	32

Figure 8: Age-standardised death rates for TB, HIV+TB and HIV for persons by sub-district, Cape Town, 2001 and 2004

Age and gender differences

Trends of age standardised deaths due to HIV/AIDS revealed a notable increase in mortality for both males and females for the period 2001 to 2004 (Figure 9). However, HIV/AIDS-related mortality by age distribution revealed that the highest rates were observed in younger women, with the deaths rates peaking in women at 25-34 years of age (580). In contrast, deaths due to HIV/AIDS in males peaked a decade later, at 35-44 years of age (413). The relative proportion of the causes of deaths by age and gender showed that HIV/AIDS was the leading cause of death among women. For males HIV/AIDS ranked second to homicide as a leading cause of death.

Examining the top ten causes of premature mortality for 2001 and 2004 revealed that in 2001, HIV/AIDS ranked as the second highest cause of premature death (12.2%), while in 2004 it became the leading cause of premature death in adults (17.6%). This highlights the impact of a maturing epidemic in the City of Cape Town, with the changes evident both in the absolute terms and in the ranking of the leading causes of premature death among adults.

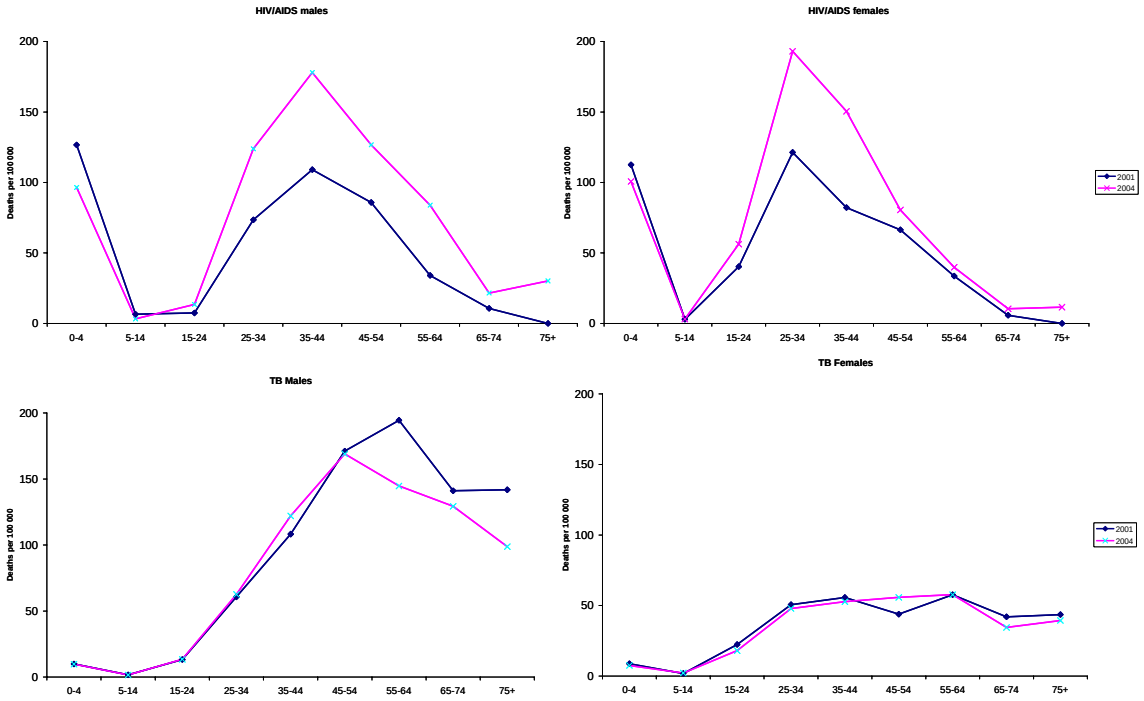


Figure 9: Age-specific death rates for HIV and TB by gender, Cape Town, 2001 and 2004

The age-specific mortality rates due to TB are shown for males and females in Figure 9. It is evident that there are stark differences in the magnitude of deaths by age distribution for males and females. In 2001 and 2004 there were far more TB-related deaths reported among males than females. However, for the period 2001 to 2004, temporal trends revealed a notable decline in TB deaths among males aged 45 years or older. For women, on the other hand, the magnitude of deaths due to TB showed no significant change for the same period.

An examination of the top 10 causes of premature mortality across the health sub-districts revealed that 9 out of 11 health sub-districts in the Cape Metropole reported HIV/AIDS as the leading cause of premature mortality in 2004 (see Table 2). In 2001 HIV/AIDS ranked first in only one sub-district and second in six sub-districts.[1]

The mortality profile of HIV/AIDS-related deaths among children closely follows the distribution of adult mortality at the health sub-district level. This is discussed in more detail in the section on child health.

Injuries

Despite the dramatic increase in deaths due to HIV/AIDS between 2001 and 2004, deaths due to non-natural causes (i.e. violence and injuries) remain among the greatest contributors to premature mortality among Capetonians. Although there is not a specific health programme to address injuries, it is clear

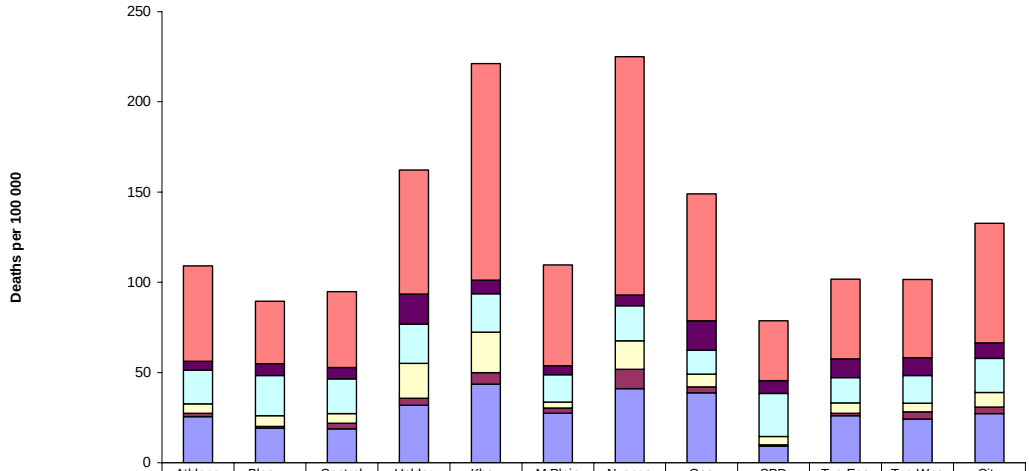
that a co-ordinated effort is required across different sectors including health. The most common causes of injury in 2004 were homicide, accounting for 12.4% of YLLs in the city, road traffic injuries (5.8%), suicide (2%), fires (1.8%), other unintentional injuries (2.2%) and other transport (0.7%). Combined, these injury deaths accounted for 35.3% of YLLs among males and 11.7% among females.

The injury mortality rates in South Africa are approximately six times higher than the global average.[15] Homicide is eight times the global rate and road traffic injuries are double. Within South Africa city-level comparisons from the NIMSS indicate that the proportions of non-natural deaths due to homicide in Cape Town and Durban are significantly higher than those in Johannesburg and Pretoria.[16]

Analysis of the data by sub-district indicates considerable disparities in the rates of fatal injuries across all categories (Figure 10). Most striking is the comparison of homicide rates - from the relatively low levels of under 35/100 000 population in Blaauwberg and the South Peninsula to more than 120/100 000 in Khayelitsha and Nyanga (132/100 000). These areas also correspond in terms of the lowest and highest rates of road traffic fatalities.

Deaths in the “other transport” category are also concentrated in three key sub-districts: Nyanga, Khayelitsha and Mitchell’s Plain, and the higher incidence of deaths from fires in Khaelitsha, Nyanga and Helderberg is probably a function of the housing stock and fuel usage patterns in these areas, which are characterised by large informal settlements.

There was little variation in suicide rates between seven of the sub-districts, at between 5 and 11 per 100 000. However, the suicide rates in two sub-districts, Helderberg and Oostenberg, were much higher, at 17 and 16 per 100 000 respectively.



	Athlone	Blaauw	Central	Helder	Khay	M Plain	Nyanga	Oos	SPD	Tyg Eas	Tyg Wes	City
Homicide	53	35	42	69	120	56	132	70	33	44	43	66
Suicide	5	7	6	17	8	5	6	16	7	10	10	9
Other unintentional	19	22	19	22	21	15	20	13	24	14	15	19
Fires	5	6	5	20	22	3	16	7	5	6	5	8
Other transport	2	1	3	4	6	3	11	3	1	1	4	4
Road traffic	26	19	19	32	44	27	41	39	9	26	24	27

Figure 10: Age-standardised death rates (pooled estimates) due to injuries by sub-district, Cape Town 2001 – 2004

Homicide remains the leading cause of premature mortality among males in Cape Town, but its contribution to total YLLs in the city has dropped from 26% to 18.7%. Similarly, the contribution of homicide to premature mortality among females has dropped from 5.2% to 3.4%, and its rank dropped from fourth to seventh position between 2001 and 2004.

The NIMSS data indicate that the decrease in homicide between 2001 and 2004 is largely due to the significant decrease in firearm-related homicides, whereas non-firearm homicide rates have remained fairly stable (Figure 11).[7] This decrease could be ascribed to several factors, including heightened public awareness prior to the introduction of stricter gun control legislation, as well as the effectiveness of targeted policing initiatives. However, the evidence as to the actual drivers still needs to be established.

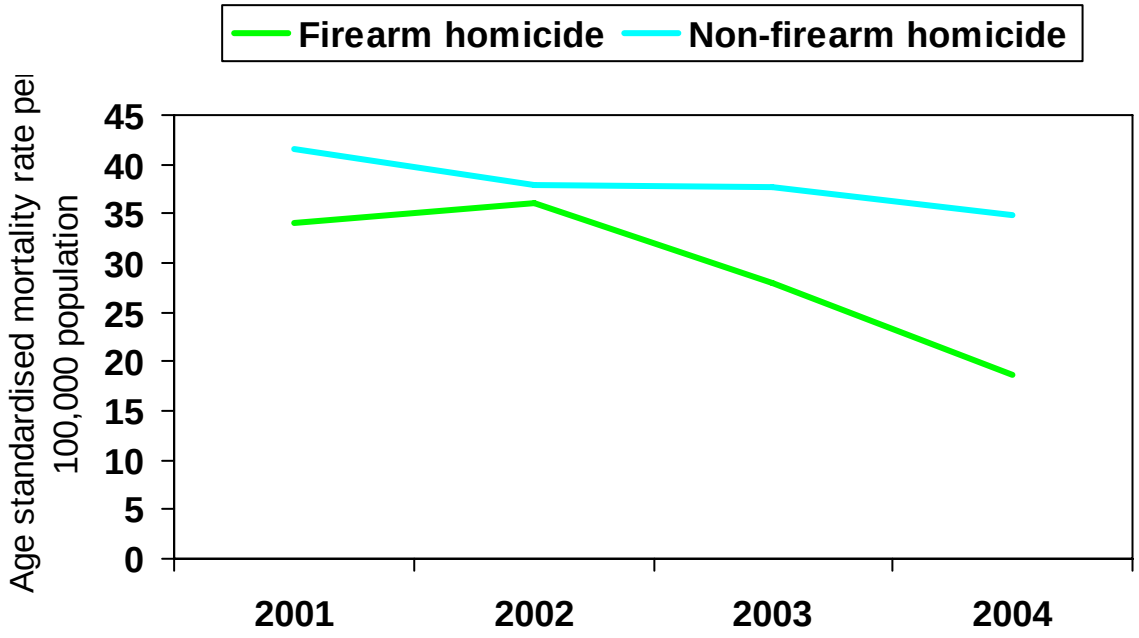


Figure 11: Firearm and non-firearm homicide rates in Cape Town, 2001 - 2004[7]

Nevertheless, the analysis of homicide rates by sub-district has further implications for firearm control interventions. As well as the high rates of gun violence in the sub-districts already noted for high homicide rates (i.e. Nyanga and Khayelitsha), a disproportionately large percentage of firearm homicides were recorded in Athlone and Mitchell's Plain (Figure 12).

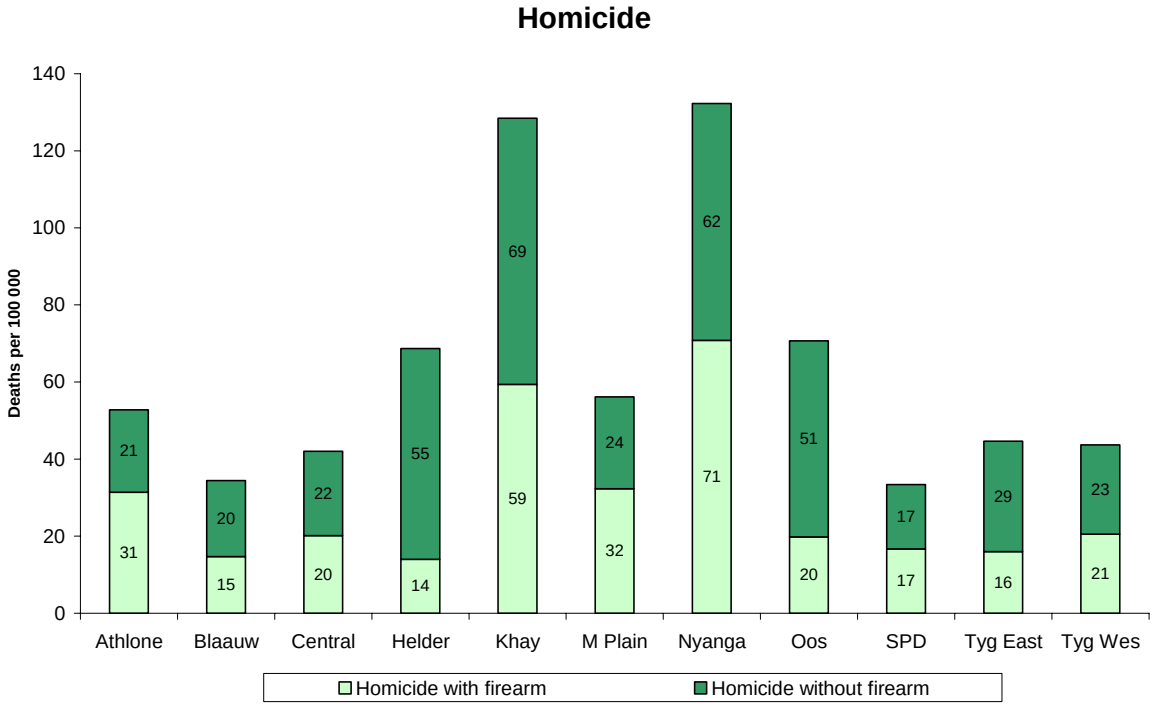
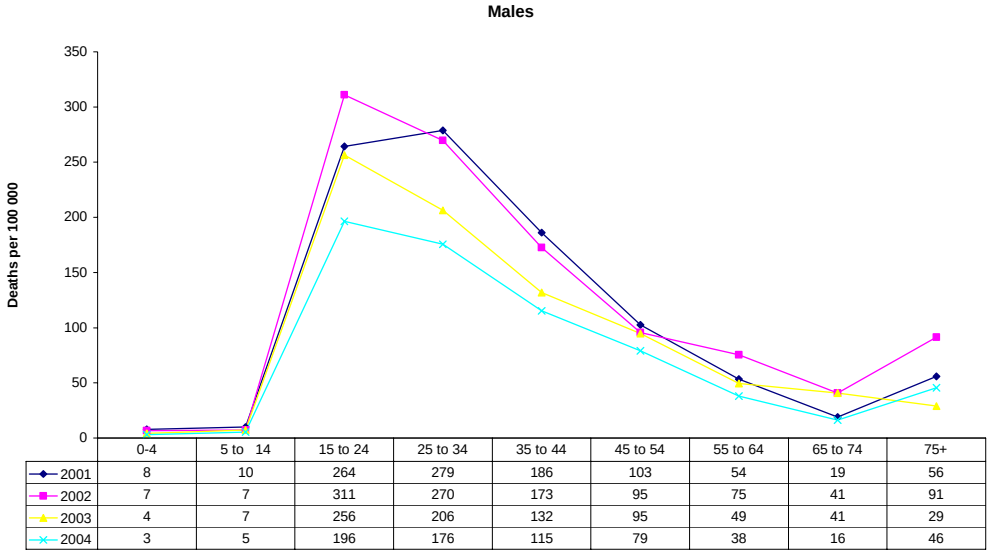
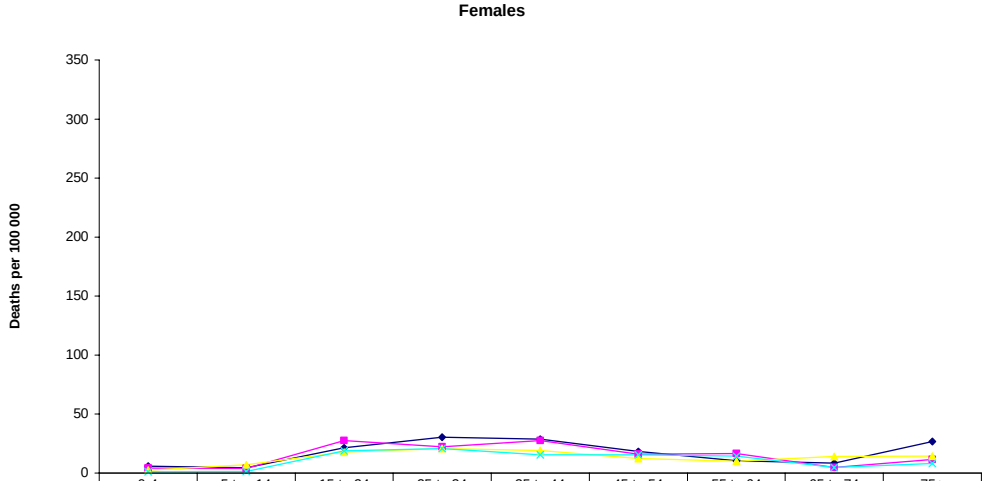


Figure 12: Age-standardised death rates (average) due to homicide by sub-district, Cape Town 2001 – 2004

The gender ratio of homicide in Cape Town is 7.5 male deaths for every female death (see Figure 13). Among males there was a distinct peak in the 15-24-year age group between 2001 and 2004, that tapered-off with increasing age and rose again after the age of 65 years (except in 2003, where the rate was lower in the older age categories). Comparison of the age profile from 2001 to 2004 also revealed a decrease in mortality across all age groups, but particularly among young adults, which is consistent with a decrease in firearm homicide and community violence.



	0-4	5 to 14	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65 to 74	75+
2001	8	10	264	279	186	103	54	19	56
2002	7	7	311	270	173	95	75	41	91
2003	4	7	256	206	132	95	49	41	29
2004	3	5	196	176	115	79	38	16	46



	0-4	5 to 14	15 to 24	25 to 34	35 to 44	45 to 54	55 to 64	65 to 74	75+
2001	6	5	21	30	29	18	11	8	27
2002	4	4	28	22	28	16	17	5	12
2003	3	7	18	21	19	12	10	14	14
2004	1	1	19	21	15	16	14	5	8

Figure 13: Age-specific homicide death rates by gender, Cape Town, 2001 – 2004

Of the four major cities with full NIMSS coverage, Cape Town recorded the highest percentage of alcohol-positive deaths, with 58% of all homicides in 2004 testing positive for blood alcohol concentration. Levels of intoxication were also significantly higher than in Johannesburg and Durban.[17]

The second major cause of non-natural mortality, road traffic injuries (including pedestrians), has not experienced the same level of decrease as homicide over the four-year period. Road traffic injuries are still ranked as the 4th and 8th leading causes of premature mortality among males and females respectively. Among females the contribution has dropped from 3.8% to 3.3% of YLLs in the city, but among males it has increased from 7.0% to 7.4%.

Although the NIMSS data for 2001 to 2004 show a slight decrease in age-standardised mortality rates, from 33 to 30/100 000 population, the findings point to the relative ineffectiveness of current road traffic injury prevention efforts compared to violence prevention. The NIMSS data reveal two major problem areas, viz.: (1) the high percentage of pedestrian deaths, which accounted for approximately 60% of all road traffic fatalities in the city in 2004; and (2) the alcohol-relatedness of road deaths. The latest NIMSS report for Cape Town reveals that in 2004 more than half of drivers (51%) and a staggering 63% of pedestrians killed on Cape Town roads tested positive for alcohol. The fatality rates by sub-district (Figure 14) indicate that the sub-districts with the lowest number of fatalities are more developed in terms of road infrastructure, are more affluent, and have smaller pedestrian populations.

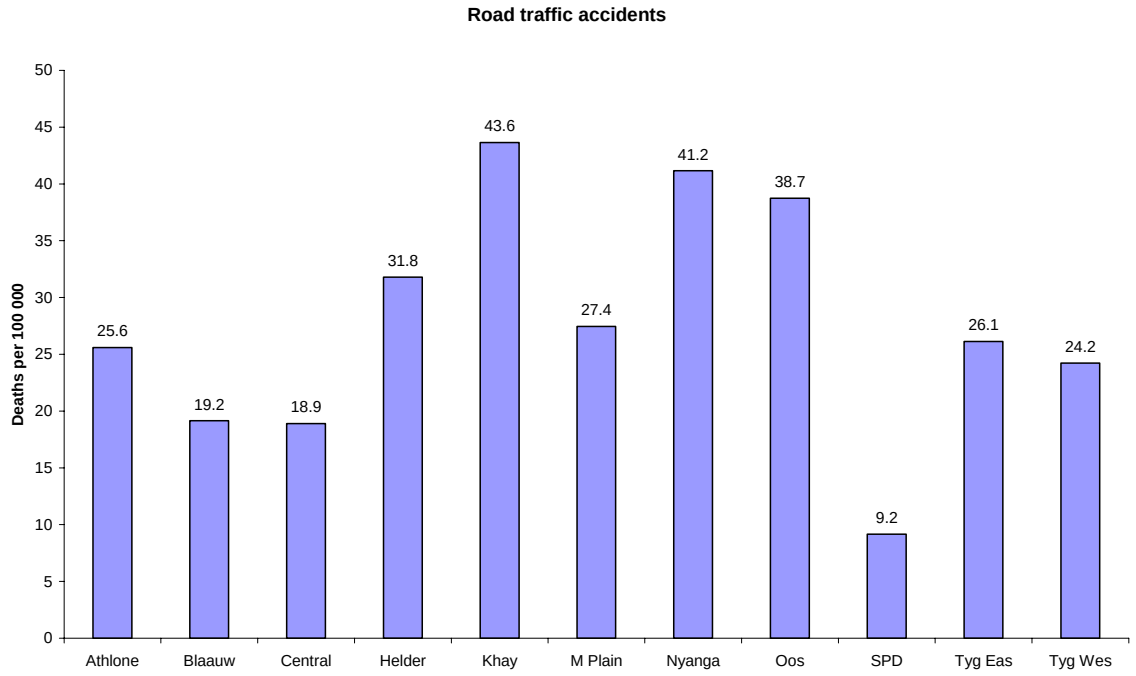


Figure 14: Age-standardised death rates (pooled estimates) due to road traffic injuries by sub-district, Cape Town, 2001 – 2004

Suicide rates (9/100 000) are low in comparison with homicide (66) and road traffic injuries (27), and have remained fairly stable between 2001 and 2004. The gender ratio for suicide is four male deaths for every female one. Since it may take months or years for the final manner of death to be determined through an inquest, particularly for suicides, some of these may be reported as 'undetermined' manner of death. Thus, it is probable that suicide deaths are underreported in these data.

Although suicide rates in Cape Town are similar to the global average, this should not be construed as an indicator of good mental health, since it should be recognised that only a small fraction of those with mental health problems commit suicide. Other injury mortality data also provide proxy measures for the extent of mental health problems. Homicide rates may also be a good indicator of mental illness in the community, as well as information on substance abuse,

which falls within the spectrum of mental illness. As indicated earlier in this chapter, homicide rates in Cape Town are abnormally high, and the majority of deaths due to violence and traffic were alcohol-positive. The importance of recognising the weighty contribution of mental health problems to YLLs in the province relates to the necessity to plan for mental health and substance abuse services in the context of the Western Cape having the highest proportions of premature deaths due to homicide, road traffic injuries and suicides in the country.

Non-communicable diseases

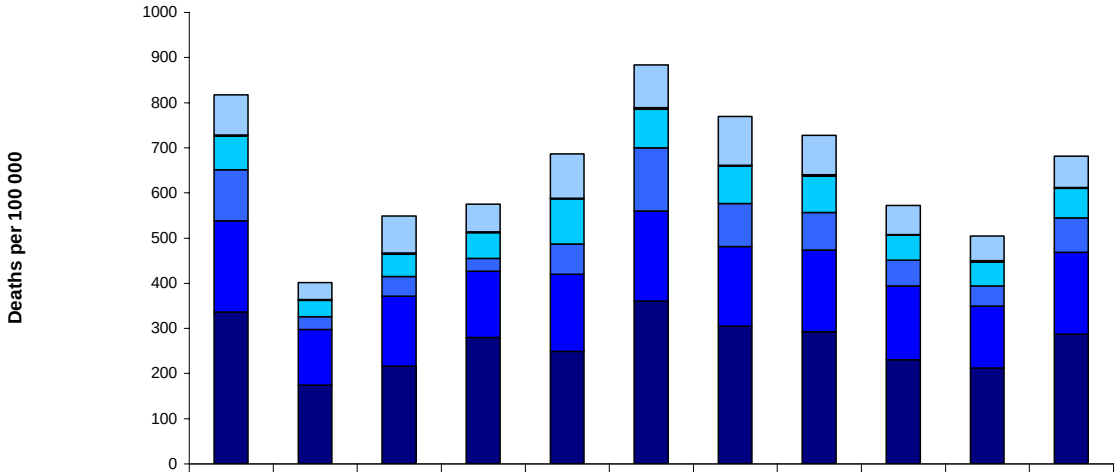
Overall, non-communicable disease mortality in Cape Town is lower than the provincial and national averages (Table 3). Mortality rates for IHD and stroke are lower and those for diabetes and cancer of the lung are higher than national rates. In the case of diabetes, IHD and stroke, this may be due to differences in the coding practice between the Cape Town system and the national vital registration system. Smoking prevalence is very high among the coloured population, which is concentrated in the Western Cape. This may contribute to the higher mortality rates from cancer of the lung.

Table 3: Comparison of National, Western Cape, and Cape Town age-standardised mortality rates for non-communicable diseases

Condition	Age-standardised mortality rates per 100 000		
	SA 2000[18]	WC 2000[18]	CT 2001
IHD	123	169	101
Hypertension	68	28	42
Stroke	124	122	86
Diabetes	53	52	63
Chronic obstructive pulmonary disease (COPD)	49	52	42
Lung cancer	24	56	41
Oesophageal cancer	17	15	12
Colon cancer	9	15	15
All non-communicable	756	768	674

From Figure 2 it can be seen that non-communicable diseases are the leading cause of death among both genders over the age of 40 years. These mainly

comprise cardiovascular diseases, cancers (neoplasms), respiratory diseases and diabetes, as shown in the age-standardised rates across the sub-districts in Figure 15. Conspicuous among these causes are the consequences of the community syndrome of hypertension, atherosclerosis and diabetes on the one hand and tobacco use on the other. This confirms earlier work suggesting that non-communicable disease occurs among poor communities as well as the rich.[19] However, the causes of non-communicable disease mortality differ across the sub-districts, indicating that they are in different stages of the health transition.



	Athlone	Blaauw	Central	Helder	Khay	M Plain	Nyanga	Oos	SPD	Tyg Eas	Tyg Wes
Other	89	38	82	61	98	95	108	87	64	55	69
Congenital	3	1	3	2	1	4	2	4	2	3	2
Respiratory	75	36	49	56	100	85	83	80	55	52	65
Diabetes	114	28	44	29	67	140	95	83	57	45	76
Neoplasms	202	123	155	147	171	199	176	182	163	137	181
Cardiovascular	336	174	216	280	249	361	305	292	231	212	288

Figure 15: Age-standardised cause of death rates (pooled estimates) for non-communicable diseases by sub-district, Cape Town, 2001 - 2004

The cardiovascular transition is described by Yusuf *et al*.[20] as having 5 stages, as shown in Table 4. As populations move from conditions of under-development towards industrialised societies, the cardiovascular disease profile changes from one related to infections and undernutrition. In the second stage, hypertensive heart disease and haemorrhagic stroke predominate. This is followed by the stage of increasing obesity, diabetes, all forms of stroke and IHD affecting young ages. The fourth stage is indicated by a shift in the IHD and stroke mortality to older ages, and is the current experience of many Western countries. Yusuf *et al.* have added the final stage based on the experience in parts of Eastern Europe, with the re-emergence of conditions related to infections and alcohol.

Table 4: Epidemiological transition of cardiovascular diseases[20]

Stages/ages	CVD deaths % of total	Predominant CVD and risk factors
1. Pestilence and famine	5 – 10	Rheumatic heart, infectious and nutritional cardiomyopathies
2. Receding pandemics	10 - 35	Hypertensive heart disease and haemorrhagic stroke
3. Degenerative diseases	35 - 50	All forms of stroke, IHD at young ages, increasing obesity and diabetes
4. Delayed degenerative disease	< 50	Stroke and IHD at old age
5. Regression and social upheaval	35 - 50	Re-emergence of rheumatic heart disease, infections, increased alcoholism and violence, increased CVD in young.

Figure 16 shows the variations in mortality resulting from IHD, stroke, hypertensive disease and diabetes. IHD mortality is very high in Athlone, Helderberg, Oostenberg and Tygerberg West but low in Khayelitsha and Nyanga. The rates are consistently higher for men. Hypertension is very high in Nyanga, Khayelitsha and Mitchell's Plain. Stroke is particularly high in Nyanga. Athlone, Mitchell's Plain and Nyanga have high diabetes mellitus death rates. The rate for Nyanga is noticeably higher than Khayelitsha, possibly indicating differing levels of care of diabetes. There is a marked excess of female mortality from diabetes in Nyanga. Compared to the national mortality rates in 2000, the mortality rates from IHD, stroke and hypertensive disease are somewhat lower. However, the mortality rate from diabetes is higher than the national average. These data would suggest that Khayelitsha and Nyanga are in the second stage of the cardiovascular transition, while the other sub-districts are further into it.

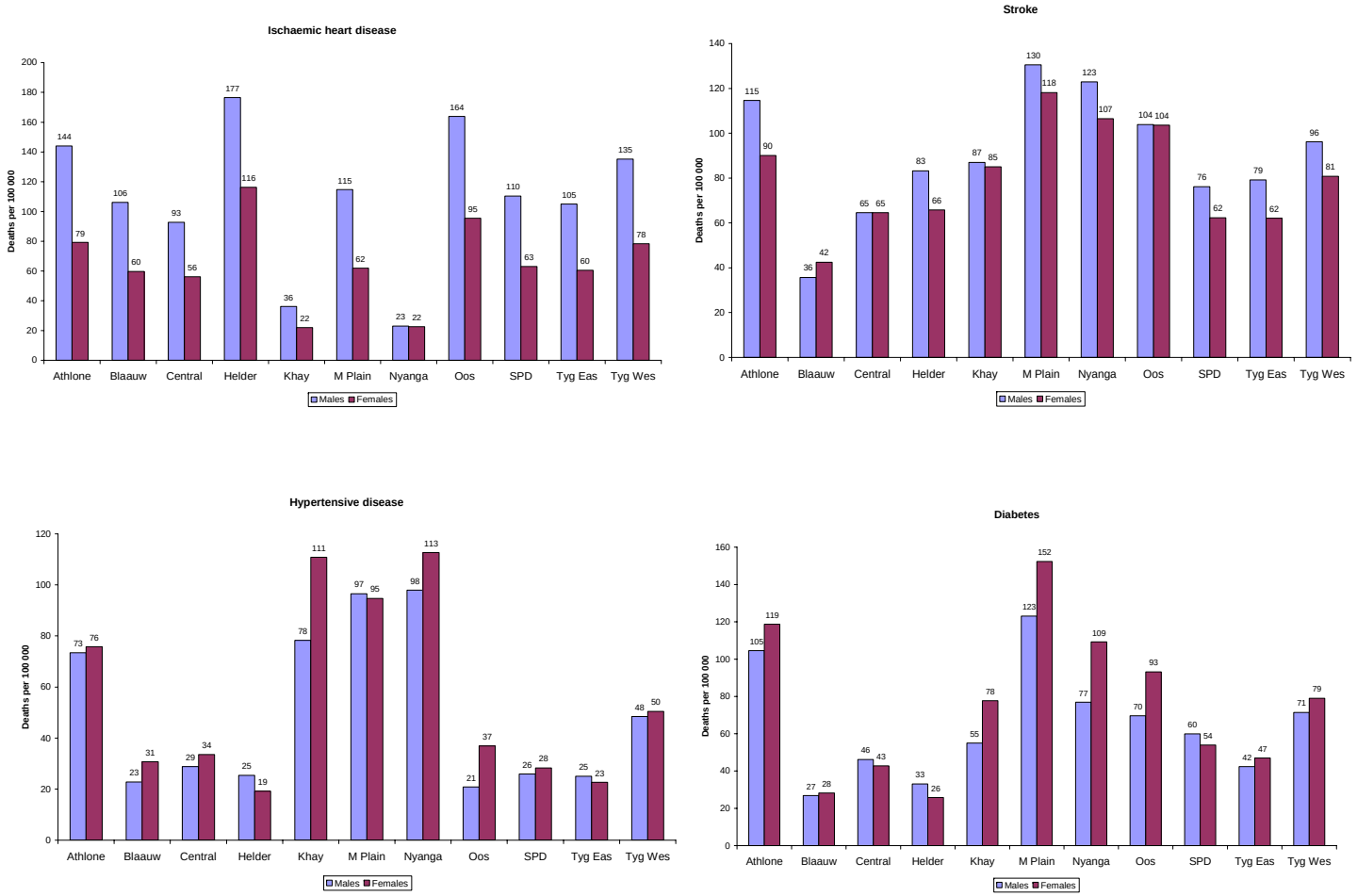
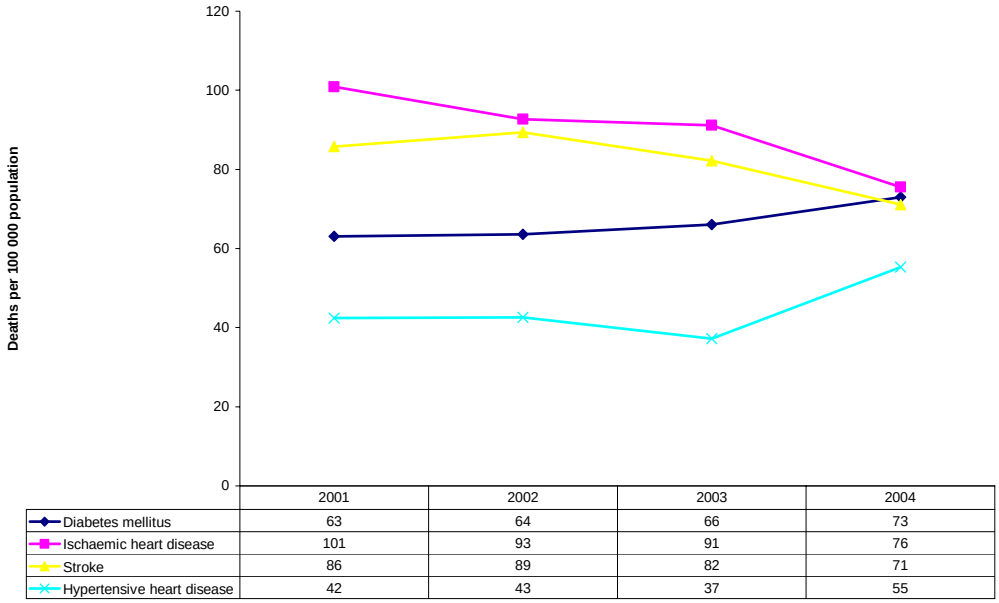


Figure 16: Age-standardised death rates (pooled estimates) for IHD, stroke, hypertension and diabetes by gender and sub-district, Cape Town, 2001 - 2004



	2001	2002	2003	2004
Diabetes mellitus	63	64	66	73
Ischaemic heart disease	101	93	91	76
Stroke	86	89	82	71
Hypertensive heart disease	42	43	37	55

Figure 17. Trends in age-standardised death rates per 100 000 population for selected non-communicable diseases, Cape Town, 2001 - 2004

Death rates due to IHD and stroke declined between 2001 and 2004, while death rates due to diabetes and hypertensive disease increased (Figure 17). It is difficult to interpret these trends. While they could reflect the transition of a stratified population, with part of the population in the more advanced stages of the cardiovascular transition and part in the early stages, they could also reflect specific trends in the major risk factors - a possible reduction in smoking but worsening diet and physical inactivity. Alternatively there might be health interventions such as the development of stroke units that play a role, or perhaps the change in the coding shortlist introduced during 2004 has contributed to the trend. The data require more careful analysis to investigate this.

Figure 18 shows the mortality rates due to COPD. These are high in Athlone, Mitchell's Plain, Oostenberg, Southern Peninsula, Tygerberg East and Tygerberg West. The gender differential consistently shows higher rates for men, which is probably related to smoking. The same sub-districts also display high rates for lung cancer (Figure 18), and show the same gender differential.

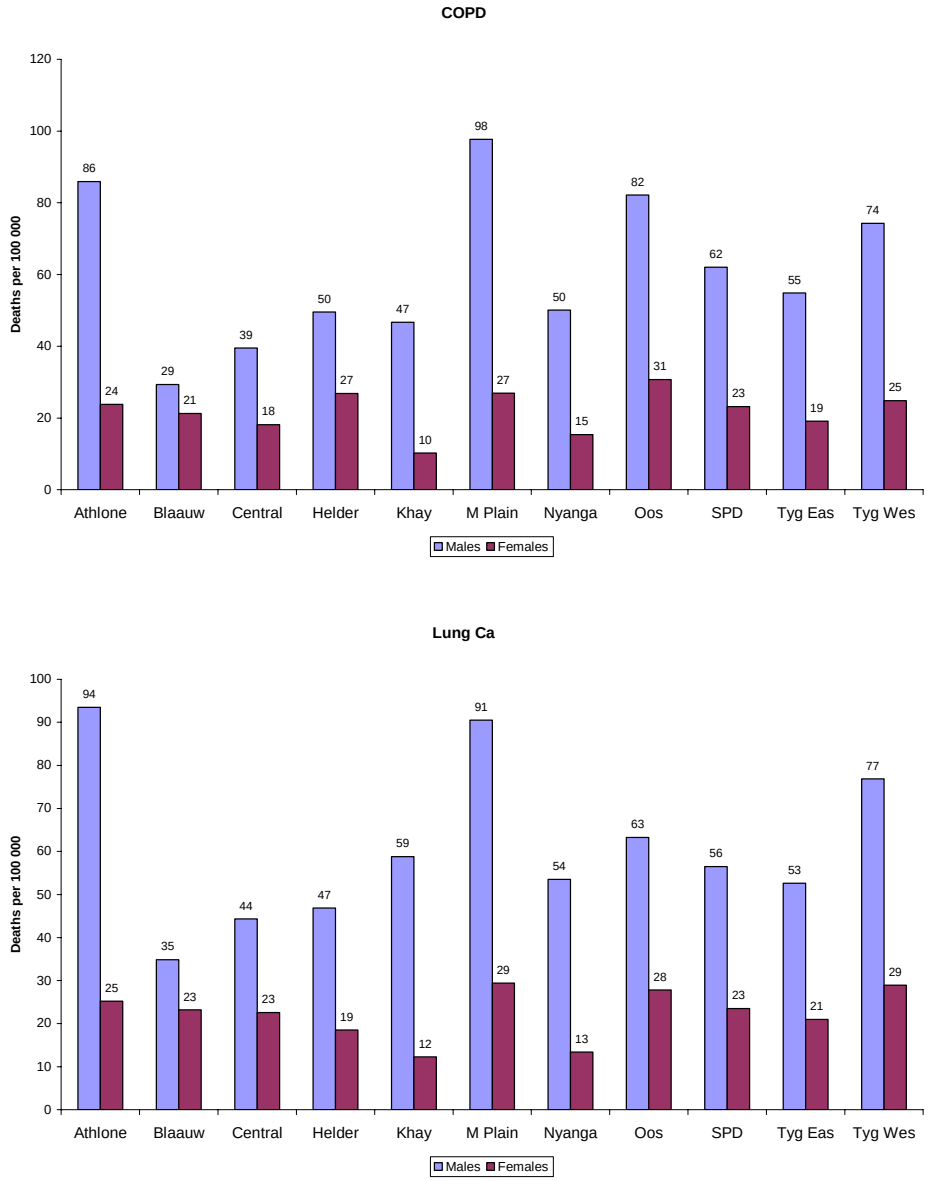


Figure 18: Age-standardised death rates (pooled estimates) for COPD and lung cancer by gender and sub-district, Cape Town, 2001 - 2004

Cancer of the oesophagus (Figure 19) is very high in Khayelitsha and Nyanga. These high rates may possibly be a result of migration from the Transkei, which has very high rates. On the other hand, colon cancer (Figure 19) is very low in Nyanga and Khayelitsha.

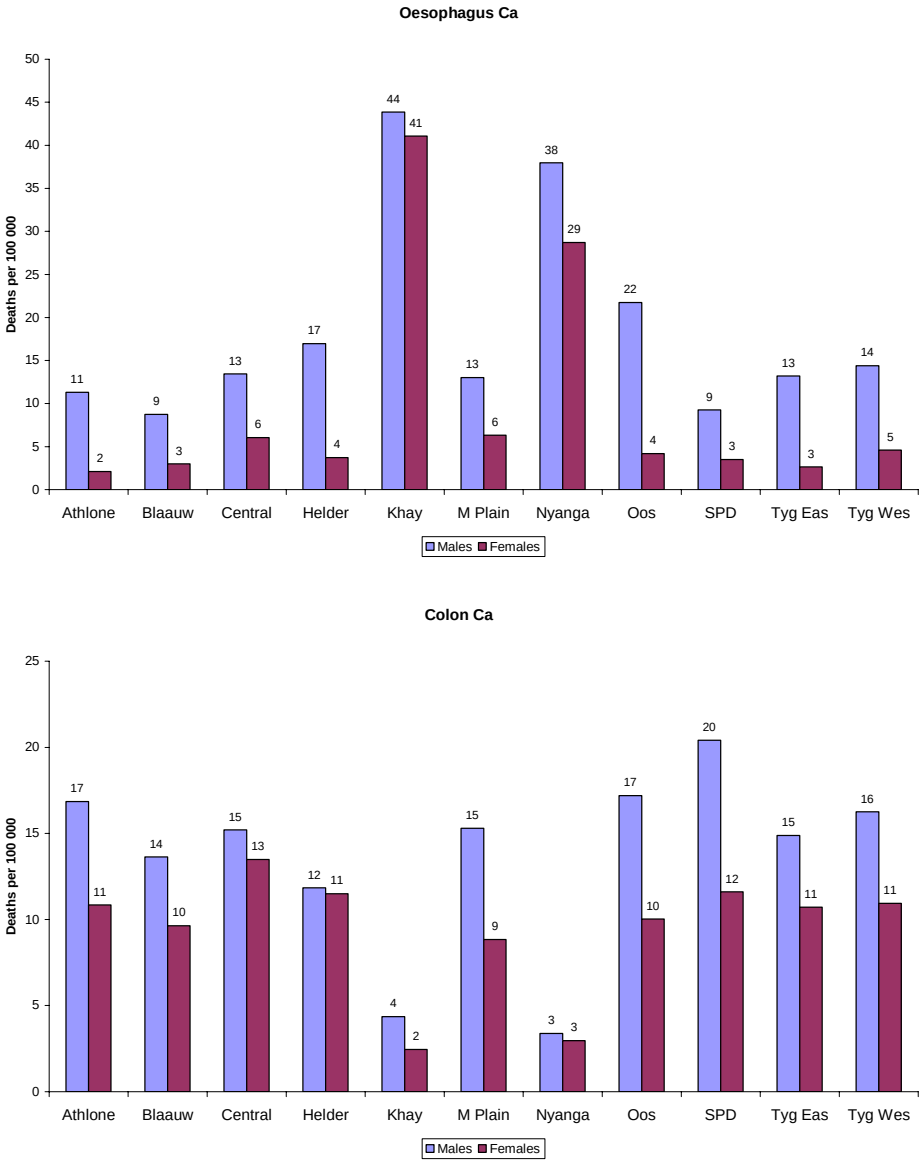


Figure 19: Age-standardised death rates (pooled estimates) for oesophagus cancer and colon cancer by gender and sub-district, Cape Town, 2001 - 2004

Child health

Trends in the mortality of children and adolescents can contribute to assessing the impact of child health programmes and assist in identifying priorities. In 2004 there were 2456 deaths in children and adolescents up to 19 years of age. We report trends in rates for infant deaths (<12 months) and children aged 1 - 4 years since these are important public health indicators. The number of deaths for the 1 – 4-year age group is small, so these rates should be interpreted with caution. We also report the leading causes of death in the distinct age groups set out in Table 5. While the majority of these deaths (34.9%) occurred in infants 1 – 11 months of age, a sizeable proportion occurred in the early neonatal period. The shortlist codes available for perinatal causes are too abbreviated to allow for really meaningful analysis of the cause profile for deaths of young babies. The data presented here should be interpreted with caution and the shortlist should be revised.

Table 5: Age distribution of deaths under 19 years

Age group	Number of deaths	% of child deaths
Early neonatal (0 – 7 days)	386	15.8
Late neonatal (8 – 30 days)	154	6.3
Post neonatal infant (1 – 11 months)	851	34.9
1 – 4 years	313	12.8
5 – 9 years	122	5.0
10 – 14 years	111	4.6
15 – 19 years	499	20.5

Mortality rates by age group are shown in Table 6. The sex ratio for infants' deaths increases with age from 1.2 in the 1 – 4-year age group to 1.5 in the 5 – 14-year age group and 2.7 in the 15 – 19-year age group, showing that male children are at substantially higher risk of dying than female children, particularly in the 15 – 19-year age group.

Table 6: Childhood mortality rates, Cape Town, 2004

Mortality rates per 1000 live births		
Neonatal	9	
Infant	24	
Mortality rates per 100 000 population		
	Male	**Female**
1 – 4 years	145	124
5 – 14 years	53	35
15 – 19 years	264	96

Infant mortality

There has been a steady increase in the number of births in the city, with a relatively large increase in the births reported between 2003 and 2004 in the Cape Town Metropole (from 53 000 to 58 000). However, infant mortality rates in Cape Town appear to have remained fairly constant, at about 24 deaths per 1000 live births over the period 2001 until 2004 (Figure 20). The trends in cause-specific rates for infants per 100 000 population are difficult to interpret. The death rate due to low birthweight and respiratory distress syndrome has increased markedly between 2002 and 2004 (Figure 21). This is accompanied by a decrease in the mortality rate from other conditions originating in the perinatal period, and more recently a decrease in HIV/AIDS mortality. Mortality from diarrhoea and lower respiratory infections, however, increased in 2004. This increase coincides with an increase in diarrhoea cases noted at public health facilities in 2004 (Tony Westwood - personal communication), suggesting that this increase is probably not a mis-classification of HIV-related deaths but due to an outbreak of diarrhoeal disease. The increase in mortality from low birthweight and prematurity warrants further investigation.

