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

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Copies of the report

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Foreword

It gives me great pleasure to write this foreword to the *Causes of death and premature mortality in Cape Town, 2001-2004*. This is a follow on of a previous report that has already been of great value to all health service providers in the City of Cape Town.

This report is the result of a well developed relationship between the Medical Research Council, the City of Cape Town's City Health directorate and the Provincial Health Department. With the MRC's help and support the City of Cape Town has been coding the underlying cause of death according to a shortlist based on ICD-10 which is based upon the most prevalent conditions in Cape Town as well as diseases of public health importance.

This process has resulted in extremely useful and accurate information about cause of death and premature mortality for the City that helps the provincial and city health departments understand the trends that are developing across the City and per sub district. This information helps to direct resources and service plans to focus on these conditions and trends. This process results in relatively recent analysis informing planning and service delivery and turns research into action research that makes a difference to service planning and delivery because of the freshness of the information and its relevance.

I wish to thank the Medical Research Council and their researchers for the participatory process undertaken by the researchers and for the willingness to go the extra mile in supporting the health information section and the service providers. I can only highly recommend this report to researchers, service providers and more broadly to those who would like to understand health and disease trends in the City of Cape Town.

Dr Ivan Toms
Executive Director: City Health
28 March 2007

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Executive Summary

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.

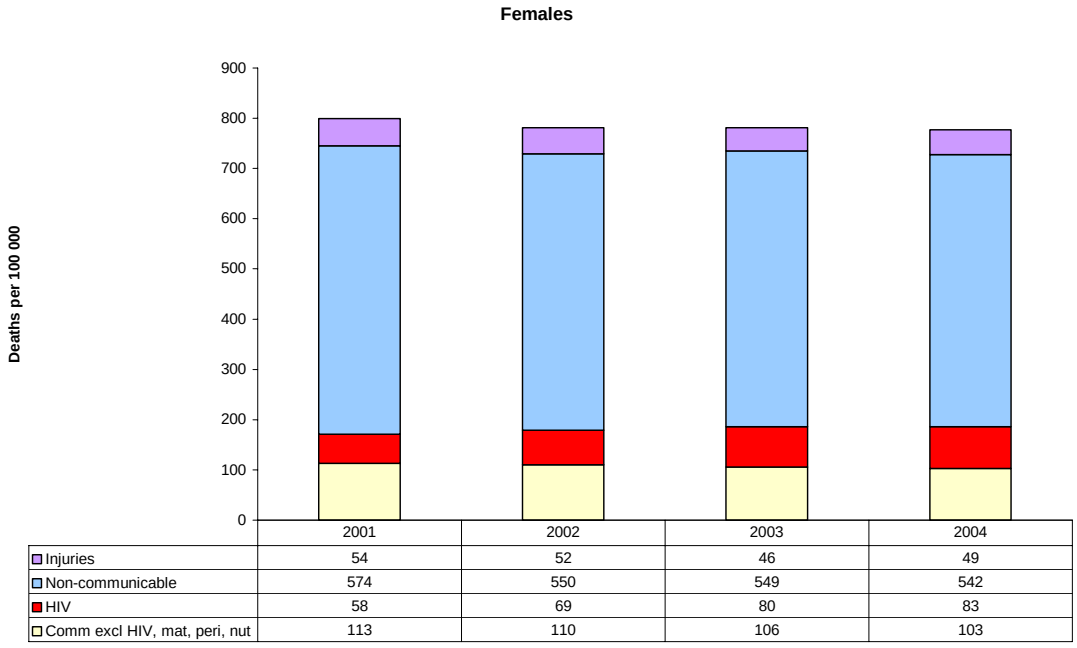
Mortality in Cape Town

Overview of mortality

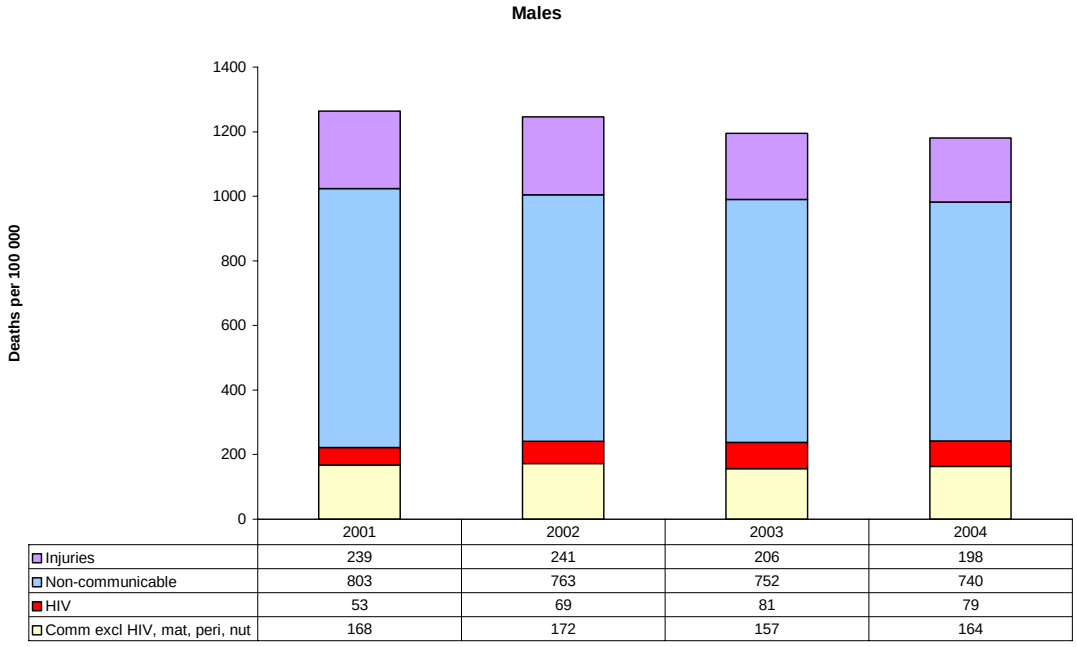
The age pattern of deaths in Cape Town in 2004 is shown for males and females in Figure 2. This pattern is very similar to that observed in 2001,[1] and is typical of the quadruple burden of disease experienced by societies undergoing a transition in their mortality patterns[8]: infectious disease mortality, 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