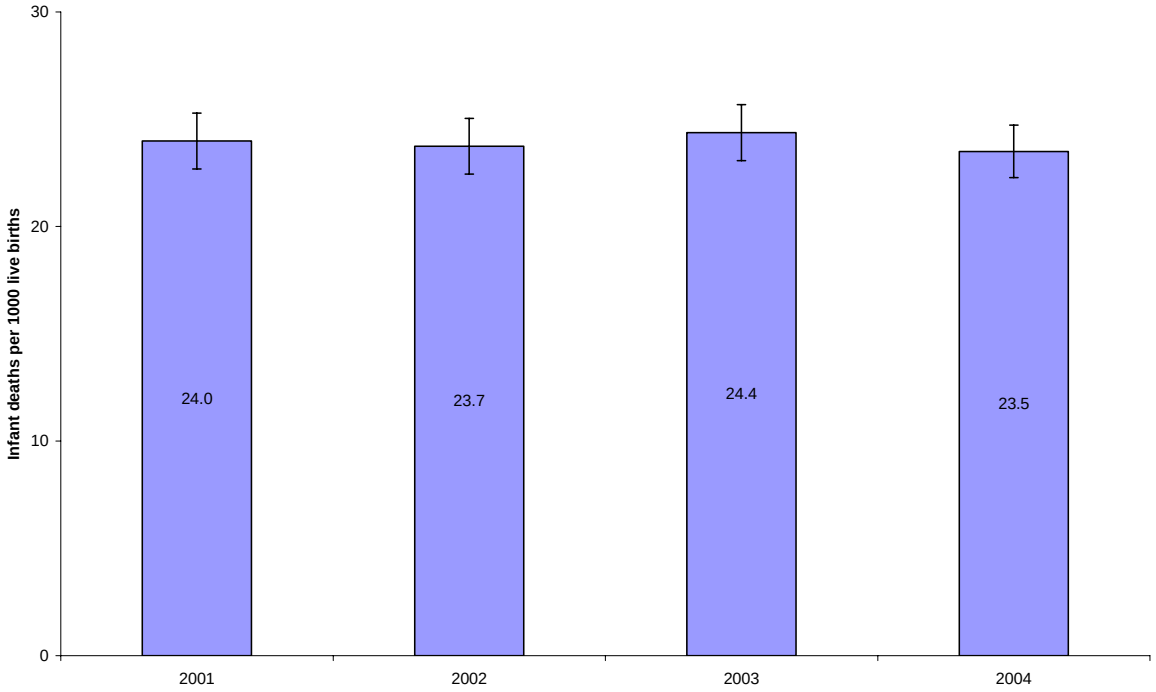


Figure 20: Trends in infant mortality rate per 1000 live births, Cape Town, 2001 - 2004

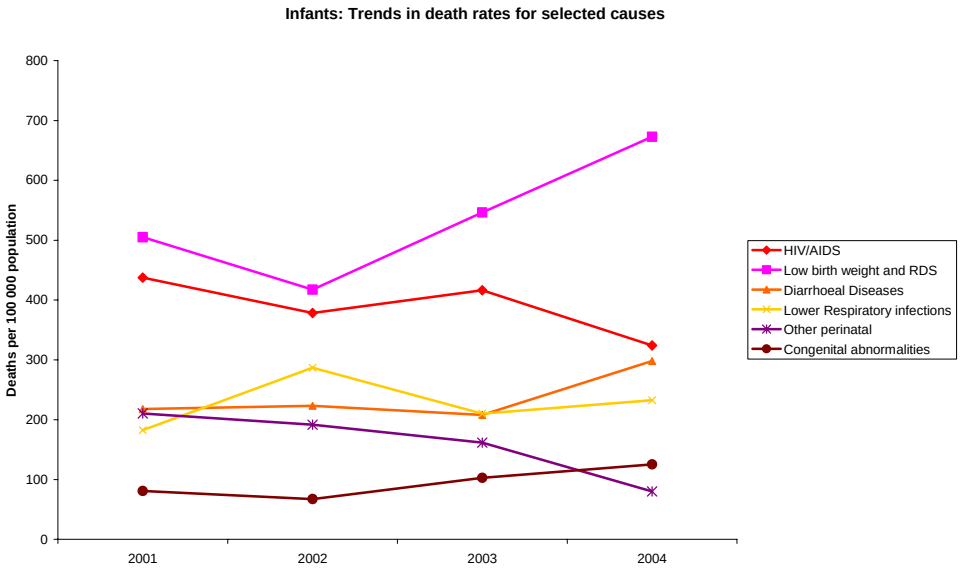
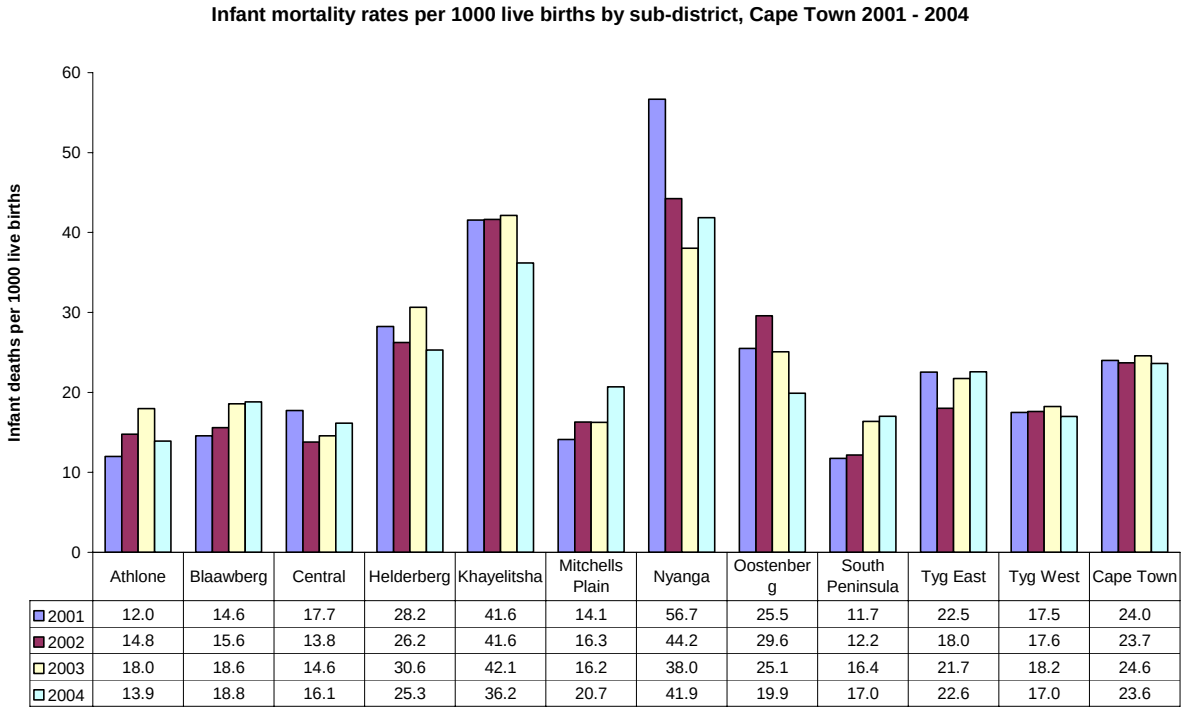


Figure 21: Trends in <1 year mortality rates per 100 000 population for selected conditions, Cape Town, 2001 – 2004

There is substantial variation in levels and trends in infant mortality between sub-districts (Figure 22). The infant mortality rates in Nyanga and Khayelitsha were almost double the average for the Metropole, and much higher than the other sub-districts. Some areas have shown little change over the period – while some have increased and some decreased. Increases have been experienced in Mitchell's Plain and South Peninsula – and may well reflect the changing demographic structure of the population towards a higher proportion of the population being African. While the rates for Nyanga and Khayelitsha are much higher than other areas, they have shown some decline over the period.



	Athlone	Blaawberg	Central	Helderberg	Khayelitsha	Mitchells Plain	Nyanga	Oostenberg	South Peninsula	Tyg East	Tyg West	Cape Town
2001	12.0	14.6	17.7	28.2	41.6	14.1	56.7	25.5	11.7	22.5	17.5	24.0
2002	14.8	15.6	13.8	26.2	41.6	16.3	44.2	29.6	12.2	18.0	17.6	23.7
2003	18.0	18.6	14.6	30.6	42.1	16.2	38.0	25.1	16.4	21.7	18.2	24.6
2004	13.9	18.8	16.1	25.3	36.2	20.7	41.9	19.9	17.0	22.6	17.0	23.6

Figure 22: Infant mortality rates per 1000 live births by sub-district, Cape Town, 2001 - 2004

In children < 1 year of age, HIV/AIDS ranked as the second highest cause of deaths in 2001 and 2004, following short gestation and low birthweight. However, more encouraging is the decline in the proportion of deaths due to HIV in the under-1 age group, from 20.4% in 2001 to 14.6% in 2004 (data not shown), relative to other causes of death. The current PMTCT programme in the Western Cape revealed a reduction in the transmission rate of 5.5% in 2006. However, this reduction reflects transmission rates for the first 14 weeks of life only.

The cause of death profile for all neonatal deaths (early and late) is shown in Figure 23. Prematurity/low birthweight accounted for the majority of deaths, followed by asphyxia and infections. Ten per cent of deaths in this group were ill-defined. The

high proportion of deaths resulting from prematurity/low birthweight indicates that the shortlist for coding should be revised to allow for better differentiation of the causes. A code must be included for asphyxia and separate codes for the small for dates low birthweight neonate, distinct from prematurity.

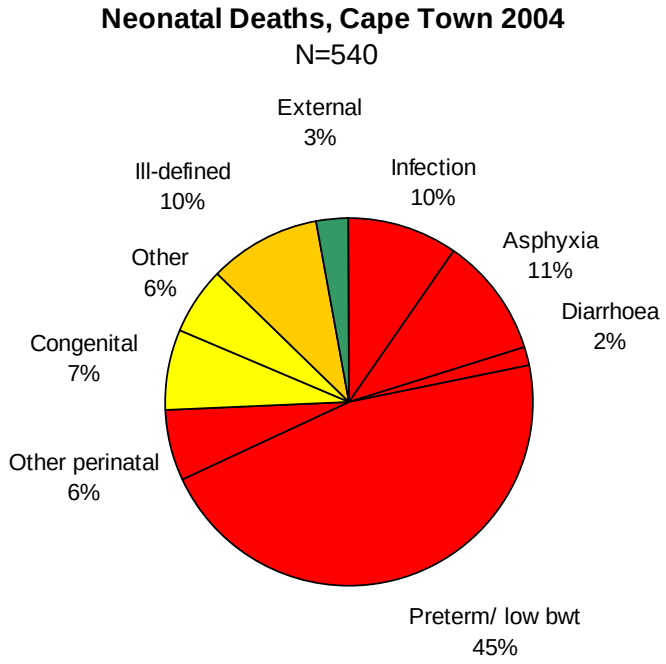


Figure 23: Neonatal cause of death profile, Cape Town, 2004

Figure 24 shows the leading causes of death during the early neonatal period (0 - 7 days) and the last neonatal period (8 - 30 days) respectively. Not unexpectedly, the leading cause of early neonatal deaths in 2004 was prematurity (54.9%), followed by respiratory distress syndrome (11.9%). Ill-defined deaths accounted for 3.6% of the perinatal deaths. About a quarter of the deaths in the late neonatal period were due to ill-defined causes (26.0%). Prematurity was the leading defined cause of death in this age group, accounting for 23.4% of these deaths. This was followed by respiratory distress syndrome, lower respiratory infection and congenital abnormalities. HIV/AIDS accounted for 1.9% of these deaths.

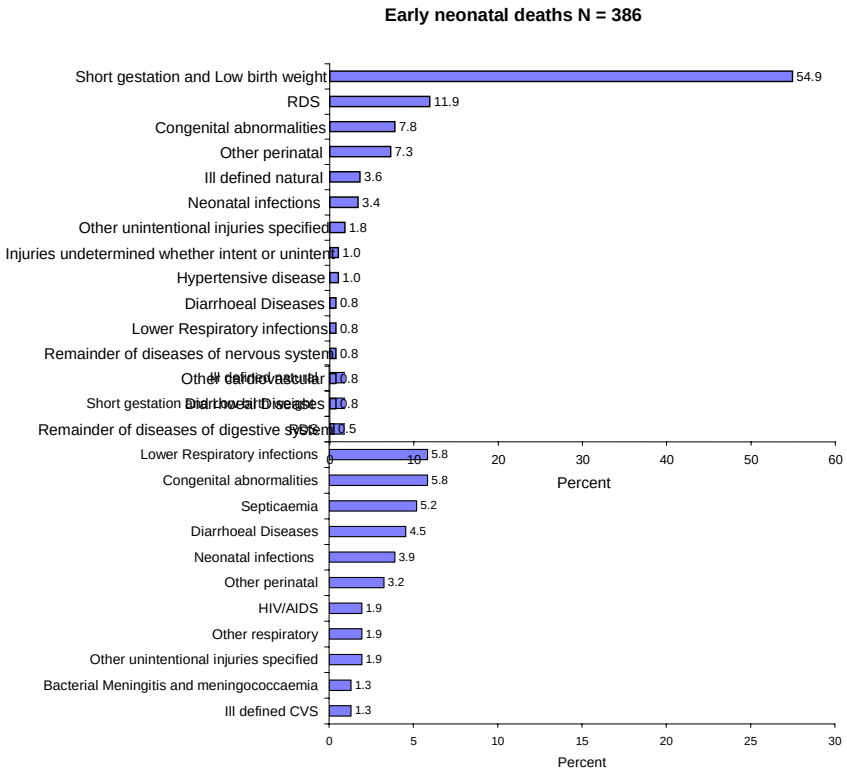


Figure 24: Leading causes of deaths in early neonatal infants (0 - 7 days) and late neonatal infants (8 - 28 days), Cape Town, 2004

Ill-defined deaths accounted for an even larger proportion of deaths (28.2%) in the post-neonatal infants (1 – 11 months) than in the younger age groups (Figures 25 and 26). HIV/AIDS (18%) was the leading defined cause of death, followed by diarrhoea and lower respiratory infection.

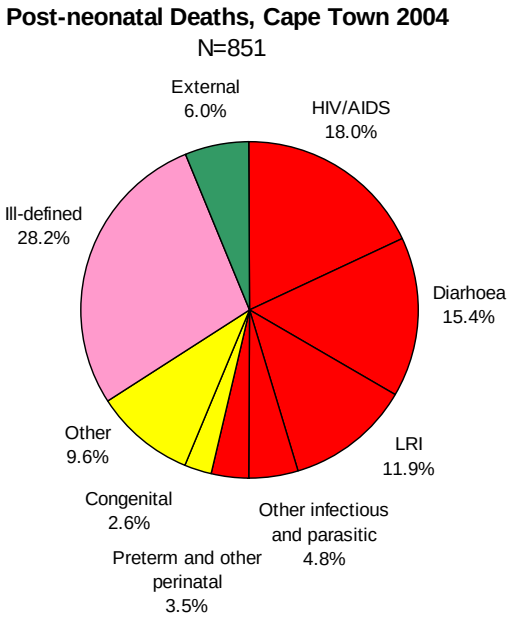


Figure 25: Cause of death profile, post-neonatal infants (1-11 months), Cape Town, 2004

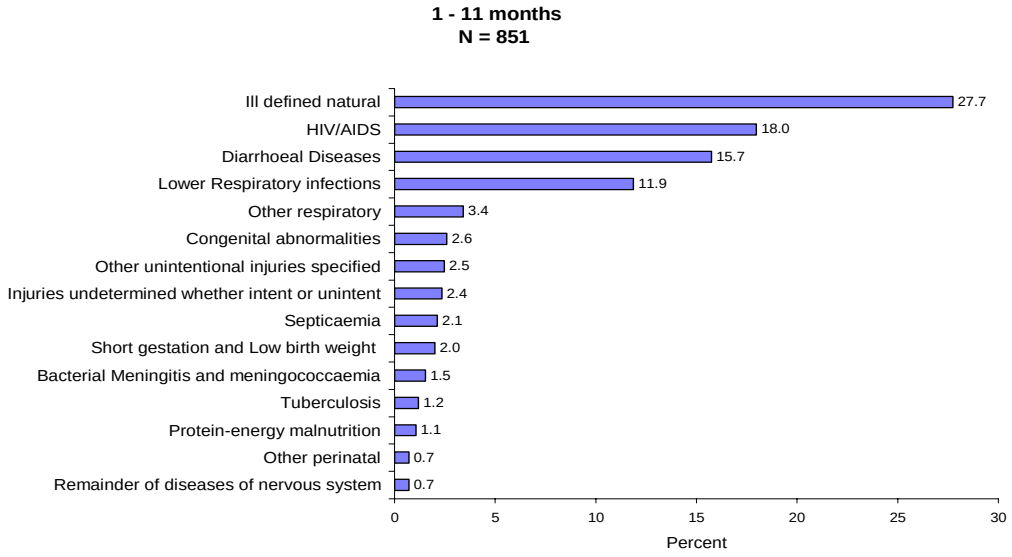


Figure 26: Leading causes of deaths in post neonatal infants (1 – 11 months), Cape Town 2004

Child mortality (1 - 4 years)

In contrast to the steady trend in infant mortality, there was a slight increase in the 1 – 4-year mortality rates between 2001 and 2002 and then a decrease to 2004, mainly due to a decrease in infections including HIV/AIDS and nutritional conditions (Figure 27). A decrease in the HIV/AIDS death rate would not be unexpected due to the roll-out of the PMTCT programme which commenced in 2001, and the availability of ARVs in public hospitals since 2003, but it is encouraging to note the decrease in the other infections and nutritional conditions as well. The injury mortality rate does not show any consistent trend.

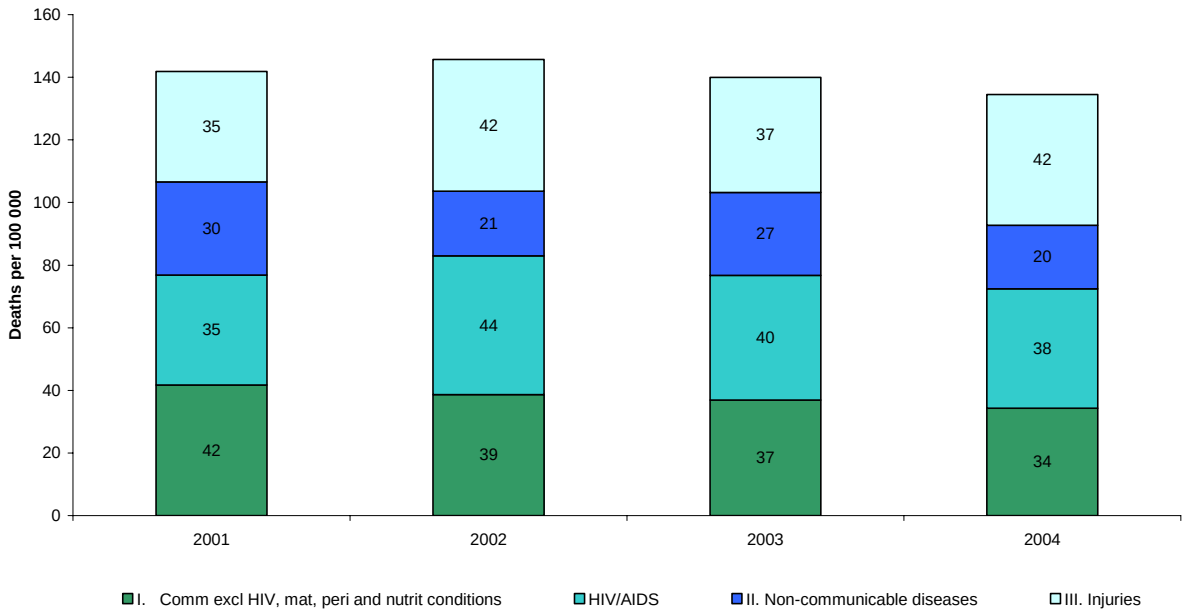


Figure 27: Trend in 1 – 4-year mortality rates per 100 000, Cape Town, 2001 – 2004

The trends in the 1 – 4-year mortality rates per 100 000 population for selected conditions are shown in Figure 28. This shows very clearly that the death rates due to HIV/AIDS peaked in 2002 and declined thereafter, and that the HIV/AIDS death rates are double those of any other condition. There appears to be a slight increase in death rates due to road traffic injuries and other unintentional injuries between 2002 and 2004. Diarrhoea mortality rates have remained fairly stable over this period, while death rates due to lower respiratory infections have declined.

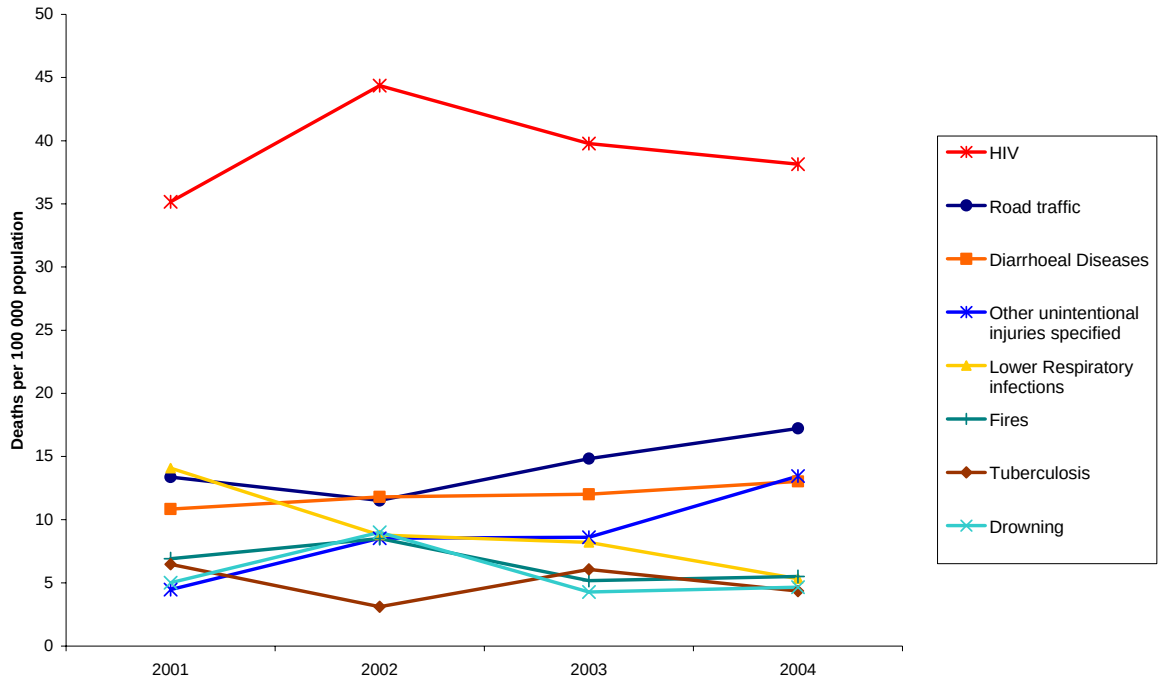
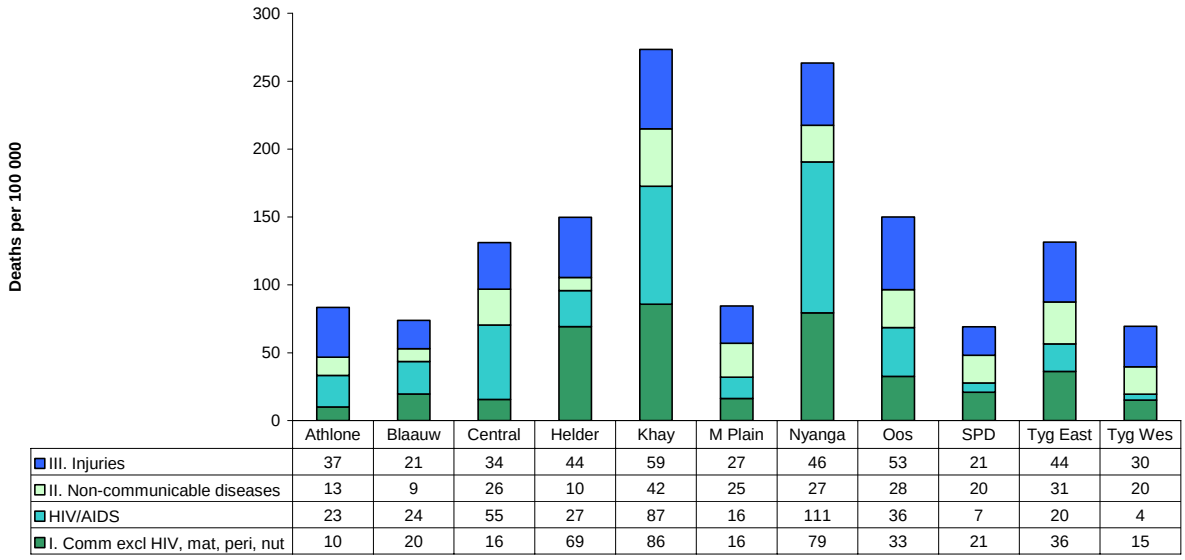


Figure 28: Trend in 1 – 4-year mortality rates per 100 000 population for selected conditions, Cape Town 2001 - 2004

Pooled estimates of the child (1 - 4 years) mortality rates per 100 000 population for the period 2001-2004 show large variations by sub-district (Figure 29). Similar to the geographic differentials in child mortality, Khayelitsha and Nyanga have the highest rates and South Peninsula the lowest. Over the period 2001 - 2004, the highest HIV/AIDS-related death rates in children under the age of five were observed in Nyanga (303/100 000) and Khayelitsha 245/100 000. The lowest were observed in Tygerberg West (15/100 000) and South Peninsula (37/100 000). This wide difference in mortality rate of 288 demonstrates the stark differences in paediatric HIV/AIDS-related mortality across the sub-districts. It also highlights that the paediatric AIDS epidemic remains a public health challenge, despite the fact that there are evidence-based and proven interventions such as PMTCT that can reduce its impact. These findings also underscore the importance of improving the coverage and assessing the impact of these interventions at sub-district level. For example, Khayelitsha sub-district, which reported one of the highest mortality rates, has the most established PMTCT programme in this province.



	Athlone	Blaauw	Central	Helder	Khay	M Plain	Nyanga	Oos	SPD	Tyg East	Tyg Wes
III. Injuries	37	21	34	44	59	27	46	53	21	44	30
II. Non-communicable diseases	13	9	26	10	42	25	27	28	20	31	20
HIV/AIDS	23	24	55	27	87	16	111	36	7	20	4
I. Comm excl HIV, mat, peri, nut	10	20	16	69	86	16	79	33	21	36	15

Figure 29: 1 – 4-year mortality rates (pooled rates) per 100 000 by sub-district, Cape Town, 2001 – 2004

HIV/AIDS was the leading cause of death among children aged 1-4 years, accounting for 25.2% of the deaths. This was followed by road traffic injuries, other unintentional injuries and diarrhoea (Figures 30 and 31). Ill-defined deaths accounted for 7.3% of deaths in this age group. Males had a larger proportion of injury deaths excluding fires, while females had a higher proportion of diarrhoea deaths and deaths due to fires.

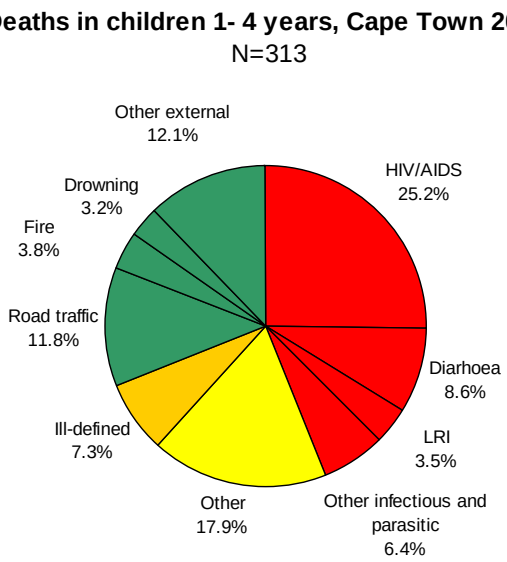


Figure 30: Cause of death profile, children 1 – 4 years, Cape Town, 2004

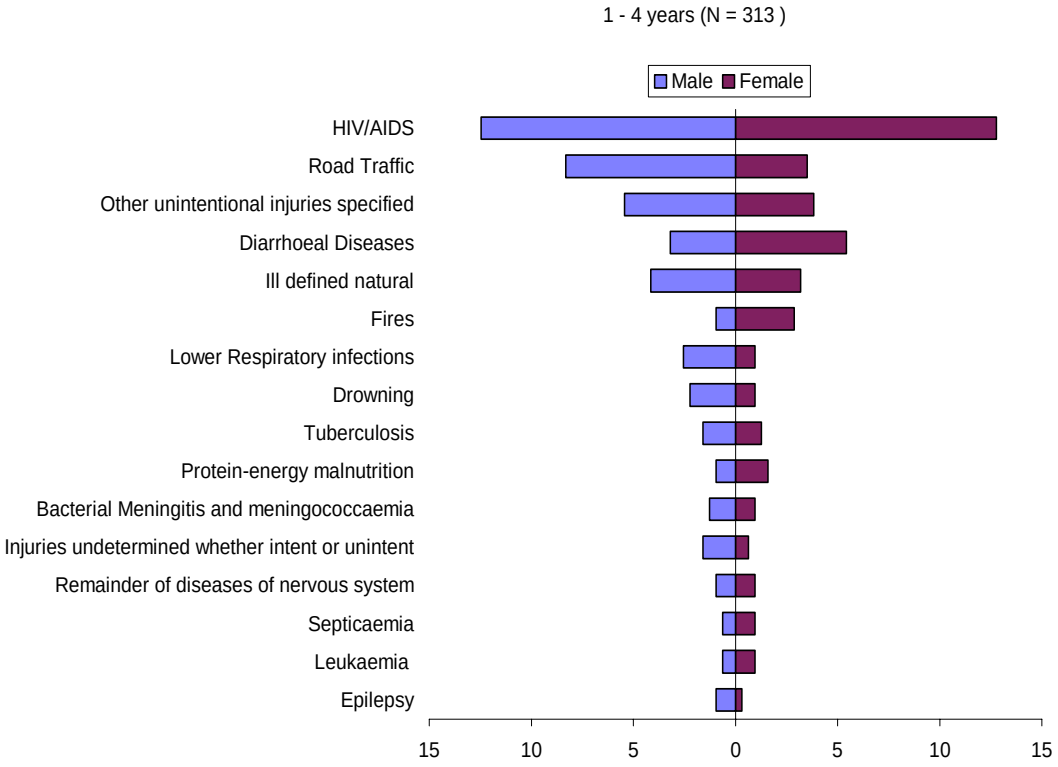


Figure 31: Leading causes of death in the 1 – 4-year age group, Cape Town, 2004

Children of 5-9 years

In age group 5 – 9 years, road traffic injuries (36.1%) move up in the ranking to the leading cause of death, followed by HIV/AIDS (11.5%) and lower respiratory infections (6.6%). Homicide ranked ninth and accounted for 4.1% of deaths in this age group. It is interesting to note the gender differential, with males having a much higher proportion of deaths due to road traffic injuries than females. The ranking of the causes is shown by gender in Figure 32 below.

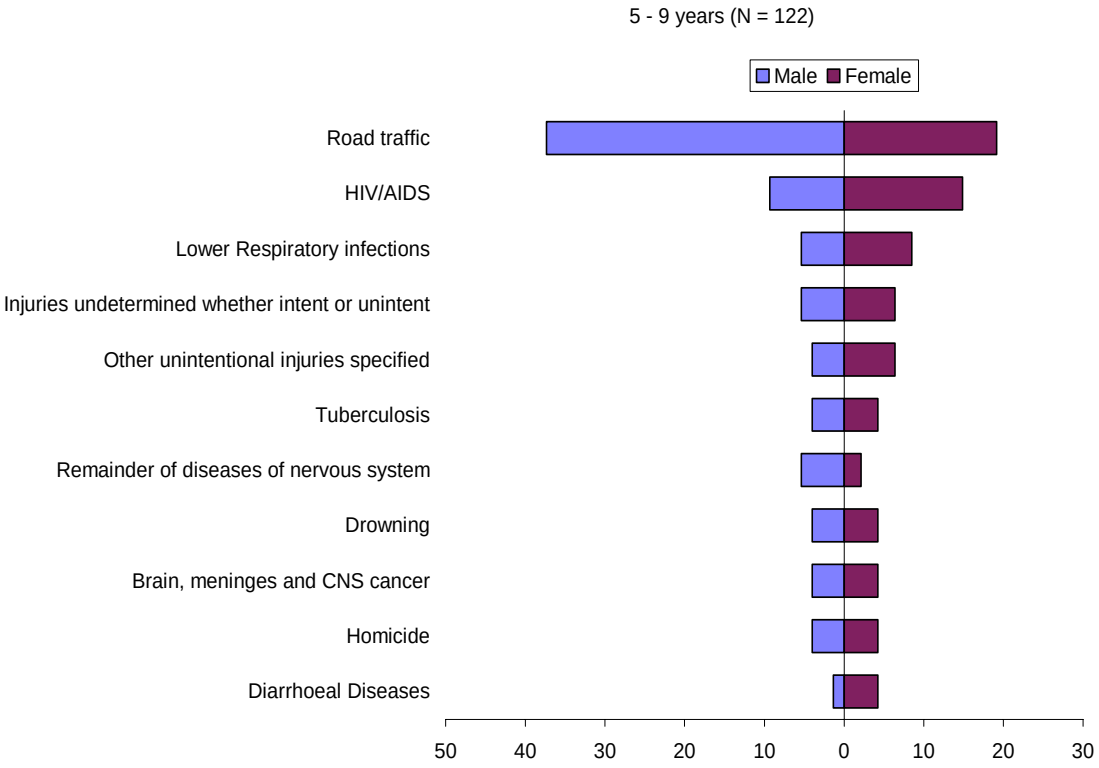


Figure 32: Leading causes of death in 5 – 9-year age group, Cape Town, 2004

Children of 10 - 14 years

A similar picture was found for the 10 – 14-year age group, with injuries dominating the causes of death and with homicide ranking second and accounting for 9.9% of deaths in this age group. Suicide ranked fifth, accounting for 4.5% of deaths. Again the males had higher proportions of injury deaths than females, particularly for homicide. The ranking of causes is shown by gender in Figure 33 below.

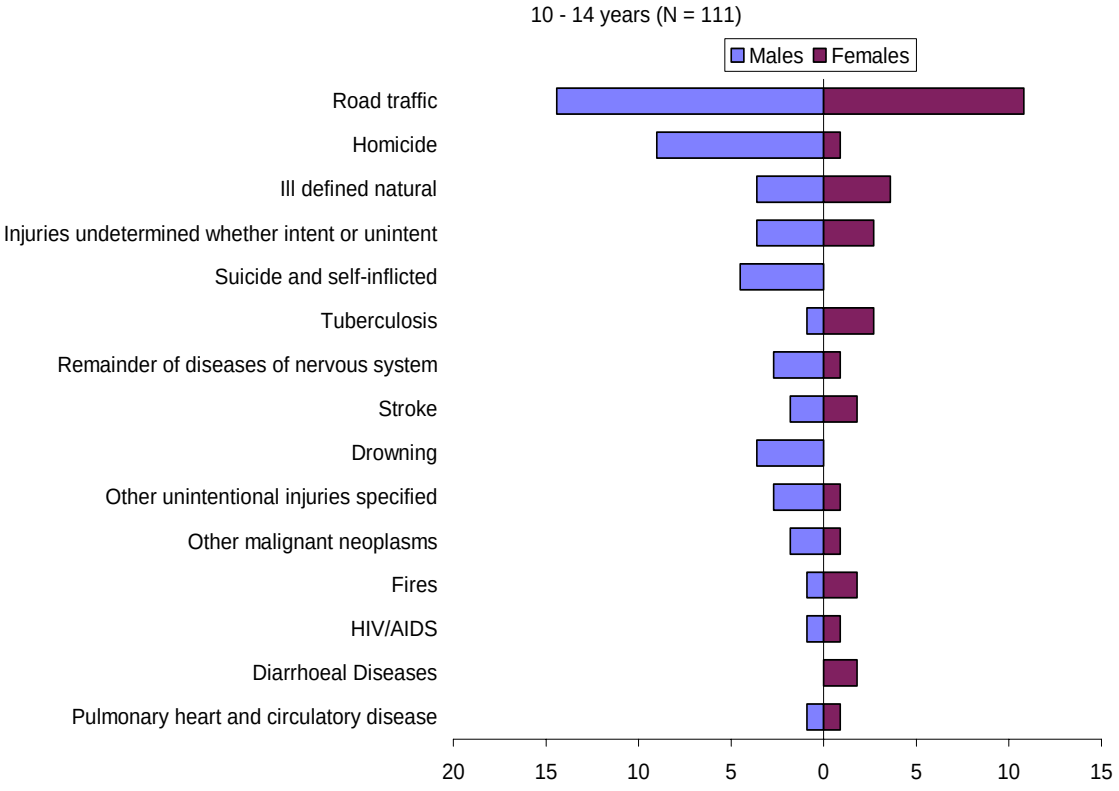


Figure 33: Leading causes of death in 10 – 14-year age group, Cape Town, 2004

Children of 15 - 19 years

In the 15 – 19-year age group it is shocking to note that homicide ranks first and accounts for almost half of the deaths (42.3%). Road traffic ranks second, followed by suicide and then HIV/AIDS. The ranking by gender is shown in Figure 34. Males in this age group are at much higher risk of dying than females, with 2.7 male deaths for every female death from all causes, and 6.6 male deaths for each female death from injury.

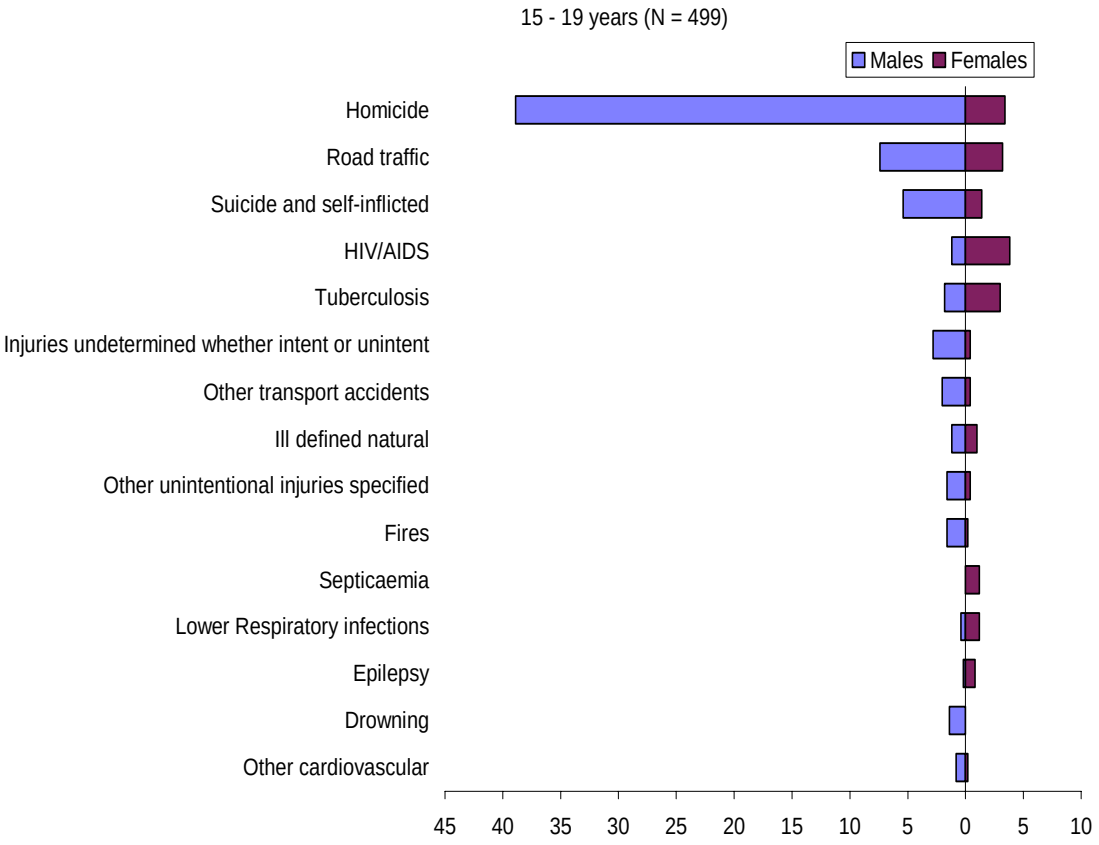


Figure 34: Leading causes of death in 15 – 19-year age group, Cape Town, 2004

Women's health

The City of Cape Town has introduced a women's health programme that aims to improve reproductive health services and provide cervical cancer screening. Mortality indicators specific to the programme would include maternal mortality and cervical cancer. However, in the context of women's health it would also be useful to review breast cancer mortality and the overall mortality pattern among adult women.

From 2001 - 2004 there were 33 deaths reported as being due to maternal conditions on death notifications for Cape Town. This gives a maternal mortality ratio of 15 deaths per 100 000 births, somewhat lower than the maternal mortality ratio of 112 per 100 000 for deliveries in health facilities in 2002 that was reported by Fawcus *et al*.[21] based on a review of the Peninsula Maternal and Neonatal Service data. The most recent report from the Confidential Enquiry into Maternal Deaths based on the notifications of maternal deaths indicates that there were 207 maternal deaths in the whole of the Western Cape Province between 2002 and 2004. Since approximately half the deaths in the Western Cape occur in the Cape Town Metropole, one might expect about 100 maternal deaths during this period. The programme needs to obtain the Metropole data provided through the confidential enquiry, but the quality of the cause of death data regarding maternal deaths also needs to be improved. Training is needed to sensitise the coders on the one hand and improve quality of certification on the other. The number of maternal deaths recorded through the death certification system is likely to be an underestimate.

Death from cancer of the cervix is eminently preventable. The screening programme aims to identify cases of cancer in the early stage of the disease when appropriate treatment can prevent the fatal consequence. At this stage there is no public programme for breast cancer screening since such a programme is much more costly. Age-standardised rates for cervical cancer and breast cancer mortality are shown for the sub-districts of Cape Town in Figure 35. There is considerable variation, partly reflecting differential access to health services. Cervical cancer mortality rates are highest in Nyanga (26/100 000 females) and Khayelitsha (20/100 000 females). In all the other sub-districts breast cancer death rates are higher than cervical cancer rates.

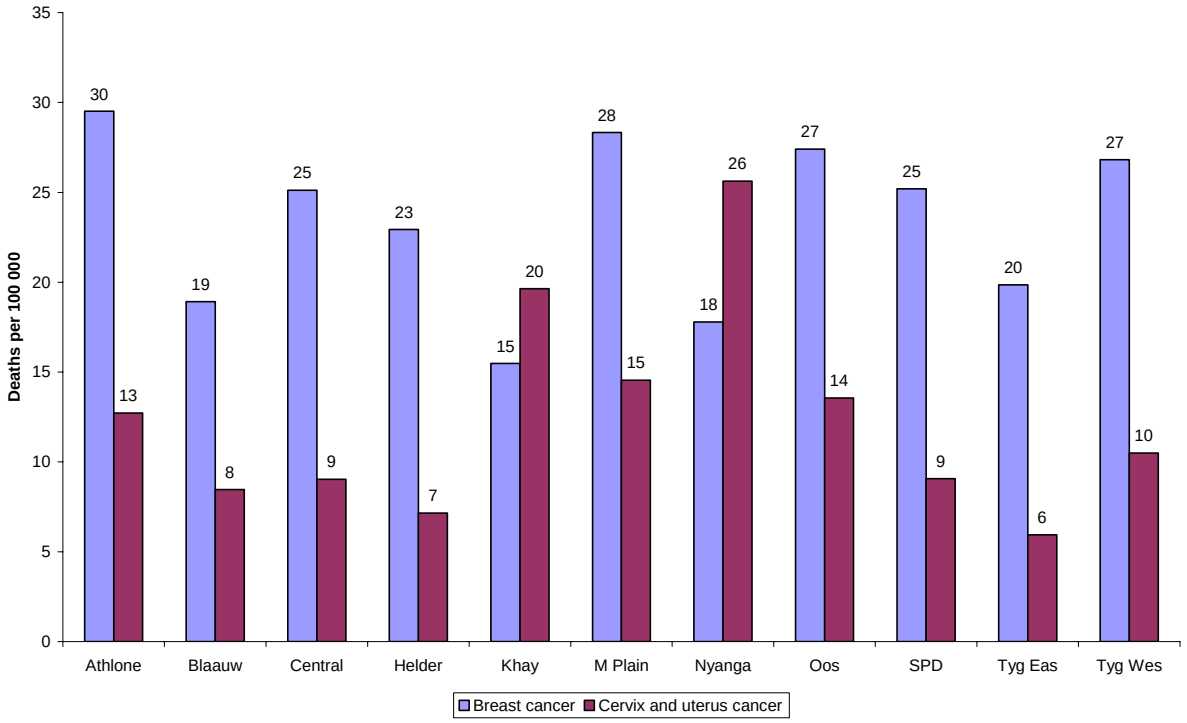


Figure 35: Age-standardised mortality rates (pooled estimates) for cervix and breast cancer by sub-district, Cape Town, 2001 – 2004

The premature mortality experienced in 2004 by women aged 15 years and older is presented in Figure 36. This shows that breast cancer accounts for 3%, cervical for 1% and maternal deaths for less than 1%, and that the major causes of death are conditions that affect both men and women. HIV/AIDS and TB together account for a third of the premature mortality. Among young women HIV/AIDS is the leading cause of death, while at later ages non-communicable diseases dominate (see Figure 2). Non-communicable diseases account for almost half of the premature mortality among adult women. The cardiovascular causes together with diabetes account for a quarter of the premature mortality among women. While the focus of a women's health programme needs to continue to address the concerns of women's specific conditions, it is clear that reducing the premature mortality burden for women will require interventions targeting HIV/AIDS and TB on the one hand and cardiovascular diseases and diabetes on the other.

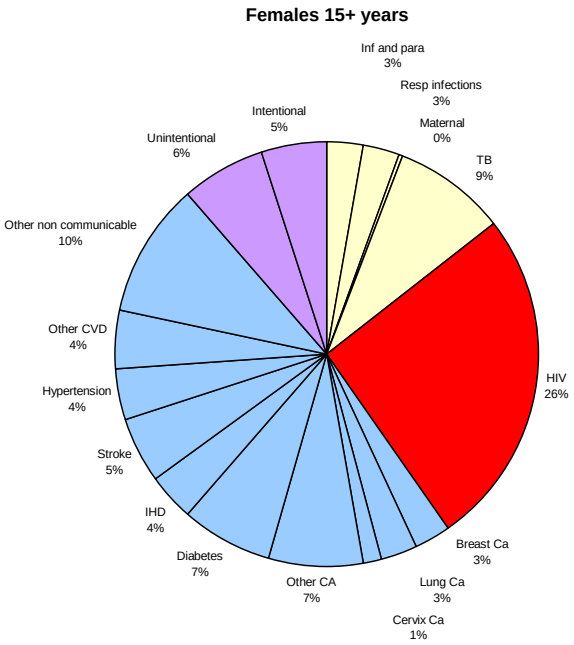


Figure 36: Premature mortality (YLLs) cause profile for women of 15+ years, Cape Town, 2004

Men's health

There is currently no men's health programme. Among men, injuries account for 40% of premature mortality (Figure 37). Injuries predominate in early adulthood, and the majority are the result of interpersonal violence. HIV/AIDS and TB also account for a quarter of the premature mortality among men. A variety of chronic conditions occurring later in life account for about a third of premature mortality. These feature not only the cardiovascular and diabetes combination, as reflected in the profile for women, but also the respiratory conditions, including COPD and lung cancer. The data would indicate a need to focus on violence and injuries, HIV/AIDS and TB, smoking and other risk factors for chronic diseases.

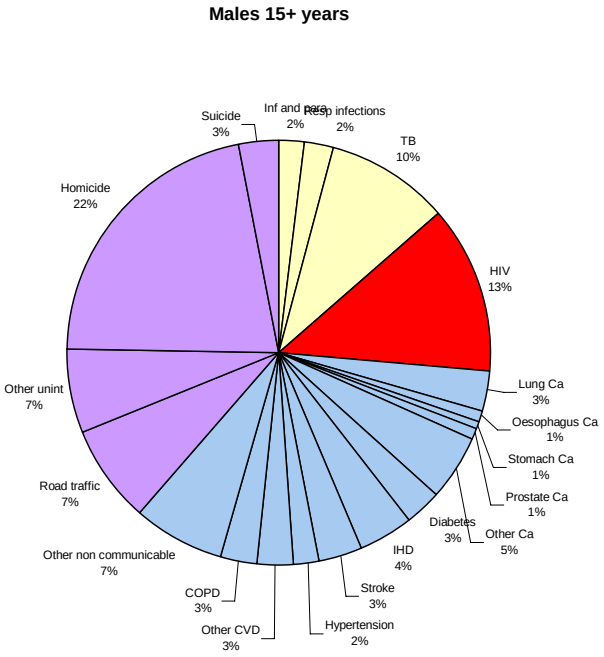


Figure 37: Premature mortality (YLLs) cause profile for men 15+ years, Cape Town, 2004

Prostate cancer is the only condition that is specific to men. It accounts for 1% of the overall premature mortality. The age-standardised rates for the sub-districts are shown in Figure 38. These compare to the estimate of 32/100 000 for the Western Cape Province and a national estimate of 27/100 000 in 2000.[18] The rates are particularly low in Khayelitsha (15/100 000 males), while Athlone, Mitchell's Plain and Oostenberg all have rates over 30/100 000 males. It is not clear whether these variations reflect real differences in the incidence of the condition, variations in access to treatment, or whether they also include the differences in diagnosis.