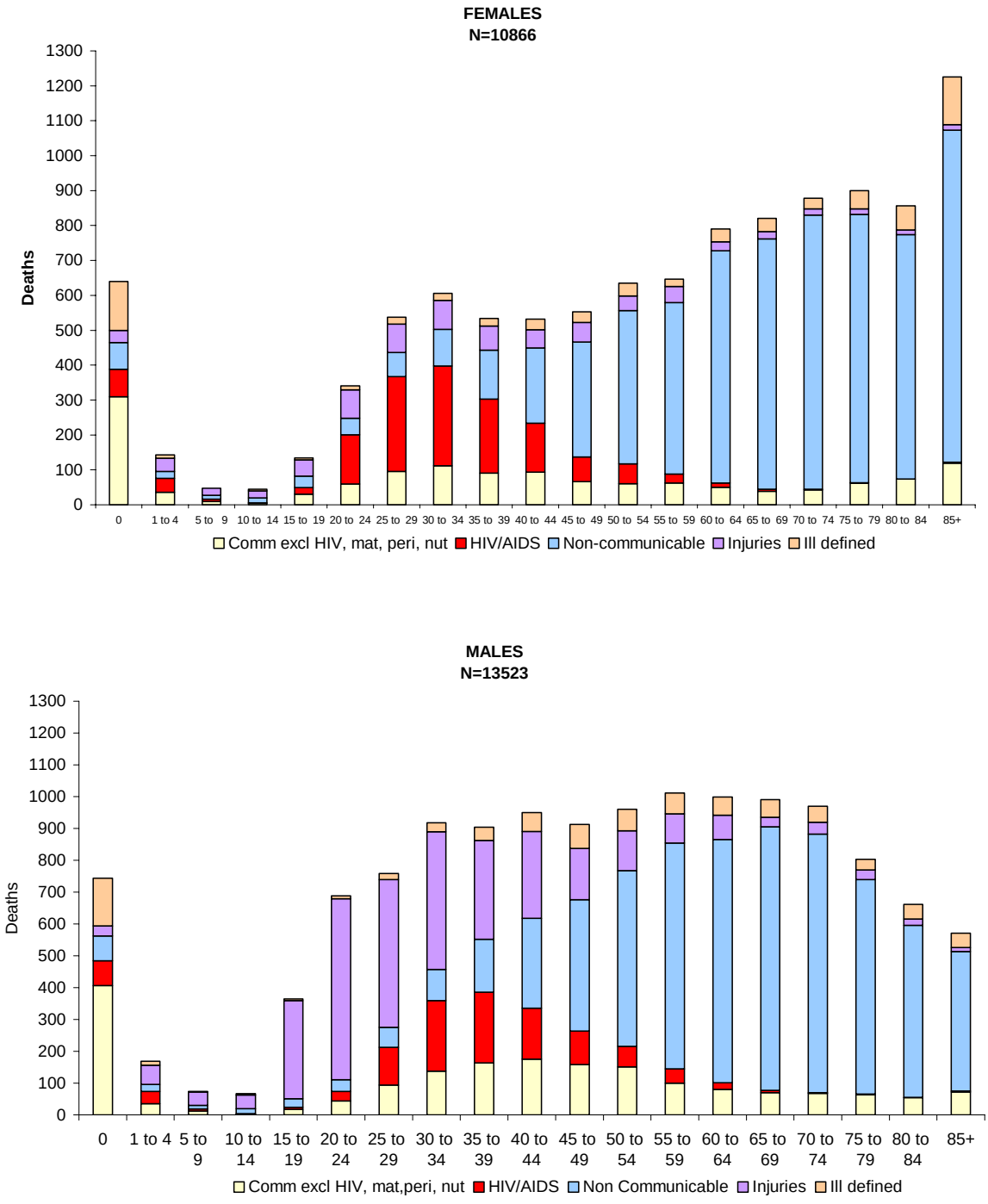


Figure 3: Age-standardised mortality rate by broad cause group by sex for Cape Town, 2001-2004

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.

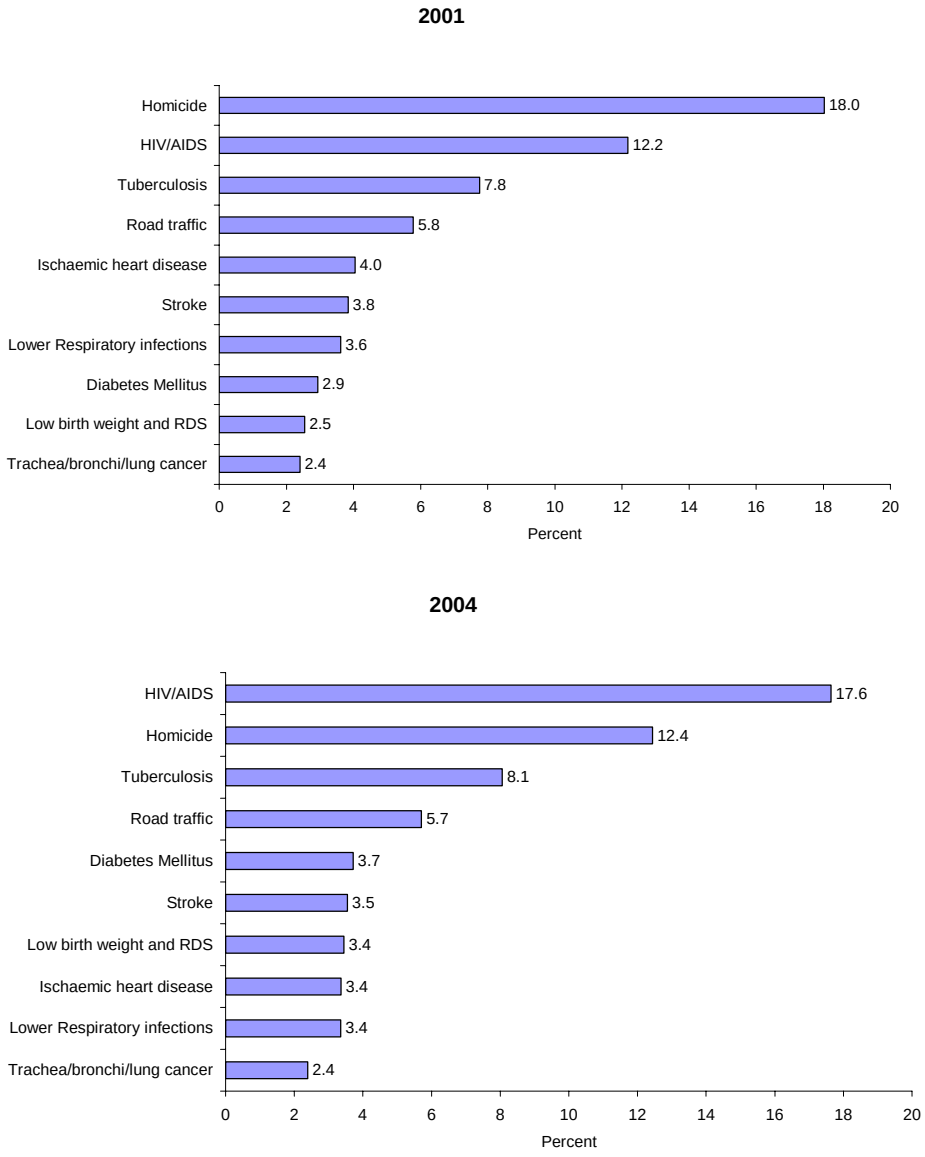


Figure 4: Top 10 causes of premature mortality (YLLs) for Cape Town, 2001 and 2004

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].