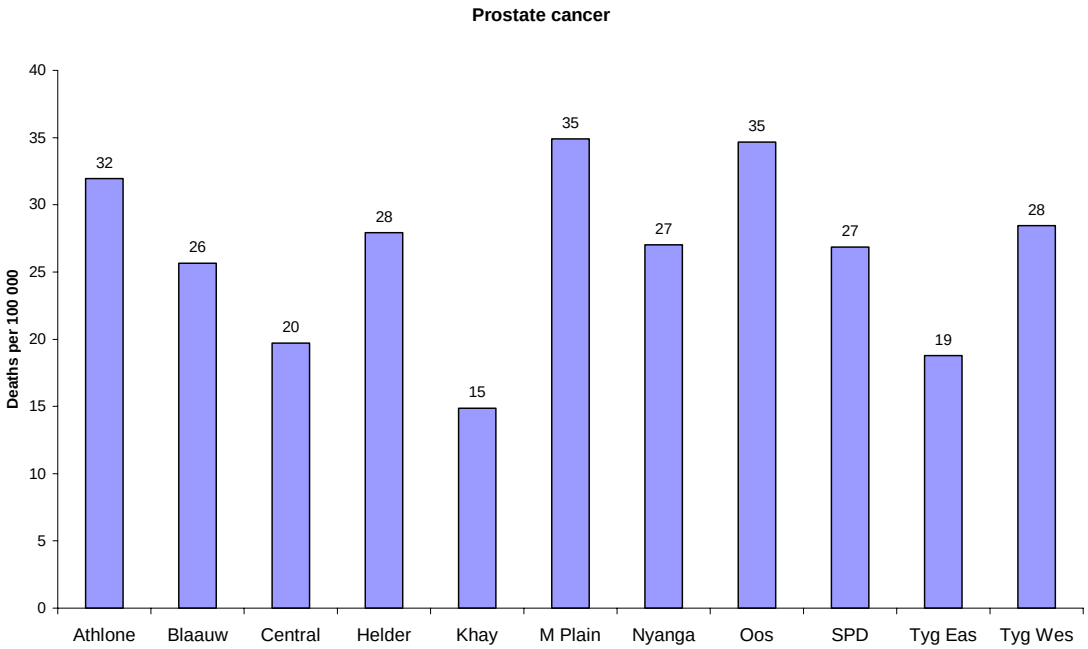


Figure 38: Age-standardised mortality rates (pooled estimates) for prostate cancer by sub-district, Cape Town, 2001 – 2004

Discussion

The Cape Town routine local mortality surveillance system provides a wealth of data on the health of the population in Cape Town. Analysis of these data has provided an opportunity to assess priority programmes in terms of mortality for the first time. The analysis also points to emerging health issues and vulnerable groups who can be identified and targeted for interventions.

It is clear that HIV/AIDS mortality has increased dramatically since 2001. Mortality from HIV/AIDS appears to have stabilised in 2004, possibly demonstrating the impact of the PMTCT and ARV programmes. However, ongoing monitoring is required in order to confirm this trend. Unfortunately, during 2005 data collection became a problem, and the data for this year are not complete enough to assess trends. Continued efforts to reduce the spread of HIV and provide appropriate treatment and care for people with AIDS is a priority. The coding practice with regard to HIV/AIDS used in the Metropole is different from that used by Stats SA, where euphemisms and abbreviations for HIV such as 'RVD' and 'immune suppression' are not coded to HIV. The interpretive coding practice used in the Metropole provides more meaningful statistics regarding HIV/AIDS. Nonetheless, the tendency to certify the indicator conditions and not disclose HIV would result in an under-estimate of the HIV/AIDS mortality rates.

Mortality due to injuries, particularly homicide, is extremely high in the City of Cape Town. There is evidence of a declining trend during this period. However, injury mortality rates, particularly homicide and road traffic injuries, remain among the highest in the world. The homicide rates are exceedingly high for men. Of particular concern are the high homicide and road traffic injury fatality rates among the male youth. This is likely to be linked to alcohol and other substance abuse, but limited routine data are collected in this area. Urgent attention needs to be given to identifying and implementing strategies to prevent injuries.

Mortality rates due to non-communicable diseases are relatively high, with geographic variations along the lines of the epidemiological transition. Diabetes mortality rates are very high when compared to developed countries, suggesting that there is scope for better management of the condition, particularly at primary care level. While the mortality rates for other cardiovascular conditions are lower than the national average, they nonetheless can be reduced further through health promotion, improved risk factor management at primary care, and secondary prevention after a cardiovascular event. Non-communicable diseases account for a high proportion of premature mortality in adult women. Smoking rates are high in the coloured population, especially among females.[22]

Child mortality appears to have remained constant over this period, but there is an unusual increase in mortality from low birthweight that needs further investigation. The data would suggest that child mortality due to HIV/AIDS has started decreasing, even although this study period covers only the beginning of the full-

scale PMTCT roll-out. In view of the fact that HIV/AIDS remains a leading cause of death in children under 5 years of age, it highlights the need to link the PMTCT interventions to the broader maternal and child health programmes and interventions that extend beyond the first few months of life. Cape Town also experienced an increase in diarrhoea death rate in 2004 that was accompanied by an increase in the number of cases attending hospital; this appears to be related to an outbreak rather than being related to HIV/AIDS.

Khayelitsha and Nyanga have a considerably higher burden than other sub-districts. Despite an increase in HIV/AIDS mortality in Khayelitsha, overall mortality has decreased in this sub-district, mainly due to a reduction in injuries. This may be partly due to an intervention by the Department of Safety and Security, which prioritised certain police stations (including Khayelitsha) for additional resources and attention. In Khayelitsha, for example, an operational centre and two new police stations were built and resourced, sector policing was introduced, community partnerships were forged and shebeen trading hours were restricted.

We consider the Cape Town surveillance system to consist of fairly robust statistics for between 2001 and 2004. Assessment of the completeness of adult death data indicates that there is little under-registration. Estimates of the population at sub-district level are from the projections done for the City using the ASSA model. The number of births is taken from the City of Cape Town's birth data. It should be recognised that there is a level of uncertainty in these numbers. However, initial analysis of the 2005 data suggests that there has been some deterioration in the system that requires urgent attention. In addition, the higher caseload recorded by the NIMSS for injuries underscores the importance of developing a sustainable mortuary-based data collection system.

Recommendations

Analysis of the 2001 mortality data for the City of Cape Town highlighted the differentials in levels of mortality across the city as well as the quadruple burden that is experienced across all the sub-districts. For the first time an analysis of the emerging trends in mortality has been undertaken covering the period 2001 - 2004. This shows that HIV/AIDS has taken over from homicide as the leading cause of premature mortality, partly as a result of a decline in homicides in this period as well as an increase in HIV/AIDS. Diabetes, stroke and IHD are all among the leading causes of premature mortality and have shifted rankings, with diabetes going from eighth in 2001 to fifth in 2004.

The broad recommendations made on the basis of the 2001 data are still highly pertinent. While there are indications that there have been some gains in reducing the burden of violence and homicide, the extremely high mortality rates, particularly in some areas, highlight the urgency of addressing the underlying determinants of the high levels of violence. Efforts to curb the HIV/AIDS epidemic as well as TB need to continue to be strengthened. The emerging epidemic of non-communicable diseases must also be tackled through strengthening primary care management on the one hand and promoting healthy lifestyles on the other. Finally, equity must be prioritised in resource allocation between the sub-districts.

Focusing on child health shows that the effective implementation of the PMTCT programme will impact on mortality in the age group 1 - 4 years, and that there is a need to investigate the increase in mortality from low birthweight and prematurity reflected among infants during this period. Road traffic injuries and other unintentional injuries among the young children and homicide among the older children are also issues of concern, particularly for boys. The inequities in health status are marked in the child mortality indicators, making these mortality rates a sensitive indicator to monitor progress in reducing the inequities in the future.

The local mortality surveillance system is providing mortality information for the region. However, in order to ensure the sustainability, improve the quality of the data collected, and ensure that the results are optimally utilised, integration with other systems such as Home Affairs, the mortuaries, NIMSS, Stats SA, South African Police Services and the Departments of Transport and Education, must be improved. Linking the NIMSS data with the Cape Town surveillance system will improve the quality of injury death data, particularly relating to the manner of death.

Interventions must be planned, implemented, monitored and evaluated multi-sectorally. Vulnerable groups/areas identified through the system must be targeted for interventions. Men's health has traditionally been overlooked, which is of concern given the high death rates among young adult men. Injuries are the predominant cause of death among, men for which structural and social interventions are needed.

Appendix 1: Exclusions from Cape Town mortality surveillance data 2001 - 2004

	2001	2002	2003	2004
Total deaths	23 818	24 196	24 069	24 449
No gender	3	5	2	0
Duplicates	120	87	10	34
Invalid cause of death	17	15	8	25
Total deaths analysed	**23 681**	**24 089**	**24 049**	**24 389**

Appendix 2: Completeness of vital registration in Cape Town

Assessing the completeness of death registration is difficult. Although there are techniques available, they either require that migration be negligible in comparison with the deaths (which is unlikely for small populations), or - if adapted to allow for migration - that one has a reasonably accurate measure of net migration. Since we do not have such an accurate measure of migration for Cape Town, an alternative approach was necessary: the numbers of deaths registered by the City of Cape Town were compared to those reported by households in the 2001 census. However, before this could be done, it was necessary to adjust the numbers of deaths reported by households in the census for any incompleteness of reporting. This was done at a national level by Dorrington, Moultrie and Timaeus (2004), and we used their correction factors by population group on the assumption that the quality of reporting by households was independent of geographical area.[1]

Unfortunately, since this method relies on the assumption that completeness of reporting of deaths by households is constant with respect to age, it is only reliable for estimating the completeness of reporting of adult deaths (e.g. those 15 and older). For children, in the absence of any recent independent estimates of child mortality, we were forced to assess completeness by comparing the number of recorded deaths against those estimated by the ASSA2003 model for the City (Dorrington, 2005).

Completeness of adult deaths

The number of adult deaths from the Cape Town vital registration in 2001 is compared with the number of deaths reported by households based on the 2001 census, once the household deaths had been adjusted for under-reporting.[2] Table 2.1 shows a summary of the comparison that was done by age and sex. This indicates that the 2001 vital registration of deaths among adults in Cape Town can be considered to be around 95% complete. Although completeness was pretty constant with respect to age for females, there was a steady downward trend in completeness with age for males which is difficult to interpret and needs further analysis.

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[1] Dorrington, R. E., Moultrie, T.A., Timaeus I.A. (2004). Estimation of mortality using the South African 2001 census data. Monograph 11. Cape Town, Centre for Actuarial Research, University of Cape Town.

[2] Zinyaktira N. (2006). Preparatory work for MPhil thesis at UCT.

Table 2.1: Completeness ratios of vital registration in Cape Town (2001) (%)

Age	Male	Female	Total
Median (15 - 85+)	96.8	94.5	96.2
Average (15 - 85+)	95.8	96.5	96.8
Median (20 - 85+)	95.7	93.9	95.9
Average (20 - 85+)	94.9	95.2	95.9

As the census data are only available for a single year, it is necessary to assess whether the levels of completeness of death registration in Cape Town have changed over time. In order to do this we examined the ratio of the rates of mortality in each year to that in 2001 for non-lung and non-oesophageal cancers combined, as well as the overall mortality rates in the 10-14 and 60+ age groups (which are not expected to be influenced by AIDS). Trends in these ratios suggest that it is reasonable to assume that the levels of completeness have not changed much during this period 2001 to 2004.[1]

Table 2.2 shows the number of deaths on the population register registered in the regional offices of Home Affairs based in Cape Town. The number of deaths in the population of 15 years and older compares well with those registered on the population register. However, in 2005 the proportion drops to 84%, suggesting that there was a problem in the system of collecting the death certificates in that year. For this reason, 2005 has been excluded from the analysis.

[1] Zinyaktira N. (2006). Preparatory work for MPhil thesis at UCT.

Table 2.2: Numbers of deaths in those aged 15+ years reported by Cape Town Metropole and on the population register

Year	Cape Town deaths	Population register (Cape Town offices of Home Affairs)	% of population register deaths
2001	21 809	20 921	104.2%
2002	22 216	22 318	99.5%
2003	22 156	22 616	98.0%
2004	22 459	22 663	99.1%
2005	19 989	23 804	84.0%

Completeness in children and infant death data

The ratio of the number of deaths of children aged 0 - 4 to the number of women aged 15 -49[1] was obtained from the ASSA model in each year from 1996 to 2004 for Africans, whites and coloureds (Indians are included with coloureds due to their small numbers in the city). Using the proportion of women aged 15 to 49 in each population group (with coloured and Indian proportions combined) as weights, a weighted average of the mortality ratio of the children to women of child-bearing age was calculated from the model. From this the expected numbers of deaths in each year were then estimated by multiplying the weighted average ratios of the children (0 - 4) with the total female population aged between 15 and 49.

The expected deaths are calculated for both sexes combined as there is no reason to suppose that the completeness between the male and female children is different. This was also done for infants alone. Table 2.3 compares the number of deaths from the Cape Town death surveillance system with these estimates. While this could suggest considerable under-registration of child deaths, it is more likely to suggest the need to reconsider the assumptions that are made in the ASSA model regarding child mortality. While it is known that there is considerable under-

[1] Women aged 15-49 are the population giving birth to children at risk of dying. This ratio was used in preference to a mortality rate since there is significant under registration of births, and under count of children in the census.

registration of child deaths in rural areas,[1] the problem has not previously been identified in the in the urban areas.

Table 2.3: Completeness in infants and children

	Infants	Children (0 - 4)
2001	66.9	53.3
2002	65.4	51.6
2003	70.1	53.6
2004	78.1	58.6

Completeness of injury deaths

Table 2.4 shows a comparison of the total number of injury deaths in the Cape Town mortality surveillance with data from the National Injury Mortality Surveillance System (NIMSS), which has maintained coverage of the two Cape Town mortuaries at Salt River and Tygerberg over the four–year period from 2001 to 2004.[2] Deaths that occur in Helderberg present to Stellenbosch mortuary, so these data are removed from the Cape Town mortality surveillance data for the comparison.

As may be expected, there are more deaths recorded in the NIMSS for all years, since the Cape Town mortality surveillance system includes deaths based on place of residence while the NIMSS records the place of death for the deceased. Thus deaths among recent migrants into the city, many of whom are young adults most at risk of injuries, will not be reflected in the Cape Town mortality surveillance system but will be reflected in NIMMS. The comparison suggests that suicides might be under-reported in the Cape Town mortality surveillance. However, more detailed investigation is needed to understand the differences between the two data sets.

[1] Kahn K. Dying for change reports that in the rural area of Agincourt, registration of child deaths increased from 20% in the early 1990' to 30% by the year 2000.

[2] Matzopoulos R (editor). A profile of fatal injuries in South Africa: 6th annual report of the National Injury Mortality Surveillance System, 2004. Cape Town: Crime, Violence and Injury Lead Programme, Medical Research Council/University of South Africa, 2005.

Table 2.4: City of Cape Town* injury deaths as % of NIMSS deaths

	2001	2002	2003	2004
Homicide	93.3	95.1	86.3	88.2
with firearm	102.9	98.8	91.8	95.4
Suicide	77.2	73.7	61.4	82.8
Road traffic	79.4	77.9	77.8	86.2
Unintentional	122.8	136.8	116.9	150.0
Undetermined	71.0	130.7	50.4	83.8
Total	91.6	97.7	84.3	95.4

* Deaths in the sub-distract of Helderberg have been removed

Appendix 3: CARe * population estimates for Cape Town Metropole, 2001 - 2004[12]

Age group	Males				Females				Persons			
	2001	2002	2003	2004	2001	2002	2003	2004	2001	2002	2003	2004
0	30066	30681	31112	31386	29583	30197	30626	30899	59649	60878	61738	62284
1-4	112996	113885	115215	116867	111317	112243	113593	115251	224312	226128	228808	232118
5-9	130287	131944	133710	135527	127690	129549	131385	133271	257978	261493	265096	268798
10-14	132580	132323	132040	131655	131380	130682	130203	129746	263961	263005	262242	261401
15-19	145290	143571	140965	138282	147002	145465	142750	139494	292292	289036	283714	277777
20-24	145224	149247	152722	155021	148822	153153	156653	159246	294046	302400	309375	314268
25-29	144967	147770	149485	150773	149332	151884	153777	155020	294299	299654	303262	305794
30-34	132660	135399	138381	141119	136129	139403	142371	145175	268789	274803	280752	286294
35-39	116724	120001	122665	125079	124740	126971	128868	130388	241464	246972	251533	255467
40-44	97187	100791	104097	106985	105839	110167	113898	117171	203026	210958	217995	224156
45-49	73130	76803	80765	84986	82397	86334	90638	94938	155526	163137	171403	179925
50-54	57956	60068	62021	63867	65210	68171	70806	73457	123167	128239	132828	137324
55-59	42139	44140	46313	48704	48226	50392	53256	56361	90366	94532	99569	105065
60-64	34026	34766	35349	35717	40903	41750	42285	43011	74929	76516	77634	78728
65-69	23386	24272	25385	26779	31483	32700	34033	35136	54869	56972	59417	61915
70-74	16780	17094	17336	17461	24259	24674	25077	25670	41039	41768	42413	43132
75-79	10640	10849	11069	11317	16749	17270	17832	18364	27389	28119	28901	29681
80-84	5873	6042	6218	6361	10455	10853	11128	11403	16328	16895	17345	17764
85+	3235	3379	3512	3661	8113	8229	8457	8698	11348	11608	11969	12359
Total	**1455149**	**1483025**	**1508359**	**1531549**	**1539630**	**1570085**	**1597636**	**1622700**	**2994779**	**3053111**	**3105994**	**3154249**

* CARe – Centre for Actuarial Research, University of Cape Town

Appendix 4: Population estimates for males for sub-districts of Cape Town Metropole, 2001 – 2004

2001 males												
Age group	**Athlone**	**Blaauwberg**	**Central**	**Helderberg**	**Khayelitsha**	**Mitchell's Plain**	**Nyanga**	**Oostenberg**	**South Pen**	**Tyg East**	**Tyg west**	**Cape Town**
0	1881	1735	2213	1345	3945	3054	3536	3359	3044	2637	3317	30066
1-4	7389	6514	7408	5256	13660	11705	12337	12929	12635	10301	12864	112996
5-9	9010	7003	8492	6183	14848	13781	13222	14456	14839	12399	16055	130287
10-14	9570	6978	9063	5999	14517	14905	12309	14310	15493	12925	16511	132580
15-19	9567	7384	11697	6165	16114	16199	14212	14459	17677	13902	17914	145290
20-24	7782	7378	16255	6228	18285	13273	17247	13882	16640	12340	15914	145224
25-29	7557	8503	14704	6699	19086	11877	18725	14484	16227	11819	15286	144967
30-34	7278	8194	12291	6079	15217	10684	14346	15140	16263	12259	14908	132660
35-39	6683	7065	9810	5414	12570	10005	11182	13607	14731	11538	14118	116724
40-44	5499	5814	8587	4644	9253	9190	7813	11059	12712	10229	12387	97187
45-49	4284	4229	6904	3549	6437	7610	5905	7695	9560	7414	9543	73130
50-54	3679	3305	6365	2802	4156	5775	4373	5288	8421	5771	8022	57956
55-59	3131	2416	5149	2214	2317	3660	2823	3702	6485	4387	5856	42139
60-64	2851	1886	4262	2001	1622	2484	2010	2755	5674	3387	5093	34026
65-69	2140	1267	3201	1510	714	1414	1056	1721	4146	2338	3879	23386
70-74	1334	944	2885	1213	442	775	789	1006	3182	1503	2708	16780
75-79	798	564	1964	896	230	299	567	610	2116	1052	1546	10640
80-84	285	276	1648	528	148	116	297	296	1075	475	727	5873
85+	145	133	914	344	52	51	146	138	666	318	327	3235
Total	**90863**	**81588**	**133813**	**69069**	**153614**	**136858**	**142896**	**150896**	**181584**	**136994**	**176974**	**1455149**

2002 males												
Age group	**Athlone**	**Blaauwberg**	**Central**	**Helderberg**	**Khayelitsha**	**Mitchell's Plain**	**Nyanga**	**Oostenberg**	**South Pen**	**Tyg East**	**Tyg west**	**Cape Town**
0	1913	1790	2255	1389	3962	3135	3621	3467	3071	2705	3372	30681
1-4	7410	6679	7554	5312	13561	11796	12405	13155	12753	10390	12870	113885
5-9	9105	7162	8638	6278	15032	13833	13308	14726	15013	12590	16258	131944
10-14	9576	6973	9058	6005	14716	14718	12227	14314	15490	12875	16371	132323
15-19	9419	7350	11344	6166	16165	15877	13959	14430	17365	13804	17692	143571
20-24	7866	7756	16547	6505	18778	13693	17631	14550	16916	12734	16270	149247
25-29	7591	8862	14869	6815	19489	12315	19186	14936	16285	12012	15409	147770
30-34	7407	8588	12583	6127	15258	10897	14629	15570	16462	12575	15304	135399
35-39	6892	7317	9951	5571	12849	10219	11466	14044	15119	11933	14641	120001
40-44	5682	6081	8777	4891	9449	9358	8007	11610	13175	10744	13017	100791
45-49	4503	4472	7002	3789	6783	7990	6206	8176	9907	7863	10110	76803
50-54	3794	3444	6498	2882	4359	6068	4553	5474	8622	6005	8369	60068
55-59	3259	2566	5338	2305	2381	3859	2955	3895	6774	4632	6177	44140
60-64	2868	1967	4269	2029	1695	2571	2046	2835	5819	3474	5193	34766
65-69	2210	1346	3238	1553	711	1482	1096	1800	4290	2463	4083	24272
70-74	1338	990	2904	1197	444	806	800	1026	3245	1553	2792	17094
75-79	820	602	1962	882	226	286	574	627	2157	1101	1612	10849
80-84	298	289	1711	518	162	116	309	300	1094	492	755	6042
85+	152	145	957	352	52	51	150	147	689	337	346	3379
Total	**92103**	**84378**	**135454**	**70566**	**156072**	**139068**	**145127**	**155083**	**184247**	**140285**	**180642**	**1483025**

2003 males												
Age group	**Athlone**	**Blaauwberg**	**Central**	**Helderberg**	**Khayelitsha**	**Mitchell's Plain**	**Nyanga**	**Oostenberg**	**South Pen**	**Tyg East**	**Tyg west**	**Cape Town**
0	1934	1833	2283	1425	3957	3199	3684	3554	3081	2756	3406	31112
1-4	7460	6867	7732	5386	13524	11932	12522	13428	12921	10517	12923	115215
5-9	9208	7324	8794	6378	15237	13897	13406	15004	15203	12789	16470	133710
10-14	9580	6962	9053	6008	14918	14533	12146	14309	15485	12820	16225	132040
15-19	9216	7263	10938	6125	16115	15462	13624	14299	16953	13613	17356	140965
20-24	7919	8108	16778	6762	19208	14062	17949	15171	17125	13081	16558	152722
25-29	7569	9154	14926	6877	19756	12668	19510	15275	16221	12113	15415	149485
30-34	7548	9003	12901	6182	15330	11128	14937	16028	16687	12912	15724	138381
35-39	7068	7528	10041	5699	13067	10379	11691	14406	15432	12265	15091	122665
40-44	5848	6329	8937	5127	9616	9492	8173	12130	13600	11232	13614	104097
45-49	4740	4731	7118	4048	7159	8399	6530	8692	10285	8345	10719	80765
50-54	3898	3571	6612	2953	4557	6351	4722	5643	8798	6223	8694	62021
55-59	3398	2728	5545	2405	2451	4076	3099	4104	7088	4895	6524	46313
60-64	2871	2039	4256	2047	1762	2647	2072	2903	5938	3545	5268	35349
65-69	2300	1438	3302	1609	713	1565	1146	1896	4475	2613	4328	25385
70-74	1336	1031	2910	1176	445	834	808	1042	3295	1596	2865	17336
75-79	842	641	1961	868	223	274	583	645	2199	1153	1681	11069
80-84	312	301	1776	508	176	115	321	303	1113	509	783	6218
85+	159	157	997	358	51	50	154	155	710	356	364	3512
Total	**93206**	**87009**	**136861**	**71943**	**158265**	**141063**	**147075**	**158987**	**186610**	**143333**	**184007**	**1508359**

2004 males												
Age group	**Athlone**	**Blaauwberg**	**Central**	**Helderberg**	**Khayelitsha**	**Mitchell's Plain**	**Nyanga**	**Oostenberg**	**South Pen**	**Tyg East**	**Tyg west**	**Cape Town**
0	1945	1865	2300	1454	3934	3246	3729	3623	3075	2793	3421	31386
1-4	7531	7072	7937	5475	13532	12101	12674	13736	13127	10672	13009	116867
5-9	9316	7486	8957	6479	15455	13966	13510	15284	15399	12989	16685	135527
10-14	9577	6942	9043	6006	15114	14342	12058	14288	15469	12751	16065	131655
15-19	9009	7166	10543	6077	16054	15047	13286	14150	16539	13408	17005	138282
20-24	7910	8399	16882	6968	19498	14323	18126	15677	17200	13326	16713	155021
25-29	7525	9417	14942	6918	19972	12988	19782	15566	16113	12176	15373	150773
30-34	7675	9406	13201	6225	15379	11338	15216	16459	16882	13225	16113	141119
35-39	7230	7720	10114	5814	13264	10517	11892	14734	15715	12571	15509	125079
40-44	5989	6550	9060	5346	9744	9583	8303	12604	13971	11677	14159	106985
45-49	4991	5003	7246	4325	7564	8834	6874	9240	10687	8856	11365	84986
50-54	3995	3691	6714	3017	4751	6628	4884	5800	8955	6428	9003	63867
55-59	3552	2903	5777	2514	2532	4314	3258	4333	7436	5183	6903	48704
60-64	2857	2099	4219	2052	1821	2707	2085	2951	6023	3594	5309	35717
65-69	2413	1549	3398	1682	723	1666	1209	2013	4709	2794	4623	26779
70-74	1325	1066	2898	1148	442	857	810	1050	3322	1628	2917	17461
75-79	867	683	1964	856	220	263	593	665	2246	1207	1753	11317
80-84	324	312	1832	496	190	115	331	305	1127	524	806	6361
85+	166	171	1042	366	50	49	159	165	733	376	384	3661
Total	**94197**	**89501**	**138070**	**73219**	**160237**	**142883**	**148778**	**162644**	**188727**	**146177**	**187116**	**1531549**

Appendix 5: Population Estimates for females for sub-districts of Cape Town Metropole, 2001–2004

2001 females												
Age group	**Athlone**	**Blaauwberg**	**Central**	**Helderberg**	**Khayelitsha**	**Mitchell's Plain**	**Nyanga**	**Oostenberg**	**South Pen**	**Tyg East**	**Tyg west**	**Cape Town**
0	1742	1666	2166	1393	3958	3013	3489	3218	3094	2603	3240	29583
1-4	7455	6213	7327	5249	13480	11631	12395	12529	12020	10161	12857	111317
5-9	8690	6843	8198	5875	15034	13644	13447	14186	14387	11951	15437	127690
10-14	9342	6893	8562	5803	15367	14616	13180	13805	14981	12527	16306	131380
15-19	9300	7158	11973	6180	18476	15767	16533	14510	15699	13905	17501	147002
20-24	8274	7500	16043	6299	20107	13577	19147	13703	14643	13565	15963	148822
25-29	8113	8627	14894	6708	20747	12231	18841	15265	15574	12812	15521	149332
30-34	8056	8376	11963	6005	15673	10998	13821	15465	16095	13294	16385	136129
35-39	7768	7310	10680	5548	13060	10939	11326	14054	15526	13105	15424	124740
40-44	6487	6075	9614	4702	9782	10796	8648	11356	13801	11060	13517	105839
45-49	5438	4653	8345	3829	6567	8836	6594	7898	10926	8221	11089	82397
50-54	4932	3631	7516	3096	3836	6509	4517	5596	9574	6491	9511	65210
55-59	4053	2679	6055	2568	2332	4078	2932	3769	7694	4894	7173	48226
60-64	3872	2176	5138	2363	1787	2920	2446	2953	6698	3946	6604	40903
65-69	3227	1629	4352	1861	929	1915	1627	1996	5570	2883	5492	31483
70-74	2216	1250	3922	1810	505	1106	1203	1427	4614	2186	4018	24259
75-79	1383	887	3268	1433	260	629	692	902	3167	1619	2510	16749
80-84	734	454	2375	972	158	325	423	547	2049	1045	1372	10455
85+	498	356	2235	715	101	231	217	341	1583	846	990	8113
Total	**101579**	**84375**	**144628**	**72409**	**162160**	**143763**	**151479**	**153519**	**187695**	**147116**	**190908**	**1539630**

2002 females												
Age group	**Athlone**	**Blaauwberg**	**Central**	**Helderberg**	**Khayelitsha**	**Mitchell's Plain**	**Nyanga**	**Oostenberg**	**South Pen**	**Tyg East**	**Tyg west**	**Cape Town**
0	1767	1711	2220	1447	3975	3079	3554	3325	3155	2673	3292	30197
1-4	7504	6337	7488	5324	13339	11717	12484	12740	12111	10275	12924	112243
5-9	8779	7013	8353	5971	15255	13789	13588	14472	14549	12144	15637	129549
10-14	9306	6885	8493	5794	15479	14365	13027	13786	14974	12451	16122	130682
15-19	9139	7156	11810	6155	18508	15495	16246	14477	15447	13783	17249	145465
20-24	8407	7815	16445	6588	20530	14111	19704	14305	14970	13983	16295	153153
25-29	8161	8868	15184	6783	21344	12647	19275	15572	15646	12911	15492	151884
30-34	8193	8754	12287	6074	15962	11213	14077	15894	16408	13669	16872	139403
35-39	7915	7468	10735	5681	13367	10934	11412	14377	15788	13438	15854	126971
40-44	6697	6386	9803	4958	10264	11107	8905	11956	14381	11596	14115	110167
45-49	5687	4903	8534	4045	7089	9319	6925	8333	11299	8624	11577	86334
50-54	5137	3828	7733	3204	4028	6928	4752	5846	9903	6814	9997	68171
55-59	4168	2869	6314	2647	2394	4303	3048	3963	8043	5146	7497	50392
60-64	3883	2297	5173	2377	1855	3036	2488	3050	6798	4059	6733	41750
65-69	3368	1722	4437	1868	955	2003	1699	2060	5775	3028	5786	32700
70-74	2289	1290	3909	1788	509	1120	1237	1441	4704	2248	4139	24674
75-79	1453	937	3332	1421	251	633	722	923	3250	1703	2644	17270
80-84	778	480	2414	997	170	340	447	568	2115	1100	1443	10853
85+	502	376	2247	693	104	232	218	343	1606	879	1028	8229
Total	**103133**	**87095**	**146912**	**73814**	**165378**	**146371**	**153810**	**157432**	**190921**	**150525**	**194695**	**1570085**

2003 females												
Age group	**Athlone**	**Blaauwberg**	**Central**	**Helderberg**	**Khayelitsha**	**Mitchell's Plain**	**Nyanga**	**Oostenberg**	**South Pen**	**Tyg East**	**Tyg west**	**Cape Town**
0	1781	1745	2261	1493	3968	3126	3598	3412	3196	2725	3322	30626
1-4	7581	6482	7680	5418	13258	11847	12621	12997	12247	10426	13037	113593
5-9	8868	7180	8508	6066	15482	13931	13728	14753	14707	12332	15831	131385
10-14	9287	6883	8440	5794	15621	14143	12899	13785	14990	12394	15965	130203
15-19	8907	7089	11555	6079	18390	15102	15834	14319	15073	13546	16857	142750
20-24	8493	8088	16757	6846	20845	14572	20156	14833	15209	14324	16530	156653
25-29	8173	9067	15408	6827	21861	13012	19629	15807	15648	12951	15393	153777
30-34	8311	9115	12586	6129	16220	11402	14301	16288	16681	14014	17322	142371
35-39	8041	7603	10763	5800	13648	10900	11469	14659	16007	13734	16243	128868
40-44	6869	6662	9932	5190	10699	11350	9109	12497	14884	12072	14634	113898
45-49	5958	5173	8748	4280	7667	9844	7286	8804	11708	9062	12108	90638
50-54	5316	4007	7908	3295	4204	7325	4966	6065	10179	7104	10436	70806
55-59	4336	3104	6660	2760	2488	4591	3205	4215	8502	5472	7924	53256
60-64	3864	2402	5169	2373	1911	3131	2512	3125	6844	4143	6811	42285
65-69	3522	1822	4534	1878	983	2098	1777	2131	5999	3184	6103	34033
70-74	2361	1330	3894	1765	512	1134	1271	1455	4791	2309	4256	25077
75-79	1529	989	3401	1411	244	638	754	946	3339	1792	2787	17832
80-84	815	500	2425	1009	180	352	467	583	2156	1143	1499	11128
85+	513	401	2288	681	109	237	223	350	1651	924	1081	8457
Total	**104526**	**89642**	**148917**	**75094**	**168291**	**148736**	**155805**	**161023**	**193812**	**153651**	**198140**	**1597636**

2004 females												
Age group	**Athlone**	**Blaauwberg**	**Central**	**Helderberg**	**Khayelitsha**	**Mitchell's Plain**	**Nyanga**	**Oostenberg**	**South Pen**	**Tyg East**	**Tyg west**	**Cape Town**
0	1786	1769	2290	1531	3944	3156	3622	3481	3220	2764	3334	30899
1-4	7680	6642	7896	5528	13221	12008	12791	13286	12414	10603	13182	115251
5-9	8961	7347	8668	6163	15721	14078	13873	15038	14870	12524	16027	133271
10-14	9269	6879	8391	5795	15770	13930	12777	13782	15005	12337	15811	129746
15-19	8646	6988	11259	5978	18199	14658	15369	14097	14646	13254	16401	139494
20-24	8528	8312	16971	7068	21045	14952	20492	15277	15357	14580	16664	159246
25-29	8151	9222	15568	6841	22295	13325	19903	15968	15582	12935	15230	155020
30-34	8420	9468	12873	6175	16465	11576	14506	16665	16933	14343	17751	145175
35-39	8145	7712	10761	5902	13895	10836	11494	14896	16178	13988	16583	130388
40-44	7011	6911	10017	5405	11100	11544	9273	12991	15328	12499	15093	117171
45-49	6229	5440	8951	4516	8271	10374	7647	9276	12106	9496	12631	94938
50-54	5497	4186	8080	3385	4384	7732	5184	6285	10451	7396	10878	73457
55-59	4519	3359	7035	2882	2591	4904	3376	4488	8998	5824	8385	56361
60-64	3862	2519	5188	2379	1976	3241	2548	3216	6920	4245	6918	43011
65-69	3653	1910	4598	1875	1005	2180	1844	2186	6183	3320	6383	35136
70-74	2452	1379	3909	1755	519	1155	1314	1479	4916	2386	4406	25670
75-79	1604	1041	3463	1399	236	641	785	968	3420	1880	2927	18364
80-84	852	521	2435	1022	190	363	487	597	2197	1185	1554	11403
85+	524	428	2331	670	114	242	227	358	1697	972	1136	8698
Total	**105785**	**92033**	**150684**	**76268**	**170942**	**150894**	**157513**	**164333**	**196421**	**156531**	**201294**	**1622700**

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REPORT 2

Report on cause of death and premature mortality in the Boland-Overberg Region 2004-2005

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April 2007

Abstract

This report covers detailed cause of death data for the Boland Overberg region for the period 2004 and 2005 Mortality reports published by Statistics South Africa are not released below a national level. The information in this report has been collected directly from the offices of the Department of Home Affairs and supplemented by information collected from local mortuaries. The cause of death coding has been done by project staff.

Deaths are analysed by age, cause and gender. Premature mortality and age standardized rates are also calculated.. Data for broad cause groups is presented by sub district. Up to date population estimates for the area are also calculated

Approximately 40% of all premature mortality in the region is due to homicide, tuberculosis, HIV/AIDS and road traffic accidents, all of which are preventable through a comprehensive primary health care approach which emphasizes promotive and preventative strategies, uses intersectoral collaboration effectively and seeks to promote equity

Copies of this report can be obtained from Wilna van der Merwe at wvdmerwe@pgwc.gov.za

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Introduction

Timeous and accurate cause of death statistics are essential for planning and monitoring health services and responding to the health needs of the population. Such information is requinred for the process of prioritisation of not only health services, programmes and research, but also for guiding the priorities in other sectors. In particular, sub-population data are needed to identify and monitor inequalities in health status. While policy is directed from a national perspective, provincial and local governments are required to respond to the specific needs of their communities.

The Boland Overberg Region implemented a system for collecting mortality information from the Department of Home Affairs and local mortuaries in January 2004, using a system similar to that used in Cape Town. A mortality report for 2004 was produced in 2005[1] and is available online from www.mrc.ac.za/bod/bod.htm. This data, for the first time, provided a profile of the causes of death experienced in the health districts of the Boland Overberg Region. Similar to national experience,[2] a substantial impact of HIV/AIDS was observed, as well as a combination of infectious diseases, child mortality, and degenerative chronic diseases. A marked injury burden was also observed in these districts.

National vital statistics data have been reported up to the year 2004.[3] However, these are not available at geographical areas lower than provincial level, making it difficult for local health authorities to plan health services and identify major health problems. The Boland Overberg Region therefore implemented the mortality surveillance system that runs in Cape Town. After a review of the quality of the cause-of-death coding in Cape Town in the year 2000, a shortlist which met the public-health needs was implemented to improve the standardisation of coding between the municipalities.[4] The key findings from the analysis of the cause of death statistics for Cape Town in 2001 were presented in a previous report,[5] which can be downloaded from www.mrc.ac.za/bod/bod.htm.

Data collected for 2004 and 2005 are presented in this report. As part of the Western Cape provincial project to reduce the burden of disease, efforts continue in making the information more useful for monitoring programmes in the area, as well as identifying new priorities. The report can be downloaded from www.mrc.ac.za/bod/bod.htm.

Methods and data quality

The Boland Overberg Region implemented a system for routinely compiling death statistics in January 2004. Local health authorities collect copies of death certificates from the Department of Home Affairs. The underlying cause of death is coded using a shortlist based on ICD-10[4], captured and processed by the local municipalities. The shortlist is adapted from the Cape Town list, which is based upon the most prevalent diseases in the area, as well as those of public-health importance. The list includes selected combinations of diseases such as HIV and TB, which are difficult to attribute to a single cause. The aim of the shortlist is to simplify the task of coding as well as to enable more detailed analysis of such data.

The mortality data for 2004-2005 were obtained electronically from the Information Management Section of the Boland Overberg Regional Health office in Worcester. The data were cleaned and analysed using Microsoft Excel and Stata. Stillbirths were excluded prior to any analysis. There were four deaths that were recorded, owing to exposure to fire (burning shacks), where the gender of the victims was unknown. These four deaths were then divided arbitrarily and equally among males and females. There were no duplicates and no invalid COD for age. The data are presented for the Boland Overberg Region, which includes the eastern half of the Cape Winelands District (called "Boland" in this report) and the Overberg District municipalities, and for each of the seven sub-districts within the Boland Overberg Region. Drakenstein and Stellenbosch are excluded, since the management of these municipalities has yet to be incorporated within the functions of the Boland Overberg Region.

After cleaning the data, the shortlist cause of death codes were aggregated according to the burden of disease classification.[6] These are categorized into three broad groups:

> **Group I** consists of the pre-transitional causes: communicable diseases, maternal causes, peri-natal conditions, and nutritional deficiencies. (HIV/AIDS is considered part of Group I, but is kept separate in the South African National Burden of Disease analysis, owing to the size of the burden that it contributes in South Africa.)
> **Group II** consists of the non-communicable causes, such as stroke and chronic obstructive pulmonary disease.
> **Group III** consists of the injuries, including both intentional and unintentional.

Since the ill-defined categories of death do not provide information with regard to the underlying causes of death, they have been reallocated to the specified causes, in line with the burden-of-disease methodology for estimation. The deaths with unknown ages were redistributed

proportionally by age and sex for each cause of death. The ill-defined cardiovascular deaths (heart failure) were redistributed proportionately by age and sex across rheumatic heart disease, ischaemic heart diseases, hypertensive heart diseases, pulmonary heart diseases and other cardiovascular diseases. The ill-defined respiratory deaths (respiratory failure) were redistributed proportionally by age and sex across chronic obstructive pulmonary disease, asthma and other respiratory diseases. The deaths coded to ill-defined natural causes were redistributed proportionally by age and sex across all pre-transitional and non-communicable causes. The undetermined injury deaths were redistributed proportionally by age and sex across all intentional and unintentional causes.

All cause and cause-specific, age-standardised mortality and premature mortality rates were calculated for the region as a whole and by sub-district. Population estimates for the Boland Overberg Region and sub-districts were obtained from the Provincial Health Information Directorate (Eugene Reynolds, pers. comm.). These estimates are based upon Census 2001 with population projections based upon Stats SA official growth rate until 2005 (see Appendices 1-3). The WHO world-standard population was used for direct-age standardisation.[7] Confidence intervals for age standardised mortality rates were calculated using a Poisson approximation method, described by Boyle and Parkin.[8]

No adjustments have been made for under-registration of deaths. While most of the deaths are considered to be registered, there are some concerns about the completeness of the data, particularly for Overstrand in 2004 and Theewaterskloof in 2005. When compared with data from the population register, it was noted that - in Overstrand - many of the death certificates for unnatural deaths were missed by the routine surveillance system operating through Home Affairs. We subsequently compared the mortuary register with the surveillance database and collected any missing deaths from the register. We have no further information on the completeness of natural deaths. In 2005 there was a problem getting death certificates photocopied at the Caledon Home Affairs office and a number of death certificates were lost before another system was implemented. This appears to have affected Theewaterskloof particularly, see Table 1 below.

Table 1: Number of deaths by sub-district, Boland Overberg Region, 2004 and 2005

Sub-district	2004	2005	% increase
Breede River winelands	675	744	10.2
Breede Valley	1253	1292	3.1
Witzenberg	713	803	12.6
Cape Agulhas	215	238	10.7
Overstrand	370	426	15.1
Swellendam	225	243	8.0
Theewaterskloof	780	557	-28.6
Total	4231	4303	1.7

When compared with the registered Home Affairs deaths at the Worcester and Caledon offices, the completeness is in excess of 100% as shown in Appendix 2. However, it is important to bear in mind that Home Affairs only registered deaths for people with identity numbers, whereas the mortality surveillance system records all deaths.

Overview of mortality in Boland Overberg

There were 4303 deaths in 2005 that were analysed. The majority of deaths (47.2%) are due to non-communicable diseases, with pre-transitional diseases accounting for 25.6% and injuries for 15.4%. deaths due to ill-defined causes account for 11.8%.

Boland has a larger proportion of deaths due to pre-transitional causes (28%) than Overberg (21%) and a lower proportion of non-communicable diseases (43.8 vs 53.8%). This is explained by the difference in age structure of the populations between the districts. Boland has a young population typical of a developing country while Overberg has an ageing population more likely to be affected by non-communicable diseases.

The age pattern of deaths for the Boland Overberg is shown in Figures 1 and 2 on page 6 of this report. There are large differences between males and females with young adult males experiencing much larger numbers of deaths than females, mainly due to injuries. HIV/AIDS accounts for a large proportion of deaths in young women. Deaths at older ages are mainly due to non-communicable diseases.

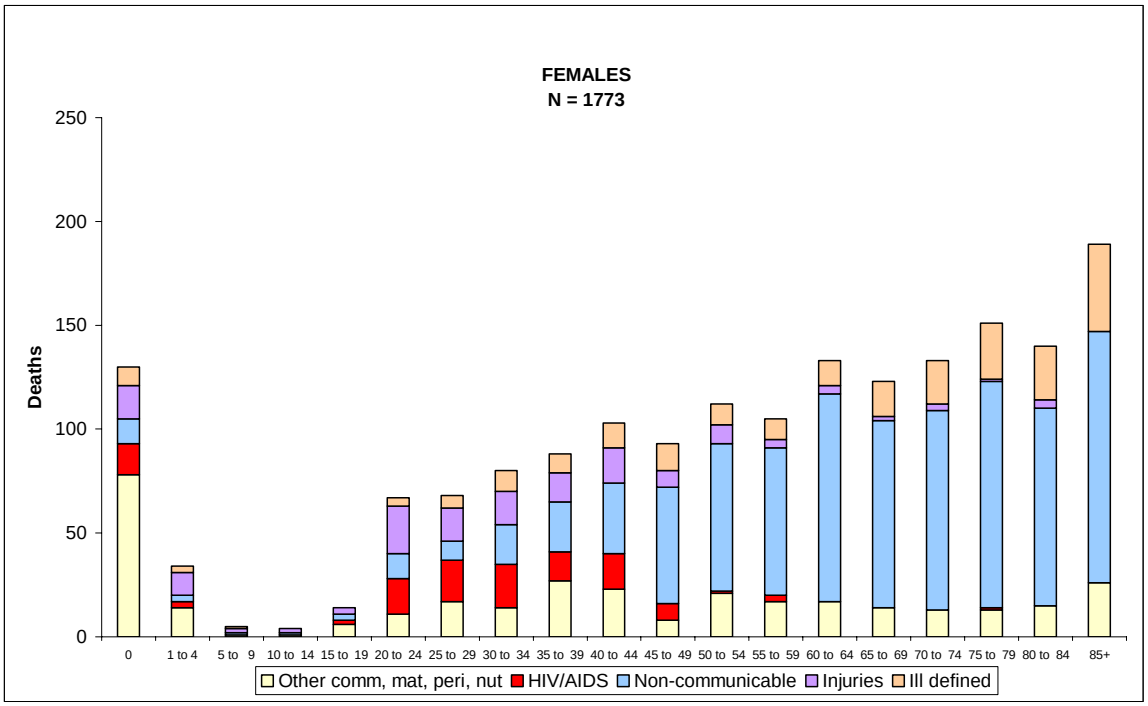


Figure 1: Age distribution of deaths by cause group and gender: Females, Boland Overberg Region, 2005

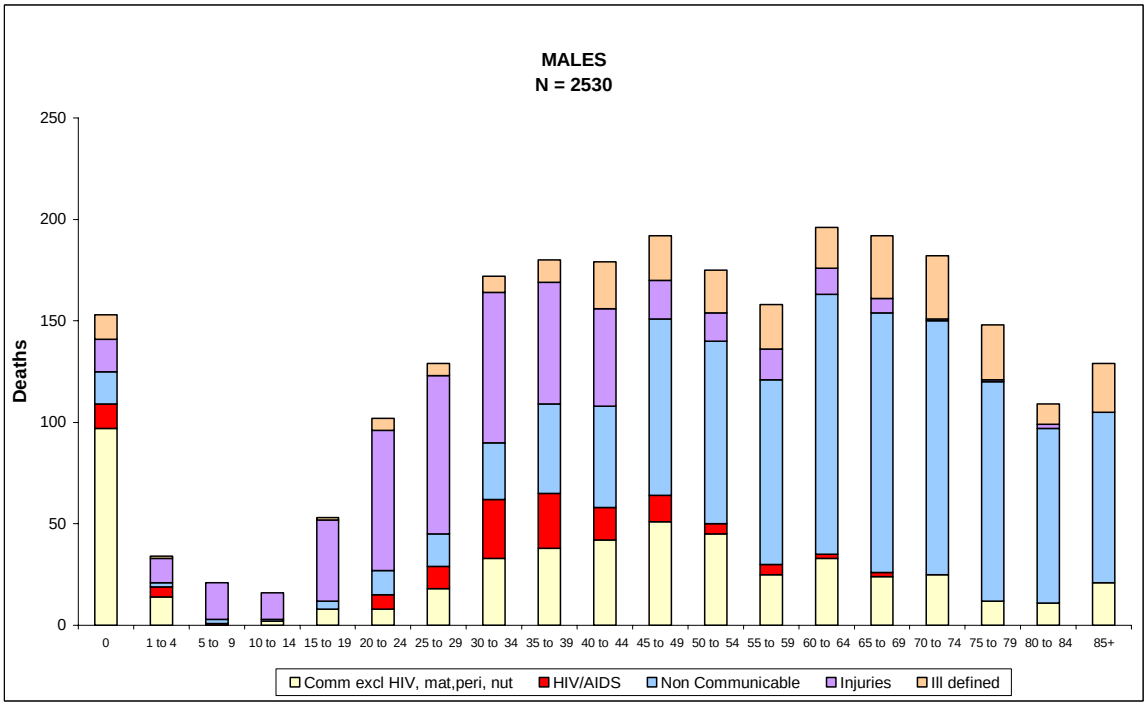


Figure 2: Age distribution of deaths by cause group and gender: Males, Boland Overberg Region, 2005

The age-standardised rates by broad cause group for males and females for 2004 and 2005 are set out in Table 2 below. Age standardisation is a technique which eliminates differences in observed mortality rates caused by differences in the age structure of the population in different areas, rather than by differences in the force of the underlying mortality. Overall the rates have increased slightly for males, mainly due to an increase in death rates due to Group I and Group II conditions. There has been a marked decrease in death rates due to injuries between 2004 and 2005. Overall, the rates for women have remained fairly consistent.

Table 2: Age-standardised mortality rate (per 100 000) by broad cause group by gender, for Boland Overberg Region, 2004 and 2005

Broad cause groups	Males		Females		Persons	
	2004	2005	2004	2005	2004	2005
Communicable diseases excl HIV, maternal, perinatal, nutritional	235	253	143	150	187	199
HIV	52	55	50	47	51	51
Non communicable	682	712	490	496	578	593
Injuries	211	178	66	56	137	117
All causes	1179	1198	749	749	953	960

The leading causes of premature mortality for 2004 and 2005 are shown in Figure 3. The top four causes of death have remained the same between 2004 and 2005, but the ranking has changed. Tuberculosis has become the leading cause of premature mortality in 2005 after ranking second to homicide in 2004. Homicide now ranks third after HIV/AIDS, with road traffic accidents ranking fourth. These top four conditions account for 40% of the premature mortality in the region. Premature mortality has been estimated using the standard Global Burden of Disease (GBD) approach to calculate years of life lost (YLLs). Age weighting, time discounting of 3% per annum and standard life expectancies based on the West model levels 25 and 26 (considered to a maximum life expectancy) have been used. The younger the age of death, the greater the years of life lost[6].

Males and females have different cause of death profiles, according to Figure 4 on page 9. Tuberculosis, homicide, HIV/AIDS and road traffic accidents are the leading causes of premature mortality among men. HIV/AIDS is the leading cause among women, followed by tuberculosis, lower respiratory infection, and homicide.

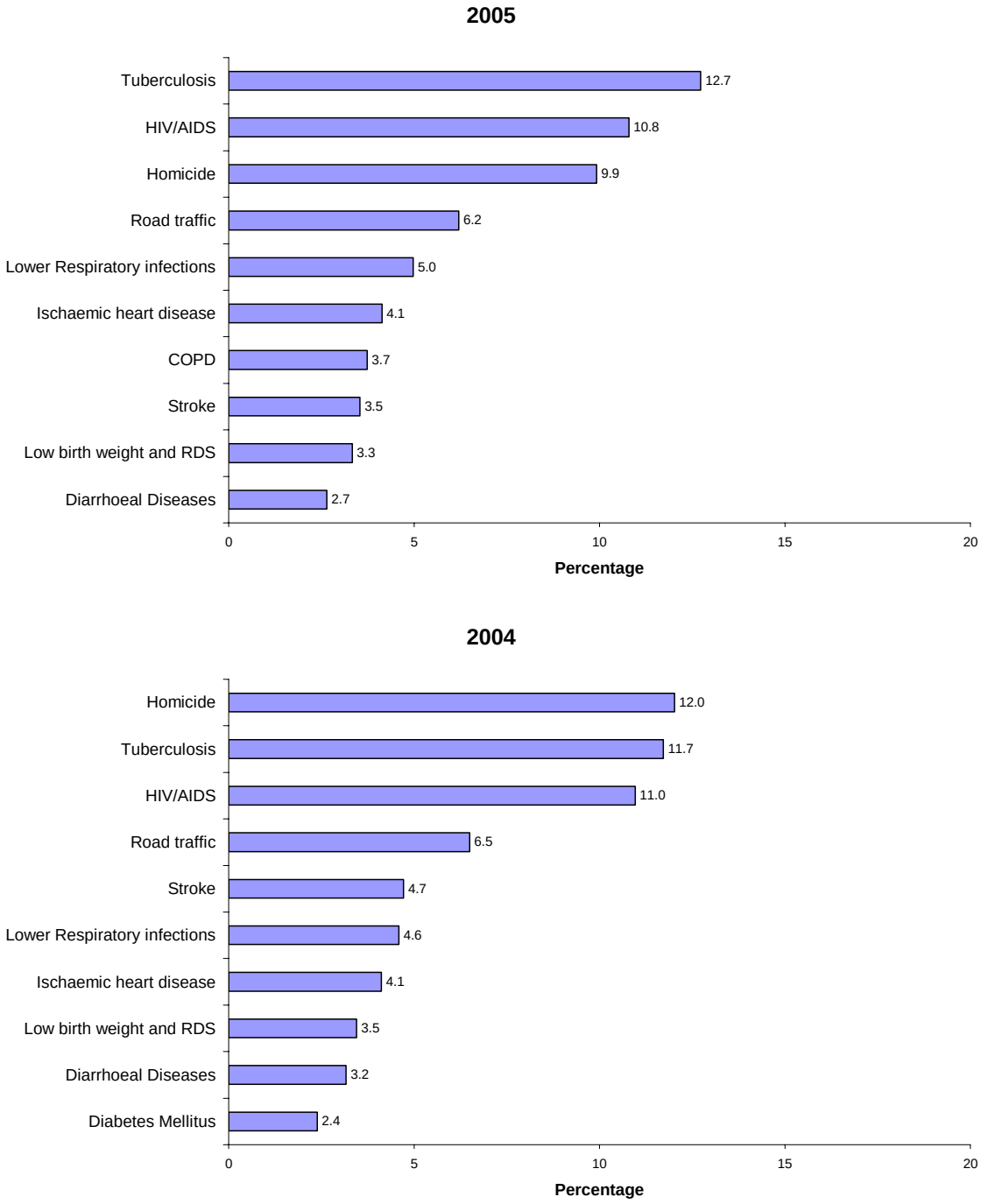


Figure 3: Top ten causes of premature mortality (YLLs) for Boland Overberg Region, 2004 and 2005

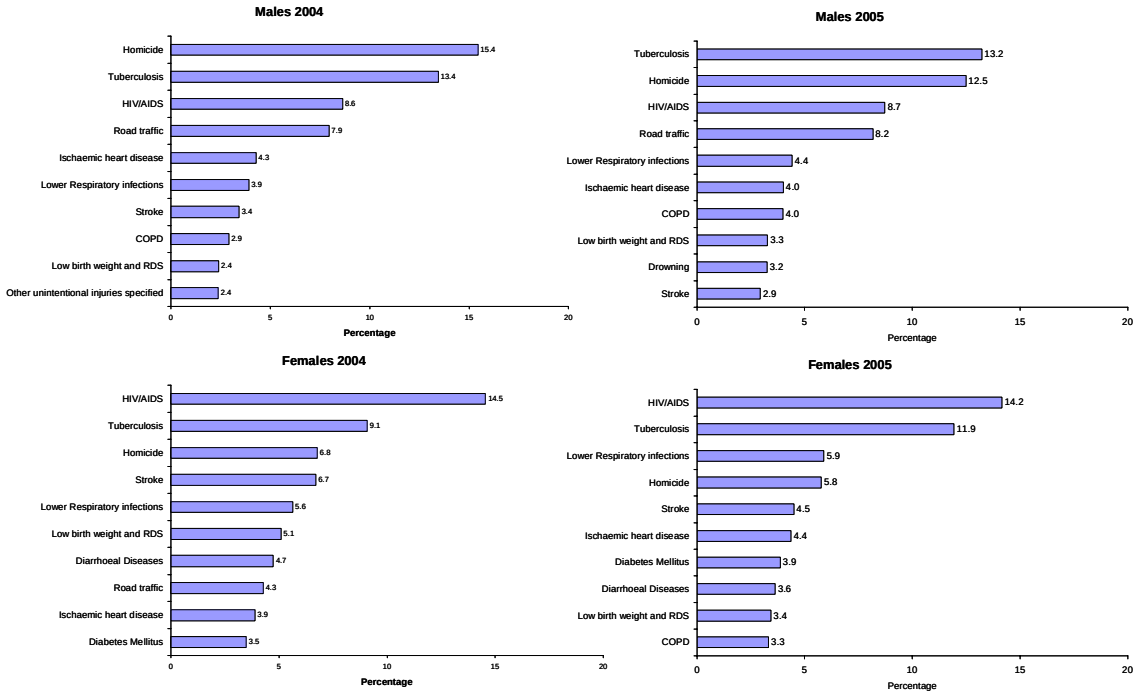


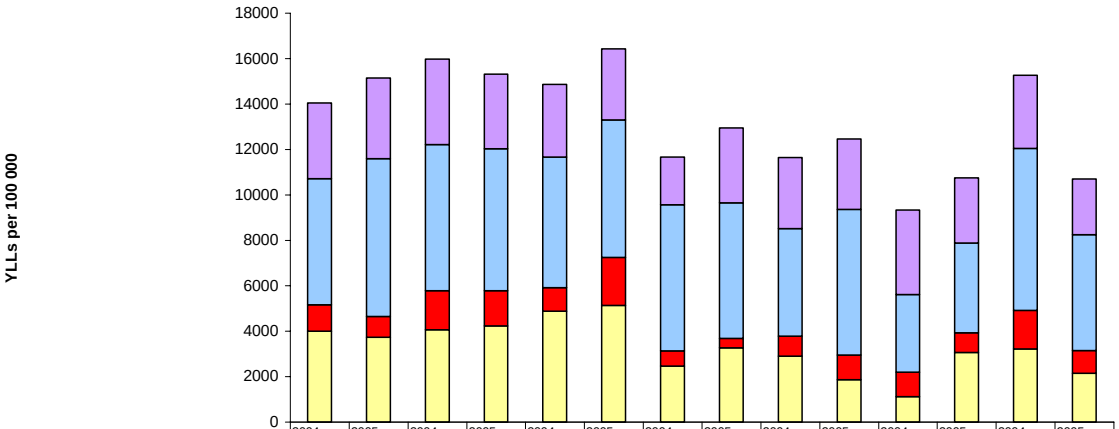
Figure 4: Top ten causes of premature mortality (YLLs) by gender, Boland Overberg Region, 2004 and 2005

The top ten causes of premature mortality for each sub-district are shown in Table 3. Tuberculosis is the leading cause of premature mortality in the Breede Valley and Witzenberg, followed by HIV/AIDS, while homicide is the leading cause in the Breede River Winelands, followed by tuberculosis. Tuberculosis is the leading cause of premature mortality in Cape Agulhas and Overstrand, while HIV/AIDs is the leading cause of premature mortality, followed by homicide, in Swellendam and Theewaterskloof.

The age-standardised premature mortality rate by cause group and HIV/AIDS are shown in Figure 4 by sub-district, for the years 2004 and 2005. Premature mortality is highest in Witzenberg, Breede Valley and Breede River. Of concern is the rapid increase in premature mortality rates in Witzenberg between 2004 and 2005, mainly due to increased mortality due to HIV/AIDS and TB. The increase in premature mortality in Overstrand and the drop in Theewaterskloof in 2005 is probably due to incomplete data rather than a real change in mortality.

Table 3: Top ten causes of premature mortality (YLLs) for Boland Overberg and by sub-districts, 2005

Rank	CAPE WINELANDS EAST	Breede River	Breede Valley	Witzenberg	OVERBERG	Cape Agulhas	Overstrand	Swellendam	Theewaterskloof	BOLAND OVERBERG
1	Tuberculosis (14.1%)	Homicide (10.2%)	Tuberculosis (14.9%)	Tuberculosis (16.3%)	Tuberculosis (10.2%)	Tuberculosis (14.7%)	Tuberculosis (11.34%)	HIV/AIDS (9.5%)	HIV/AIDS (11.1%)	Tuberculosis (12.7%)
2	HIV/AIDS (11.8%)	Tuberculosis (8.9%)	HIV/AIDS (11.5%)	HIV/AIDS (15.4%)	Homicide (9.3%)	Homicide (9.3%)	HIV/AIDS (8.09%)	Homicide (8.3%)	Homicide (10.9%)	HIV/AIDS (10.8%)
3	Homicide (10.2%)	HIV/AIDS (6.9%)	Homicide (9.8%)	Homicide (10.8%)	HIV/AIDS (8.8%)	Road Traffic (6.4%)	Homicide (7.5%)	Tuberculosis (7.7%)	Tuberculosis (9.5%)	Homicide (9.9%)
4	Road traffic (5.9%)	Pneumonia (6.2%)	Road traffic (6.9%)	Road traffic (5.0%)	Road traffic (6.9%)	Ischaemic heart disease (4.9%)	Pneumonia (6.8%)	Ischaemic heart disease (7.3%)	Road traffic (7.6%)	Road traffic (6.2%)
5	Pneumonia (5.03%)	Road traffic (4.9%)	Pneumonia (4.7%)	Pneumonia (4.6%)	Ischaemic heart disease (4.9%)	Stroke (4.8%)	Road traffic (6.3%)	Stroke (6.6%)	Pneumonia (4.4%)	Pneumonia (4.9%)
6	COPD (3.8%)	Ischaemic heart disease (4.8%)	COPD (4.2%)	Ischaemic heart disease (3.9%)	Pneumonia (4.8%)	Suicide (4.2%)	Fires (4.9%)	Drowning (5.9%)	Ischaemic heart disease (4.2%)	Ischaemic heart disease (4.1%)
7	Ischaemic heart disease (3.7%)	Low birth weight & RDS (4.4%)	Stroke (3.9%)	Low birth weight (3.9%)	Stroke (4.1%)	Pneumonia (3.5%)	Ischaemic heart disease (4.9%)	Road Traffic (5.8%)	COPD (3.8%)	COPD (3.7%)
8	Low birth weight & RDS (3.7%)	Diarrhoea (3.7%)	Ischaemic heart disease (3.4%)	Diarrhoea (3.6%)	COPD (3.0%)	HIV/AIDS (3.1%)	Low birth weight & RDS (3.6%)	Diabetes mellitus (3.6%)	Stroke (3.6%)	Stroke (3.5%)
9	Stroke (3.3%)	COPD (3.5%)	Low birth weight & RDS (3.2%)	COPD (3.2%)	Drowning (2.9%)	Low birth weight & RDS (2.8%)	Suicide (3.2%)	Pneumonia (3.2%)	Drowning (3.0%)	Low birth weight & RDS (3.2%)
10	Diarrhoea (3.2%)	Lung cancer (3.5%)	Diabetes mellitus (2..8%)	Stroke (2.5%)	Suicide (2.9%)	Cot death (2.8%)	Stroke (3.2%)	Hypertensive disease (3.2%)	Low birth weight & RDS (2.7%)	Diarrhoea (2.7%)



	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
	Breede River		Breede valley		Witzenberg		Cape Agulhas		Swellendam		Overstrand		Theewaterskloof	
III. Injuries	3327.4	3536.1	3760.7	3273.0	3209.3	3134.4	2084.3	3304.2	3149.2	3097.9	3721.0	2867.4	3212.9	2447.4
II. Non-communicable diseases	5548.5	6949.8	6432.3	6260.1	5754.2	6045.1	6445.8	5973.9	4730.8	6420.6	3425.5	3943.7	7137.3	5099.4
HIV/AIDS	1171.7	920.5	1725.4	1542.6	1033.1	2122.1	669.7	420.6	873.9	1082.6	1076.6	865.4	1699.2	998.0
I. Other comm, mat, peri and nutri conditions	4001.0	3736.0	4064.6	4235.7	4875.7	5125.3	2459.4	3258.9	2904.2	1863.9	1116.0	3067.4	3210.6	2152.0

Figure 5: YLLs per 100 000 by cause group and HIV/AIDS for Boland Overberg Region and by sub-districts, 2004 and 2005

Age-standardised death rates by sub-district for the three broad cause groups and HIV, for 2004 and 2005, are shown in Figure 6. In contrast to all other sub-districts, there is a significant rise in mortality due to HIV between 2004 and 2005 in Witzenberg which is likely to be a real increase. The significant drop in death rates noted for all causes, except injuries, in Theewaterskloof, however, are likely to be due to missing data. Data collection at mortuaries was close to complete for both years so, unless unnatural deaths from Theewaterskloof were sent to mortuaries other than Worcester and Hermanus, this is likely to be a real decrease.

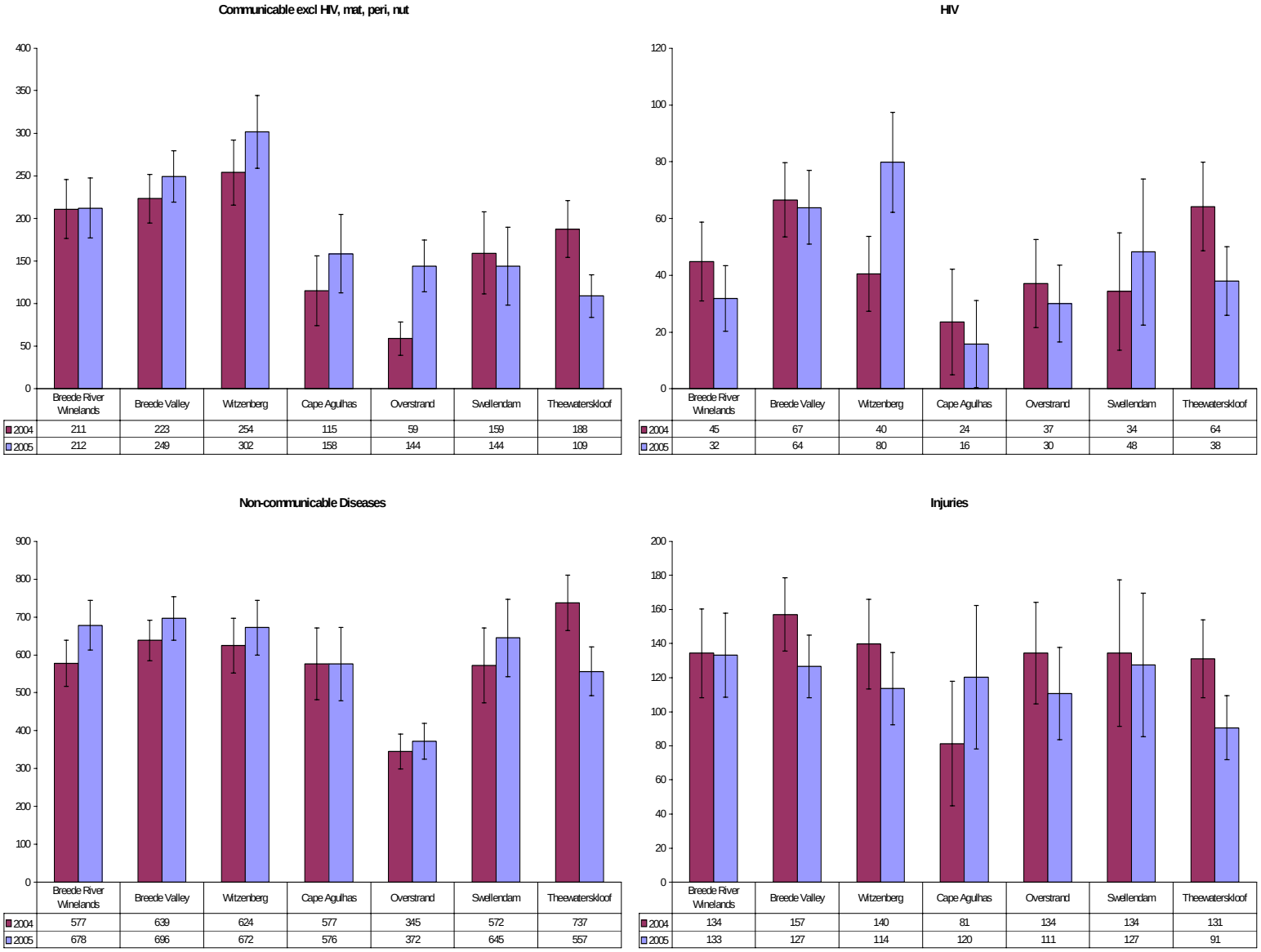


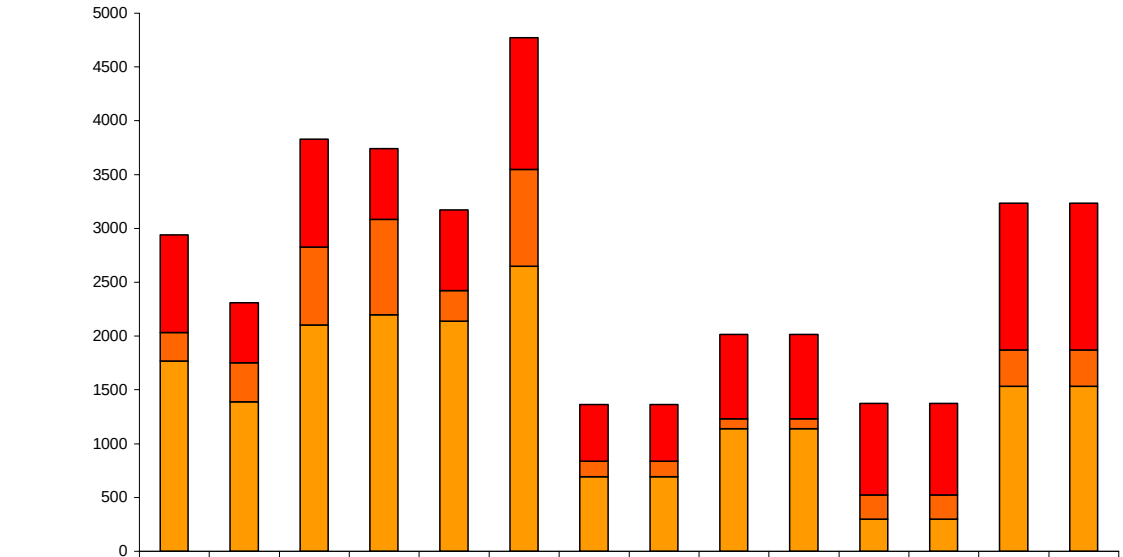
Figure 6: Age-standardised premature mortality (YLL) rates for TB, HIV+TB and HIV for individuals by district, Boland Overberg Region, 2004 and 2005

Important conditions

HIV and TB

Tuberculosis is the leading cause of death in the Boland Overberg Region. Because of the increased susceptibility of HIV-positive people to tuberculosis disease and mortality, it is even more important that the HIV/AIDS epidemic is controlled in this area, which has very high tuberculosis incidence rates. Tuberculosis cure rates are particularly poor in Witzenberg (63%), where HIV/AIDS prevalence has reached levels similar to those in the Eastern Cape in some populations. This is probably an important reason for the high levels of tuberculosis and HIV/AIDS premature mortality experienced in this sub-district (see Figure 6). There has been a significant increase in age-standardised mortality rates due to HIV/AIDS in Witzenberg between 2004 and 2005: from 40 per 100 000 (95% CI: 27; 53) to 80 per 100 000 (95% CI: 62; 98). (See Figure 5.) The mortality rate due to tuberculosis increased over this period from 101 per 100 000 to 147 per 100 000, but this difference was not significant. It is possible that the TB and HIV premature mortality rates for Theewaterskloof in 2005 are falsely low, in view of the missing data mentioned above. In accordance with ICD 10 guidelines[9], HIV/AIDS was selected as the underlying causes when both tuberculosis and HIV/AIDS appeared on the death certificate.

The age-specific HIV and TB deaths rates for males and females are shown in Figure 7 below. While the HIV peak for women decreased between 2004 and 2005, it has increased slightly for men in the same period.



	2004.0	2005.0	2004.0	2005.0	2004.0	2005.0	2004.0	2005.0	2004.0	2005.0	2004.0	2005.0	2004.0	2005.0
	Breede River		Breede Valley		Witzenberg		Cape Agulhas		Swellendam		Overstrand		Theewaterskloof	
HIV/AIDS excl TB	905.5	560.3	1002.6	657.2	749.1	1221.8	527.1	527.1	784.6	784.6	853.1	853.1	1361.4	1361.4
HIV/AIDS + TB	266.3	360.2	722.8	885.4	283.9	900.3	142.6	142.6	89.4	89.4	223.5	223.5	337.8	337.8
Tuberculosis	1767.1	1389.6	2104.4	2197.2	2137.6	2648.9	694.0	694.0	1140.0	1140.0	298.8	298.8	1534.0	1534.0

Figure 7: Age-standardised premature mortality (YLL) rate for TB, HIV+TB and HIV for individuals by district, Boland Overberg Region, 2004 and 2005

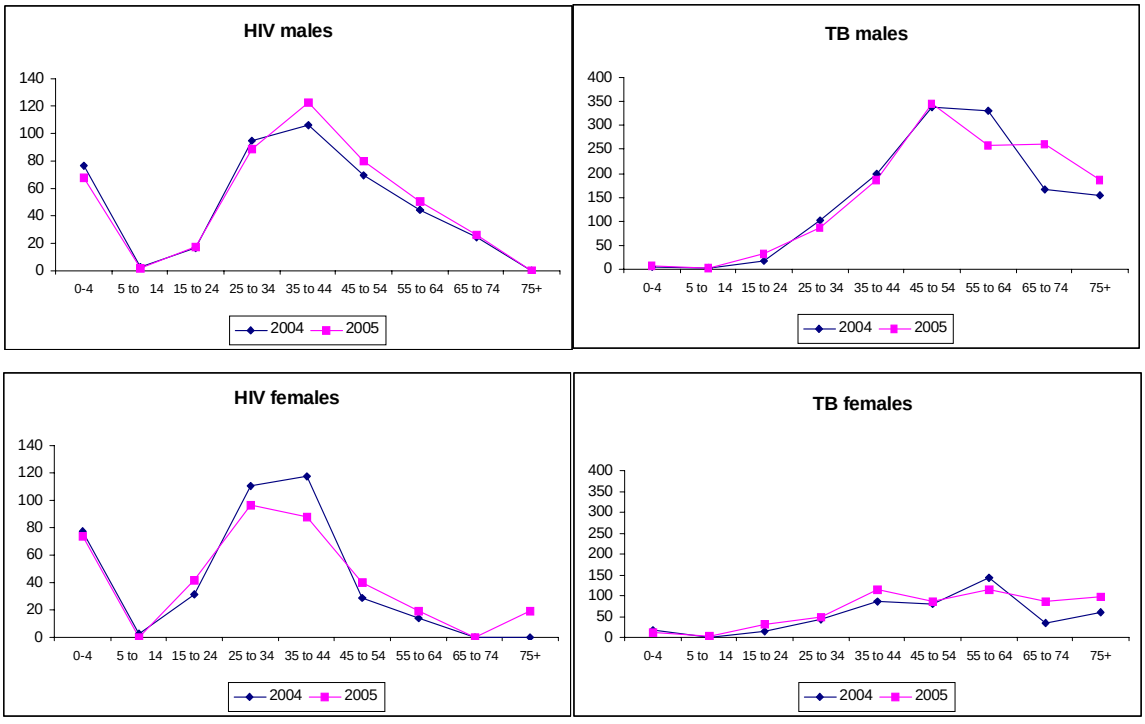
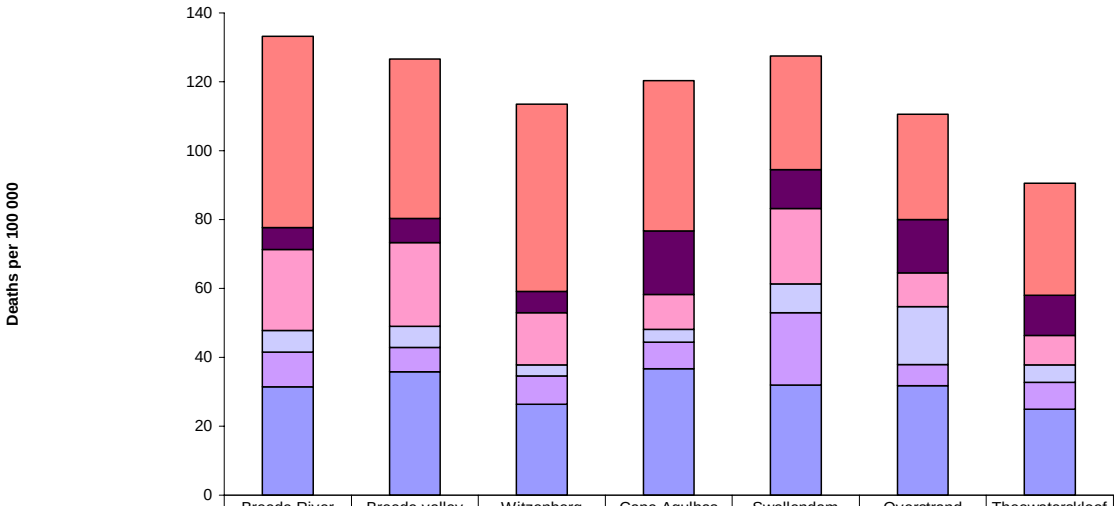


Figure 7A: Age-specific death rates for HIV and TB by gender, Boland Overberg Region, 2004 and 2005

Injuries

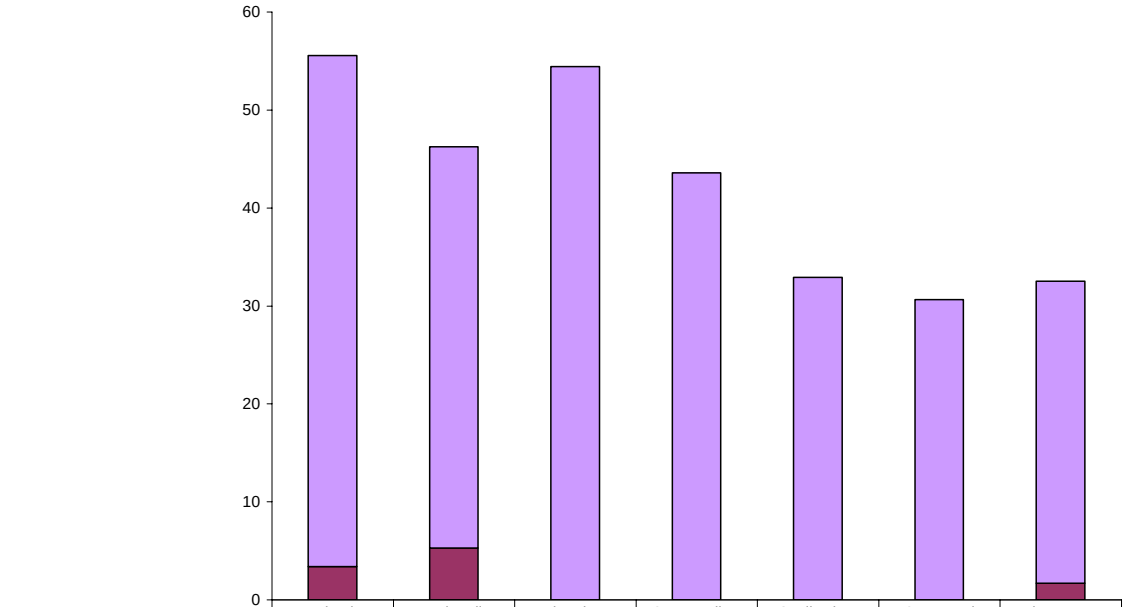
Injuries account for about 15 % of deaths in the Boland Overberg with homicide and road traffic injuries ranking among the top four leading causes of death. Overall, injury age-standardised mortality rates decreased from 137.1 per 100 000 (95% CI: 127 – 147) to 117.0 per 100 000 (95% CI: 112 – 126) in the Boland Overberg Region between 2004 and 2005. This decrease just reached statistical significance. There are slight variations in the age-standardized death rates for injuries among sub-districts, with Breede River having the highest rates and Theewaterskloof the lowest (see Figure 8). Although these differences are not significant, they are based on small numbers and should therefore be interpreted with caution, particularly for Cape Agulhas and Swellendam.



	Breede River	Breede valley	Witzenberg	Cape Agulhas	Swellendam	Overstrand	Theewaterskloof
Homicide	55.57	46.26	54.42	43.59	32.91	30.63	32.52
Suicide and self-inflicted	6.30	7.10	6.19	18.43	11.34	15.40	11.66
Other unintent	23.50	24.28	15.09	10.10	21.92	9.82	8.59
Fires	6.30	6.10	3.27	3.75	8.29	16.81	5.00
Drowning	10.11	7.06	8.17	7.67	20.99	6.19	7.83
Road traffic	31.45	35.83	26.41	36.76	31.99	31.73	24.96

Figure 8: Age standardised death rates due to injuries by district, Boland Overberg Region, 2005

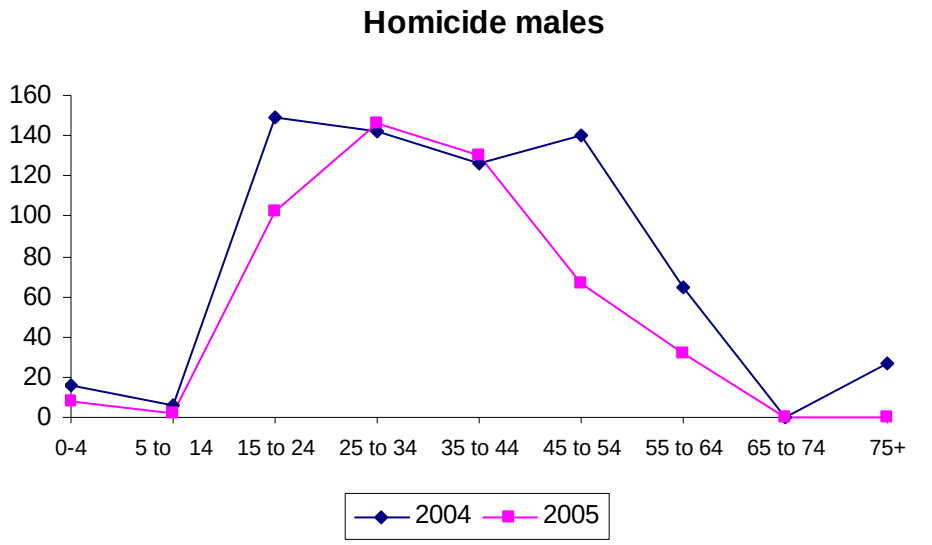
The age-standardised rates for homicide dropped from 56 per 100 000 to 44 per 100 000 between 2004 and 2005, mainly due to a large drop in homicide rates among males (89 to 69 per 100 000). The rates for females fell slightly from 24 per 100 000 to 19 per 100 000. The homicide rates for males are similar to those in Cape Town (91 per 100 000), but the rates for females are double those in Cape Town (12.2 per 100 000)[10]. Age-standardised homicide rates are highest in Breede River and Witzenberg, and lowest in Theewaterskloof (see Figure 9). A low proportion of homicides in the Boland Overberg involve the use of a firearm, which is in sharp contrast with Cape Town, where about 40% of homicides involve the use of a firearm.



	Breede River	Breede valley	Witzenberg	Cape Agulhas	Swellendam	Overstrand	Theewaters
Homicide and violence without firearm	52.16	40.95	54.42	43.59	32.91	30.63	30.84
Homicide and violence with firearm	3.42	5.31	0.00	0.00	0.00	0.00	1.68

Figure 9: Age-standardised death rates due to homicide by district, Boland Overberg Region, 2005

Homicide dropped in the ranking from the first to the third leading cause of death in the Boland Overberg Region during this period. The age-specific death rates for homicide by gender, between 2004 and 2005 are shown in Figure 10 below. There is a marked gender differential, with males having rates three times as high as females. Nevertheless, there has been a marked decrease in the homicide rates among males between 15 and 24 years, and between those between 45 and 64 years. In females, the decrease is noted in the 35 to 44-year age group.



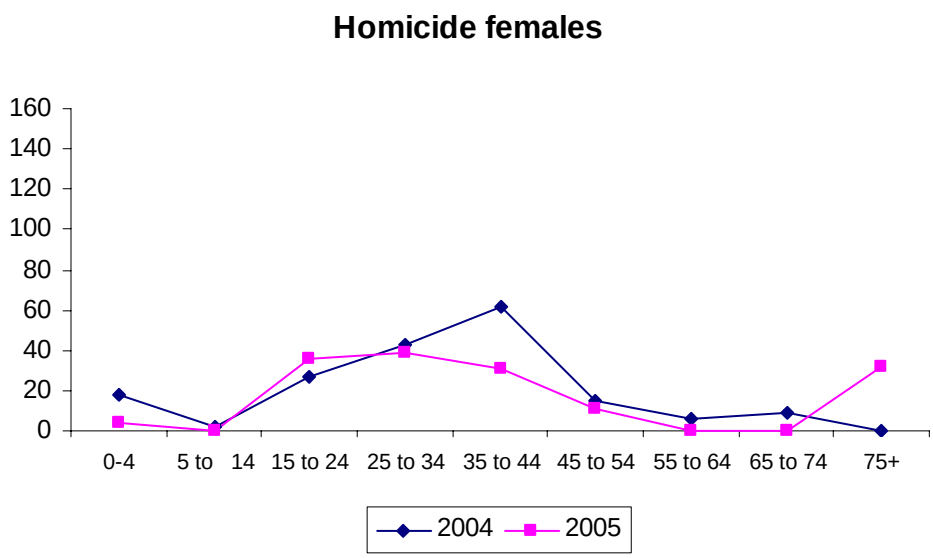


Figure 10: Age specific homicide death rates by gender, Boland Overberg Region, 2004 – 2005

The age-standardised death rates due to road traffic accidents decreased slightly from 33.4 to 31.4 per 100 000, in the Boland Overberg between 2004 and 2005. There are slight variations in age standardised death rates due to road traffic accidents between sub-districts (see Figure 11 below). These rates, however, are based upon small numbers and should be treated with caution. Road traffic accidents rank fourth in the leading causes of death.

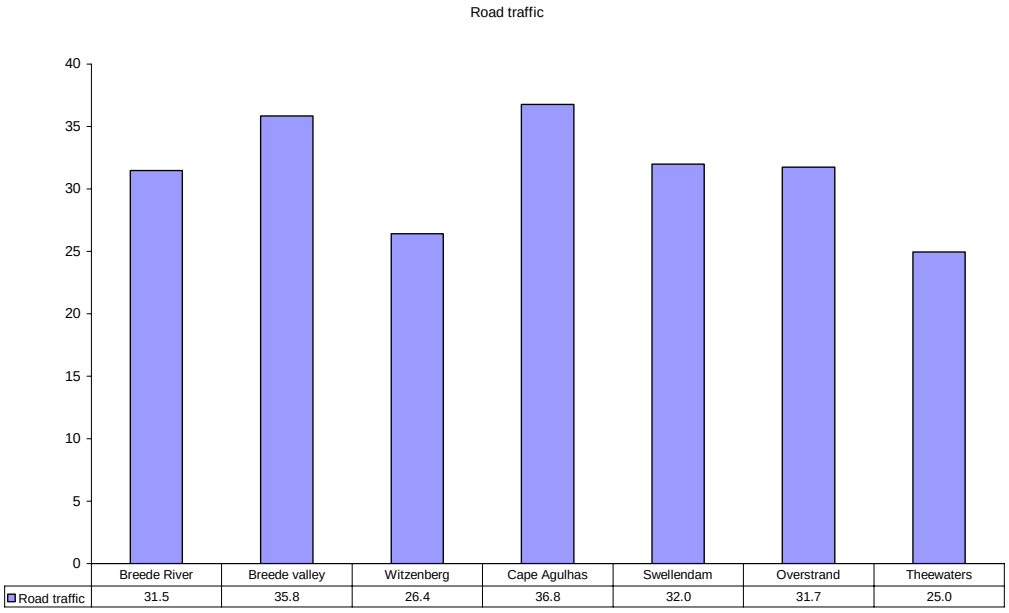


Figure 11: Age-standardised death rates due to road traffic accidents by sub-district, Boland Overberg Region, 2005

The age-specific road-traffic death rates by gender are set out in Figure 12 below. Again the rates for males are more than double those for females.

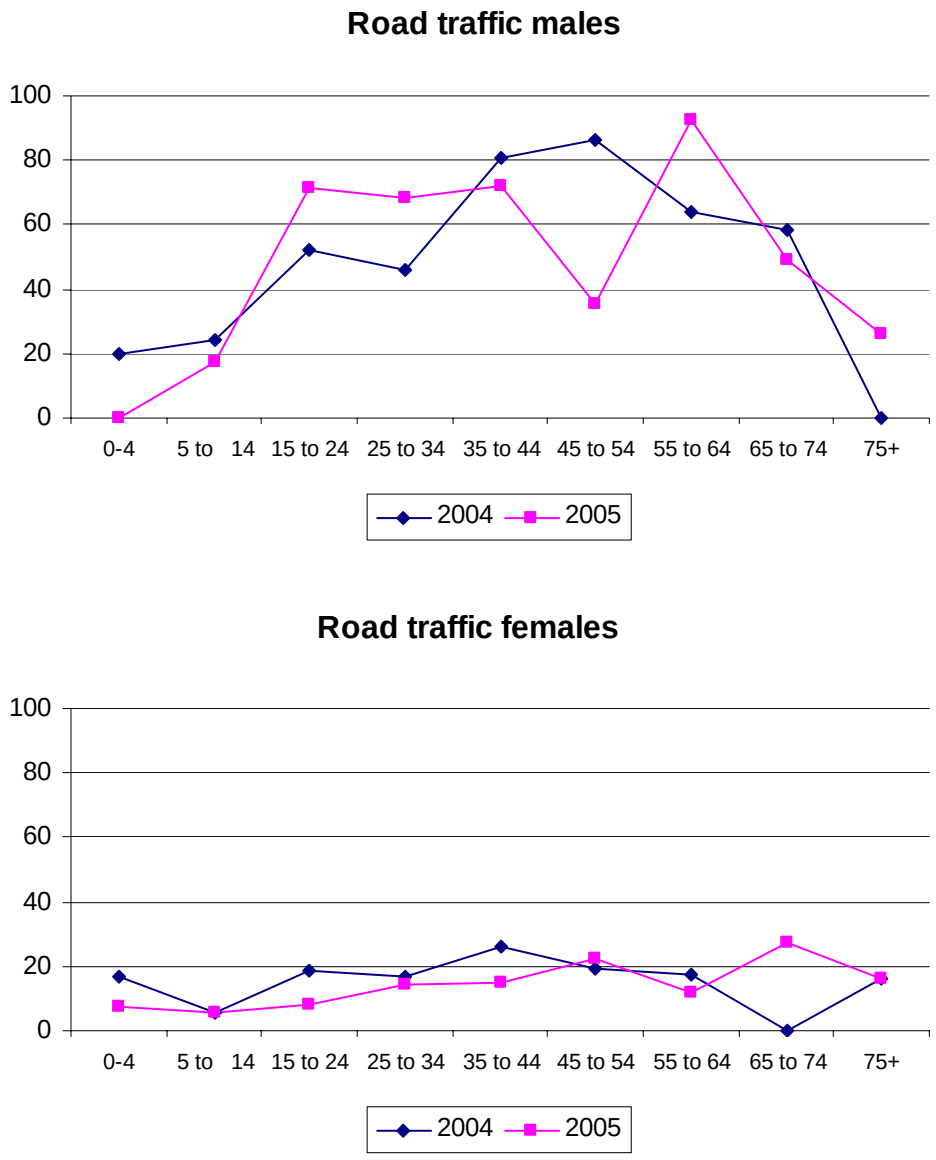
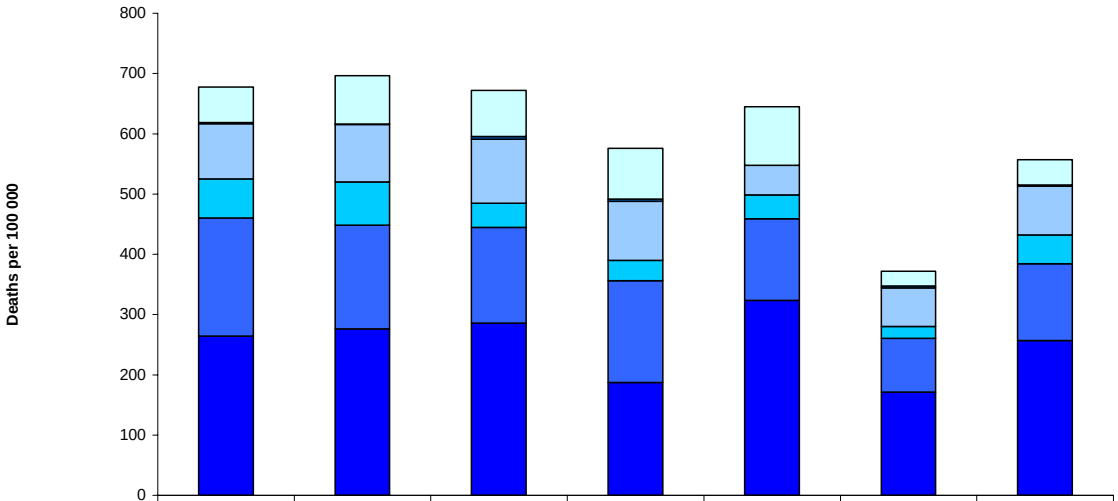


Figure 12: Age specific road traffic accident death rates by gender, Boland Overberg Region, 2004 and 2005

Non-communicable diseases

Non-communicable diseases account for a large proportion (55%) of deaths in the Boland Overberg Region, with cardiovascular conditions accounting for the majority of these. The age-standardised death rates for non-communicable diseases by sub-district for 2005 are shown in Figure 13. These are based upon small numbers, however, and should therefore be interpreted with caution. It is not clear why the rates for Overstrand are so much lower than the other sub-districts. We suspect that data is missing for Theewaterskloof, so these rates should also be interpreted with caution. Overall, the rates for non-communicable diseases are similar to those found in Cape Town. Yet, while cardiovascular and cancer mortality rates are similar, diabetes mortality rates are lower than in Cape Town, and mortality due to respiratory conditions is higher.



	Breede River	Breede valley	Witzenberg	Cape Agulhas	Swellendam	Overstrand	Theewaters
Other	59.4	80.1	77.1	84.7	97.2	24.3	41.8
Congenital	1.3	1.2	3.8	3.7	0.0	3.5	1.9
Respiratory	91.7	95.0	106.2	97.4	48.7	63.8	81.2
Diabetes	64.7	71.8	40.3	34.3	39.9	19.5	48.0
Neoplasms	196.1	171.7	158.9	169.0	135.4	89.5	127.1
Cardiovascular	264.5	276.5	285.7	186.9	323.4	171.1	256.9

Figure 13: Age-standardised cause of death rates for non-communicable diseases by district, Boland Overberg Region, 2005

Women's health

Non-communicable diseases account for about half of the premature mortality in adult women (15+ years) with stroke, IHD and diabetes accounting for about 6% each, as shown in Figure 14 below. HIV/AIDS is the largest single cause of premature mortality among adult women, accounting for 15% of deaths in this group; followed by tuberculosis, which accounts for 14%. Injuries account for 14% of premature mortality in this group.

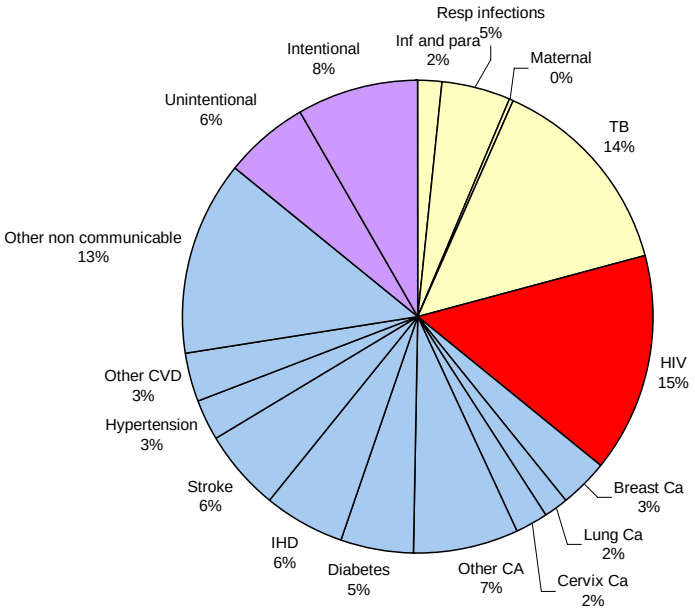


Figure14: Premature mortality cause profile for women 15+ years, Boland Overberg Region, 2005

Men's health

Premature mortality in men is almost double that of women and is dominated by injuries, as shown in Figure 15 below. Homicide is the second largest cause of premature mortality in this group, accounting for 15% of YLLs, while road traffic accounts for nine percent. Tuberculosis is the single largest cause of premature mortality in this group, accounting for 16% of YLLs. COPD and IHD each account for 5% of premature mortality in this group.