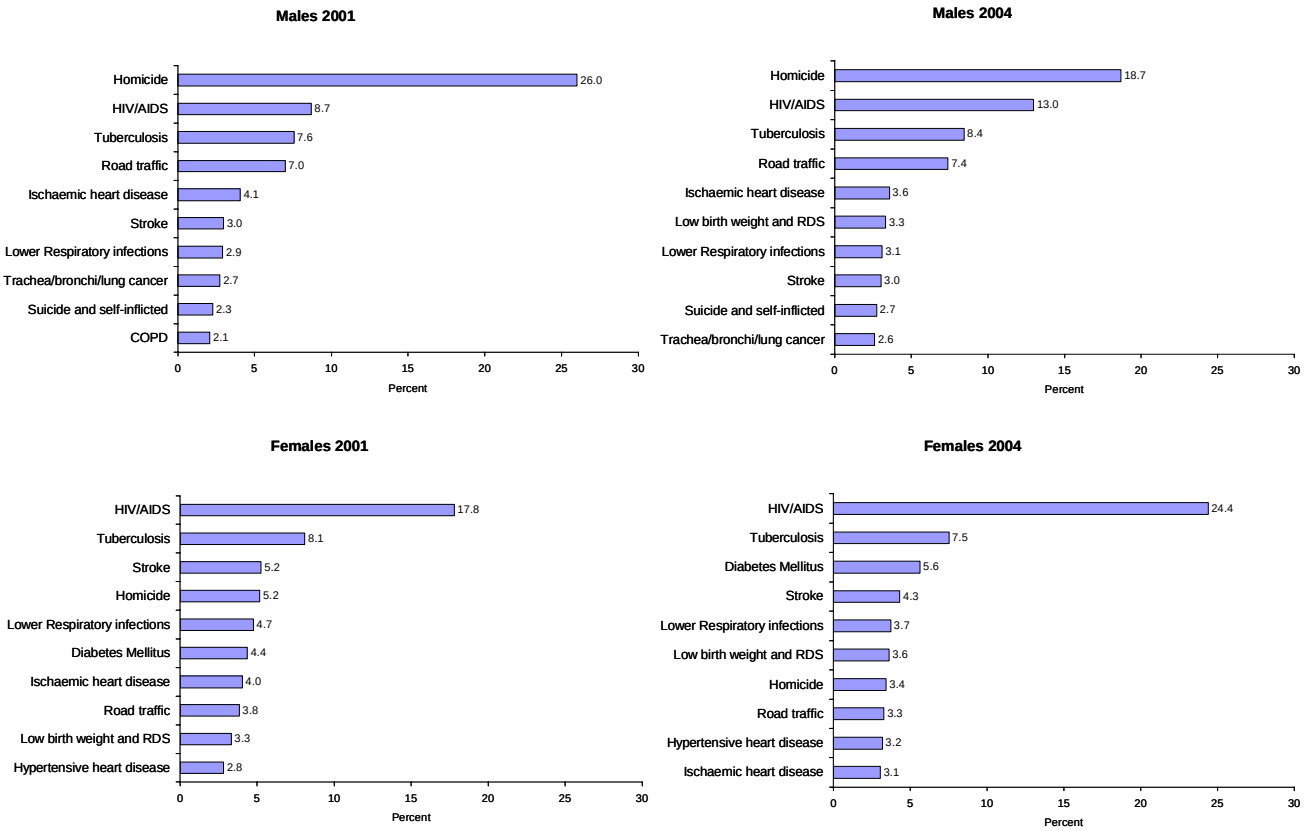


Figure 5: Top 10 causes of premature mortality (YLLs) by sex for Cape Town, 2001 and 2004

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.

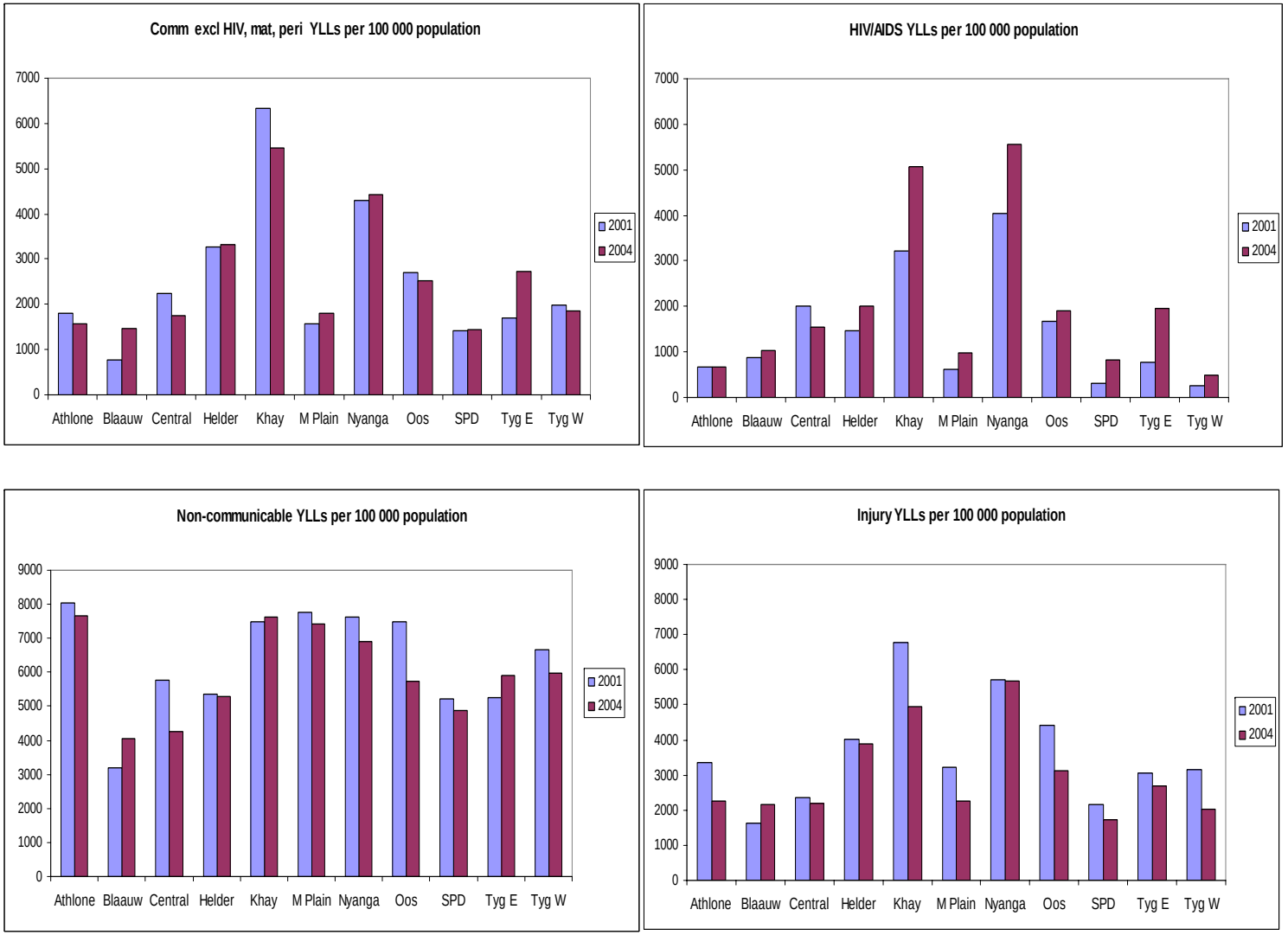
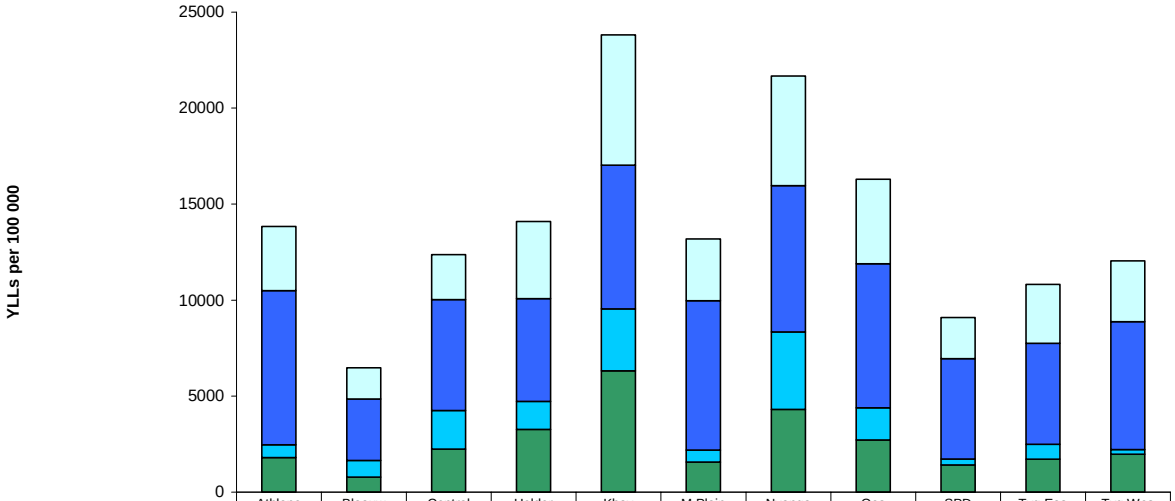