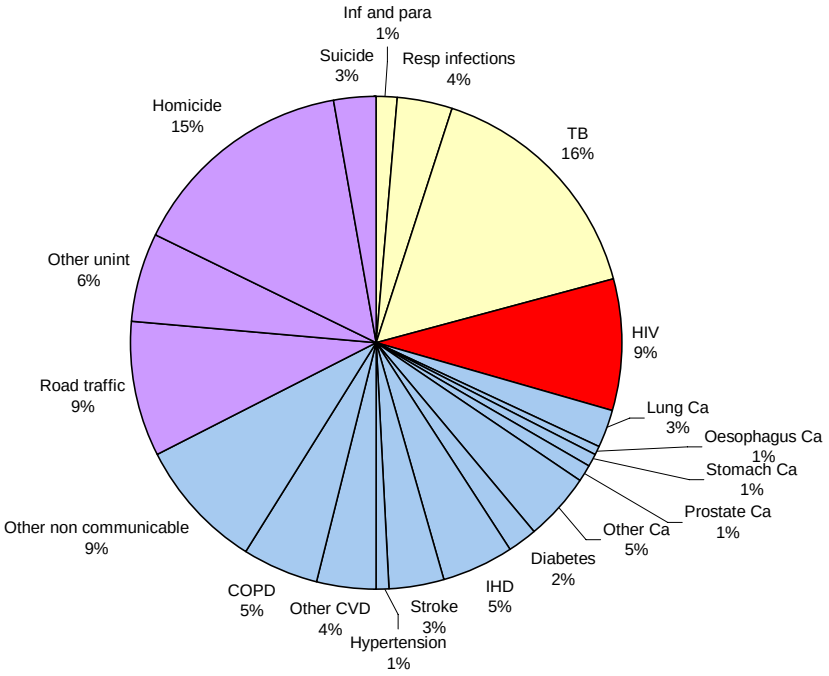


Figure 15: Premature mortality cause profile for men 15+ years, Boland Overberg Region, 2005

Child health

Infant mortality in the Boland Overberg Region has remained fairly constant at around 30 infant deaths per 1000 live births since 1997, with the possibility of a slight downward trend, as shown in Figure 16 below.

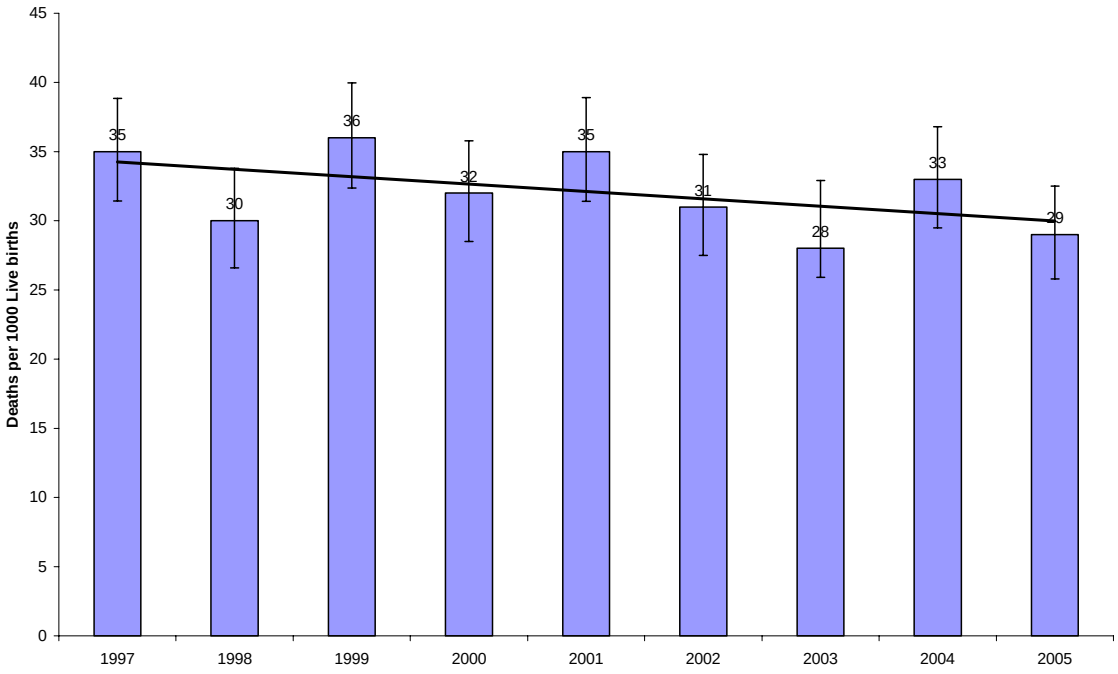
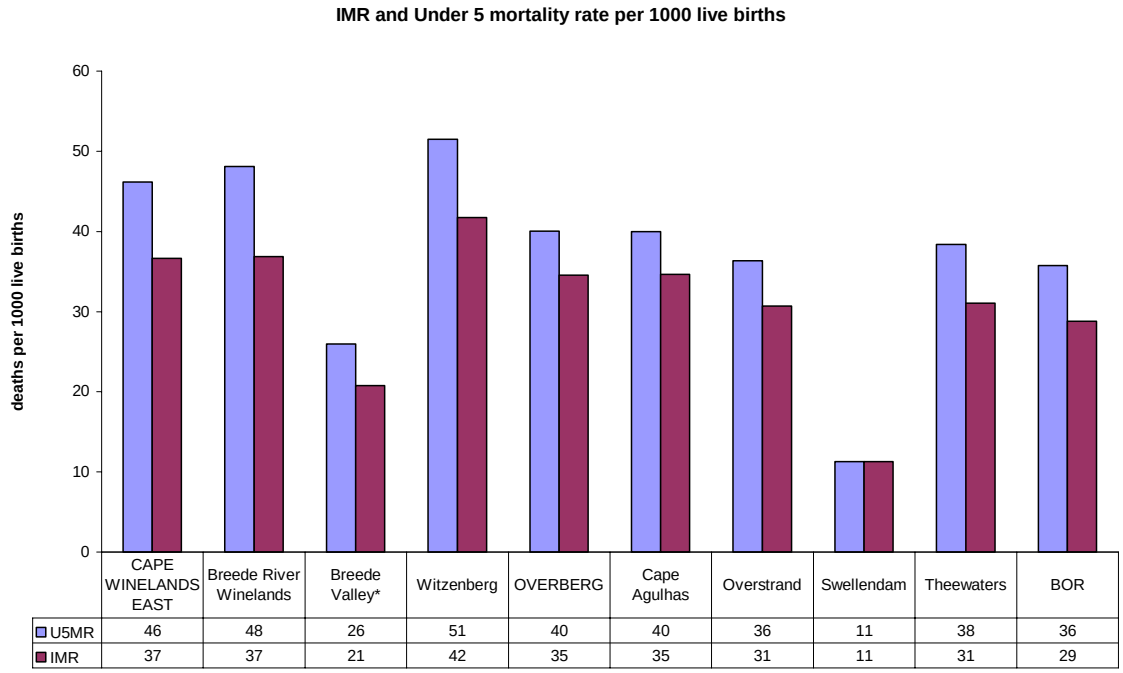


Figure 16: Infant mortality rate per 100 live births, Boland Overberg Region, from 1997 to 2005

The infant and child mortality rates, however, do vary by sub-district, with the highest rates found in Witzenberg in 2005, and the lowest in Breede Valley and Swellendam (although caution must be exercised, given the very low numbers). This is shown in Figure 17 below.



	CAPE WINELANDS EAST	Breede River Winelands	Breede Valley*	Witzenberg	OVERBERG	Cape Agulhas	Overstrand	Swellendam	Theewaters	BOR
U5MR	46	48	26	51	40	40	36	11	38	36
IMR	37	37	21	42	35	35	31	11	31	29

Figure 17: IMR and Under 5 mortality rate per 1000 live births by sub-district, Boland Overberg Region, 2005

The leading causes of death among the various age groups are set out in Table 4 below. The majority of these deaths occurred among post neonatal infants (1 – 11 months).

Table 4: Age distribution of deaths under 19 years

Age group	Number of deaths	% of child deaths
Early neonatal (0 – 7 days)	167	17.2
Late neonatal (8 – 30 days)	69	7.1
Post neonatal infant (1 – 11 months)	368	37.8
1 – 4 years	159	16.3
5 – 9 years	55	5.7
10 – 14 years	49	5.0
15 – 19 years	106	10.9

The leading cause of early neonatal deaths is prematurity, accounting for 43.1% of deaths in babies aged 0 to 7 days, as shown in Figure 18 below. Other perinatal conditions account for 18.6% of deaths in this group, followed by congenital abnormalities, which account for 8.4% of deaths. Ill-defined deaths account for 6.6% of deaths in this group. This profile is similar to that found in Cape Town.

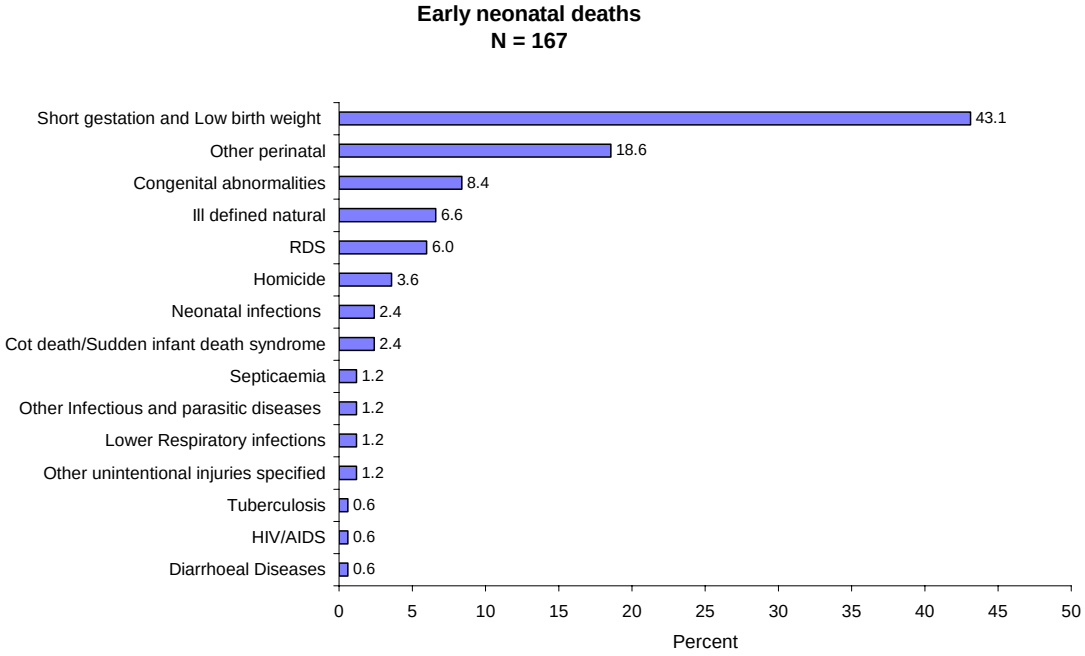


Figure 18: Leading causes of early neonatal deaths, Boland Overberg Region, 2004 and 2005

Prematurity and low birthweight are the leading causes of death in the late neonatal age group (8-30 days), accounting for 33.3% of deaths, as shown in Figure 19 below. This is followed by ill-defined natural deaths (10.1%), cot death (7.2%), other unintentional injuries specified (7.2%), and HIV (5.8%). In Cape Town, the leading cause of death in this age group was found to be those which were ill defined and naturally occurring.

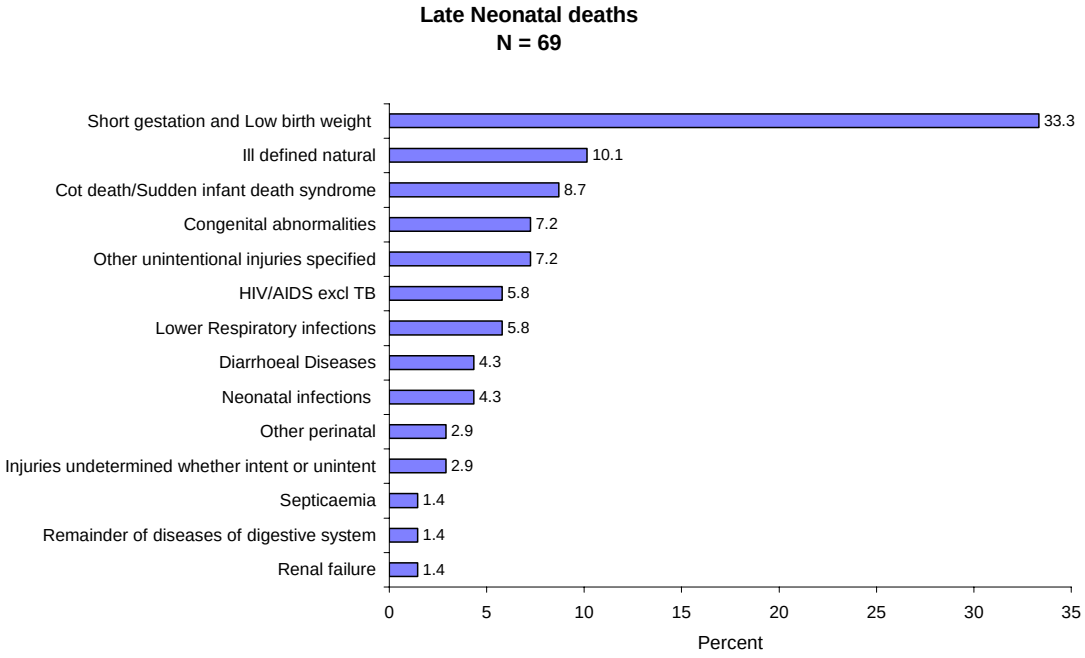


Figure 19: Leading causes of late neonatal deaths, Boland Overberg Region, 2004 and 2005

In the post neonatal infant cohort (1–11 months) diarrhoea was seen as the leading cause of death, accounting for 19.6% of deaths, as shown in Figure 20 on page 27. This was followed by ill-defined natural causes (16.0%), lower respiratory infections (14.7), and HIV/AIDS (11.1%). In Cape Town, ill-defined deaths were the leading cause in this age group and diarrhoea ranks third.

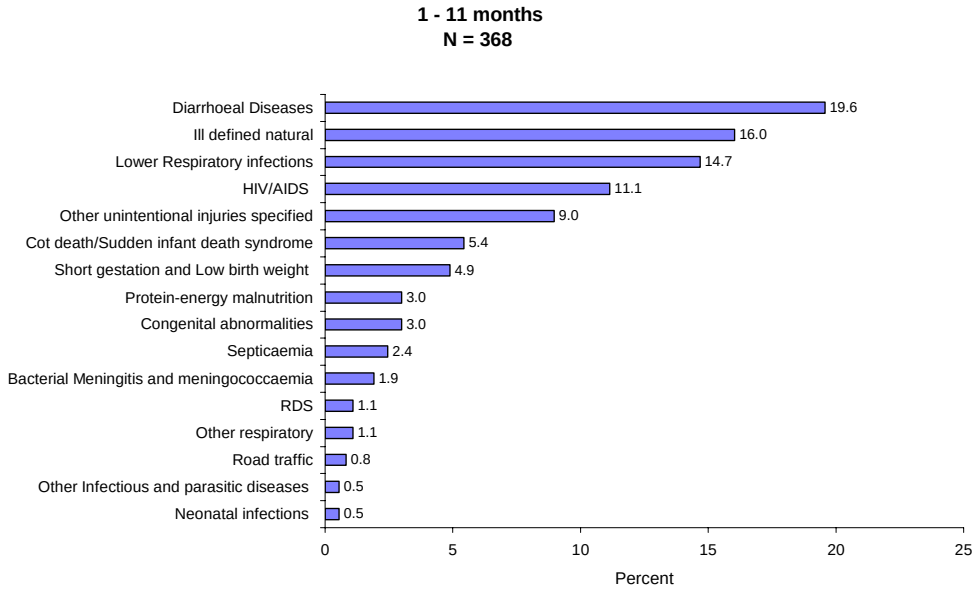


Figure 20: Leading causes of post neonatal infants, Boland Overberg Region, 2004 and 2005

HIV/AIDS was the leading cause of death among 1-4 year olds (15.1%), followed by drowning (14.5%), diarrhoea (11.9%), protein energy malnutrition (10.7%), ill-defined natural causes (8.2%), and lower respiratory infections (7.5%), as shown in Figure 21 below. Drowning is more prominent among boys than girls, while road-traffic injuries rank 7th in this age group. In Cape Town, HIV/AIDS was also the leading cause, but road-traffic injuries featured more prominently in ranking second.

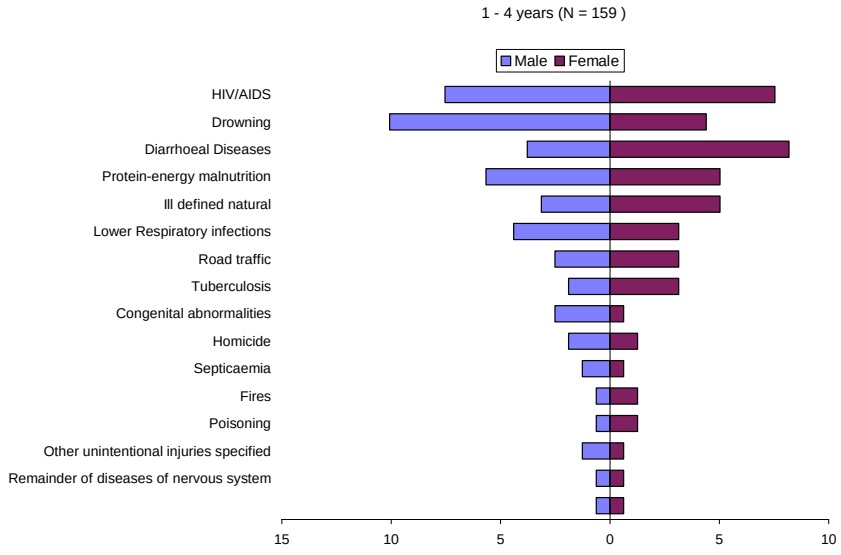


Figure 21: Leading causes of deaths in children 1 – 4 years, Boland Overberg Region, 2004 and 2005

olds, accounting for 30.9% of deaths, followed by drowning (23.6%), other Road-traffic injuries were the leading cause of death among 5- to 9-year-unintentional injuries specified (7.3%), and HIV/AIDS (5.5%), as

shown in Figure 22 below. Ill-defined deaths accounted for 5.5%, while homicide accounted for 1.8% of deaths in this age group. Deaths among males predominated. The leading cause was the same in Cape Town, but HIV/AIDS and lower respiratory infections ranked second and third, respectively, as opposed to accidental injuries in the Boland Overberg Region.

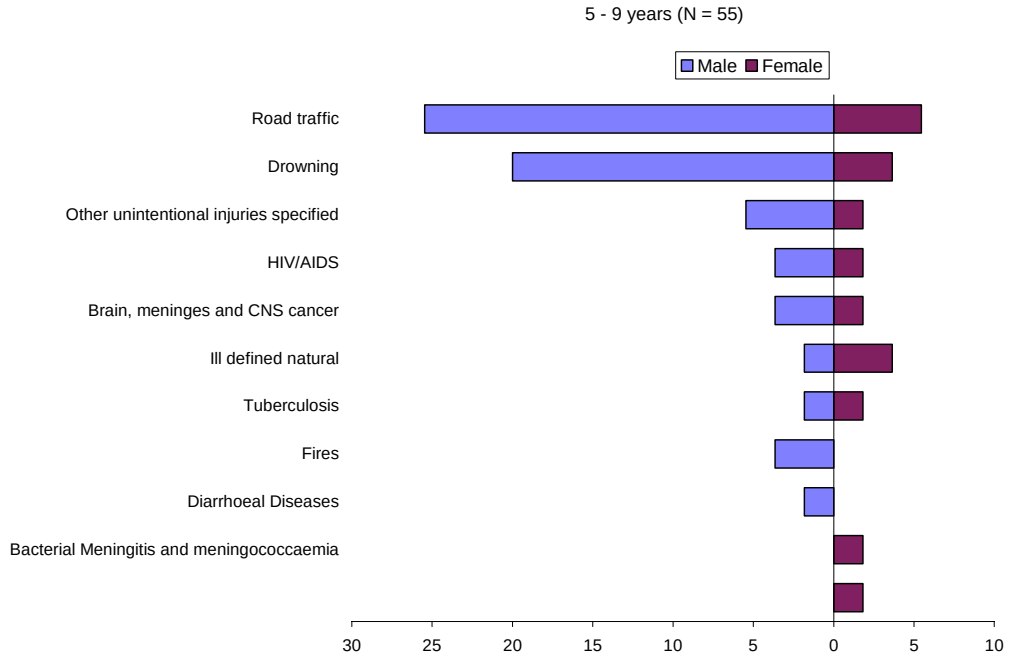


Figure 22: Leading causes of deaths in children 5-9 years, Boland Overberg Region, 2004 and 2005

A similar pattern was seen in the 10- to 14-year age group, with road traffic accidents (24.5%) appearing as the leading cause of death, followed by drowning (16.3), and homicide (8.2%), and shown in Figure 23 below. Ill-defined natural deaths account for only 2% of deaths in this group. The profile in Cape Town is similar, except that homicide ranks second and drowning is lower in the ranking than in the Boland Overberg Region.

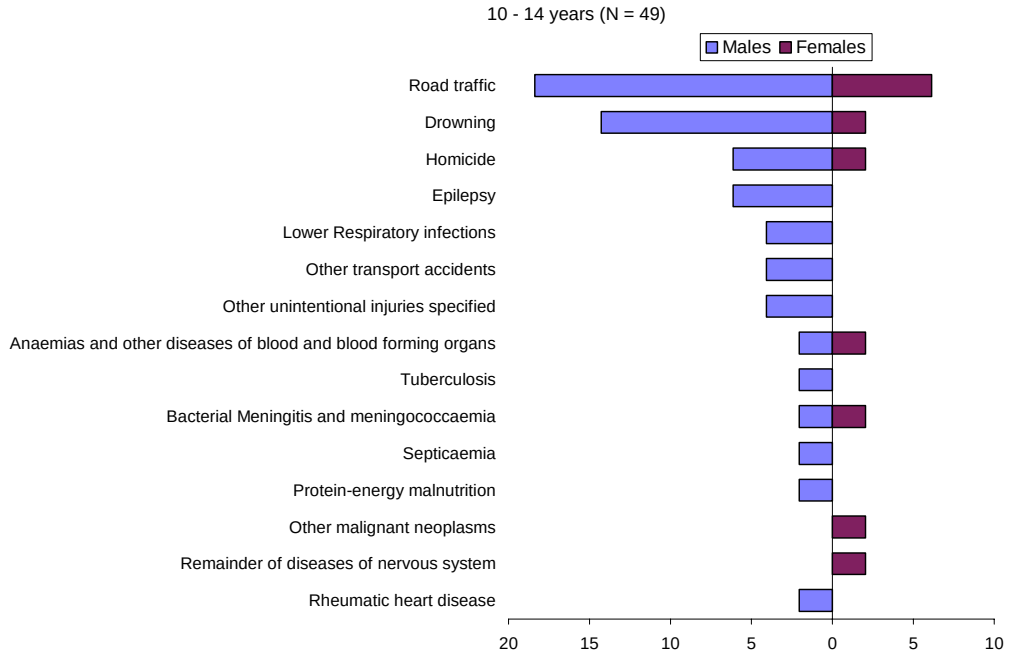


Figure 23: Leading causes of deaths in children 10-14 years, Boland Overberg 2004 and 2005

As in Cape Town, mortality among 15- to 19-year-olds in the Boland Overberg Region is dominated by homicide (34%) and road traffic injuries (18.9%), as shown in Figure 24. There is a marked gender differential with males accounting for almost 70% of the deaths in this age group.

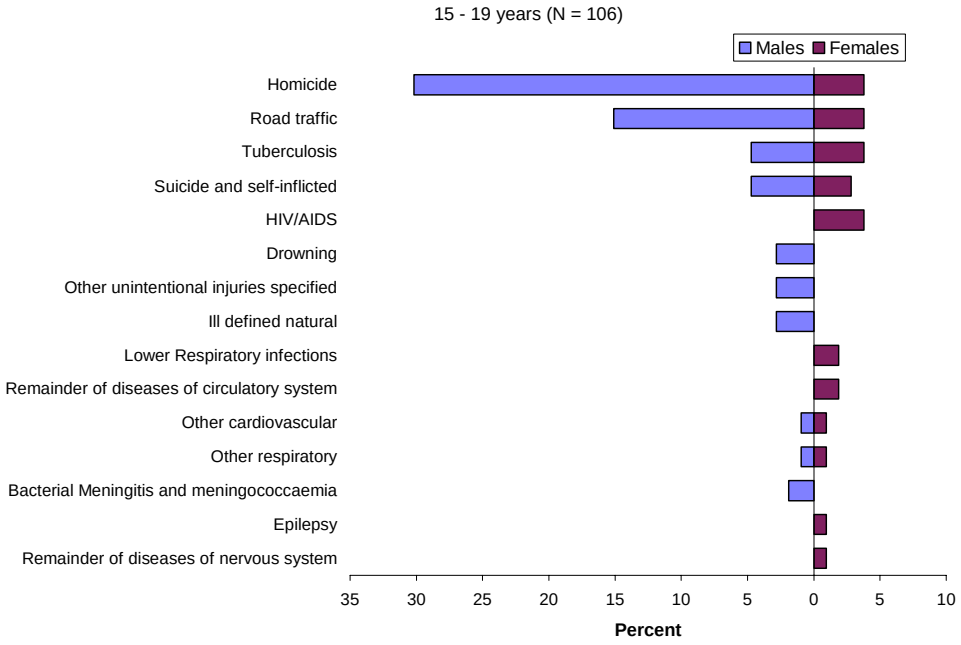


Figure 24: Leading causes of deaths in children 15 - 19 years, Boland Overberg 2004 and 2005

Discussion

The mortality surveillance system in the Boland Overberg Region has been maintained and continues to provide statistics that can be used to guide public-health programmes in the region. The year-on-year variations in mortality in the region need to be interpreted cautiously, especially at sub-district level, where the numbers of deaths are often small. However, the Boland Overberg Region's death data from 2005 strongly confirm the patterns seen in 2004.

- Tuberculosis is the leading cause of mortality in the region with mortality rates much higher than those experienced in Cape Town (86 per 100 000 vs 50 per 100 000 in 2004).

- HIV/AIDS mortality rates have continued to increase, but are lower than those in Cape Town (50 per 100 000 vs 80 per 100 000). The increase in mortality in Witzenberg, due to a significant increase in HIV/AIDS mortality and a marked increase in mortality due to tuberculosis, is cause for concern.

- Homicide mortality rates decreased between 2004 and 2005, particularly among males. The profile of homicide is quite different from that found in Cape Town: the use of firearms is very limited in the Boland Overberg Region and homicide rates among females are almost double those experienced in Cape Town.

- Overall, mortality rates due to non-communicable diseases in Boland Overberg Region are slightly lower than those in Cape Town (577 vs 626 per 100 000). There are differences in the profile, however, with mortality rates due to cardiovascular conditions and cancers being similar, while mortality due to respiratory conditions is higher in the Boland Overberg Region than in Cape Town, and diabetes mortality rates are lower.

- Infant mortality has remained fairly constant in the Boland Overberg Region since 1997, with the suggestion of a downward trend. However, there is a marked variation among sub-districts, with Witzenberg having the highest rates. Infant mortality rates in the Boland Overberg Region (about 31 per 1000 LB) are higher than those in Cape Town (24 per 1000 LB). Prematurity and low birth-weight are the leading causes of neonatal deaths. Ill-defined deaths rank second and account for a high proportion of deaths in late neonatal and post-neonatal infants.

- Diarrhoea deaths are more prominent among young children in the Boland Overberg Region than in Cape Town, while injuries are prominent in older children. Of great concern is the large proportion of preventable deaths due to homicide and road-traffic injuries among 15 – 19 year olds, particularly among males.

As with any routine surveillance system, it is important to assess the completeness and quality of the data before drawing any conclusions. We have identified certain limitations of this data, incomplete data collection in the Overberg, for example, and have drawn attention to these where appropriate in the report. The proportion of causes of death that are ill-defined has remained at about 12 percent. No attempt has been made to validate the accuracy of the certified cause of death. When comparing this data with national data it is important to know that coding practices differ and this may give rise to slightly different results.

Recommendations

The local mortality surveillance system is the source of mortality information for the region. Nevertheless, in order to ensure sustainability, an improvement in the quality of the data collected, and the optimal use of the results, integration with other systems - such as those of Home Affairs, the mortuaries, the South African Police Services, and the Departments of Transport and Education - must be improved. Interventions must be planned, implemented, monitored and evaluated across all sectors. Demographic estimates for the region need to be revised and updated if needed.

Approximately 40% of all premature mortality is due to homicide, tuberculosis, HIV/AIDS and road traffic accidents, all of which are preventable through a comprehensive primary health-care approach, which emphasises health promotion and preventative strategies; uses intersectoral collaboration effectively; and seeks to promote equity.

- Tuberculosis control must be prioritised within the regional Health Department, particularly in Witzenberg. Since effective tuberculosis control requires intersectoral interventions aimed at reducing poverty and improving living conditions, the national Departments of Housing, Agriculture, and Social Security and Poverty Alleviation all have an important role to play.

- At the same time, the HIV/AIDS Programme needs to be strengthened, particularly in Witzenberg.

- Intersectoral strategies are urgently required to prevent violence, homicide, and road-traffic accidents. As one of the leading causes of premature mortality in the Boland Overberg region, homicide should be prioritised as a health need. The pattern of the distribution of homicides should inform the allocation of resources to crime-prevention programmes. The underlying socio-economic instability of the high-incidence areas can only be addressed by a committed intersectoral approach. The problem of homicide highlights the need for a commitment to close working partnerships among a range of provincial and local authority departments, including Safety and Security, Sports and Recreation, Education, and Housing.

- Primary care for the management of non-communicable diseases should be strengthened and healthy lifestyles promoted in order to reduce the substantial burden of non-communicable diseases.

- Antenatal and perinatal care need to be strengthened.

Appendices

Appendix 1: Population estimates for individuals in the Boland Overberg Region*, 2004 – 2005

Age group	Breede Valley	Breede River Winelands	Witzenberg	Cape Agulhas	Overstrand	Swellendam	Theewaterskloof
0	3148	1921	2009	487	1119	551	2016
1-4	12401	7133	7634	1873	3849	2326	7440
5-9	15422	9037	9303	2662	4409	3014	9191
10-14	15538	8878	9385	2775	4213	2917	8846
15-19	16226	7890	8996	2509	4598	2631	9062
20-24	13310	6668	8593	1778	5261	2183	8933
25-29	13528	7232	9467	1958	5514	2529	10021
30-34	13130	7420	8951	2241	4829	2479	9461
35-39	12108	6640	7694	2207	4153	2429	8551
40-44	10546	5672	6306	2055	3497	2040	6995
45-49	8287	4380	4929	1595	2912	1570	5201
50-54	6383	3520	3837	1300	2819	1315	4174
55-59	4564	2733	2717	1165	2860	1021	2906
60-64	3642	2398	2112	1117	2941	892	2337
65-69	2749	1802	1472	897	2405	740	1644
70-74	1984	1385	1086	643	1778	558	1069
75-79	1120	914	644	385	1072	320	676
80-84	762	513	373	250	651	197	383
85+	445	294	260	149	384	120	272
Total	155293	86429	95767	28046	59265	29832	99178

* Excluding Stellenbosch and Drakenstein

Appendix 2: Population estimates for males in the Boland Overberg Region by sub-district, 2005

Age group	Breede Valley	Breede River Winelands	Witzenberg	Cape Agulhas	Overstrand	Swellendam	Theewaterskloof
0	954	1537	1024	256	577	288	1046
1-4	3586	6150	3888	950	1922	1165	3736
5-9	4491	7748	4716	1352	2169	1561	4633
10-14	4463	7744	4706	1370	2124	1457	4456
15-19	3778	8226	4388	1220	2238	1302	4399
20-24	3156	6646	4360	856	2613	1115	4705
25-29	3426	6681	4765	955	2869	1263	5439
30-34	3524	6439	4382	1076	2395	1218	5182
35-39	3207	5874	3844	1035	2092	1231	4645
40-44	2640	5025	3086	974	1774	999	3733
45-49	2126	3935	2420	802	1420	782	2649
50-54	1731	3057	1973	622	1368	645	2171
55-59	1307	2211	1355	561	1225	495	1523
60-64	1140	1651	1045	521	1406	427	1203
65-69	809	1176	721	401	1160	357	811
70-74	628	867	463	318	827	274	478
75-79	396	400	260	154	495	142	282
80-84	190	262	125	83	262	75	166
85+	105	137	85	42	135	42	76
Total	41655	75763	47606	13548	29071	14841	51334

Appendix 3: Population estimates for females in the Boland Overberg region by sub-district, 2005

Age group	Breede Valley	Breede River Winelands	Witzenberg	Cape Agulhas	Overstrand	Swellendam	Theeswaterskloof
0	967	1612	985	231	542	263	970
1-4	3546	6251	3746	923	1926	1161	3704
5-9	4545	7675	4587	1310	2240	1453	4558
10-14	4415	7794	4679	1405	2090	1460	4390
15-19	4112	8000	4607	1289	2360	1329	4663
20-24	3512	6664	4233	922	2648	1068	4227
25-29	3806	6847	4702	1003	2646	1266	4583
30-34	3897	6691	4569	1165	2434	1261	4279
35-39	3433	6234	3851	1172	2061	1197	3906
40-44	3032	5521	3220	1081	1723	1041	3262
45-49	2254	4352	2508	793	1492	788	2552
50-54	1790	3326	1863	678	1450	669	2002
55-59	1426	2353	1362	604	1635	526	1383
60-64	1257	1990	1067	596	1535	465	1134
65-69	994	1573	751	496	1244	383	834
70-74	757	1117	623	326	951	284	591
75-79	518	720	384	232	577	178	394
80-84	323	501	248	168	390	122	217
85+	189	308	175	107	250	78	195
Total	44773	79530	48161	14499	30194	14992	47844

Appendix 4: Comparison of the numbers of deaths in the Boland Overberg region with different sources

Year	Registered by Home Affairs	BO death surveillance	% of Home Affairs
2004	4241	4162	101.9%
2005	4303	4176	103.0%

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REPORT 3

Western Cape Province Mortality 1997 – 2002

Analysis of empirical cause of death data collected by Statistics South Africa from death notifications

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David Bourne, Ria Laubscher

April 2007

Acknowledgements

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We would like to acknowledge Jovial Wessie for his technical contribution in creating statistical tables.

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Contents

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Acronyms and Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
ASSA2003	Actuarial Society of South Africa 2003 model
BOD	Burden of Disease
DALY	Disability adjusted life year
GBD List	Global Burden of Disease list
GBD	Global Burden of Disease
Group I	Communicable diseases, maternal causes, perinatal conditions and nutritional deficiencies, including HIV/AIDS unless otherwise specified
Group II	Non-communicable diseases
Group III	Injuries
HIV	Human immuno-deficiency virus
ICD-10	International Classification of Diseases (Tenth edition)
MRC	Medical Research Council
NIMSS	National Injury Mortality Surveillance Study
SA BOD list	South African Burden of Disease list
SA NBD	South African National Burden of Disease Study
Stats SA	Statistics South Africa
WHO	World Health Organization
YLLs	Years of life lost due to premature mortality

Executive Summary

The Western Cape Department of Health has initiated a project that aims to reduce the burden of disease in the province. An important part of this project is to improve population health surveillance and monitor the trends in the burden of disease in the province. This report, for the first time investigates the trends in the Western Cape empirical cause of death data from 1997 to 2002 utilising Western Cape cause of death data provided by Statistics South Africa as a special tabulation of the data collected from death notifications.

The number deaths for the Western Cape reported by Stats SA increased during the period from 1997 to 2002. Comparison with the ASSA2003 model estimates suggest that the registration of deaths in this province is reasonably high and has remained so throughout the period. Reported deaths of children under-five also increased during the period, but as mortality data for children relative to adults is poor, and the levels of registration of child and infant deaths remains uncertain, interpretation of these data are difficult.

The data revealed a pronounced gender difference in the registered deaths. Though there are consistently more male deaths than females, the province contains more females than males. Distinctive age patterns emerged during the period from 1997 to 2002, showing a rapid increase in mortality in young adults as a result of an increase in HIV/AIDS deaths. While the burden of HIV/AIDS and related deaths is high in the province, it is much lower than national levels. Deaths due to infectious and parasitic diseases increased during the period in all age groups examined, with the steepest increases occurring among young adult females between 15 and 49 and males between 20 and 59. The smallest increase was among children under 14 and older adults over 60.

Throughout the period, non-communicable diseases dominate the mortality profile of the province. These affect older people and impact on mortality among the 45-59 year age group, and vastly dominate mortality in older adults. At 60 years and above, mortality patterns are very similar for males and females, but female deaths occurred at much older ages. The patterns showed very little change from 1997 to 2002. Injury deaths are very high among males, especially among the 15 to 29 year age group. Among children under the age of 14, though death due to injuries is high, there is very little differentiation by sex.

Premature mortality was assessed for 1997 and 2002 using years of life lost (YLLs). Undetermined injuries remained the leading cause of premature mortality for males across the period. However, the gap between this cause and TB narrowed considerably. In the case of females, TB was the leading cause of premature mortality in 2002, replacing undetermined injuries. Detailed analysis of this data shows that age weighting and discounting make little difference at a broad level when ranking the causes of YLLs. However, when it comes to the exact position in the top league, discounting strongly favours conditions that have a higher impact on adults, and reduces the ranking of conditions affecting children. The impact of age weighting is less marked. Decision makers must give serious consideration to the use of age weighting and discounting in the calculation of YLLs and DALYs.

Certain data quality issues were revealed by this analysis. It was found that the incorrect use of perinatal ICD-10 codes for deaths of children under the age of 1 year created an under representation of many true causes of death for children aged from one week to twelve months. In addition, the proportion of ill-defined natural causes in the Western Cape was 6% compared to a national average of 12%. This suggests data in the province to be of a better quality than data for South Africa as a whole. However, there was a relatively high proportion of ill-defined cardiovascular causes, particularly for females. It was not possible to analyse trends in the causes of injury deaths as they were largely unspecified.

This analysis has revealed important information about changes in the mortality profile in the Western Cape. In addition, although there have been substantial improvements in vital registration in South Africa since 1994, there is a clear need for further improvement including:
training in the certification of cause of death
improvements in the registration of the deaths of children
resolving some coding issues that exist
making data available at a sub-province level.
Although this study provides valuable public health information, a burden of disease assessment that makes use of multiple sources of data and adjusts for the under-registration of deaths and the mis-classification of causes is needed.

Introduction

Mortality estimates for Western Cape Province were produced as part of the National Burden of Disease Study (Bradshaw *et al*, 2003a). These synthetic estimates made adjustments for the known under-registration of deaths and the ill-defined causes of death, developing consistent and coherent information that could be used for planning. The estimates of mortality rates provide a profile of the causes of death in the province giving some reflection of the demands on the health service, and years of life lost (YLLs) indicating the public health needs to reduce premature mortality.

The Western Cape mortality profile highlighted the substantial impact of non-communicable diseases in this province and the fact that a major health transition is under way. As countries become more developed the disease profile changes from one of infectious diseases, high child mortality and malnutrition to a predominance of degenerative, chronic diseases. However, developing countries often experience a double burden, resulting from the simultaneous occurrence of these disease spectrums. In the case of Western Cape, the double burden is accompanied by a substantial burden of injuries and an emerging burden from HIV/AIDS.

These estimates, amongst other information, have resulted in the initiation of a provincial burden of disease project that aims to estimate the burden of disease in the Western Cape, its associated risk factors, and intersectoral interventions. Efforts to improve the provincial capacity to monitor the burden of disease, including mortality and morbidity, are an integral part of the project to reduce the burden of disease. The intention of these efforts is to ensure an ongoing mechanism to monitor trends in the burden and evaluate the impact of the efforts to reduce the burden.

Since 1994 there have been substantial improvements in the completeness of death registration. Since 1997, the coding of the causes of death from the death notifications has been standardized and Statistics South Africa has reported on the national cause of death statistics that have been processed in a standard manner. However, these statistics require careful analysis as they still suffer from some deficiencies. Although the national data has been made available for further analysis, it has only been possible to obtain the data for 1997 – 2002 for the province. It has not been possible to obtain sub-provincial level data.

This report, for the first time investigates the trends in the Western Cape empirical cause of death data. It is important to do this in order to glean as much information on trends, but also to identify data quality issues in preparation for further burden of disease analysis and the estimation of death rates. This report investigates the trends in the profiles as recorded by Stats SA.

Methods

1.1 *Data source*

The data from which this report is prepared were received from Statistics South Africa as a special tabulation for the Western Cape stratified by age, sex and underlying cause of death. These data were also used to prepare Statistics South Africa's P0309 series of reports on mortality and causes of death (Stats SA, 2005). The information about each deceased is based exclusively on information recorded on the death notification forms, as received from the Department of Home Affairs. In 1998, a new form (BI-1663) was introduced, replacing the BI-7 and BI-12 forms that were previously used. In addition, a form (BI-1680) to be completed by a traditional headman was introduced for use in rural areas when a medical practitioner is not available. It is not clear that many such forms are used in the Western Cape, but it is impossible to distinguish from which form type the data has been obtained. A 3 digit ICD-10 (WHO, 1992) code was manually assigned by Stats SA coders for each cause of death recorded on the death notification form. These were converted to 4 digit codes by specifying the generalized code for the 4th digit, so that the underlying cause of death could be derived automatically with a software programme called Automated Classification of Medical Entities (ACME 2004.02) developed by the United States National Center for Health Statistics (NCHS). In most cases, the fourth digit was '9' or '8', indicating that the detail of the recorded disease was not specified. While the ACME programme did not resolve all coded cases, it did so for the vast majority with typically only 1% of the underlying causes requiring manual derivation.

1.2 Burden of disease list

The ICD-10 code list is extensive and allows for clinically distinct diagnoses. However, such details provide more information than is required when analyzing the data from a public health point of view. The underlying cause has therefore been aggregated to the South African Burden of Disease (SA BOD) list (Bradshaw *et al.,* 2003). This list was developed from the Global Burden of Disease 1990 list of causes of death (Murray and Lopez, 1996) and adapted on the basis of the disease profile for South Africa, with some adaptations from the Australian BOD study (Mathers *et al*., 1999). The list comprises 140 conditions and is presented in Appendix I. The list also allows for the ill-defined classifications within categories eg., ill-defined perinatal conditions.

For the analysis, causes are divided into three broad groups: Group I, the pre-transitional causes, include communicable diseases, maternal causes, perinatal conditions, and nutritional deficiencies; Group II, the non-communicable causes, include chronic and degenerative diseases; and Group III, the injuries. Each group is divided into several major disease categories.

1.3 Comparison with numbers of deaths on population register

The total number deaths for the province reported by Stats SA are compared with the number registered on the population register and the numbers estimated by the ASSA2003 model in order to assess the consistency. Details of deaths logged on the population register by the Department of Home Affairs are sent to the MRC on a

monthly basis and included in a database used for rapid mortality surveillance. The database consists of registered deaths where a South African ID was also available. Therefore the population register data is essentially a subset of the Stats SA death data. Non-natural deaths can be separated in this database via an algorithm based on key descriptive words developed to distinguish between the natural and non-natural causes of death.

1.4 Comparison with numbers of deaths from ASSA2003

The ASSA2003 model, developed by the Actuarial Society of South Africa, is available on the web (http://www.assa.org.za/default.asp?id=1000000050). It is a demographic component projection model that incorporates behavioural factors and is calibrated to population estimates from the 1996 and 2001 censuses, the HIV sero-prevalence from annual antenatal clinic surveys up to the year 2002, empirical levels of child mortality from the 1996 census and the 1998 South African Demographic and Health Survey and adult mortality levels (deaths recorded by the Department of Home Affairs on the population register and deaths recorded by Statistics South Africa after adjusting for under-reporting). ASSA2002 models the heterosexual epidemic (Actuarial Society of South Africa, 2004).

1.5 Premature mortality (YLLs)

Describing mortality based on the number of deaths does not take into consideration premature mortality. This is an important public health indicator of the health status of a population. Since many deaths occur at older ages, mortality data is typically dominated by conditions affecting the elderly. Years of life lost (YLL) is a method that takes into account the age at death by giving greater weight to deaths at younger ages and lower weight to deaths at older ages. Deaths at younger ages accrue more years of life lost than deaths occurring at older ages.

YLLs have been calculated using the standard GBD approach of Murray and Lopez (1996 a) with standard life expectancies based on the West model levels 25 and 26 for males and females respectively (Coale and Demeny, 1966). A sensitivity analysis is undertaken comparing YLLs using age weighting and a 3% standard discounting.

Results

2.1 Number of deaths

The number of recorded deaths reported by Stats SA increased from 33,166 in 1997 to 43,570 in 2002.Although there are more females in the province, there are consistently more male deaths than female with a male to female ratio of 1.3. The number of deaths reported by Stats SA is compared with the numbers of deaths recorded on the population register and the numbers estimated by the ASSA2003 model in Table 1 for males and females and the totals are shown in Figure 1. The populations register data starts in the year 1999, when the MRC began to systematically collect these data. There were a total of 32,402 deaths in 1999, accounting for 86% of the Stats SA number of that year. In 2002 there were 41,357 deaths recorded on the population register, which had increased to 95% of the number recorded by Stats SA indicating an improvement in the registration of individuals onto the population register. When comparing the deaths recorded by Stats SA to the numbers estimated by the ASSA2003 model, the Stats SA deaths increased from 92% of the ASSA2003 estimates in 1997 to 95% in 1998 and then dropped back to 92% in 2002. This indicates that there is good coverage of death registration in this province. However, there are marked differences between males and females. Compared to the ASSA2003 estimates, Stats SA recorded approximately 95% of the male deaths over the period and 88% of the female deaths. It is possible that registration of deaths for females is lower than that for males. From 2000 onwards there is a growing discrepancy between the number of registered deaths and the model estimates for females.

Table 1: Total deaths recorded by Stats SA, Population Register, and estimated by ASSA2003, by sex

	Stats SA			Population Register			ASSA2003 estimation		
Year	Male	Female	Total	Male	Female	Total	Male	Female	Total
1997	19070	14096	33166				20172	15797	35970
1998	20764	15395	36159				21231	16870	38101
1999	21641	16266	37907	18684	13718	32402	22237	17989	40226
2000	21617	16789	38406	19912	15131	35043	23351	19235	42585
2001	23229	17821	41050	21525	16648	38173	24586	20633	45219
2002	24686	18884	43570	23289	18068	41357	25669	21920	47589
2003				23622	19118	42740	26464	22914	49377
2004				23700	19459	43159	27122	23761	50883
2005				24010	20020	44030	27884	24756	52640
2006							20172	15797	35970

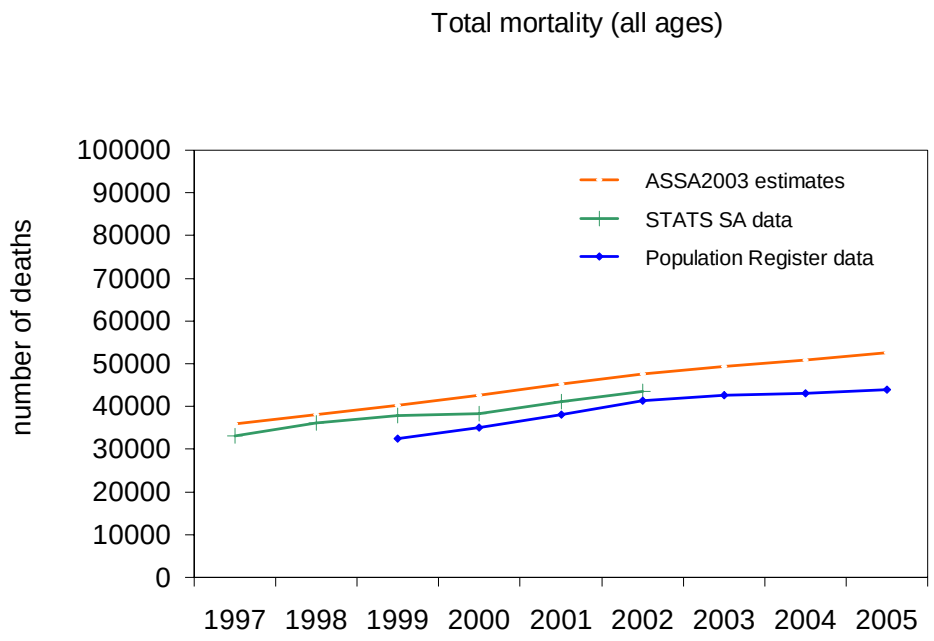


Figure 1: Number of Western Cape deaths from Stats SA, Population Register, and ASSA2003

- The number of recorded deaths reported by Stats SA increased from 33166 in 1997 to 43570 in 2002.
- Based on ASSA2003 model estimates, there is very good coverage of death registration in the Western Cape.

The number of deaths of children under the age of five years recorded by Stats SA are compared to the number recorded on the population register and the estimates derived from the ASSA2003 in Table 2; totals are shown in Figure 2. As with the all age deaths, the number of under-five deaths recorded by Stats SA increased during the same period. Under-five deaths recorded by Stats SA increased from 2,354 deaths in 1997 to 3,151 in 2002. On the population register there are 736 recorded deaths of children under five in 1999, just 26% of the number recorded by Stats SA for the same year. Efforts to improve birth registration have resulted in an increase in this proportion. By 2002 the number of under-five deaths recorded on the population register had increased to 44% of the number recorded by Stats SA.

The number of under-five deaths recorded by Stats SA was compared to estimates from ASSA2003. Stats SA recorded 62% of the deaths estimated by ASSA2003 for both male and female children under-five in 1997. By 2002 the deaths recorded by Stats SA accounted for 70% of the deaths estimated by ASSA2003. However, this differed by sex with 73% the estimate of deaths of male children and 66% of female children. It is evident that the model is not fitting well with empirical trends at these younger ages. From Figure 2, it can be seen that whereas the model projected that the number of child deaths would peak in 2001 and start to decline thereafter, the empirical data shows that they have continued to increase. It is not clear whether this is a result of improved registration of deaths or whether the model does not fit well. Accuracy of the estimates generated by the model is dependent upon the empirical data used to calibrate the model. Because mortality data for children is poor relative to that of adults, estimates generated by the model are possibly not as robust for children.

Table 2: Under-5 deaths recorded by Stats SA, Population Register, and estimated by ASSA2003

Year	Stats SA	Population Register	ASSA2003 estimation
1997	2354		3798
1998	2757		4030
1999	2884	736	4286
2000	2852	807	4528
2001	2780	977	4634
2002	3151	1387	4522
2003		1429	4280
2004		1656	4079
2005		1510	3983
2006			3924

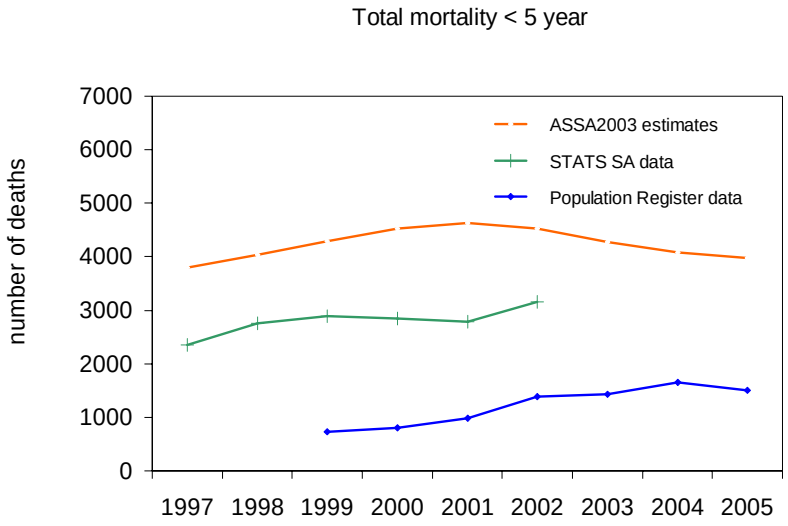


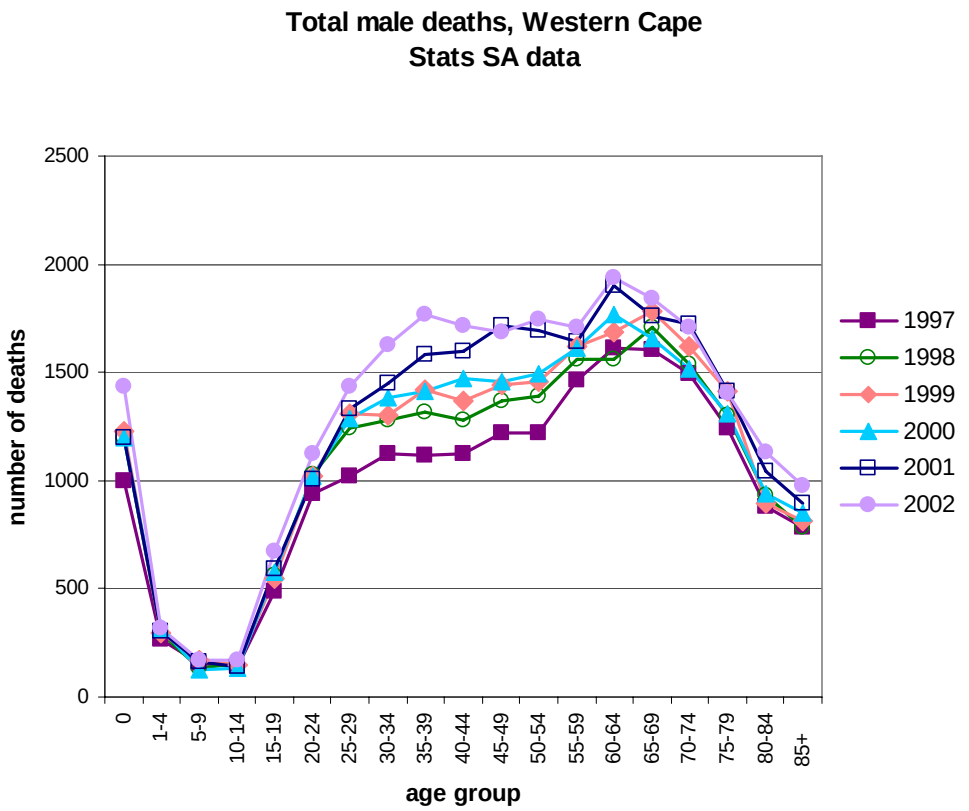
Figure 2: Number of child deaths in Western Cape from Stats SA, Population Register and ASSA2003

- The number of under-five deaths recorded by Stats SA increased from 2354 in 1997, to 3151 in 2002.
- However, mortality data for children is poor relative to that of adults, and interpretation should be made with caution.

2.2 Trends in numbers of deaths by age and sex

The age specific distribution of deaths in the Western Cape Province reported by Stats SA for the year 1997 through 2002 are shown in Figure 3. These show very distinctive age patterns in the increase. After age 14, mortality increases sharply and the distribution of deaths begins to differentiate by sex. During the period from 1997 to 2002, two rapidly emerging peaks in mortality become evident in females; one in young adult females aged 20 to 44, and the other in senior adult females aged 60 to 79. After age 84 mortality increases sharply in females. The mortality peak of young adult females increased steadily each year after 1997 up to 2002. In senior females aged 60 to 79 mortality generally increased over the time period, but less dramatically than young adult females. In males, a double mortality peak is also evident but with a much higher number of deaths in young adult males than young adult females. An increasing peak in mortality emerges at approximately age 25 to 44 and at age 55 to 85+ in males. The high mortality observed among females aged 85 and over is not present in males. This is likely due to population demographics in the province where there is a larger population of females at older ages. The number of deaths among males aged 25 to 44 increased steadily from 1997 to 2002. At younger ages of both sexes, the number of deaths of infants under the age of 1 year was four times higher than the number of child deaths among the 1 to 4 year age group, in 1997. By 2002 infant deaths were 4.5 times higher than child deaths. Throughout the period mortality remained very low in children aged 1 year up to age 14 years.

Overall the number of deaths reported in the Western Cape increased at a rate of 5.6% per annum. Figure 4 shows the rate of increase by age group and sex. This highlights the rapid growth in female deaths aged 15-44 years. The increase in the number of male infant deaths is somewhat higher than that for females. The mortality trends in the Western Cape are in sharp contrast to the mortality patterns observed at a national level (see Appendix B). The difference at the baseline can be explained in part as a result of the demographic difference of the province, ie. having an older population than the national average, and in part as result of the province being more affluent and having better access to basic services and health care. The baseline pattern of male deaths in the Western Cape also had a distinctively high number of young adult deaths. The trend however, shows that the Western Cape has a lower prevalence of HIV than the rest of the country.



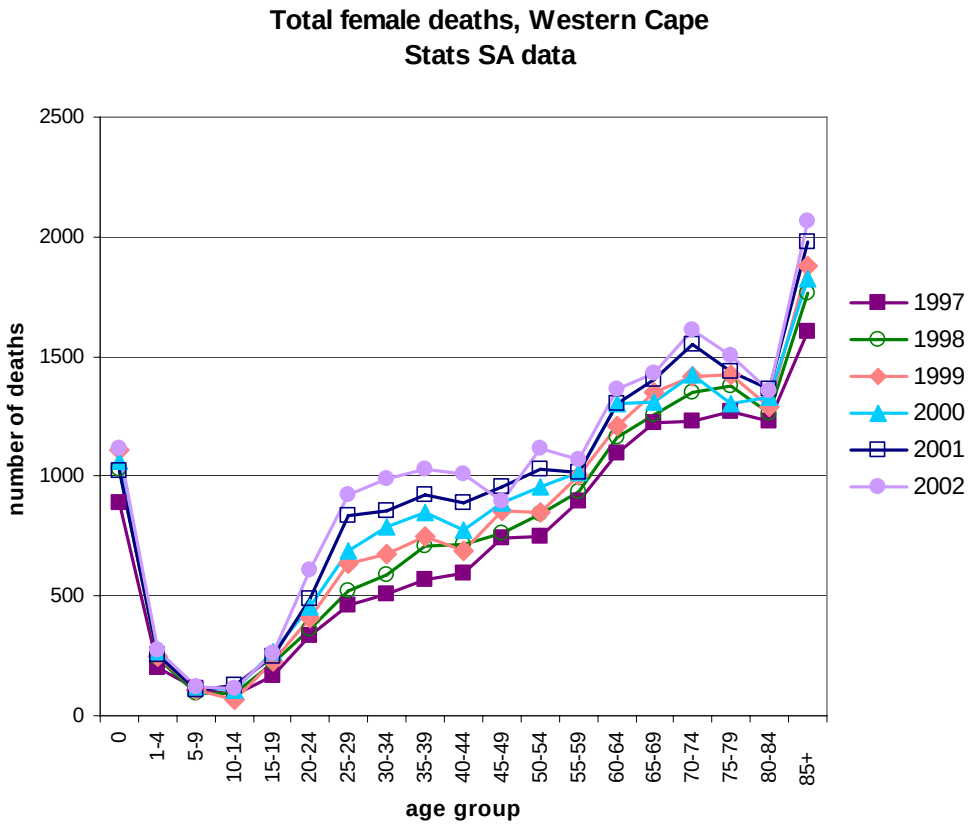


Figure 3: Number of Western Cape deaths by age and sex, Stats SA 1997-2002

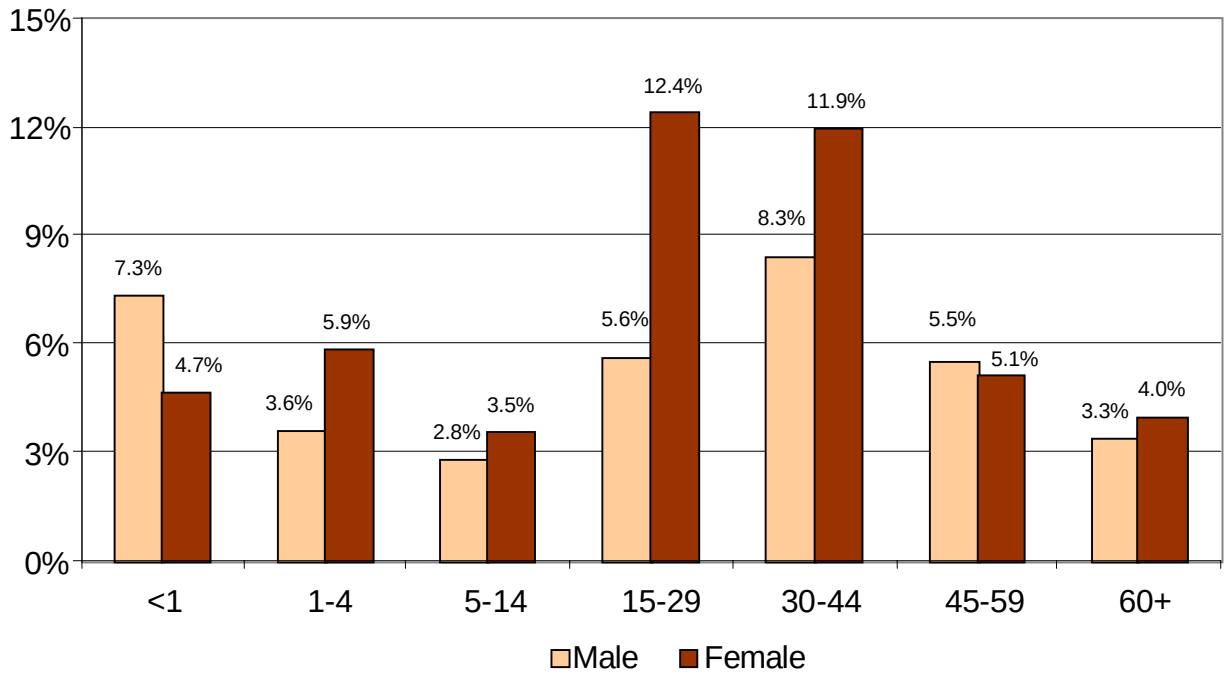
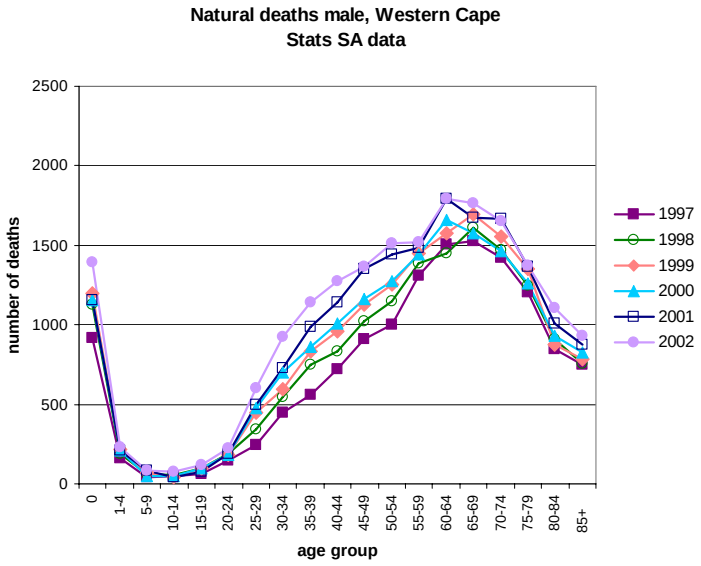
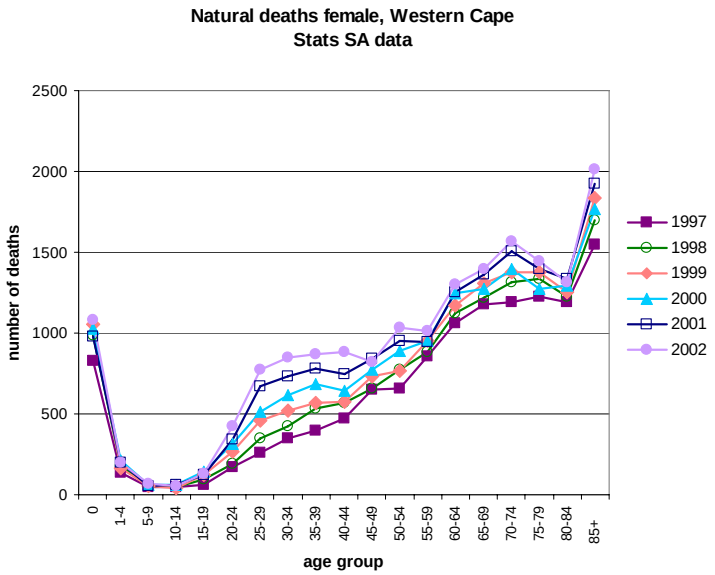
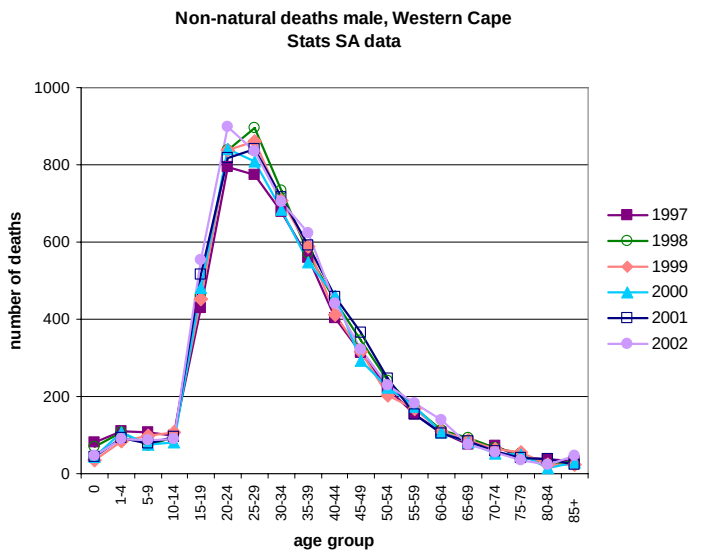


Figure 4: Annual growth rate in recorded deaths by Stats SA between 1997 and 2002 by age and sex, Western Cape

When deaths due to natural causes are viewed separately from non-natural causes, it is clear that deaths due to non-natural causes contribute extremely large numbers to the mortality of young males aged 15 to 59 (Figure 5). At age 20 to 29 males die from non-natural causes at a ratio of approximately 5 males to 1 female of the same age group. There appears to be no increase over time in non-natural deaths in males and females.







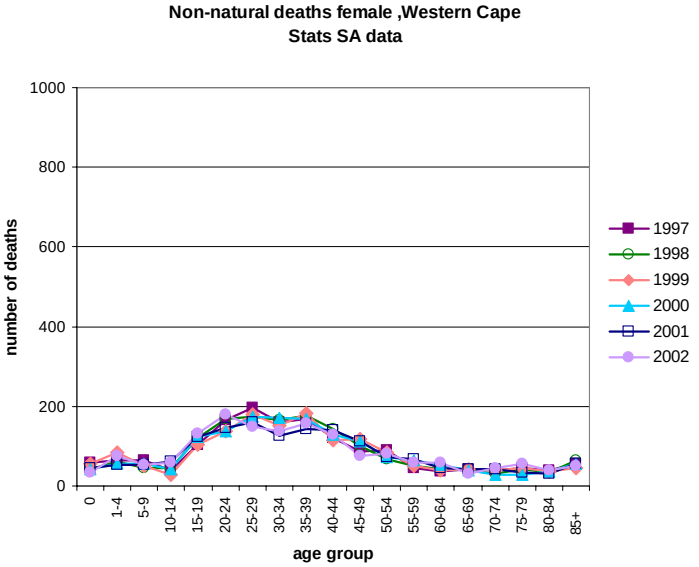


Figure 5: Number of Western Cape natural and non-natural deaths by age and sex, Stats SA 1997-2002

2.3 Trends in cause of death

Figure 6 shows the 1997 and 2002 age trend of disease categories for males and females. The distinct age pattern of the deaths can be observed with a higher number of infant deaths dropping during childhood and increasing rapidly into adulthood and older ages. The pattern reflects both the age specific mortality rates and the age structure of the population of the province. The male age pattern displays a marked young adult peak which results from a high number of injury deaths.

There is an increase in numbers of deaths over this period that occurs across all ages. However, between 1997 and 2002 the changing cause of death pattern reveals the emergence of an increase in deaths from infectious and parasitic diseases in both sexes due to the HIV/AIDS pandemic. This is most notably among young adults with the majority of deaths from infectious and parasitic diseases occurring at a slightly younger age in females than in males. In 2002 the highest number of deaths from infectious and parasitic diseases occurred at the age of 20 to 24 years of age among females, and age 25 to 29 among males. Injuries particularly dominated the cause of death of males from adolescence through to mid-life in 1997 and in 2002. The major cause of death in infants under age one year was due to those causes categorised as perinatal conditions, maternal conditions and nutritional deficiencies. Infectious and parasitic diseases, and injuries are the major contributors to mortality during childhood, early adulthood and mid-life. Deaths from non-communicable diseases, specifically cardiovascular diseases, malignant neoplasms, respiratory disease and Diabetes mellitus increase throughout older ages, while deaths from infectious and parasitic diseases and injuries are not as prominent at older ages.

- Very distinct age patterns, consisting of rapidly increasing peaks in mortality in young adult males and young adult females, emerge during the period of 1997 to 2002.
- This is due to an increase in deaths from infectious and parasitic diseases, particularly among young adults; a direct result of the HIV/AIDS pandemic.
- The age patterns of mortality in the Western Cape are very different from the national data, with the Western Cape having a higher proportion of older deaths and a lesser HIV/AIDS pattern.
- Deaths due to non-natural causes are very high in males.
- The overall the number of deaths reported in the Western Cape increased 5.6% per annum.

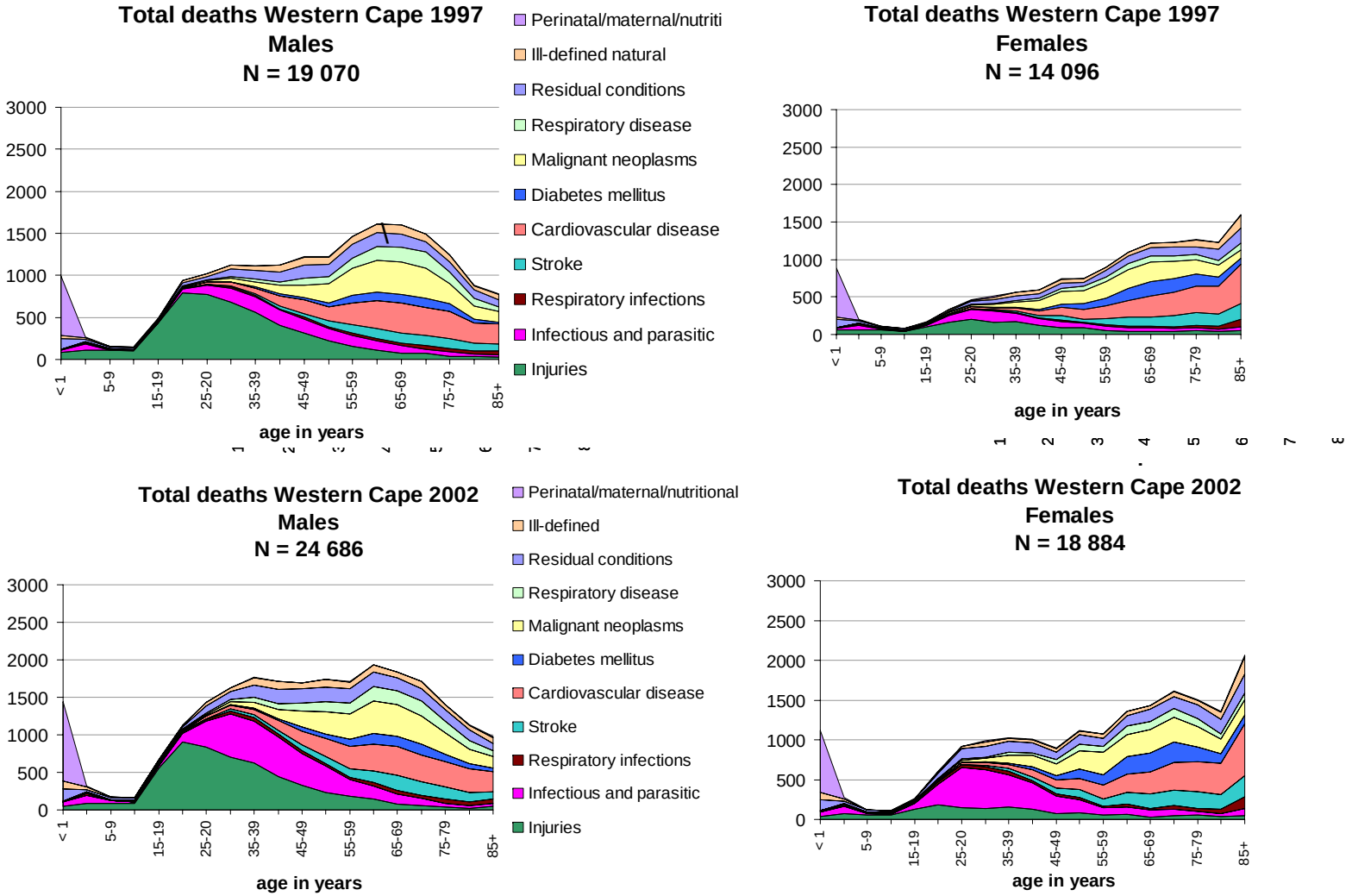


Figure 6: Western Cape deaths by category, age and sex, Stats SA 1997 and 2002

Figure 7 shows the trend in the proportion of deaths by category of diseases. Among both males and females, the proportion of deaths due to infectious and parasitic diseases increased steeply from 1997 to 2002. In females, this category surpassed cardiovascular disease and malignant neoplasms, contributing the highest proportion of deaths by 2002. This pattern is very similar in males except injuries (non-natural conditions) contribute, by far, the highest proportion of deaths throughout the entire time period. Furthermore, the proportion of injury deaths among males deceased during the period. This illustrates how interpretation of proportions of death should be made with caution, as the decrease in injury deaths here is rather the result of an *increase* in other causes, most notably infectious and parasitic diseases. The fact that there is *not* a large decrease in the total number of injury deaths in males during this time period was shown in the graph of non-natural deaths in males, Figure 5.

- The proportion of infectious and parasitic deaths shows a steep increase for both males and females between 1997 and 2002.
- The proportion of male deaths resulting from injuries (non-natural conditions) declined during the period. While part of this results from the increase in other causes, the numbers of injury deaths among males increased from 5146 in 1997 to 5520 in 2002, clearly slower than the pace of population growth and suggesting a decline in the injury mortality rates.

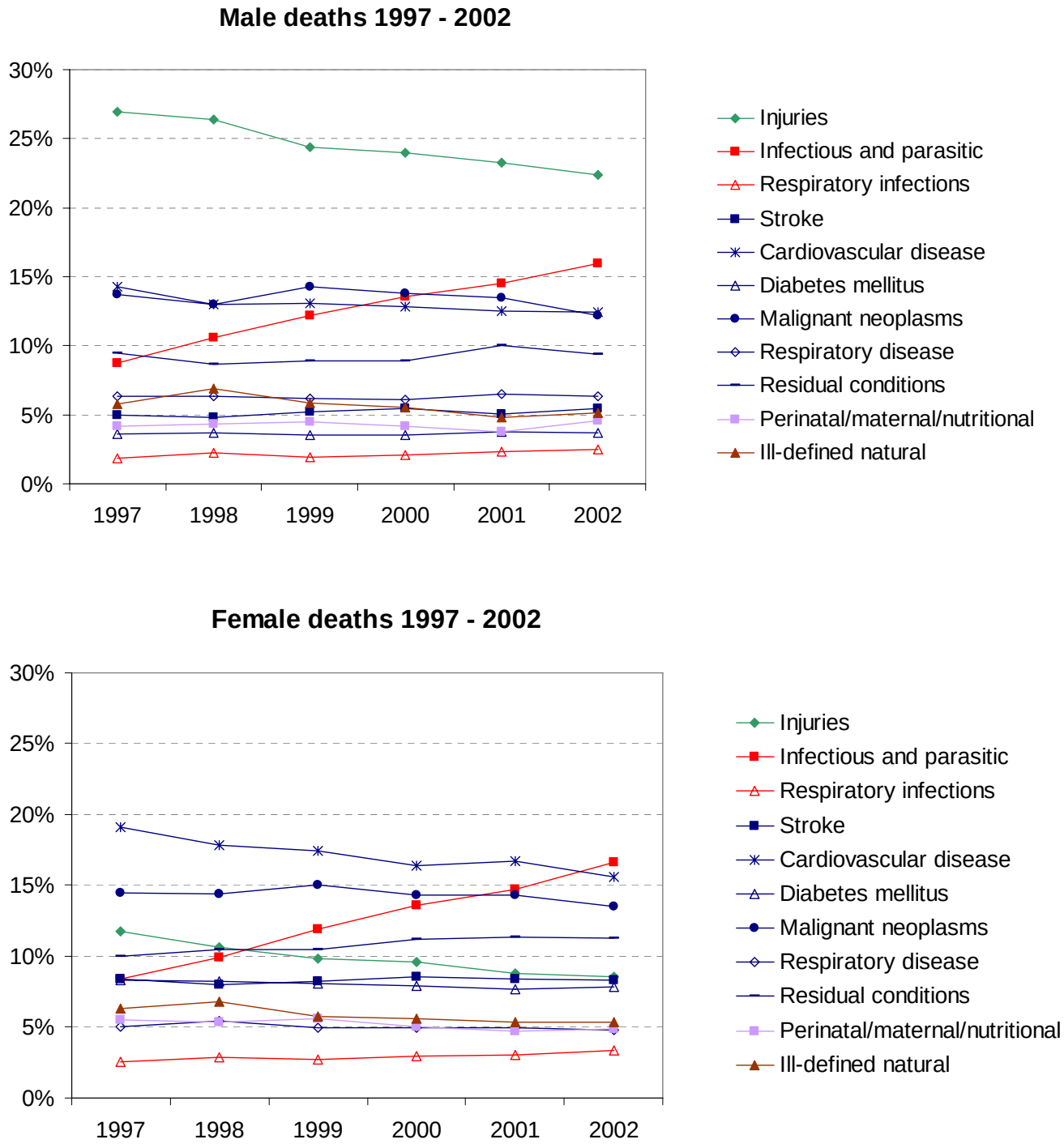


Figure 7: Proportion of total Western Cape deaths by category, Stats SA 1997-2002

Figure 8 and 9 show the trends in the proportion of deaths due to selected ill-defined causes of death. The year that the new death certificate was introduced (1998) is highlighted. The proportion of total deaths in the Western Cape due to ill-defined natural causes increased from 6% to 7% for both males and females in 1998, and then declined thereafter (Figure 8). This is a relatively high proportion of deaths, although much lower than the national average of 12%, and may be indicative of better quality data based on better certification of the causes of death, compared to national data. A similarly high proportion of deaths in the province was due to ill-defined cardiovascular causes among females. This was almost twice as high as the proportion in males. Among males and females, the proportions of ill-defined cardiovascular causes decreased from 1997 to 2002 but without a sharp change at 1998. With the relatively high proportion of deaths due to ill-defined cardiovascular causes, the patterns of deaths due to specified cardiovascular causes must be interpreted with caution.

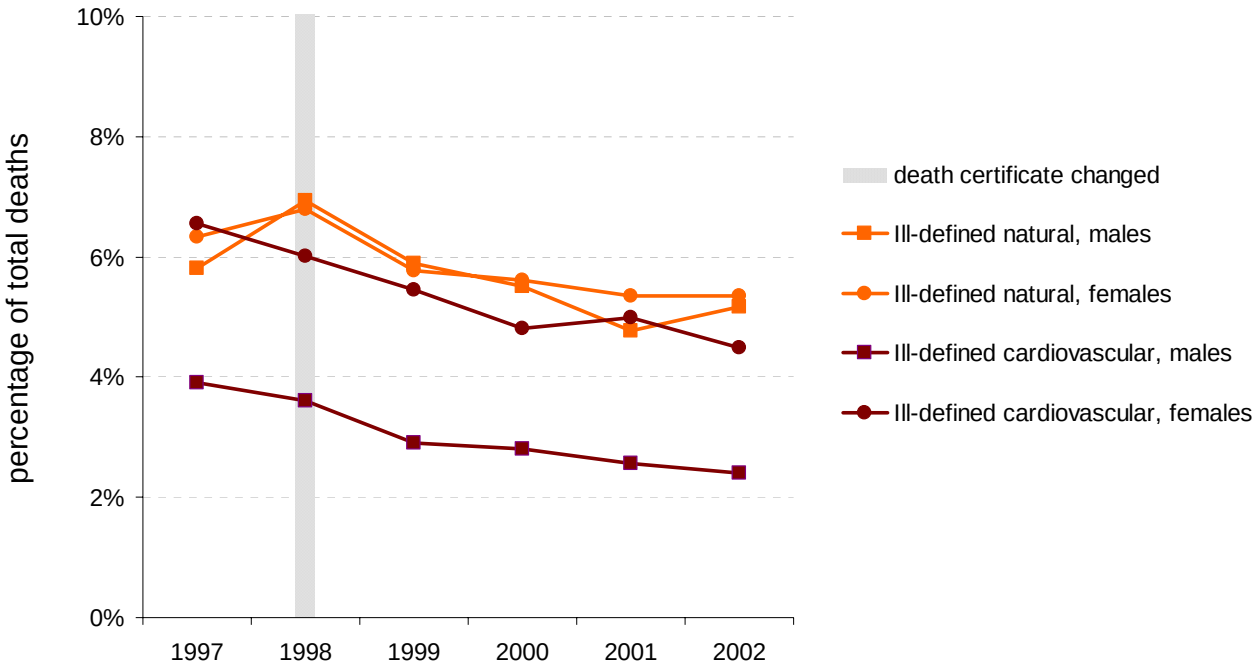


Figure 8: Proportion of total Western Cape male and female deaths due to ill-defined causes, Stats SA 1997-2002

Figure 9 shows the large contrast of injury deaths of undetermined cause between males and females. Among males, the proportion of deaths due to undetermined injuries declined from 1997 to 2002 while the proportion of specified injuries increased, particularly since 1998. This pattern is similar in females except at much lower proportions. The trends around the introduction of the new death certificate suggest improvements in the identification of causes of deaths as a result of the changes on the certificate, but such interpretations should be made with caution.

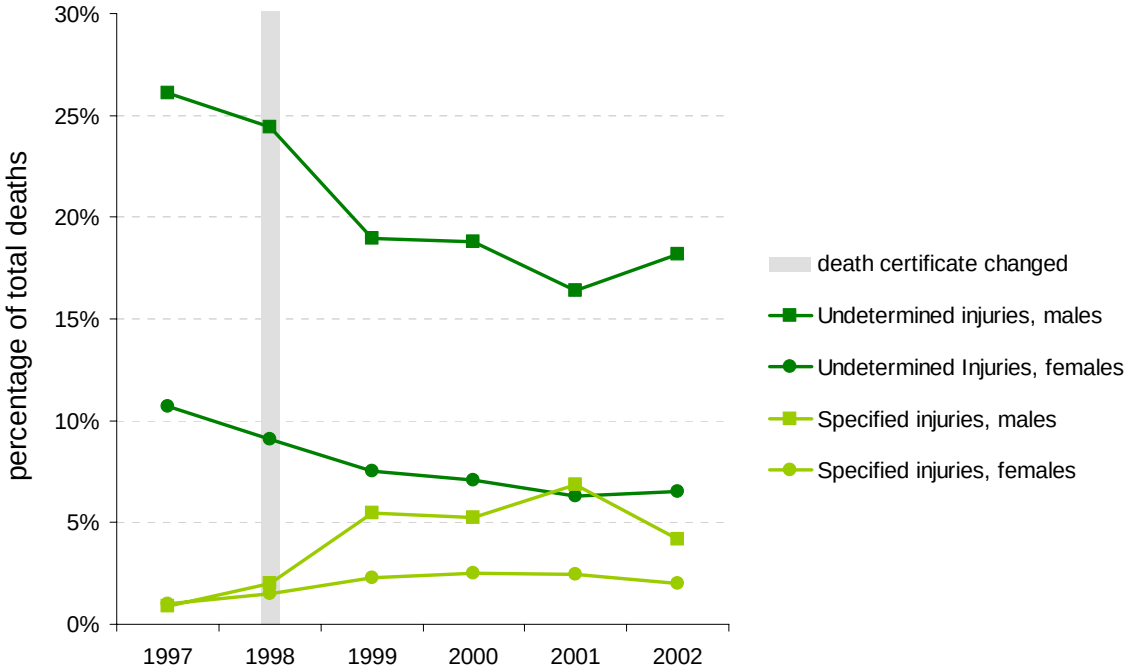


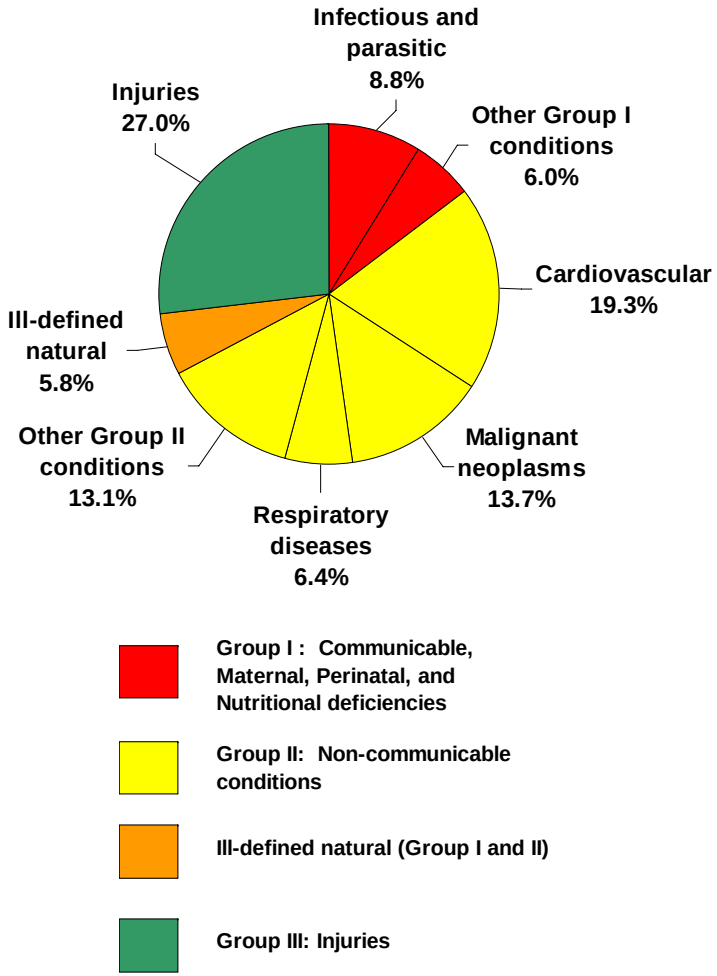
Figure 9: Proportion of total Western Cape male and female deaths due to injuries, Stats SA 1997-2002

- The proportion of deaths due to undetermined injuries declined from 1997 to 2002, but the proportion of specified injuries increased, particularly since 1998, the year the new death certificate was introduced.
- The proportion of deaths due to ill-defined causes increased from 6% to 7% in 1998 and declined thereafter.
- A sizable proportion of deaths are due to ill-defined cardiovascular causes, particularly for females. The patterns of specified cardiovascular causes should therefore be interpreted carefully.

The overall cause of death profiles for males and females in 1997 and 2002 are shown using pie charts in Figures 10 and 11. In addition, the ten leading specific causes of death for 1997 and 2002 were ranked and are shown using bar graphs. The large proportion of deaths from injuries, contributing to the overall cause of death profile in males, is particularly evident. Injuries accounted for 27% of the total male deaths in 1997 and 22% of the total male deaths in 2002, while 12% of female deaths in 1997 were due to injury, and 8.5% in 2002. In the case of females, death from non-communicable diseases was more prominent. Non-communicable diseases accounted for 65% of the total female deaths in 1997, and 61% in 2002. Stroke, ischaemic heart disease, and Diabetes mellitus ranked among the ten leading specific causes of death from 1997 to 2002 for both sexes. Hypertensive heart disease and ill-defined cardiovascular disease ranked among the ten leading specific causes in females, while chronic obstructive pulmonary disease and trachea/bronchial/lung cancer ranked in males. Ill-defined natural causes accounted for approximately 6% of the total deaths for both sexes in 1997 and 2002.

A marked increase in deaths from 1997 to 2002 among both males and females was due to deaths from Group I conditions (communicable diseases, maternal conditions, perinatal conditions, and nutritional deficiencies). In 1997, Group I conditions accounted for 16% of male deaths and 17% of female deaths. By 2002, the numbers had increased to 23% of male deaths and 25% of female deaths. The increase was largely due to an increase in deaths from tuberculosis, HIV/AIDS and lower respiratory infections with tuberculosis becoming the second leading specific cause of death for both males and females by 2002.

- A marked increase in deaths from 1997 to 2002 among both males and females was due to deaths from the TB and HIV/AIDS complex with an increase in TB, HIV/AIDS and lower respiratory infections resulting in the increase in Group I conditions
- Non-communicable diseases still dominate the cause of death profile in the Western Cape, particularly among women.
- Injury deaths accounted for a large proportion of the total male deaths.



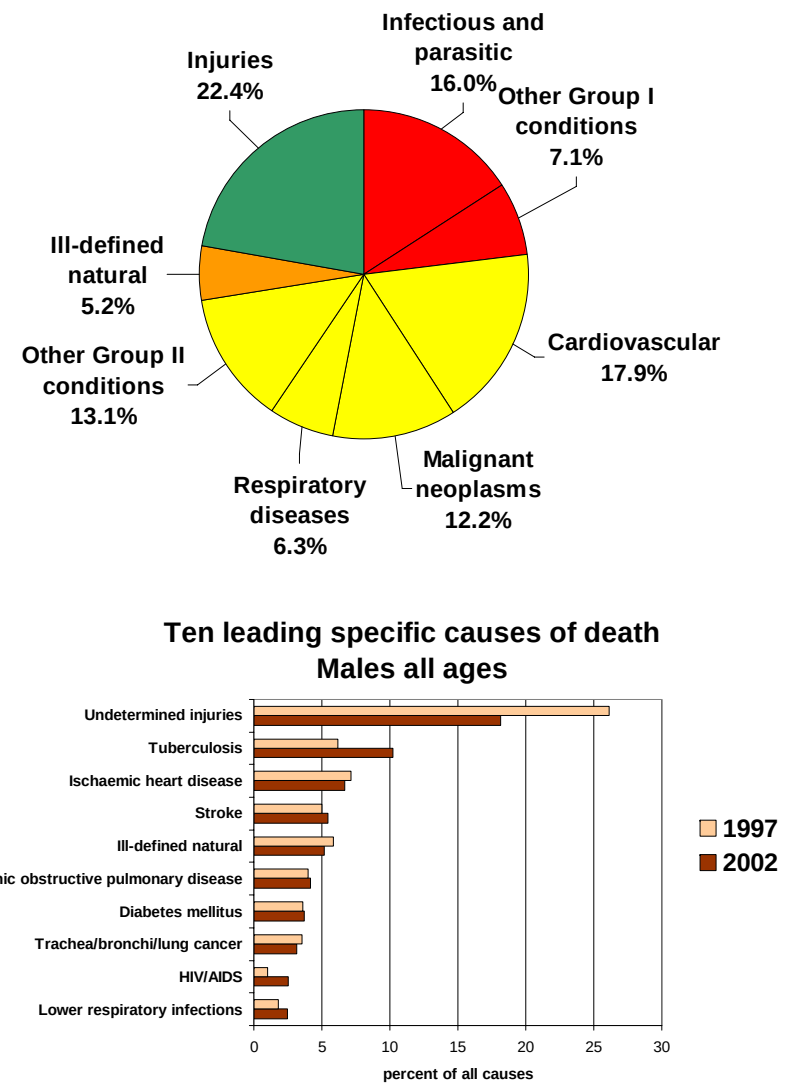


Figure 10: Cause of male deaths (all ages) Western Cape, Stats SA 1997 and 2002

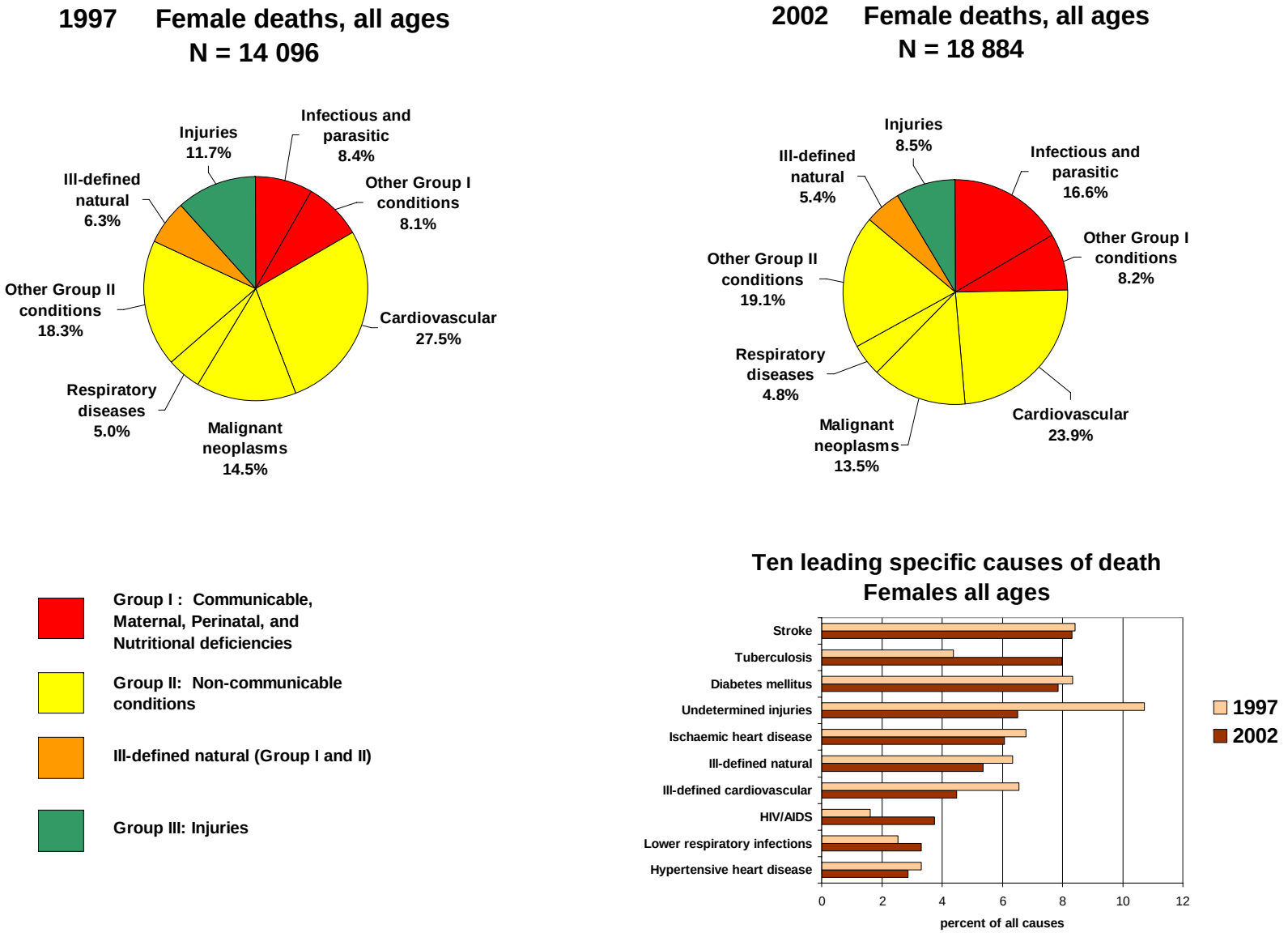


Figure 11: Cause of female deaths (all ages) Western Cape, Stats SA 1997 and 2002

2.4 Trends by age group

The cause of death profile differs markedly across age groups. Figures 12 through 18 show mortality profiles by age for 1997 and 2002 using the following age groups: <1, 1-4, 5-14, 15-44, 45-59, and 60+ years. The ten leading specific causes of death for 1997 and 2002 for each age group were ranked and are shown in bar graphs. The ten leading specific causes of death were determined on the basis of the average in 1997 and 2002. It is important to note that ranking is dependent upon the choice of aggregation used.