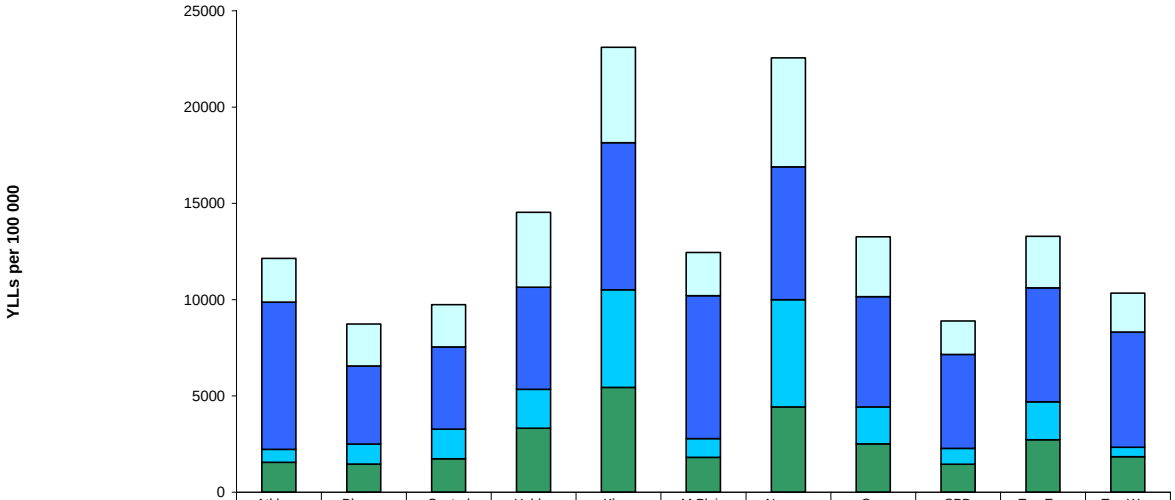
Figure 6: Age-standardised premature mortality rates per 100 000 by broad cause group for Cape Town sub-districts, 2001 and 2004

2001



	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

2004



	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

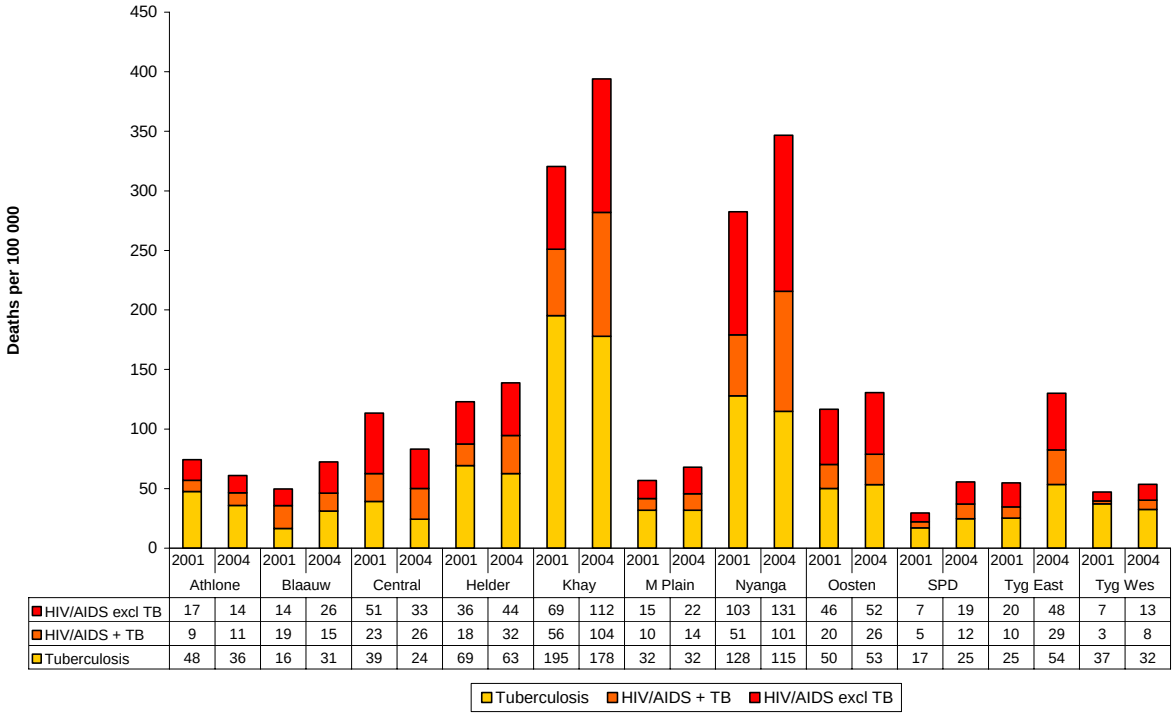
The data for 2001 - 2004 show that HIV mortality has become the leading cause of premature mortality in the city, and that TB remains the third. HIV/AIDS and TB are now closely linked. Aside from TB being one of the indicator conditions for AIDS, there is clear evidence that the TB epidemic is being 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.

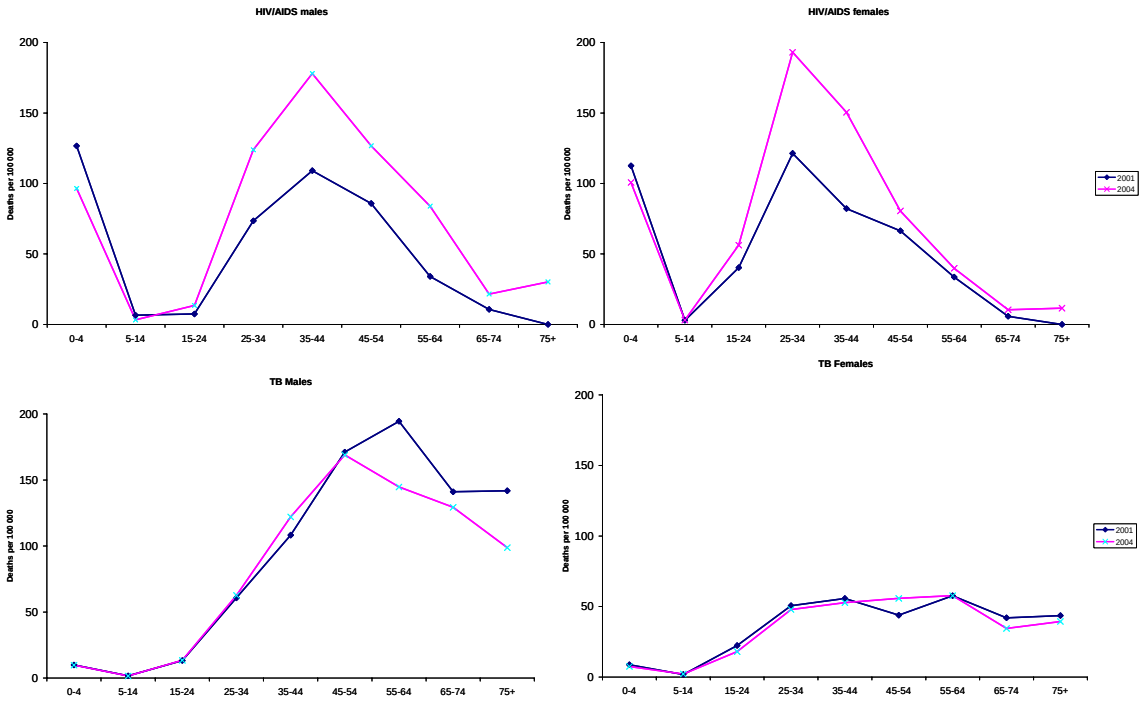


Figure 9: Age-specific death rates for HIV and TB by gender, Cape Town, 2001 and 2004

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.