2.4.1 Infants (less than 1 year)

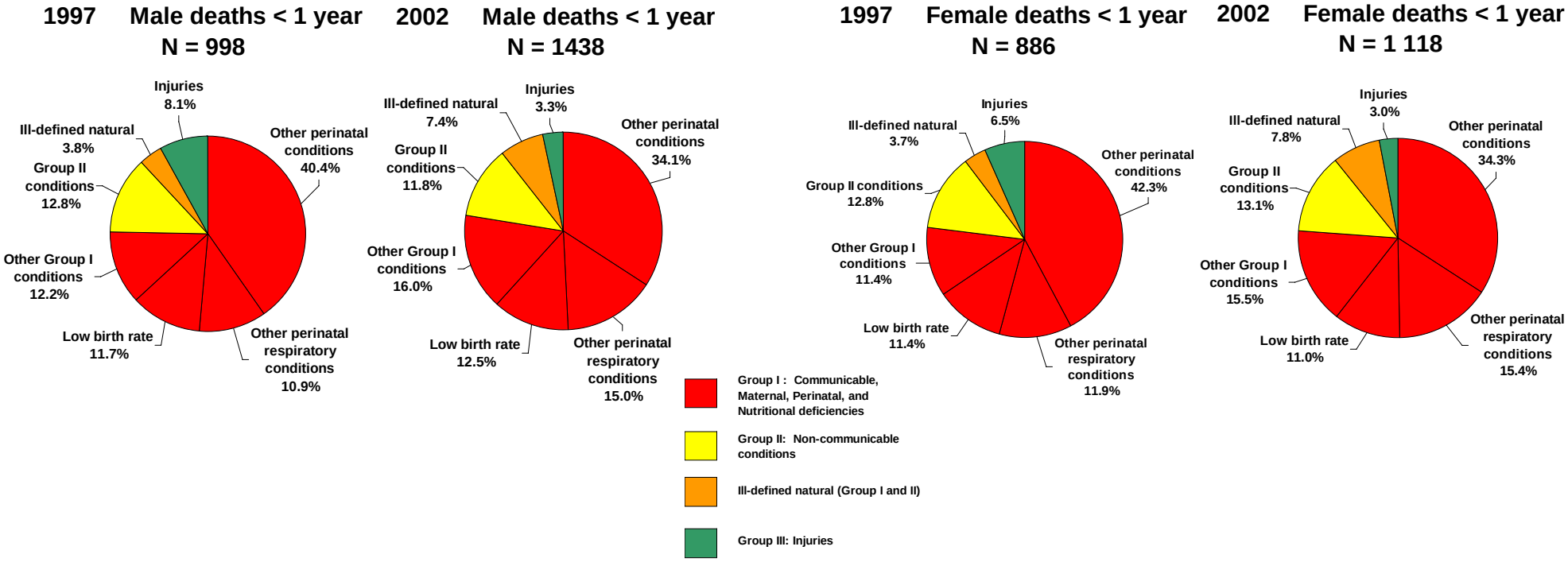
The number of deaths of infants less than 1 year of age reported by Stats SA increased steadily during the period from 1997 to 2002. The causes of death for this age group are shown in Figure 12. Although there are consistently more male infant deaths than females, the profiles are very similar in this age group where mortality is dominated by deaths from communicable diseases, perinatal conditions and nutritional deficiencies (Group I). In 1997, death due to Group I conditions accounted for 75% of the total infant male deaths and 76% total infant female deaths; in 2002 the figures were 79% for males and 75% for females. The proportion of injuries in both males and females declined during this period. However, as injury rates in infants are unlikely to change rapidly, it would suggest that the decline has been a result of the increase in deaths due to natural causes.

The bar graphs in Figure 12 show the ten leading specific causes of death in 1997 and 2002 for male and female infants under 1 year. The rankings were very similar for males and females. Undetermined injuries and ill-defined natural causes ranked among the ten leading specific causes of death during the period. Other infectious and parasitic diseases, other endocrine and metabolic conditions, and cot death also ranked among the leading ten. However the majority of Group I causes that dominate this age group and rank among the leading ten specific causes of death, fell within the category of Perinatal Conditions (equivalent to the ICD-10 chapter “Certain conditions origination in the perinatal period”). The leading cause of death in under ones was *other perinatal conditions*. Analysis of the national data at a finer age resolution, based on a special tabulation provided by Stats SA, suggests that the data for under-ones, as it is currently coded, is not be a true reflection of the mortality of this age group (Appendix C). This analysis revealed that deaths due to perinatal conditions were recorded as occurring across all ages up to 1 year and not just in the first week. Discussions with Stats SA have indicated that causes of death were preferentially given perinatal codes if the death occurred before the first birthday, and that these codes were not restricted to causes *originating* in the first week of life in accordance with the ICD definitions. This coding practice has resulted in a substantial inflation of perinatal conditions and a corresponding under representation of the actual causes of death prior to 12 months of age, making it very difficult to interpret these data. Stats SA have changed this coding practice for deaths occurring from 2006 onwards.

- Interpretation of the cause of death profile in infants is difficult as there has been incorrect coding of causes to perinatal conditions, even when the deceased was older than 1 week. For example, diarrhoea does not appear as an explicit condition in the leading causes as they have been mis-coded to perinatal causes.

- The numbers of registered infant deaths (aged under 1 year) has increased substantially between 1997 and 2002.

- Deaths from Group I conditions predominate the under 1 age group, primarily perinatal and neonatal causes.



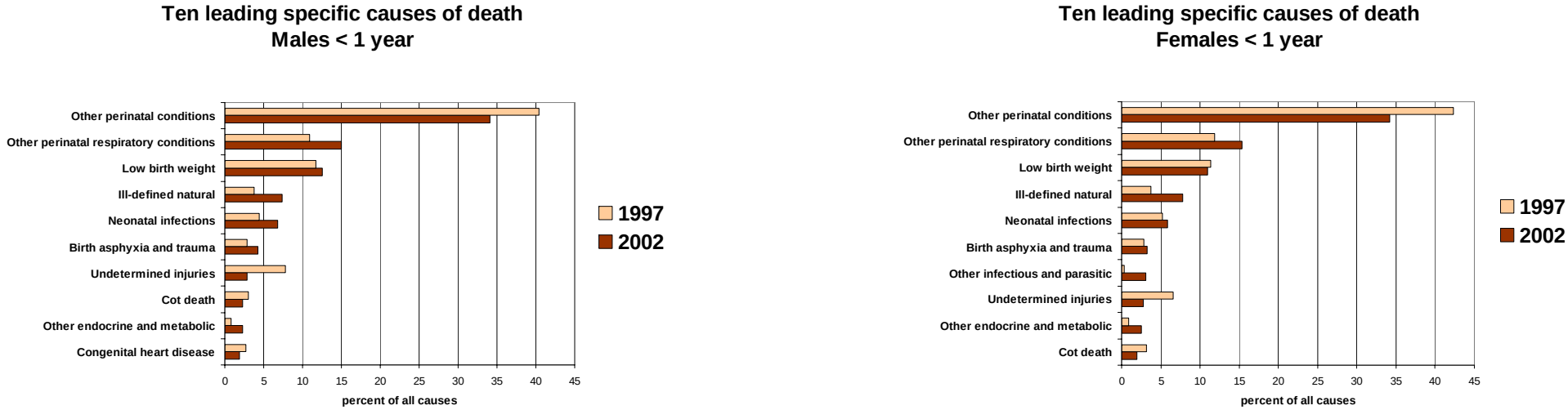


Figure 12: Cause of death of infant males and females, aged under-1, Western Cape, Stats SA 1997 and 2002

2.4.2 Children 1-4 years

The number of deaths in children aged 1-4 years is much lower than the infant deaths, but these too have increased over the period 1997-2002 (Figure 13). Injuries play a major role in the mortality of male and female children of this age group: in 1997, 41% of male children aged 1-4 years died from injuries and 32% of female children died of injuries. Unfortunately most injuries are recorded as "undetermined whether intentional or unintentional" and this cause ranked as the leading specific cause of death in male and female children in 1997 and in 2002. Communicable diseases and nutritional deficiencies (Group 1) are the most common broad cause, accounting for 33% of the total deaths of male children in 1997 and in 2002, and 44% of the total deaths of female children in 1997 and 46% in 2002. Diarrhoeal diseases, tuberculosis, HIV/AIDS and lower respiratory infections ranked among the ten leading specific causes of death in both male and female children aged 1 to 4 in 1997 and 2002. Diarrhoeal diseases ranked second in males and females in 1997. It is interesting to observe that deaths from this cause decreased among males from 12% in 1997 to 10% in 2002 but increased among females from 9% in 1997 to 14% in 2002. This was accompanied by larger increases in the proportions of deaths from HIV and TB in the males compared with females. There is a noticeable increase in the proportion of deaths from other endocrine and metabolic disorders. Deaths certified with "immune-deficiency" as a cause have been coded by Stats SA to the unspecified immune suppression which falls into this category. Non-communicable (Group II) conditions accounted for approximately 17% of male child deaths and female child deaths in 1997 and in 2002. Protein-energy malnutrition ranked as one of the ten leading specific causes of death in both sexes in 1997 and also in 2002 accounting for about 3% of male child deaths and about 6% of female child deaths. Unlike the trend in the all age data, the proportion of deaths due to ill-defined natural causes in this age group increased between 1997 and 2002. Ill-defined causes accounted for a higher proportion of male deaths than female deaths among children 1-4 years.

- The number of registered child deaths, aged 1-4 years, increased between 1997 and 2002.
- The proportion of injury deaths is high in both male and female children aged 1-4 years. Details on the causes of the injuries are not available as most are unspecified on the death certificate.
- The proportion of deaths due to infections increased between 1997 and 2002, as did ill-defined natural causes, and endocrine and metabolic causes.

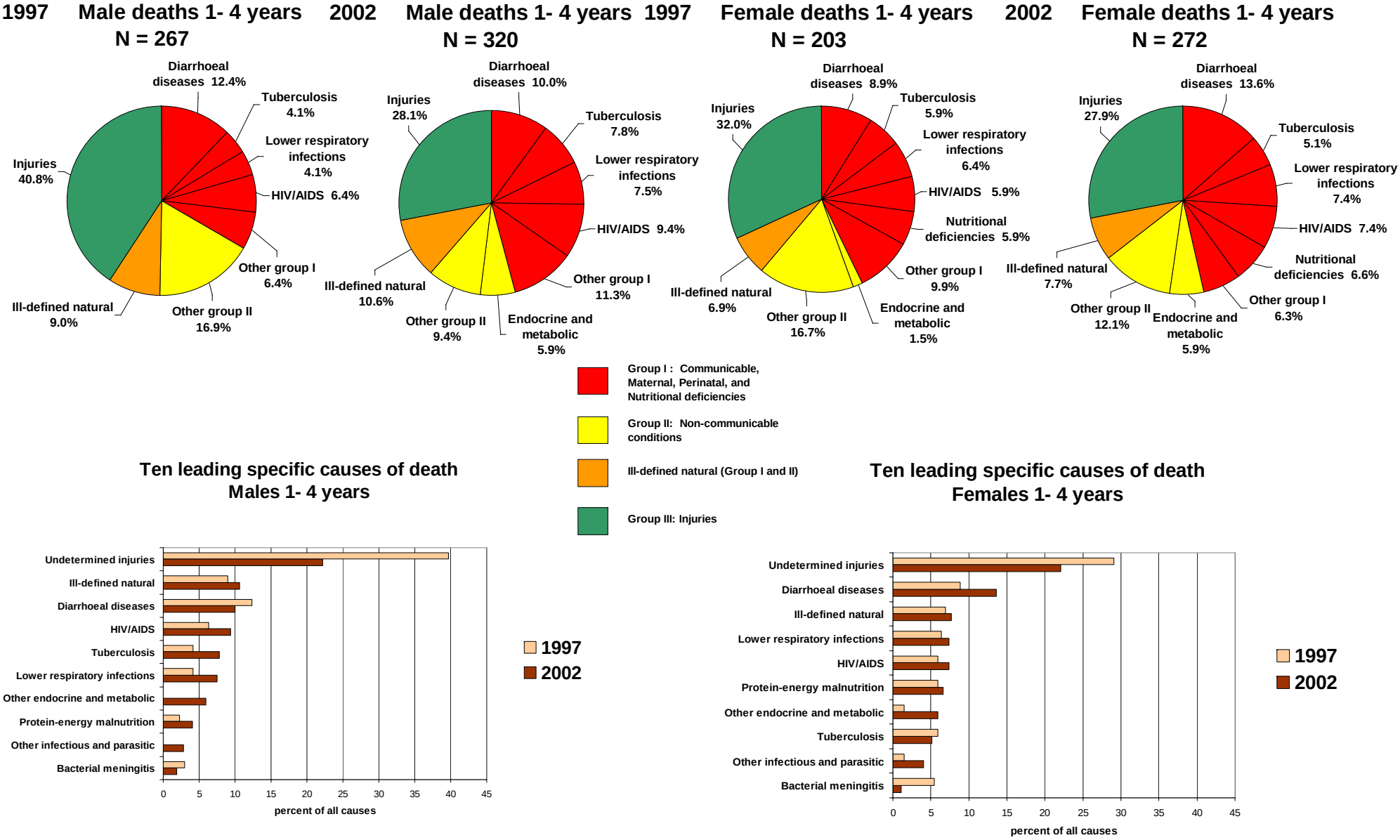


Figure 13: Cause of death of male and female children aged 1-4 years, Western Cape, Stats SA 1997 and 2002

2.4.3 Children 5-14 years

For each female death in the age group 5-14 years there are 1.5 male deaths. In 1997 the sex ratio was 1.51 and in 2002 the ratio was 1.48, showing little change.

Deaths as a result of injuries contribute a very large proportion to the total number of deaths of children aged 5 to 14 years. Among males, 69% of the total deaths in 1997 were due to injuries, and 52% among females (Figure 14). The vast majority of deaths in this age group were undetermined injuries, which ranked as the leading specific cause of death in both males and females in 1997 and in 2002.

Deaths due to infections and nutritional conditions (Group I) increased considerably in this age group from 1997 to 2002. In 1997, Group I conditions accounted for 6% of the total deaths among male children aged 5-14, and 10% among females. By 2002 this had increased to 29% of male deaths and 18% of female. Tuberculosis, HIV/AIDS and lower respiratory infections were among the Group I conditions that increased from 1997 to 2002 ranking among the ten leading specific causes of death in this age group. Injury deaths (Group II) accounted for 22% of deaths in males in 1997 and 28% in 2002. In females injuries accounted for 32% of deaths in 1997 and 33% in 2002. Ill-defined natural causes contributed from 3% to 6% of the total deaths in male and female children aged 5 to 14 in 1997 and 2002.

- The proportion of deaths due to injuries is high in both male and female children aged 5-14 years.
- Deaths from infections increased rapidly between 1997 and 2002; specifically TB, HIV/AIDS and lower respiratory infections.

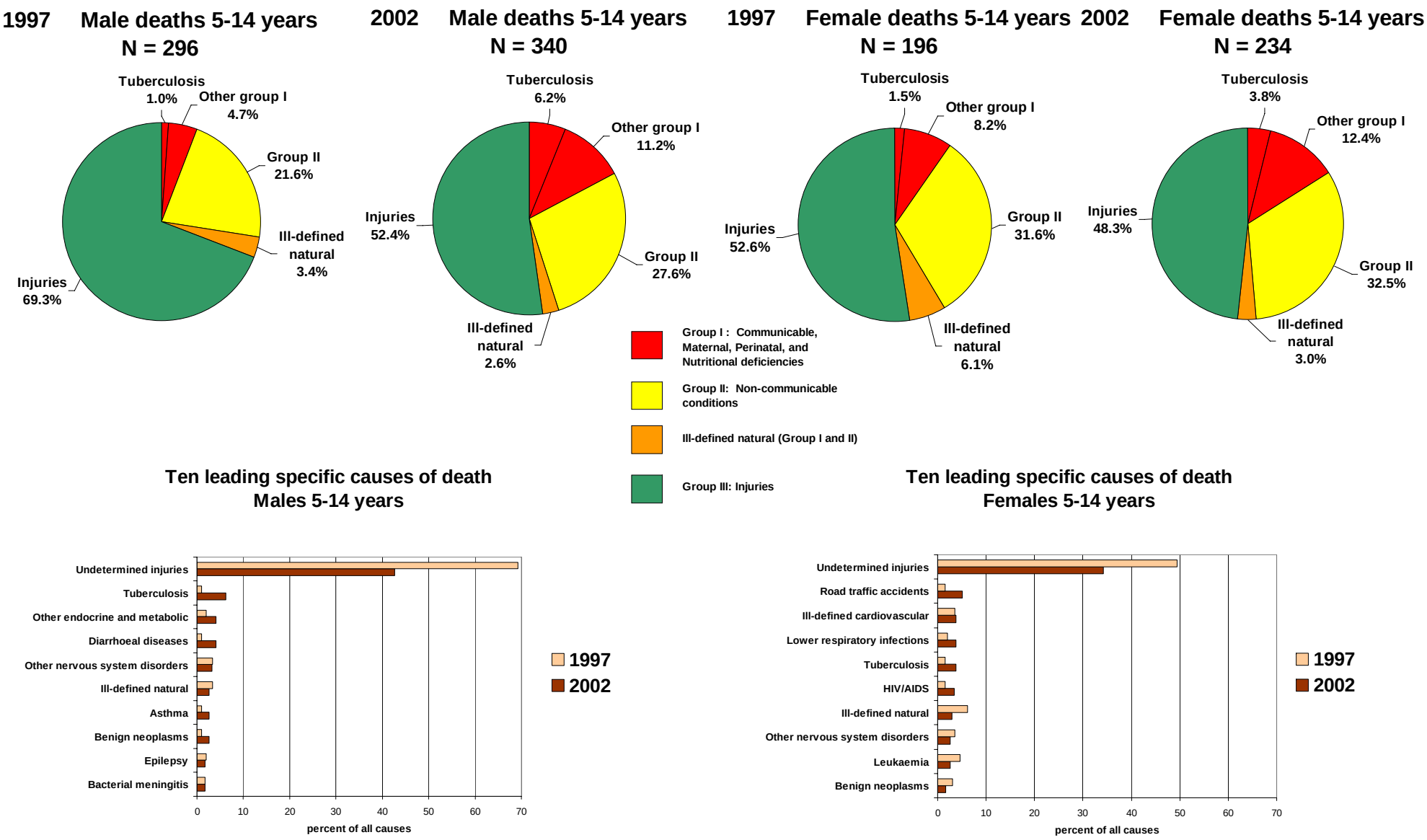


Figure 14: Cause of death of male and female children aged 5-14 years, Western Cape, Stats SA 1997 and 2002

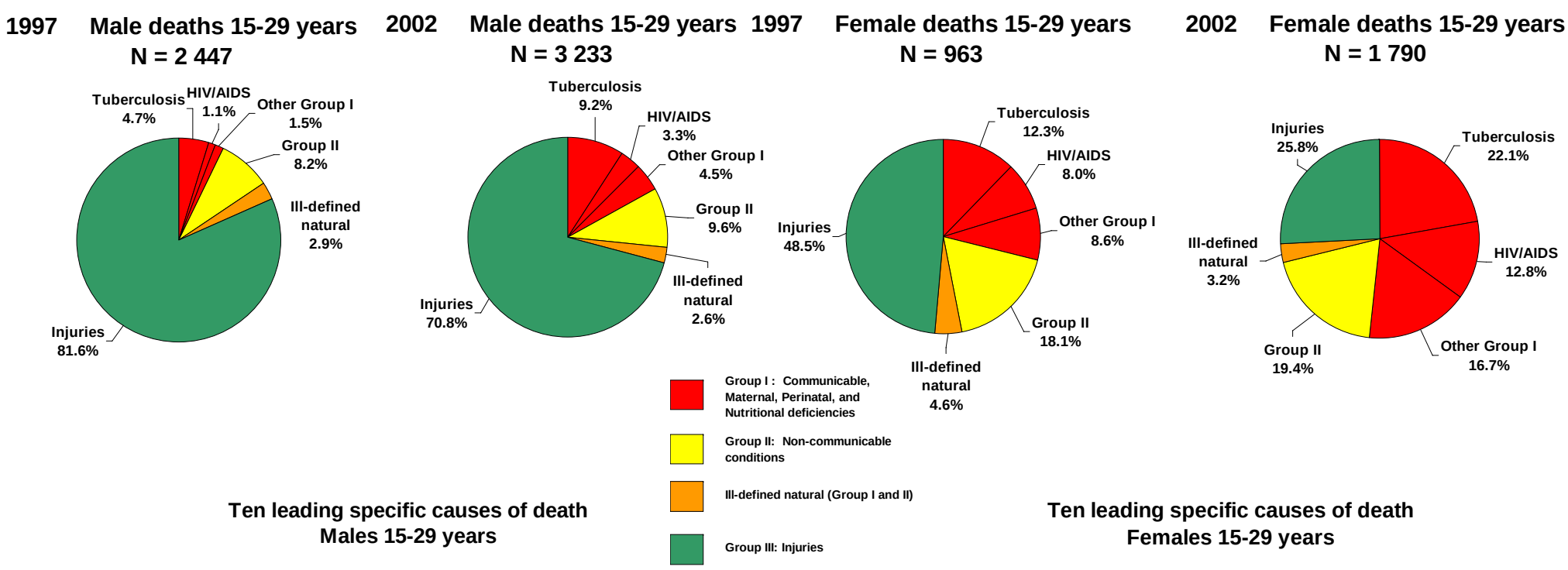
2.4.4 Adults 15-29 years

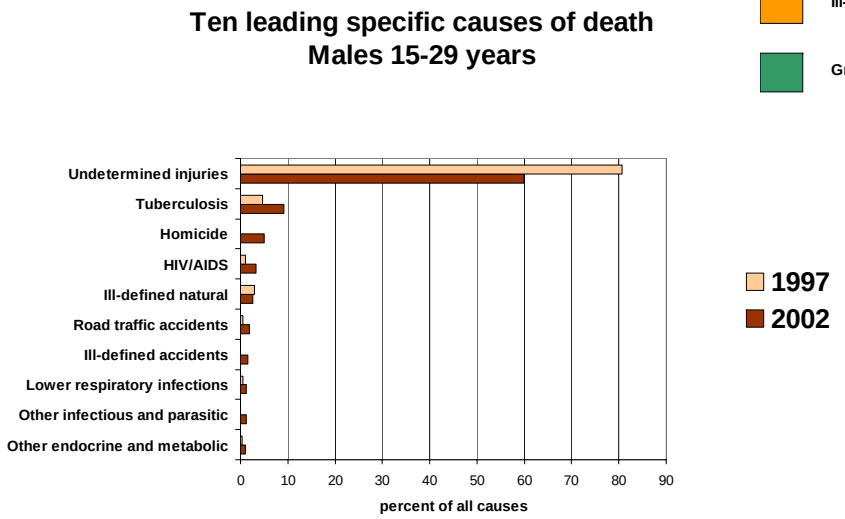
Death due to injury is a major cause of mortality in young males aged 15-29 years (Figure 15). In 1997, 82% of the total males deaths in this age group were due to injuries, while the figure for females was 49%. Homicide, road traffic accidents and ill-defined accidents ranked among the ten leading specific causes of death. Undetermined injuries ranked as the leading cause of death in males of this age group.

Deaths due to Group I conditions (communicable diseases, maternal and nutritional conditions) increased among both sexes from 1997 to 2002. The numbers were much higher and increased to a larger extent among females. Group I deaths in females increased from 29% in 1997 to 52% in 2002, mostly due to an increase in deaths from tuberculosis and HIV/AIDS. Tuberculosis deaths among females increased from 12% to 22% during this time period and 4.7% to 9.2% among males. Deaths recorded as HIV/AIDS deaths accounted for 13% of the total deaths in females aged 15-29 in 2002; this was up from 8% in 1997. HIV/AIDS is under-recorded on death certificates with a tendency to certify the indicator conditions only. Males of this age group died from HIV/AIDS at 3.3% in 2002; up from 1.1% in 1997. Six of the ten leading causes of death in females were from the Group I category; five of the leading ten in males. Among these were tuberculosis, HIV/AIDS and lower respiratory infections.

Non-communicable (Group II) contributed 8% to the total mortality of males aged 15 to 29 years in 1997 and 10% in 2002. Among females these figures were 18% and 19% respectively. Ill-defined natural causes contributed from 2.6% to 4.6% to the total deaths of each sex in 1997 and 2002.

- Deaths from Group I conditions increased in the 15-29 age group, especially among females, due to increases in deaths from HIV/AIDS, TB and lower respiratory infections.
- Injuries deaths are very high in males in the 15-29 year age group.





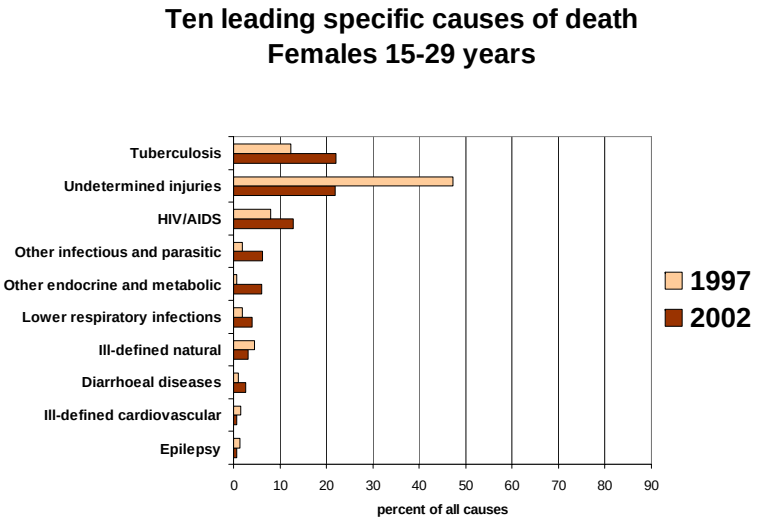


Figure 15: Cause of death of males and females aged 15-29 years, Western Cape, Stats SA 1997 and 2002

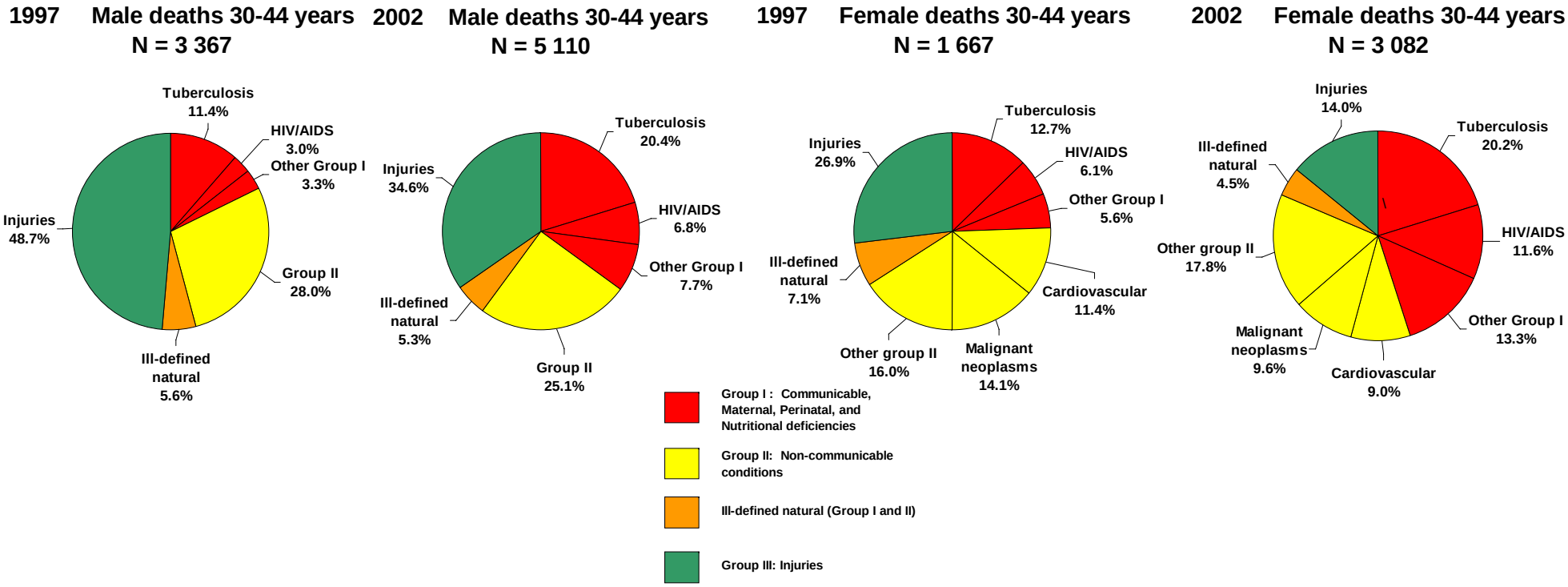
2.4.5 Adults 30-44 years

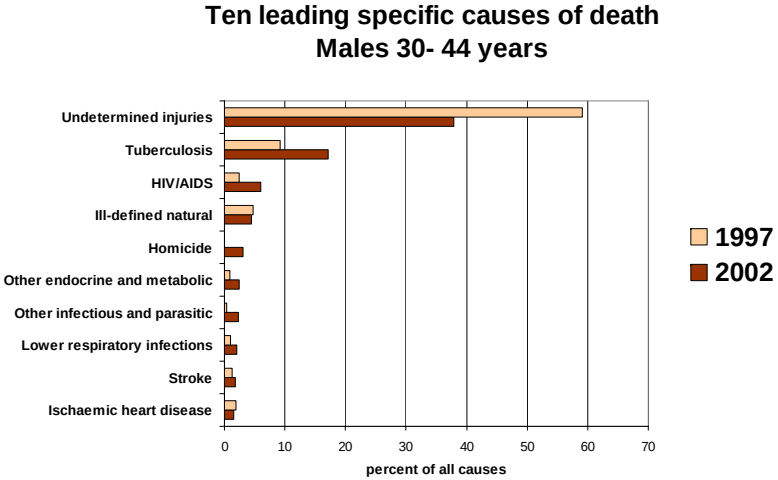
Deaths due to the communicable diseases and maternal and nutritional conditions (Group I) increased among adults aged 30 to 44 years from 1997 to 2002, more so among females. In males, deaths from Group I conditions increased from 18% in 1997 to 35 % in 2002, in females the increase was from 24 % to 45%. Tuberculosis and HIV/AIDS ranked high among the ten leading specific causes of death in both males and females, five of the ten causes were from Group I conditions in both sexes.

Non-communicable diseases begin to make a considerable contribution to mortality by the ages of 30 to 44 years, particularly among females. In 1997 deaths from Group II conditions contributed 28% to the total deaths among males and 25 % in 2002. Among females, the figures were 42% and 36%. Stroke and ischaemic heart disease ranked among the ten leading specific causes of death in males; and stroke, breast cancer and Diabetes mellitus, in females.

Injury deaths continue to make a substantial contribution to mortality in males of this age group with 49% of the total deaths in 1997 and 35% in 2002. Deaths from ill-defined natural causes contributed from 5.3% to 7.1% to the total deaths of each sex in 1997 and 2002.

- Deaths due to Group I conditions increased from 1997 to 2002 among both sexes, but more so among females. The increase occurred in HIV/AIDS, TB, other infections and lower respiratory infections. There was a parallel increase in other endocrine and metabolic disorders.
- Death from injuries continues to be high in males aged 30 to 44.





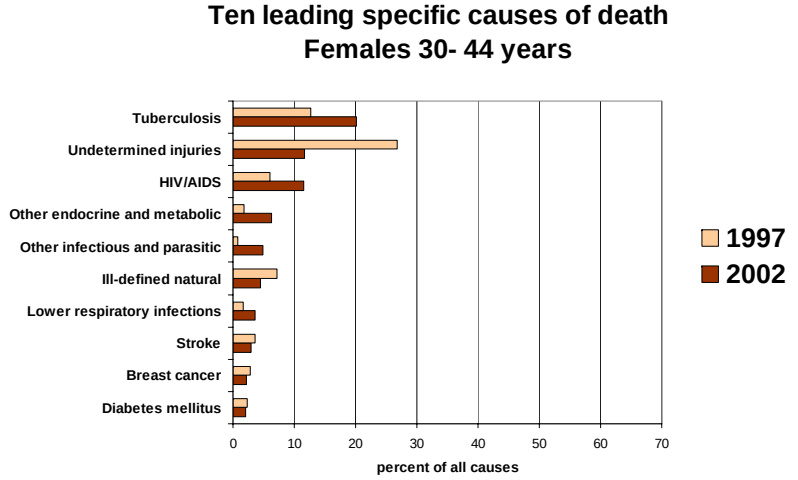


Figure 16: Cause of death of males and females aged 30-44 years, Western Cape, Stats SA 1997 and 2002

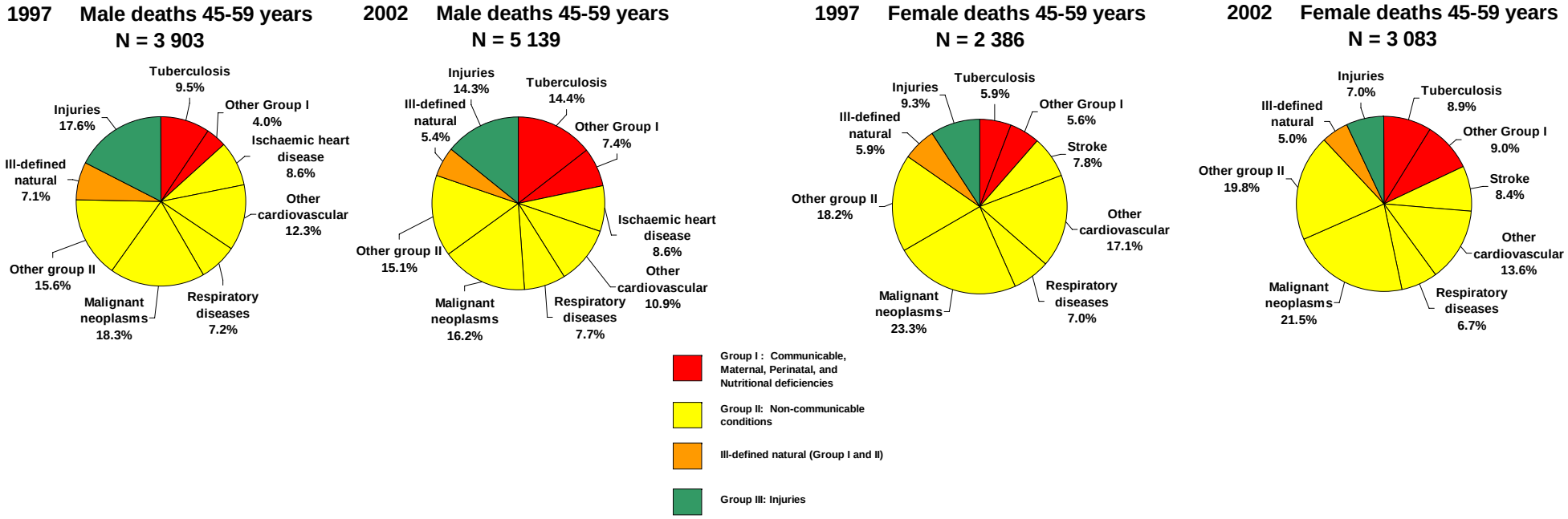
2.4.6 Adults 45-59 years

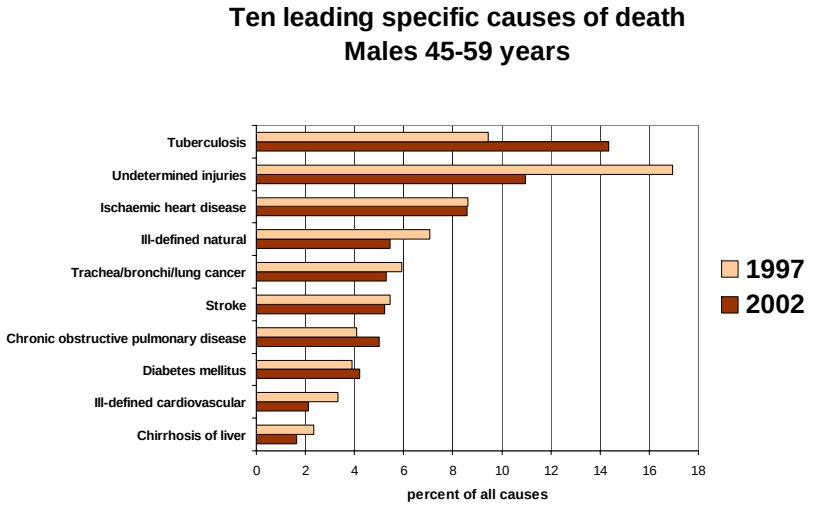
Non-communicable diseases (Group II) contribute the majority of deaths by the ages of 45 to 59 years (Figure 17). Mortality profiles in 1997 were quite similar to those in 2002, but profiles of males differ from profiles of females. Non-communicable diseases accounted for approximately 61% of the total deaths of males of this age group and 72% of females. Deaths from cardiovascular diseases accounted for approximately 15% of the total number of deaths in both sexes in 1997 and in 2002; malignant neoplasms accounted for 14% to 23%; respiratory diseases accounted for approximately 7% and other non-communicable diseases accounted for 9% to 12% of the total. Of the leading specific causes of death in this age group, eight of ten were non-communicable conditions. Death due to ischaemic heart disease, trachea/bronchial/lung cancer, stroke and Diabetes mellitus were common to both sexes. Chronic obstructive pulmonary disease (COPD) and chirrhosis of the liver ranked among the leading specific causes of death for males. Breast cancer and ill-defined cardiovascular ranked among females.

Deaths due to communicable diseases and maternal and nutritional conditions (Group I) increased from 1997 to 2002 in both sexes. Tuberculosis deaths in males increased from 9.5% of the total in 1997 to 14.4% in 2002. In females, tuberculosis deaths accounted for 5.7% of the total deaths in 1997, increasing to 8.9% in 2002. Tuberculosis ranked second to Diabetes mellitus as a leading specific cause of death in this age category in 2002.

Injury deaths contributed just under 20% of the total deaths among males aged 45 to 59 in 1997 and in 2002, approximately twice that of females. Injuries of undetermined cause ranked as the leading specific cause of death in males in 1997 and the second leading cause, after tuberculosis, in 2002.

- Non-communicable diseases contribute the majority of deaths at ages 45-59 years, accounting for 61% of male deaths and 72% of male deaths.
- Group I conditions increased from 1997 to 2002, with TB ranking very high.
- Twice as many males aged 45-59 died from injuries than females.





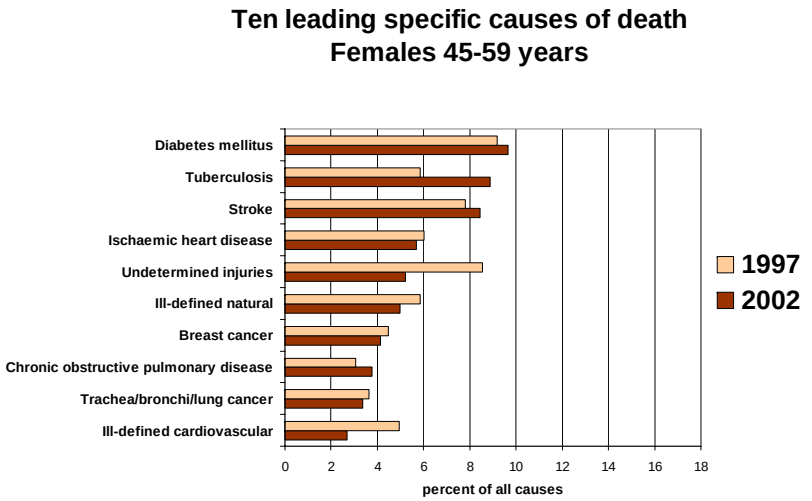


Figure 17: Cause of death of males and females aged 45-59 years, Western Cape, Stats SA 1997 and 2002

2.4.7 Adults 60+ years

Mortality profiles changed very little from 1997 to 2002 in the over 60 age group. Profiles for males and females were similar. Non-communicable diseases (Group II) contribute the vast majority of deaths in persons aged 60 years and older (Figure 18). In 1997, 80% of the total deaths among males of this age group, and 81% of females, was due to Group II conditions. The percentages were very similar in 2002 at 83% for males and 82% for females. Deaths due to communicable diseases and maternal and nutritional conditions (Group I) contributed approximately 9% to the total number of deaths in males and in females in 1997 and 2002; ill-defined natural causes contributed between 3% to 6%; injuries contributed less than 6%. Of Group II conditions, cardiovascular disease contributed approximately 33% of the total deaths in males in 1997 and 2002 and approximately 38% of females in both years. Malignant neoplasms accounted for 22% of the total male deaths in 1997 and 2002 and 16% of female deaths in 1997 and 2002.

Stroke ranked as the leading specific cause of death in females over 60 in 1997 and in 2002. Ischaemic heart disease, and ill defined cardiovascular disease ranked among the ten leading specific causes, along with Diabetes mellitus, chronic obstructive pulmonary disease (COPD), trachea/bronchial/lung cancer, and ill-defined natural causes. The ten leading causes were similar for males but with a slightly different order of ranking. Ischaemic heart disease was ranked as the leading cause of death in males, and while tuberculosis, undetermined injuries and prostate cancer ranked among the leading ten specific leading causes in males, hypertensive heart disease, lower respiratory tract infections and ill-defined cancers ranked among females.

- Very little change in mortality profiles from 1997 to 2002 for persons aged 60 and over, with similar profiles for males and females.
- More than 80% of deaths were due to non-communicable diseases.
- Cardiovascular diseases accounted for over 1/3 of the total deaths in males and females over 60.

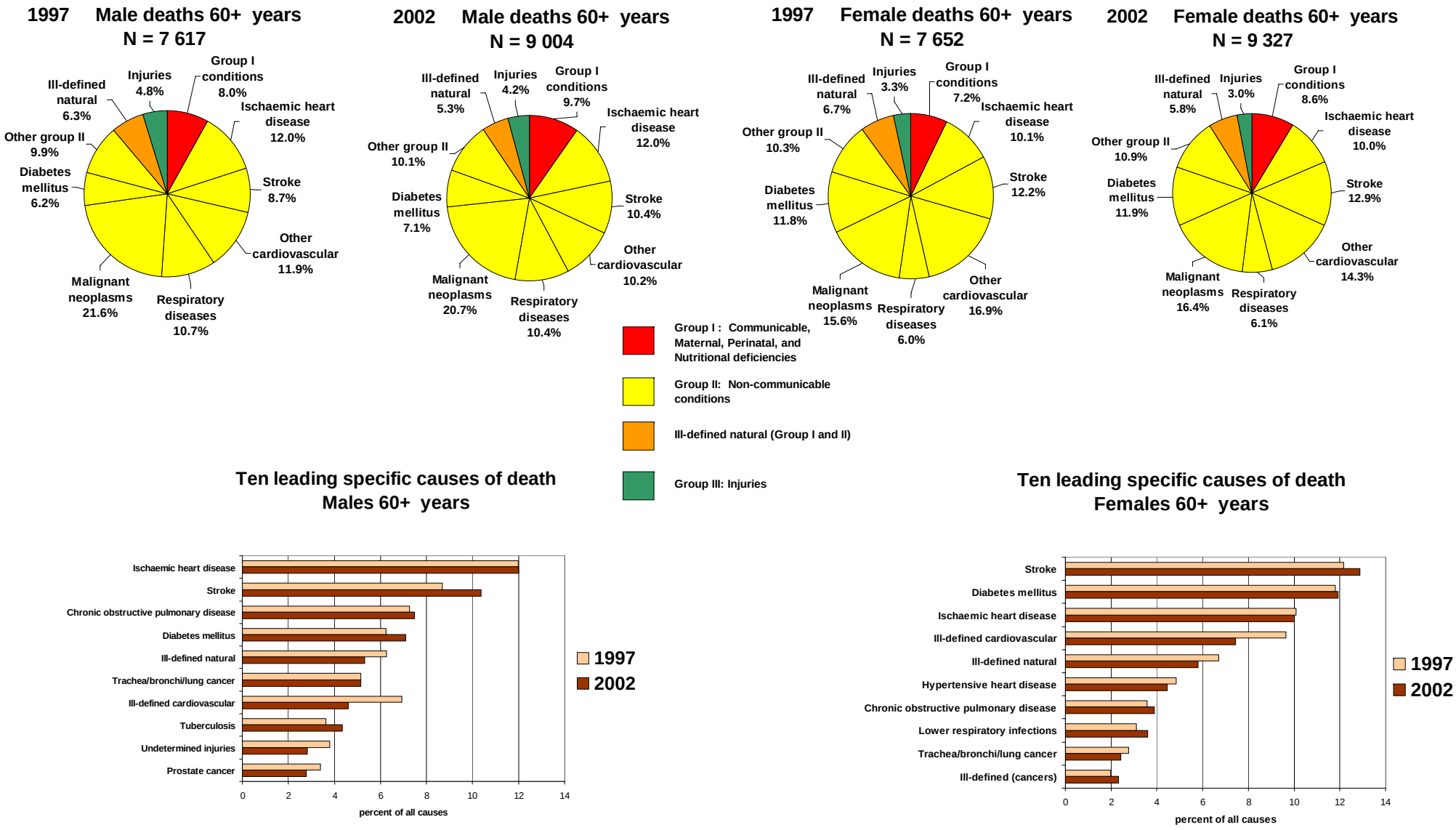


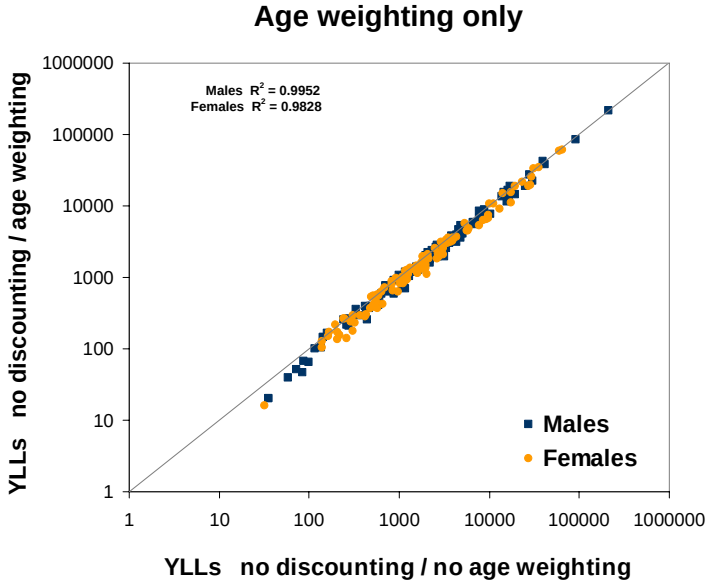
Figure 18: Cause of death of males and females aged 60+ years, Western Cape, Stats SA 1997 and 2002

2.5 Years of life lost (YLLs)

Years of life lost (YLLs) are an important measure of premature mortality as the age of death is taken into account. The original GBD studies and the SA NBD studies made use of age weighting in the calculation of the YLLs by valuing a year of life in the middle age range higher than those at very young age and old age. However, increasing questions on the justification for age weighting has seen the WHO decide not to use age weighting in the calculations of YLLs and DALYs (WHO 2005 Statistics Report). The Western Cape death data can be investigated to assess what impact age weighting and discounting have on the estimates of YLLs in the South African context.

YLLs calculated with each combination of age weighting and discounting are compared with YLLs calculated with no age weighting and no discounting are shown in Figure 19. This shows the strong correlation between the YLLs calculated with age weighting and without and clearly indicates that the broad ranking of causes will not change with the use of age weighting or without. However, as seen in Table 3, the detailed ranking of the leading 10 causes can be affected by the use of discounting in particular.

- Age weighting makes little difference at a broad level when ranking the causes of years of life lost (YLLs).
- However, depending on the underlying age distribution of deaths, discounting can make a substantial difference to the ranking of leading causes of death by reducing childhood conditions and emphasizing conditions of middle and older ages.
- Serious consideration should be given to the question of age weighting and discounting in the calculation of YLLs and DALYs if these measures are to be used for decision making.



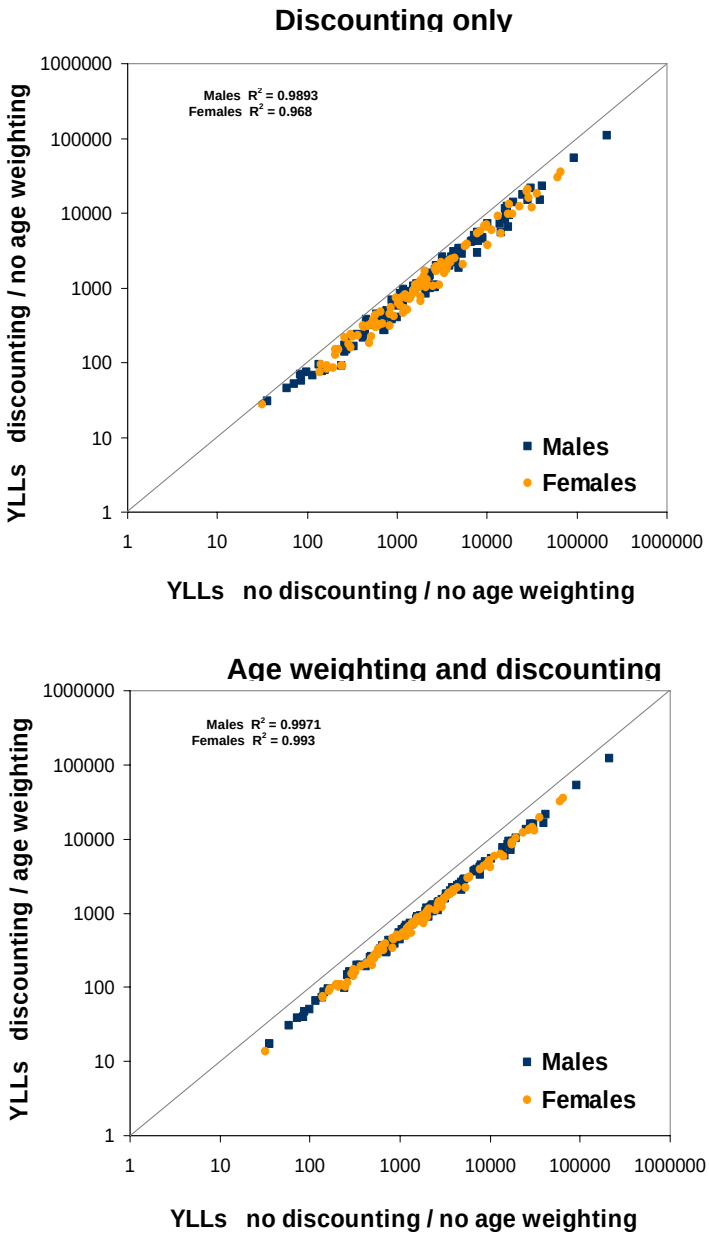


Figure 19: Years of life lost comparing the use of age weighting and discounting, Western Cape, Stats SA, 2002

Table 3 shows the ranking of the causes of death in 2002 based on YLLs calculated with age weights and without. It can be seen that TB ranks the top by a long margin, regardless of weighting. However, for other conditions that each account for much more similar proportions of the years of life lost, there are substantial changes in the actual position in the ranking. Discounting tends to increase the burden of conditions affecting middle to older ages, and decreases the burden of conditions affecting younger ages. The category, other perinatal conditions drops substantially in rank for both males and females, while Diabetes mellitus, stroke and ischaemic heart disease have a substantially higher ranking for females. Age weighting on the other hand does not have a major impact on the ranking. It is interesting to note the different impact for males and females, which arises from the underlying age distribution of deaths. This suggests that the impact of discounting is particularly sensitive to the age distribution of deaths.

The ten leading specific causes of YLLs are shown in Figure 20 for 1997 and 2002. YLLs were calculated without age weighting and without discounting. As with ranking by percentage of total deaths in Figures 10 and 11, the leading condition for males in both years was undetermined injuries. Furthermore, years of life lost due to Group I conditions increased in both males and females from 1997 to 2002. But ranking by YLLs places more emphasis on Group I conditions by ranking many of them higher as compared to percentage of total deaths. Among females, HIV/AIDS ranked as the 3rd leading contributor to YLLs in 2002 but the 8th leading cause of death in that year. Tuberculosis was the second leading cause of death in both males and females in 2002 and the leading cause of years of life lost in females. The cause called *other perinatal conditions* did not rank among the leading 10 causes of death in 1997 or 2002 but ranked 2nd in YLLs in females, 3rd in males in 1997, and 4th in both sexes in 2002.

Most group II conditions moved down in importance in YLLs as compared to percentage of total deaths. Most dramatically, stroke was ranked as the leading cause of death in females in 2002 but 7th in YLLs in that year. Stroke, ischaemic heart disease, Diabetes mellitus and ill-defined cardiovascular moved down in ranking in YLLs as compared to percentage of total deaths in males also, as did COPD.

Table 3: Leading 10 causes of deaths and years of life lost calculated with and without age weighting for males and females, Western Cape, Stats SA, 2002

Males 2002						
	Deaths	**%**	**no discounting, no age weighting**	**%**	**3% discounting only**	**%**
1	Undetermined injuries	18.2	Undetermined injuries	25.9	Undetermined injuries	23.7
2	Tuberculosis	10.2	Tuberculosis	11.2	Tuberculosis	11.6
3	Ischaemic heart disease	6.7	Ill-defined natural	5.0	Ill-defined natural	5.0
4	Stroke	5.5	Other perinatal	4.7	Ischaemic heart disease	4.7
5	Ill-defined natural	5.2	Ischaemic heart disease	3.7	Stroke	3.8
6	Chronic obstructive pulmonary disease	4.1	HIV/AIDS	3.4	HIV/AIDS	3.3
7	Diabetes mellitus	3.7	Stroke	3.0	Other perinatal	3.2
8	Trachea/bronchi/lung cancer	3.2	Chronic obstructive pulmonary disease	2.4	Chronic obstructive pulmonary disease	3.0
9	HIV/AIDS	2.5	Other endocrine and metabolic	2.1	Diabetes mellitus	2.6
10	Lower respiratory infections	2.5	Other perinatal respiratory conditions	2.1	Trachea/bronchi/lung cancer	2.4
			age weighting only	**%**	**3% discounting plus age weighting**	**%**
1			Undetermined injuries	28.4	Undetermined injuries	27.6
2			Tuberculosis	11.0	Tuberculosis	11.8
3			Other perinatal	5.5	Ill-defined natural	4.9
4			Ill- defined natural	5.0	Other perinatal	3.7
5			HIV/AIDS	3.6	Ischaemic heart disease	3.6
6			Ischaemic heart disease	2.9	HIV/AIDS	3.6
7			Stroke	2.4	Stroke	3.0
8			Other perinatal respiratory conditions	2.4	Chronic obstructive pulmonary disease	2.3
9			Other endocrine and metabolic	2.2	Other endocrine and metabolic	2.1
10			Homicide	2.1	Homicide	2.1

Females 2002						
	Deaths	**%**	**no discounting, no age weighting**	**%**	**3% discounting only**	**%**
1	Stroke	8.3	Tuberculosis	11.1	Tuberculosis	10.7
2	Tuberculosis	8.0	Undetermined injuries	10.3	Undetermined injuries	9.1
3	Diabetes mellitus	7.9	HIV/AIDS	6.1	Diabetes mellitus	6.2
4	Undetermined injuries	6.5	Other perinatal	5.4	Stroke	5.9
5	Ischaemic heart disease	6.1	Ill-defined natural	5.0	HIV/AIDS	5.5
6	Ill-defined natural	5.4	Diabetes mellitus	4.9	Ill-defined natural	4.9
7	Ill-defined cardiovascular	4.5	Stroke	4.7	Ischaemic heart disease	4.0
8	HIV/AIDS	3.7	Other endocrine and metabolic	3.9	Other endocrine and metabolic	3.7
9	Lower respiratory infections	3.3	Other infectious and parasitic	3.3	Other perinatal	3.6
10	Other endocrine and metabolic	3.0	Ischaemic heart disease	3.0	Lower respiratory infections	3.0
			age weighting only	**%**	**3% discounting plus age weighting**	**%**
1			Tuberculosis	11.8	Tuberculosis	12.1
2			Undetermined injuries	11.6	Undetermined injuries	11.0
3			HIV/AIDS	6.8	HIV/AIDS	6.7
4			Other perinatal	6.5	Ill-defined natural	4.8
5			Ill-defined natural	5.0	Diabetes mellitus	4.8
6			Other endocrine and metabolic	4.2	Stroke	4.6
7			Diabetes mellitus	3.8	Other perinatal	4.3
8			Other infectious and parasitic	3.7	Other endocrine and metabolic	4.1
9			Stroke	3.7	Other infectious and parasitic	3.5
10			Lower respiratory infections	3.0	Lower respiratory infections	3.0

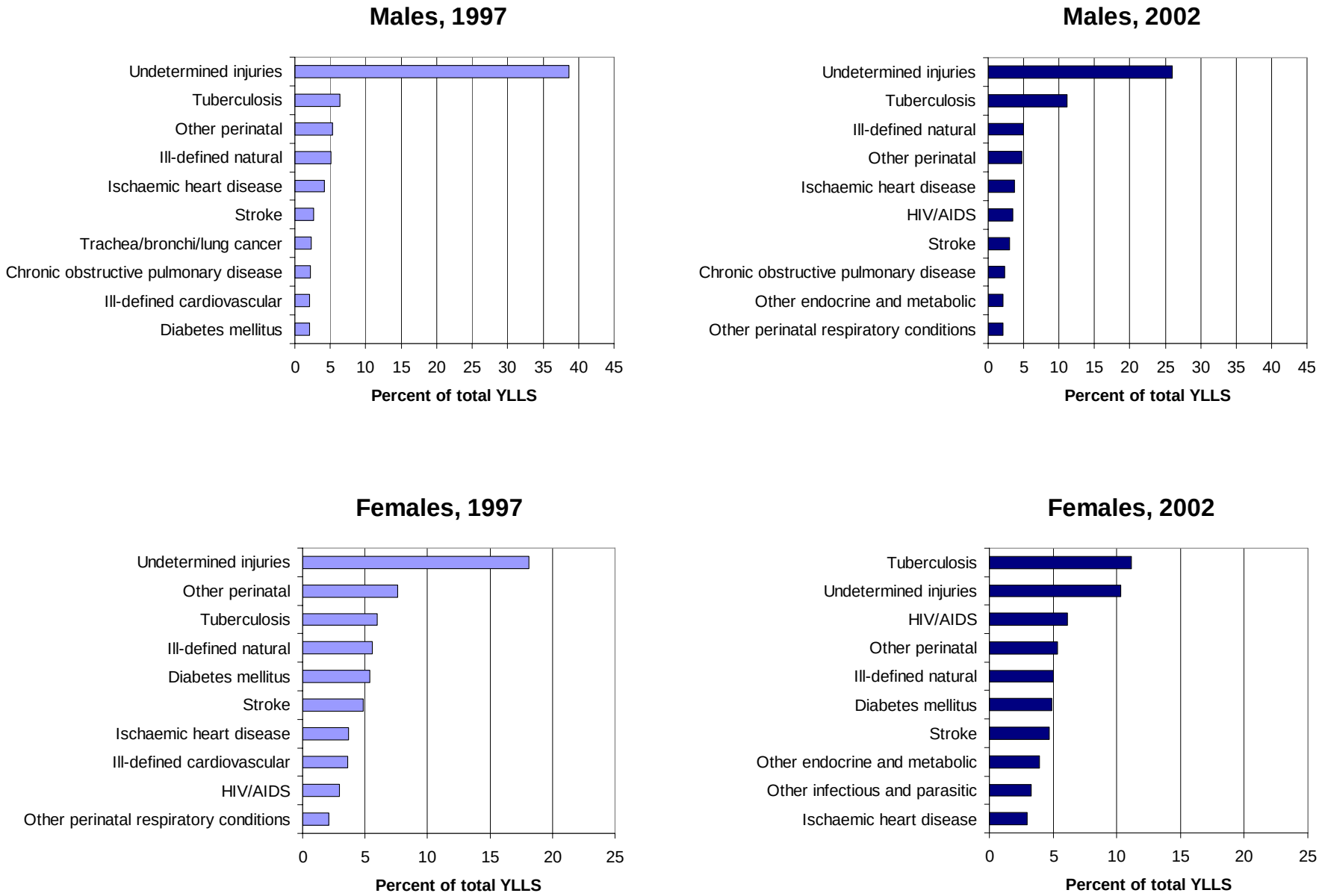


Figure 20: Leading causes of years of life lost for males and females all ages calculated without age weighting or discounting, Western Cape, Stats SA, 1997 and 2002

Discussion

Examination of the cause of death data for the Western Cape from 1997 to 2002 has revealed several data quality issues. Comparison with the ASSA2003 model suggests that the registration of deaths in this province is reasonably high and that it has remained so over the period. While the ASSA model is well-calibrated to empirical adult mortality data, there has been less scope for this to be done in the case of children. The differences seen in the trends of the various sources of data used in this report suggest that the model is currently not as robust for children. There still remains uncertainty about the levels of registration of child and infant deaths and this needs further investigation.

Compared with the national situation, there is a lower proportion of deaths from ill-defined conditions in general but a higher proportion of deaths from ill-defined cardiovascular causes. The low proportion of HIV/AIDS deaths when compared to the ASSA model is partly due to a strict coding practice by Statistics South Africa whereby HIV or AIDS is only coded if explicitly stated as such on the death certificate. It is also lower because the HIV status of the deceased may be unknown or the full details of the cause of death are not provided by the certifier. The Stats SA data does not provide insight into the causes of injuries as only some of the death notifications provide details on the manner of death as a result of the requirements of the Inquest Act. These deficiencies in the cause of death data therefore need to be taken into account when estimating death rates for the province and highlight the importance of the National Injury Mortality Surveillance that has been established at sentinel mortuaries to collect statistics on the manner of injury deaths.

Nonetheless, this analysis has revealed much about the mortality in the province. It is clear that the mortality profile is somewhat difference from the national profile. The Western Cape also experiences the quadruple burden that has been described as the combination of pre-transitional conditions related to under-development, non-communicable diseases, injuries and HIV/AIDS. However, this data shows that the HIV/AIDS epidemic is at a lower scale than in other provinces and that injuries and non-communicable diseases are more pronounced.

There are pronounced gender differences in the registered deaths. There are consistently more male deaths than females, although the province has more females than males. Child mortality is generally higher for males than for females and can be seen in the Western Cape data also. In the age groups over 5 years, the high injury burden contributes substantially to the higher numbers of male deaths. However, in 1997, there was also a consistently higher number of male deaths from natural causes across all ages. This appears to be a result of the higher number of TB deaths among males as well as cardiovascular and respiratory causes which would be related to the higher tobacco and alcohol use among males. Over the period of 1997 to 2002, there was a rapid increase in the number of young adult deaths between 20 and 59 in males and 15 and 49 in females, resulting from increases in HIV/AIDS and related conditions. By 2002, the number of natural deaths among women aged 20- 29 years exceeded the number of deaths among males. In the 60+ age group the numbers of male and female deaths are similar, but the female deaths occur at much older ages than males. The nature of non-communicable diseases differs between males and females. Stroke is a major cause of death in the province. However, males appear to

have the occurrence of ischaemic heart at younger ages while females have diabetes at younger ages. It will be important to calculate age specific rates in the older ages to assess the trends.

It is difficult to rank the causes of death in a meaningful way. Firstly, the granularity of the classification needs careful consideration. For example, all cancers would rank quite differently from the separate cancer sites. This analysis used the SA NBD list which was developed from the GBD list with a few modifications for the South African setting. The list has combined conditions that have a similar aeitiology or health intervention. Mis-classification in the cause of death data makes ranking difficult to interpret. Developing meaningful rankings of the cause of death data will require a burden of disease approach to adjust for the mis-classification. This will require adjustment for the under-registration (small), the ill-defined causes, the mis-classification of HIV/AIDS and the missing details on the manner of death in the case of injuries. In addition, the use of premature mortality to rank the causes needs consideration about the use of age weighting or discounting in the calculation of YLLS.

Conclusion

This analysis of the cause of death data from death notifications provided by Stats SA reveals important information about the mortality profile in the province. However, there is clearly a need for improvement in the quality of the cause of death data. Training in the certification of cause of death is needed to improve the quality of the data and some coding issues need to be addressed. There is a strong need for sub-province level data. However, this data can be used with adjustments for under-registration of deaths and mis-classification of causes to be able to provide clear public health information. Mortality rates and estimates of premature mortality should be estimated as well as rankings of the causes.

Nonetheless, it is clear that the mortality profile in this province is somewhat different from the national. The injury burden is high, particularly among males. It is not clear from this data whether it has decreased during this period. On the other hand, HIV/AIDS has had a major impact on mortality during this period, with rapid increases in the number of young adult deaths. Non-communicable diseases play a major role in the mortality of this province with cardiovascular and respiratory causes featuring for males and stroke and Diabetes mellitus featuring for women.
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Appendix A: South Africa Burden of Disease List

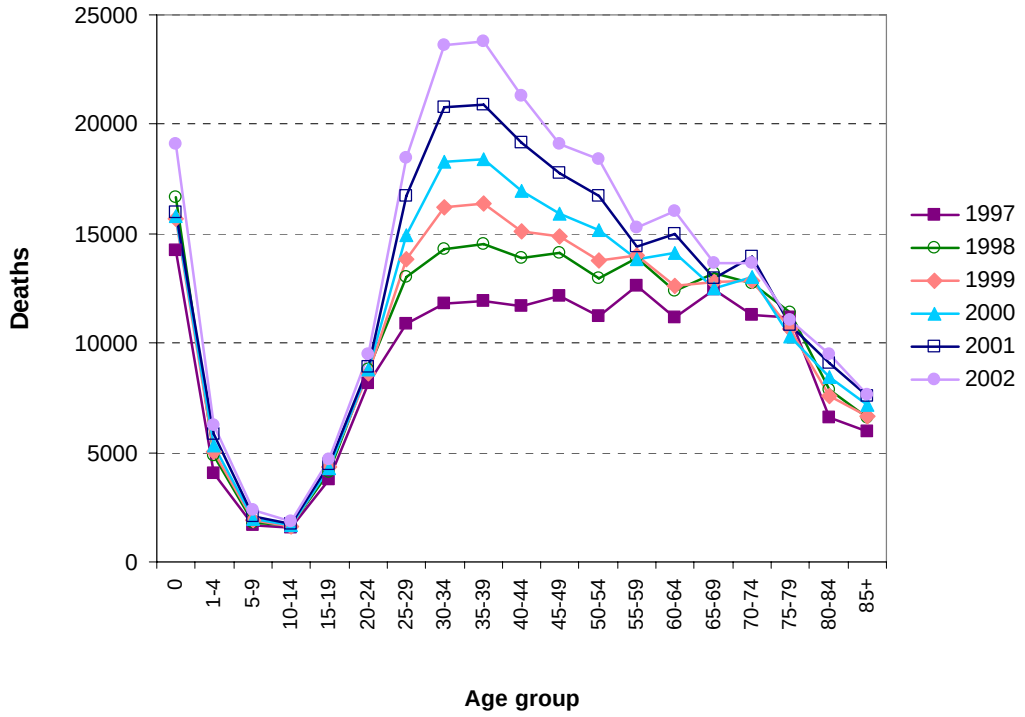
SA NBD code			Title of SA NBD cause	ICD-10 Code
I			**Communicable, maternal, perinatal and nutritional Diseases**	**A00-A99, B00-B99, C46, D50-D53, D64, E00-E02, E40-E46, E50-E64, G00,G03, H65-H66, J00-J22, J90, N70-N73, O00-O99, P00-P96**
I	**A**		**Infectious and parasitic**	**A00-A99, B00-B99, C46, G00,G03, J90, N70-N73**
I	**A**	**ZA1**	Tuberculosis	A15-A19, B90, J90
I	**A**	**ZA2**	STDs excluding HIV	A50-A64, N70-N73
I	**A**	**ZA2a**	Syphilis	A50-A53
I	**A**	**ZA2b**	Other STDs	A54-A64, N70-N73
I	**A**	**ZA4**	Diarrhoeal diseases	A00-A04, A06-A09
I	**A**	**ZA5**	Childhood (Vaccine preventable) cluster	A33-A37, A80, B03, B05-B06, B91
I	**A**	**ZA5a**	Pertussis	A37
I	**A**	**ZA5b**	Polio	A80, B91
I	**A**	**ZA5c**	Diptheria	A36
I	**A**	**ZA5d**	Measles	B05
I	**A**	**ZA5e**	Tetanus	A33 - A35
I	**A**	**ZA5f**	Rubella	B06
I	**A**	**ZA6**	Bacterial meningitis	A39, G00, G03
I	**A**	**ZA7**	Hepatitis	B15-B19
I	**A**	**ZA8**	Malaria	B50-B54
I	**A**	**ZA9**	Schistosomiasis and other tropical diseases	B55-B56, B65, B74
I	**A**	**ZA10**	Leprosy	A30, B92
I	**A**	**ZA11**	Intestinal parasites	B76-B81
I	**A**	**ZA12**	Septicaemia	A40-A41
I	**A**	**ZA13**	Other infectious and parasitic	A05, A20-A28, A31, A32, A38, A42-A49, A65-A69, A70-A74, A75-A79, A81-A89, A90-A99, B00-B02, B04, B07-B09, B25-B34, B35-B49, B57-B64, B66-B73, B75, B82-B89, B94-B99
I	**B**		**Respiratory infections**	**J00-J06, J10-22, H65-H66**
I	**B**	**ZA14**	Lower respiratory infections	J10-J18, J20-J22
I	**B**	**ZA15**	Upper respiratory infections	J00-J06
I	**B**	**ZA16**	Otitis media	H65-H66
I	**C**		**Maternal conditions**	**O00-O99**
I	**C**	**ZA17**	Maternal haemorrhage	O20, O44-O46, O67,O72
I	**C**	**ZA18**	Maternal sepsis	O85-086
I	**C**	**ZA19**	Hypertension in pregnancy	O10-O16
I	**C**	**ZA20**	Obstructed labour	O64-O66
I	**C**	**ZA21**	Abortion	O00-O08
I	**C**	**ZA22**	Other maternal	O21-O29, O30-O43, O47-O48, O60-O63, O68-O71, O73-O75, O80-O84, O87-O92, O95-O99
I	**D**		**Perinatal conditions**	**P00-P96**
I	**D**	**ZA23**	Low birth weight	P05-P07, P22
I	**D**	**ZA24**	Birth asphyxia and trauma	P03, P10-P15, P20-P21
I	**D**	**ZA25**	Other perinatal respiratory conditions	P23-P28
I	**D**	**ZA26**	Neonatal infections	P35-P39
I	**D**	**ZA27**	Other perinatal	P00-P02, P04, P08, P29, P50-P61, P70-P94, P96
I	**D**		*Ill-defined perinatal*	P95
I	**E**		**Nutritional deficiencies**	**D50-D53, D64, E00-E02, E40-E46, E50-E64**
I	**E**	**ZA28**	Protein-energy malnutrition	E40-E46
I	**E**	**ZA29**	Deficiency anaemias	D50-D53, D64
I	**E**	**ZA30**	Other nutritional deficiencies including pellagra and vitamin A deficiency	E00-E02, E50-E64
I	**X**		**HIV/AIDS**	**B20-B24,C46**
I	**X**	**ZA3**	Acquired immunity deficiency syndrome	B20-B24,C46
II			**Non-communicable diseases**	**C00-C45, C47-C97, D00-D48, D55-D63, D65-D89, E03-E07, E10-E14, E15-E34, E65-E90, F00-F99, G04-G99, H00-H63, H68-H95, I00-I99, J30--J89, J92-98, K00-K93, L00-L98, M00-M99, N00-N64, N75-N99, Q00-Q99, R00-R95**
II	**F**		**Malignant neoplasms**	**C00-C45, C47-C97**
II	**F**	**ZA31**	Mouth and oropharynx	C00-C14
II	**F**	**ZA32**	Oesophagus	C15
II	**F**	**ZA33**	Stomach	C16
II	**F**	**ZA34**	Colo-rectal	C18-C21
II	**F**	**ZA35**	Liver	C22

SA NBD code			Title of SA NBD cause	ICD-10 Code
II	**F**	**ZA36**	Pancreas	C25
II	**F**	**ZA37**	Larynx	C32
II	**F**	**ZA38**	Trachea/bronchi/lung	C33-C34
II	**F**	**ZA39**	Bone and connective tissue	C40-C41, C47, C49
II	**F**	**ZA40**	Melanoma	C43
II	**F**	**ZA41**	Other skin cancer	C44
II	**F**	**ZA42**	Breast	C50
II	**F**	**ZA43**	Cervix	C53
II	**F**	**ZA44**	Corpus uteri	C54, C55
II	**F**	**ZA45**	Ovary	C56
II	**F**	**ZA46**	Prostate	C61
II	**F**	**ZA47**	Bladder	C67
II	**F**	**ZA48**	Kidney	C64-C66, C68
II	**F**	**ZA49**	Brain	C71
II	**F**	**ZA50**	Lymphoma, multiple myeloma	C81-C90, C96
II	**F**	**ZA51**	Leukaemia	C91-C95
II	**F**	**ZA52**	Other malignant neoplasms	C17, C23-C24, C26, C30-C31, C37-C39, C45, C48, C51-C52, C57-C58, C60, C62-C63,C69-C70, C72-C75
			Ill-defined cancers	C76-C80, C97
II	**G**	**ZA53**	**Benign neoplasms**	**D00-D48**
II	**H**	**ZA54**	**Diabetes mellitus**	**E10-E14**
II	**I**		**Endocrine and metabolic disorders**	**D55-D63, D65-D89, E03-E07, E15-E34, E65-89**
II	**I**	**ZA55**	Albinism	E70.3
II	**I**	**ZA56**	Other endocrine and metabolic	D55-D63, D65-D89, E03-E07, E15-E16, E20-E34, E65-E68, E71-E89
II	**J**		**Mental disorders**	**F10-F99**
II	**J**	**ZA57**	Alcohol dependence	F10
II	**J**	**ZA58**	Drug use	F11-F16, F18-F19
II	**J**	**ZA59**	Schizophrenia	F20-F29
II	**J**	**ZA60**	Unipolar	F32-F33
II	**J**	**ZA61**	Bipolar	F30-F31
II	**J**	**ZA62**	Anorexia nervosa	F50
II	**J**	**ZA63**	Neurotic disorders	F40-F42
II	**J**	**ZA64**	Hyperkinetic Syndrome of childhood	F90
II	**J**	**ZA65**	Adjustment reaction (PTSS)	F43
II	**J**	**ZA66**	Mental Disability	F70-F79
II	**J**	**ZA67**	Other mental disorders	F17, F34-39, F44-F48, F51-F59, F60-F69, F80-F89, F91-F98, F99
			Nervous system disorders	**F01-F09, G03-G99**
II	**K**	**ZA68**	Alzheimer and other dementias	F01-F09, G30-G31
II	**K**	**ZA69**	Parkinsons disease	G20-G21
II	**K**	**ZA70**	Multiple sclerosis	G35
	K	**ZA71**	Epilepsy	G40-G41
II	**K**	**ZA72**	Encephalitis and brain abscess	G04, G06, G09
II	**K**	**ZA73**	Other nervous system disorders	G08, G10-G12, G23-25, G36-37, G43-G47, G50-G58,G60-G64,G70-G72, G80-G83,G90-G98
II	**L**		**Sense organs**	**H00-H13, H15-H59, H60-H62, H68-H95**
II	**L**	**ZA74**	Glaucoma	H40
II	**L**	**ZA75**	Cataracts	H25-H26
II	**L**	**ZA76**	Other visual disorders	H00-H21, H27-H35, H42-H59
II	**L**	**ZA77**	Hearing loss and other ear disorders	H60-H62, H68-H95
II	**M**		**Cardiovascular**	**I00-I26, I28-I84, I86-I99, J81**
II	**M**	**ZA78**	Rheumatic heart disease	I01-I09
II	**M**	**ZA79**	Ischaemic heart disease	I20-I25
II	**M**	**ZA80**	Stroke	I60-I69
II	**M**	**ZA81**	Inflammatory heart disease	I30, I33, I38, I40, I42
II	**M**	**ZA81a**	Peri-, endo, myocarditis	I30, I33, I38, I40
II	**M**	**ZA81b**	Cardiomyopathy	I42
II	**M**	**ZA82**	Hypertensive heart disease	I10-I13
II	**M**	**ZA83**	Non-rheumatic valvular disease	I34-I37
II	**M**	**ZA84**	Pulmonary embolism	I26
II	**M**	**ZA85**	Aortic aneurism	I71
II	**M**	**ZA86**	Peripheral vascular disorders	I72- I78, I80-I84, I86-I89
II	**M**	**ZA87**	Other cardiovascular	I00, I28, I31, I44-I45, I95-I99
			Ill-defined cardiovascular	I46-I49, I50-I51, I70, J81
II	**N**		**Respiratory**	**I27, J30-J80; J82-J86, J92-J99**
II	**N**	**ZA88**	COPD	J40-J44, I27
II	**N**	**ZA89**	Asthma	J45-46
II	**N**	**ZA90**	Aspiration pneumonia/ lung abscess/empyema	J69, J85-J86
II	**N**	**ZA91**	Other respiratory	J30-J39, J47, J60-J68, J70, J80, J82-J84, J92-J98

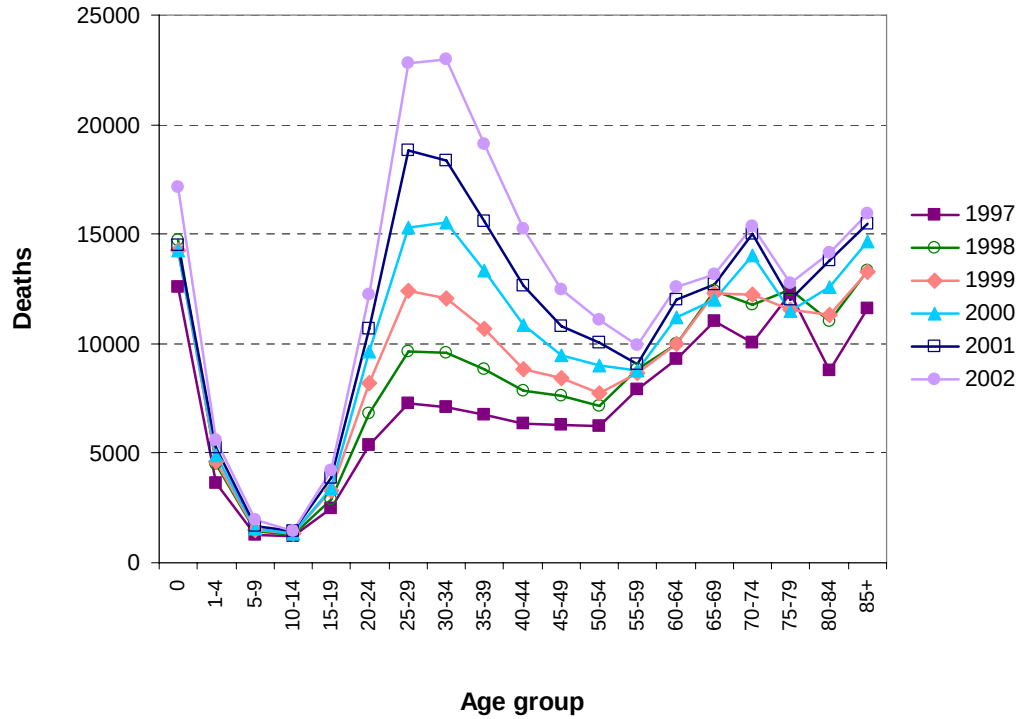
SA NBD code			Title of SA NBD cause	ICD-10 Code
II	**O**		**Digestive**	**K20-K38, K40-K63, K65-K93, I85**
II	**O**	**ZA92**	Peptic ulcer	K25-K28
II	**O**	**ZA93**	Appendicitis	K35-K37
II	**O**	**ZA94**	Noninfective gastroenteritis and colitis	K50-K52
II	**O**	**ZA95**	Cirrhosis of liver	K70, K74, K76, I85
II	**O**	**ZA96**	Hepatic failure	K72
II	**O**	**ZA97**	Gall bladder disease	K80-K83
II	**O**	**ZA98**	Diseases of the pancreas	K85, K86
II	**O**	**ZA99**	Other digestive	K20-K22, K29-K31, K38, K40-K46, K55-K66, K71, K73, K75, K90-K91
			Ill-defined digestive	K92
II	**P**		**Genito-urinary**	**N00-N50, N60-N64, N75-N98**
II	**P**	**ZA100**	Nephritis/nephrosis	N00-N19
II	**P**	**ZA101**	Benign prostatic hypertrophy	N40
II	**P**	**ZA102**	Other genito-urinary	N20-N23, N25-N39, N41-N50, N60-N64, N75-N98
II	**Q**	**ZA103**	**Skin disease**	**L00-L98**
II	**R**		**Musculo-skeletal**	**M00-M99**
II	**R**	**ZA104**	Rheumatoid arthritis	M05-M06
II	**R**	**ZA105**	Osteoarthritis	M15-M19
II	**R**	**ZA106**	Other musculo-skeletal	M00-M02, M08, M10-M13, M20-M99
II	**S**		**Congenital abnormalities**	**Q00-Q99**
II	**S**	**ZA107**	Neural tube defects	Q00-Q07
II	**S**	**ZA108**	Cleft lip/palate	Q35-Q37
II	**S**	**ZA109**	Congenital heart disease	Q20-Q28
II	**S**	**ZA110**	Congenital disorders of GIT	Q38-Q45
II	**S**	**ZA111**	Down's syndrome and other chromosomal anomalies	Q90-Q99
II	**S**	**ZA112**	Fetal alcohol syndrome	Q86.0
II	**S**	**ZA113**	Other congenital abnormalities	Q10-Q18, Q30-Q34, Q50-Q56, Q60-Q64, Q65-Q79, Q80-Q85, Q87
			Ill-defined congenital	Q89
II	**T**		**Oral conditions**	**K00-K14**
II	**T**	**ZA114**	Dental caries	K02
II	**T**	**ZA115**	Periodontal disease	K05
II	**T**	**ZA116**	Other oral health	K00-K01, K03-K04, K06-K14
II	**U**		**Cot death**	**R95, R96-R98 < 12 MTHS**
II	**U**	**ZA117**	Cot death	R95, R96-R98 < 12 MTHS
			Ill-defined signs and symptoms	**R00-R09, R10-R19, R20-R23, R25-R29, R30-R39, R40-R46, R47-R49, R50-R69, R70-R79, R80-R82, R83-R94, R96-R98 > 12 months, R99**
III			**Injuries**	**V01-V99, WOO-W99, X00-X99, Y00-Y98**
III	**V**		**Unintentional**	**V00-V99, W00-W99, X00-X59, Y40-Y86, Y88**
III	**V**	**ZA118**	Road traffic accidents	V01-V04, V06, V09-V80, V87, V89, V99
III	**V**	**ZA119**	Other transport accidents	V05, V81-V86, V88, V90-V94, V95-V98
III	**V**	**ZA120**	Mining accidents	Y37
III	**V**	**ZA121**	Poisoning	X40-X49
III	**V**	**ZA122**	Surgical / medical misadventure	Y60-Y69, Y70-Y82, Y83-Y84, Y88
III	**V**	**ZA123**	Falls	W00-W19
III	**V**	**ZA124**	Fires	X00-X09
III	**V**	**ZA125**	Natural and environmental factors	W53-W64, X20-X29, X30-X39, X50-X57
III	**V**	**ZA126**	Drowning	W65-W74
III	**V**	**ZA127**	Suffocation and foreign bodies	W75-W84
III	**V**	**ZA128**	Other unintentional injuries specified	W20-W49, W50-W52, W85-W99,Y40-Y59, X10-X19, X58, Y38, Y39
			Ill-defined unintentional	
III	**W**		**Intentional injuries**	**X60-X99, Y00-Y09, Y35-Y36**
III	**W**	**ZA129**	Suicide and self-inflicted	X60-X84
III	**W**	**ZA130**	Homicide and violence	X85-Y09
III	**W**	**ZA130a**	with firearm	X93-X95
III	**W**	**ZA130b**	without firearm	X85-X92, X96-X99, Y00-Y08
			Homicide unspecified	Y09
III	**W**	**ZA131**	Legal intervention and war	Y36, Y35
			Undetermined whether intentional or unintentional	**Y10-Y34, Y87, Y89**

Appendix B: Deaths for South Africa, 1992-2002

Number of male deaths by age, 1997 - 2002
Stats SA National data



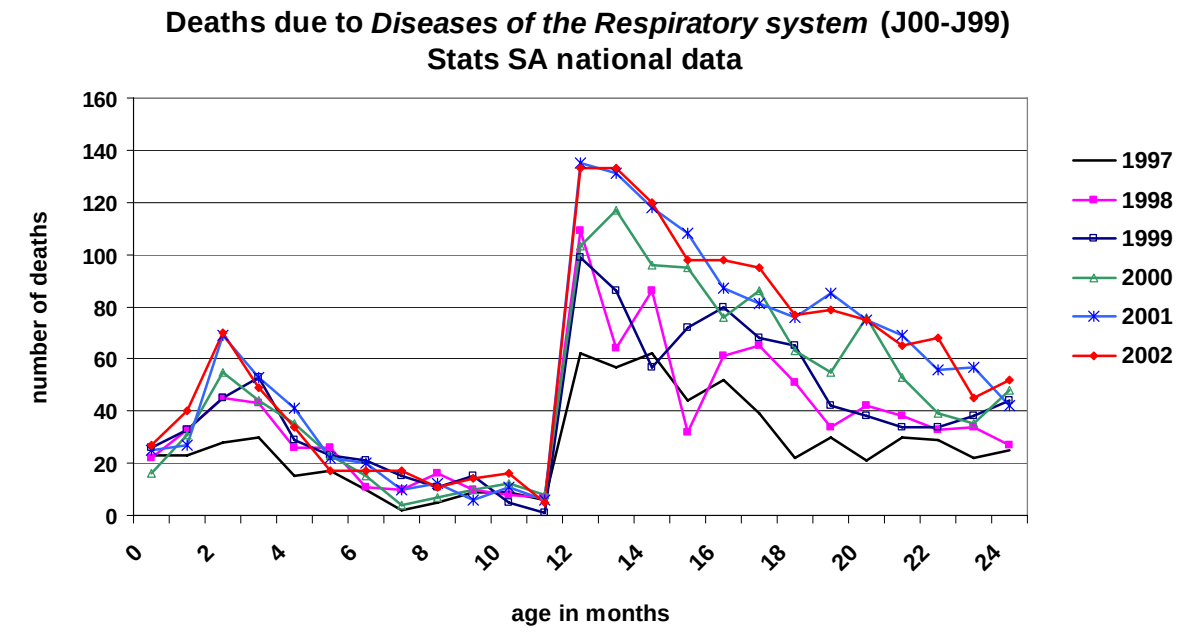
Number of female deaths by age, 1997 - 2002
Stats SA National data



Appendix C: Deaths under one year of age, South Africa

Figure C1 shows the number of child deaths under 2 years of age due to respiratory diseases (J00-J99) and conditions originating in the perinatal period (P00-P96) for the period 1997 to 2002 by age in months. The numbers of deaths increase each year with very distinct patterns: the numbers of respiratory disease deaths have a disjuncture at 12 months with much higher numbers over-1 year of age than under. The perinatal deaths are very high for deaths in the first month of life, and tail off at 12 months with an emerging peak at 3 months. These patterns indicate that Statistics South Africa has adopted an incorrect coding algorithm whereby deaths of infants under-1 year of age, have generally been coded to the P codes, rather than the specific cause. The algorithm leads to a discontinuity at 12 months of age with all explicit causes of death being under-reported, and Chapter XVI being over-represented under-1 year of age. In spite of the algorithm, some causes of death have been coded to their correct classification leading to non-zero (but under-reported) numbers in the other chapters.

The data used for the analyses in this appendix is a special tabulation of national data by month of age and ICD-10 code supplied by Statistics South Africa. This data is not available at a provincial level. However, the high number of infant deaths in the Western Cape that are due to perinatal conditions would suggest that this problem applies to the provincial data as well.



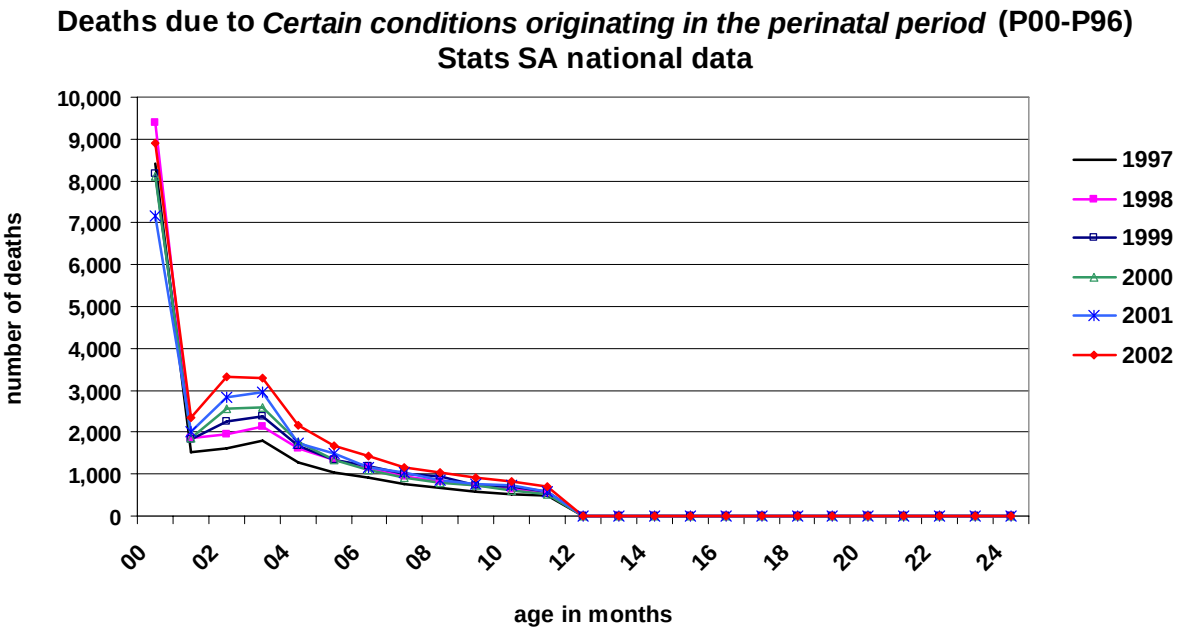


Figure C1. Number of deaths in South Africa recorded by Stats SA between 1997 and 2002 by age in months, Chapter X: *Diseases of the respiratory system* and ICD-10 Chapter XVI: *Certain conditions originating in the perinatal period*, National data, Stats SA

Appendix to Volume 2

A comparative risk assessment for South Africa, 2000

Towards promoting health and preventing disease

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Introduction

The first South African National Burden of Disease (SA NBD) study identified the underlying causes of premature mortality and morbidity experienced in South Africa in the year 2000. The next step was to undertake the Comparative Risk Assessment component of the SA NBD study. Reliable and comparable analysis of risks to health is key for a health sector response to preventing disease and injury. The aim of this study was to estimate the contributions of 17 selected risk factors, in various levels of causality, to burden of disease in South Africa in 2000. The list of risk factors was identified by consulting a range of stakeholders.

Methods

The study followed comparative risk assessment methodology developed by the World Heath Organization. Expert working groups carried out a comprehensive review of published work for the selected risk factors to obtain local prevalence of risk factor exposure and hazard size in some instances. Population attributable fractions were calculated and applied to revised burden of disease estimates (deaths and disability adjusted life years, (DALYs)) from the South African NBD study to obtain the attributable burden for each selected risk factor.

Results

Provisional results are shown in Tables 1 and 2. The first table shows the burden attributable to the risk factors in terms of deaths, and the second in terms of DALYS. In each case the ranking of the risk factors is shown alongside the ranking of the leading underlying diseases and conditions. The study indicates that unsafe sex is the leading risk factor accounting for 31.5% of DALYs. Interpersonal violence ranks second accounting for 8.4% of DALYs. Alcohol harm accounts for 7% and tobacco for 4% of total DALYs. It was also estimated that the diet related risk factors such as high body mass, high blood pressure and cholesterol, as well as undernutrition both cause significant harm. The leading causes of mortality included unsafe sex, high blood pressure and tobacco.

Table 1. Deaths attributable to selected risk factors compared with the underlying causes of death

Rank	Risk factor	% total deaths	Rank	Disease or injury	% total deaths
1	Unsafe sex/STIs	26.3	1	HIV/AIDS	25.5
2	High blood pressure	9.0	2	Ischaemic heart disease	6.6
3	Tobacco	8.5	3	Stroke	6.5
4	Alcohol harm	7.1	4	Tuberculosis	5.5
5	High BMI	7.0	5	Interpersonal violence	5.3
6	Interpersonal violence	6.7	6	Lower respiratory infections	4.4
7	High cholesterol	4.6	7	Hypertensive disease	3.2
8	Diabetes	4.3	8	Diarrhoeal diseases	3.1
9	Physical inactivity	3.3	9	Road traffic accidents	3.1
10	Low fruit and vegetable intake	3.2	10	Diabetes mellitus	2.6
11	Unsafe water, sanitation and hygiene	2.6	11	Chronic obstructive pulmonary disease	2.5
12	Childhood and maternal underweight	2.3	12	Low birth weight	2.2
13	Urban air pollution	0.9	13	Asthma	1.3
14	Vitamin A deficiency	0.6	14	Trachea/bronchi/lung cancer	1.3
15	Indoor smoke	0.5	15	Nephritis/nephrosis	1.3
16	Iron deficiency anaemia	0.4	16	Septicaemia	1.2
17	Lead exposure	0.3	17	Oesophageal cancer	1.1

Table 2. DALYs attributed to selected risk factors compared with the underlying causes of DALYS

Rank	Risk factor	% total DALYs	Rank	Disease or injury	% total DALYs
1	Unsafe sex/STIs	31.5	1	HIV/AIDS	30.9
2	Interpersonal violence	8.4	2	Interpersonal violence	6.5
3	Alcohol harm	7.0	3	Tuberculosis	3.7
4	Tobacco	4.0	4	Road traffic accidents	3.0
5	High BMI	2.9	5	Diarrhoeal diseases	2.9
6	Childhood and Maternal underweight	2.7	6	Lower respiratory infections	2.8
7	Unsafe water sanitation and hygiene	2.6	7	Low birth weight	2.6
8	High blood pressure	2.4	8	Asthma	2.2
9	Diabetes	1.6	9	Stroke	2.2
10	High cholesterol	1.4	10	Unipolar depressive disorders	2.0
11	Low fruit and vegetable intake	1.1	11	Ischaemic heart disease	1.8
12	Physical inactivity	1.1	12	Protein-energy malnutrition	1.3
13	Iron deficiency anaemia	1.1	13	Birth asphyxia and birth trauma	1.2
14	Vitamin A deficiency	0.7	14	Diabetes mellitus	1.1
15	Indoor smoke	0.4	15	Alcohol dependence	1.0
16	Lead exposure	0.4	16	Hearing loss, adult onset	1.0
17	Urban air pollution	0.3	17	Cataracts	0.9

Conclusions

Provisional results show that the loss of health in South Africa is dominated by sexually transmitted diseases resulting from unsafe sex in combination with risk factors related to

poverty and under-development on the one hand, such as under-nutrition, unsafe water, sanitation and hygiene and indoor smoke from solid fuels, and on the other hand by risk factors associated with a Western lifestyle, such as alcohol, tobacco, high blood pressure and high cholesterol. An assessment of the relative burden attributable to selected risk factors provides an important evidence base to help identify which risk factors need to be targeted for study and interventions and provides South African evidence to compare the relative impact of the risk factors assessed.

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