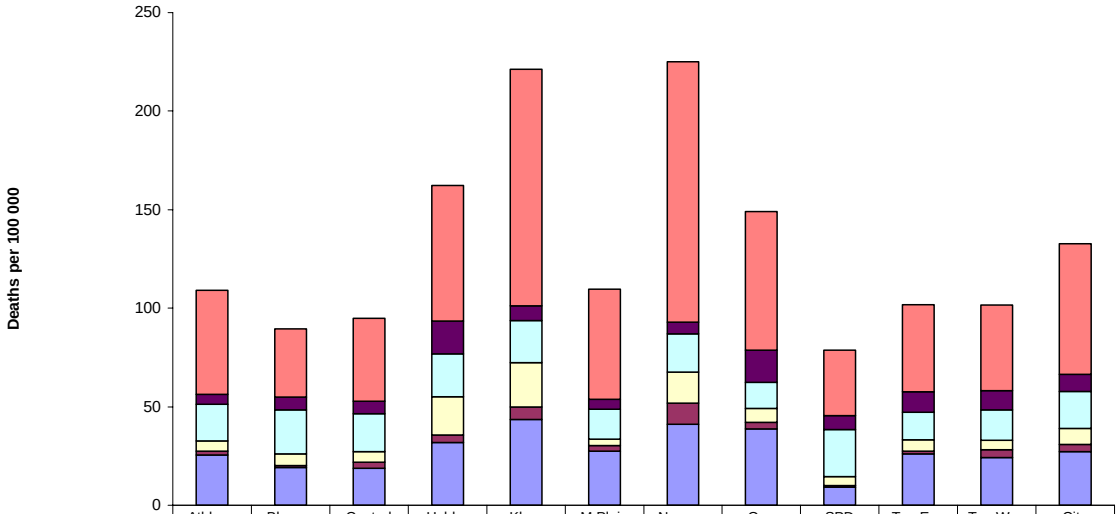
The injury mortality rates in South Africa are approximately six times higher than the global average.[15] Homicide is eight times the global rate and road traffic injuries are double. Within South Africa city-level comparisons from the NIMSS indicate that the proportions of non-natural deaths due to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

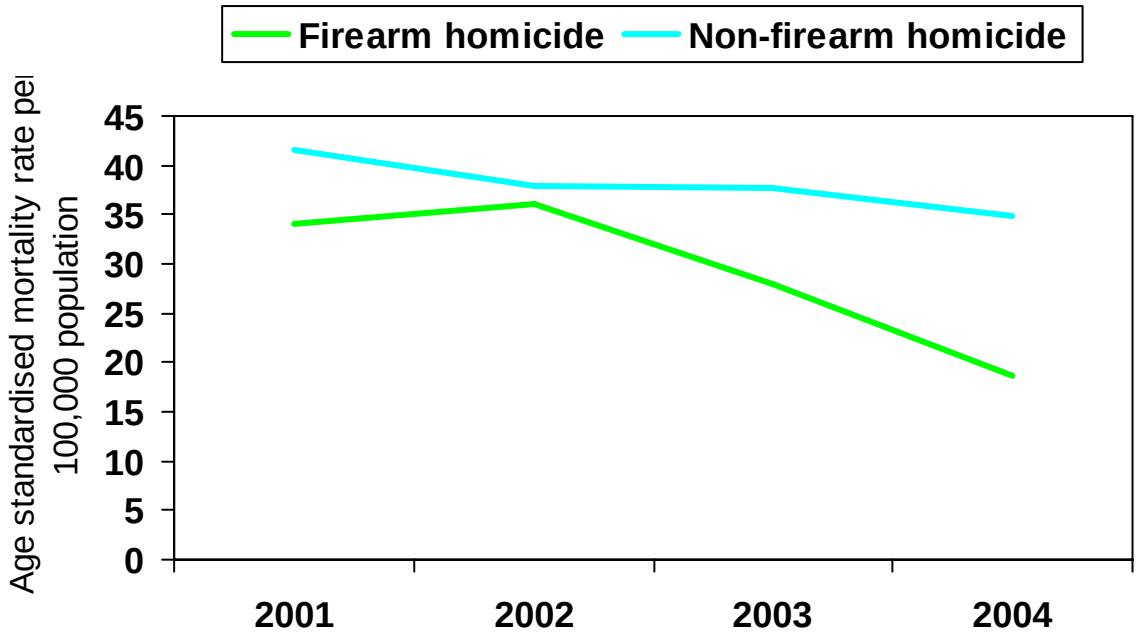


Figure 11: Firearm and non-firearm homicide rates in Cape Town, 2001 - 2004[7]

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).

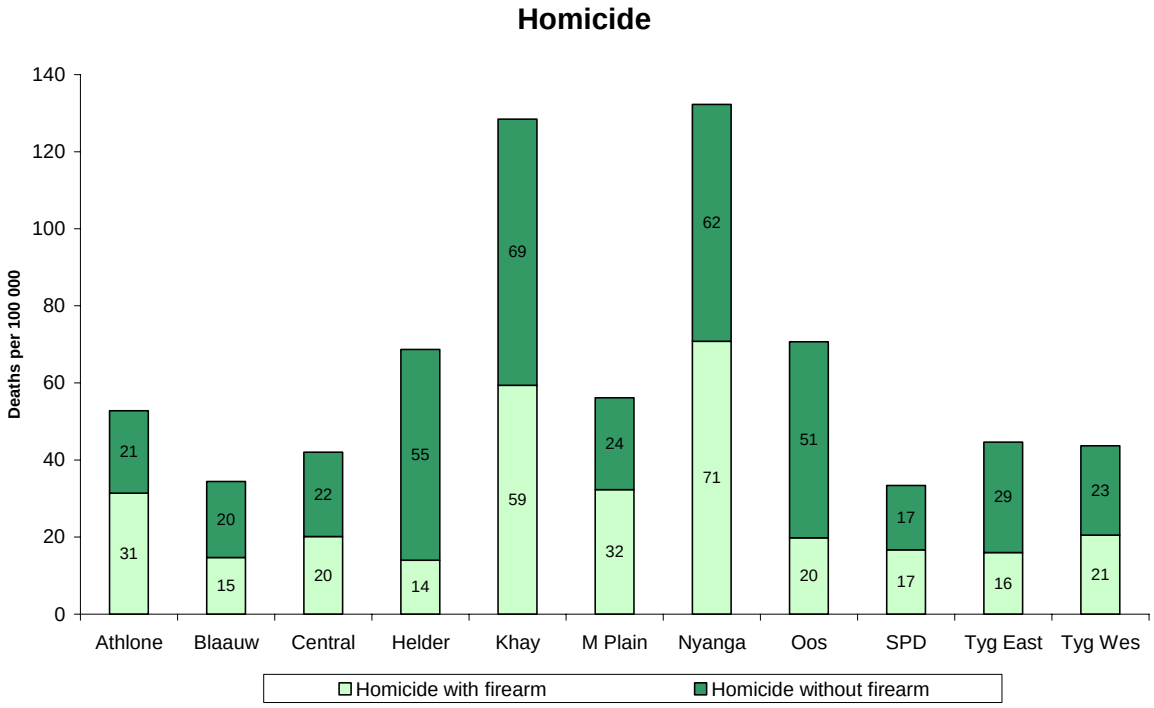
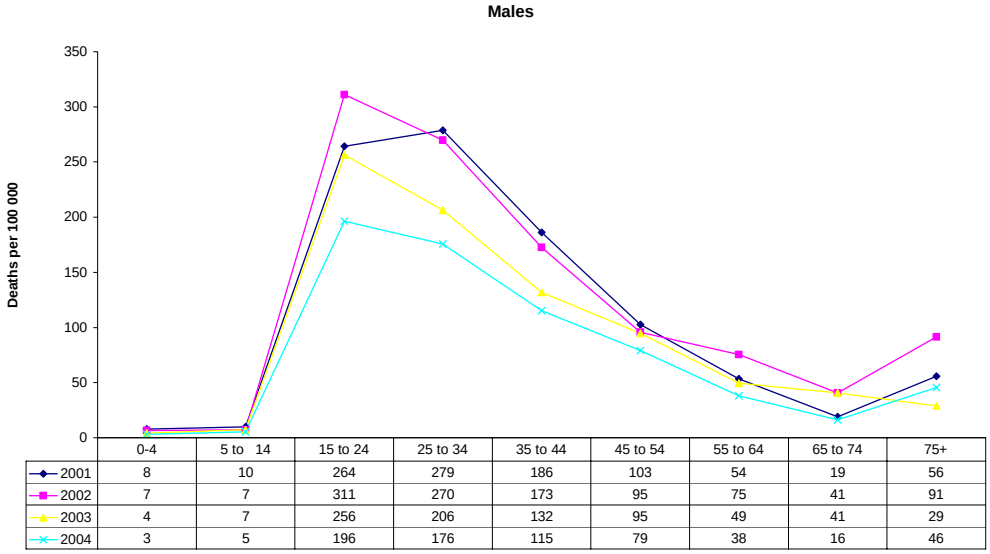


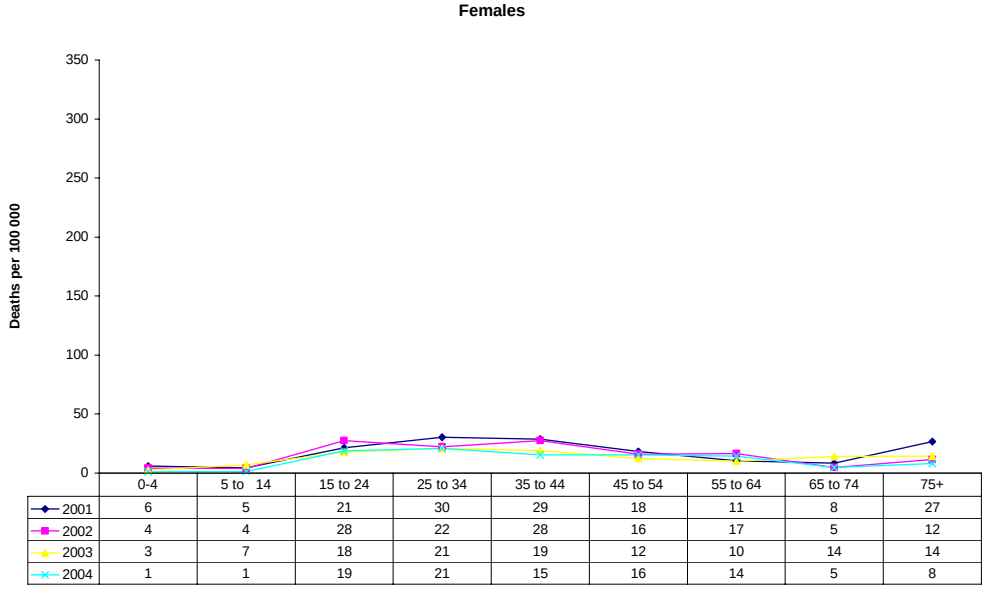
Figure 12: Age-standardised death rates (average) due to homicide by sub-district, Cape Town 2001 – 2004

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.

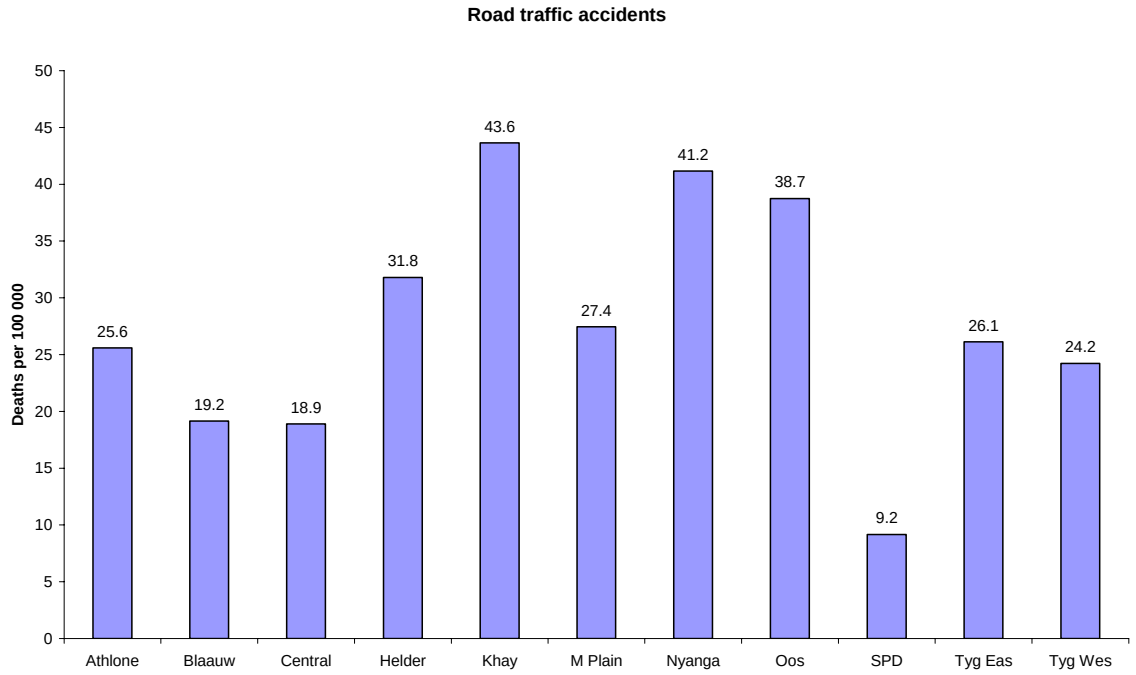


Figure 14: Age-standardised death rates (pooled estimates)
due to road traffic injuries by sub-district, Cape Town, 2001 – 2004

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.

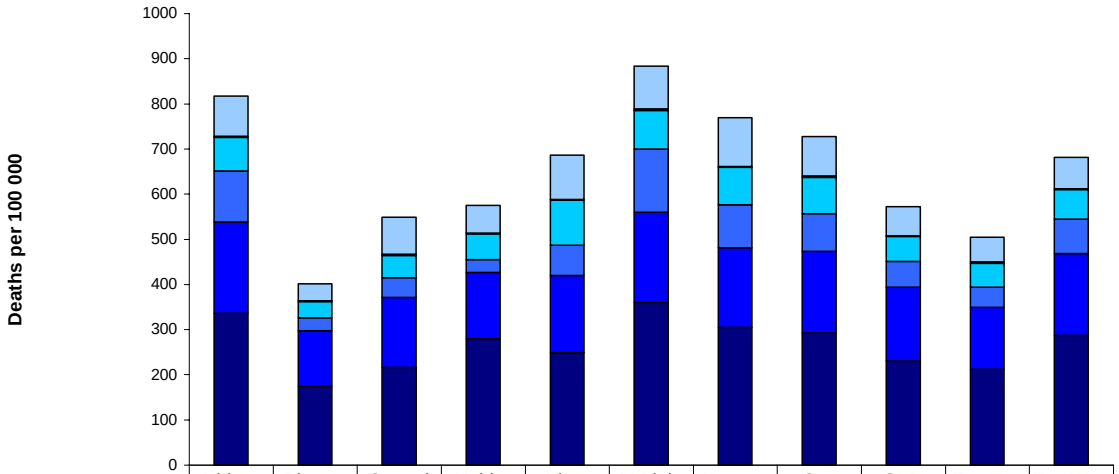
Non-communicable diseases

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.

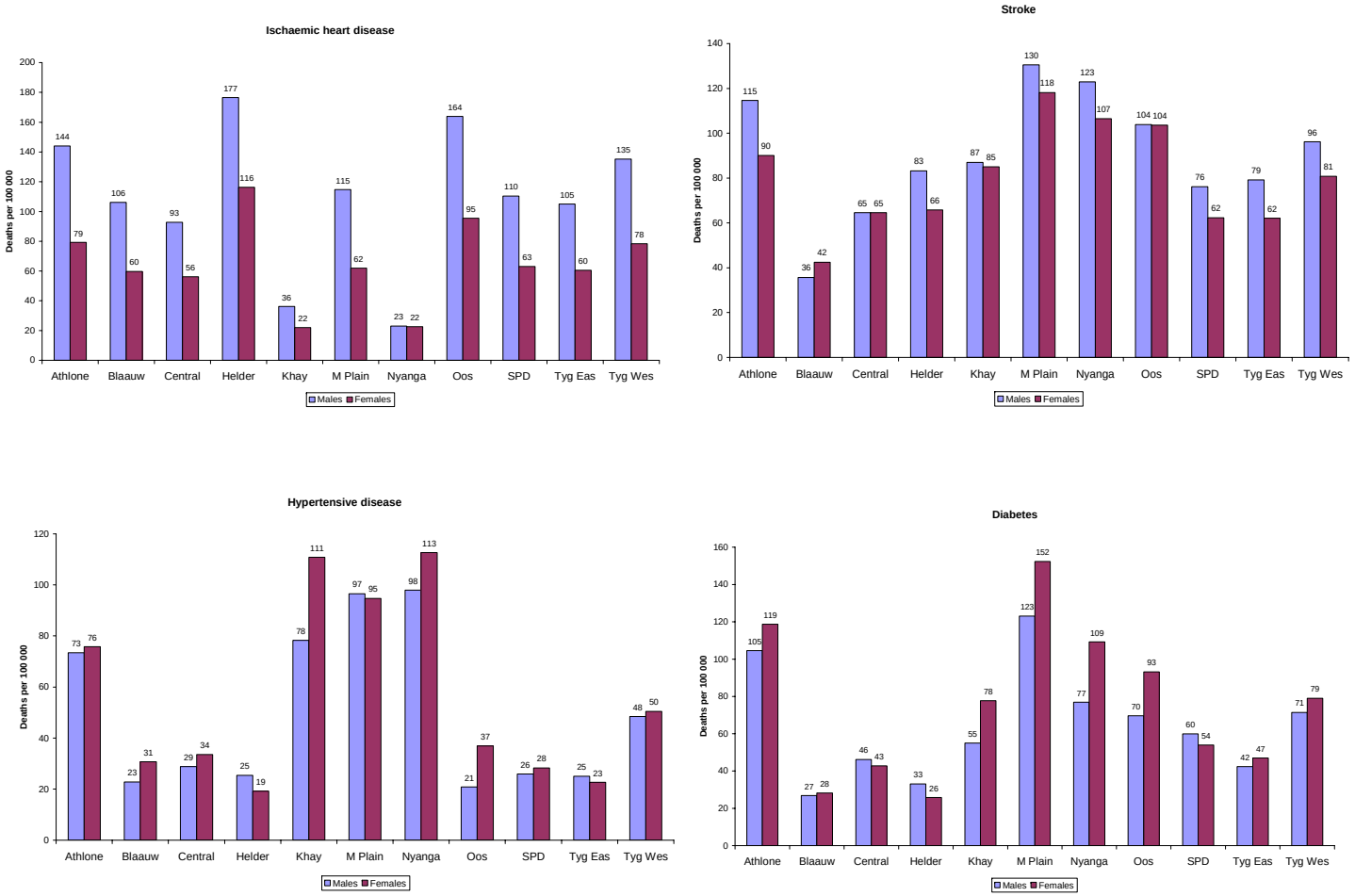
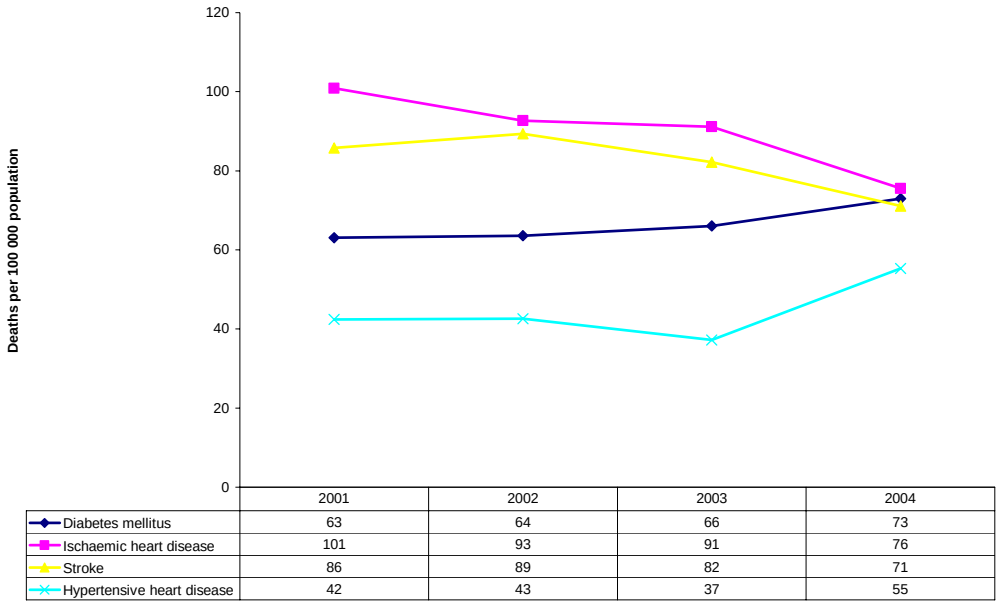


Figure 16: Age-standardised death rates (pooled estimates) for IHD, stroke, hypertension and diabetes by gender and sub-district, Cape Town, 2001 - 2004



	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.

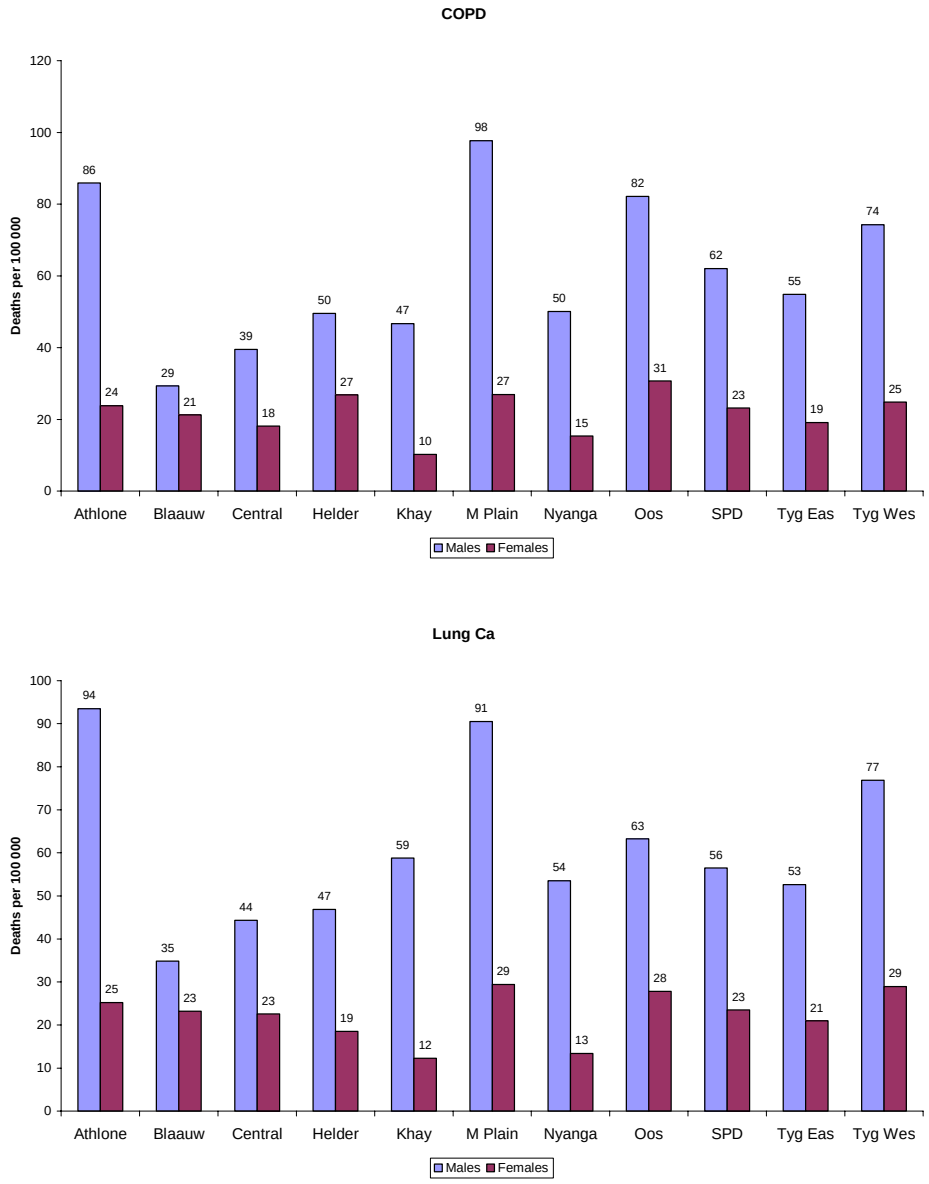


Figure 18: Age-standardised death rates (pooled estimates) for COPD and lung cancer by gender and sub-district, Cape Town, 2001 - 2004

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.

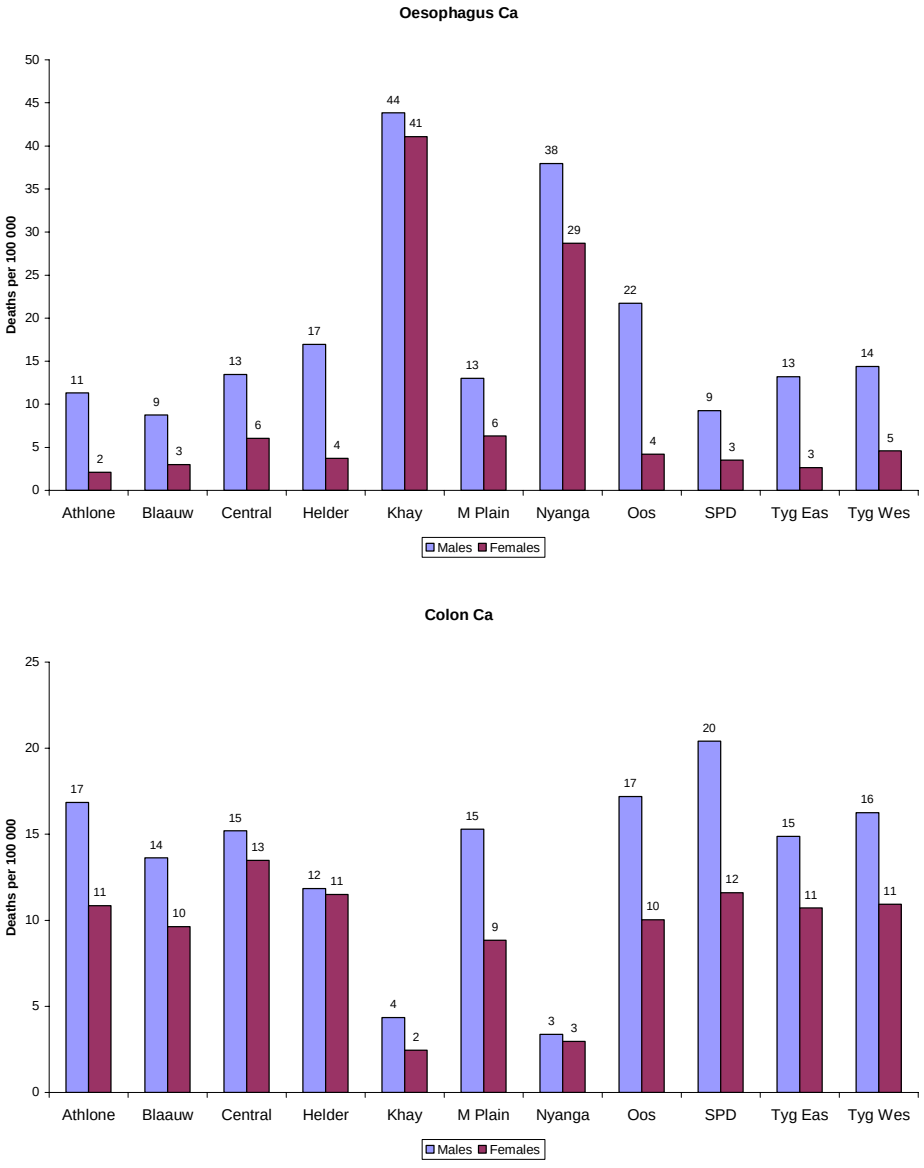


Figure 19: Age-standardised death rates (pooled estimates) for oesophagus cancer and colon cancer by gender and sub-district, Cape Town, 2001 - 2004

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.

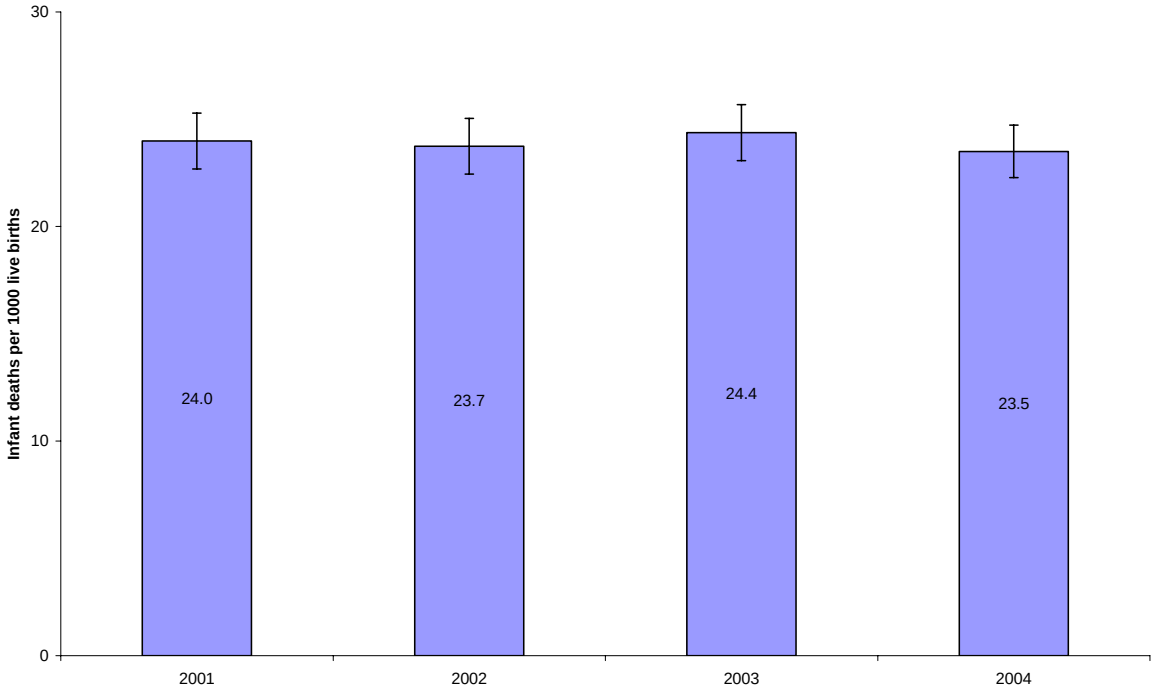


Figure 20: Trends in infant mortality rate per 1000 live births, Cape Town, 2001 - 2004

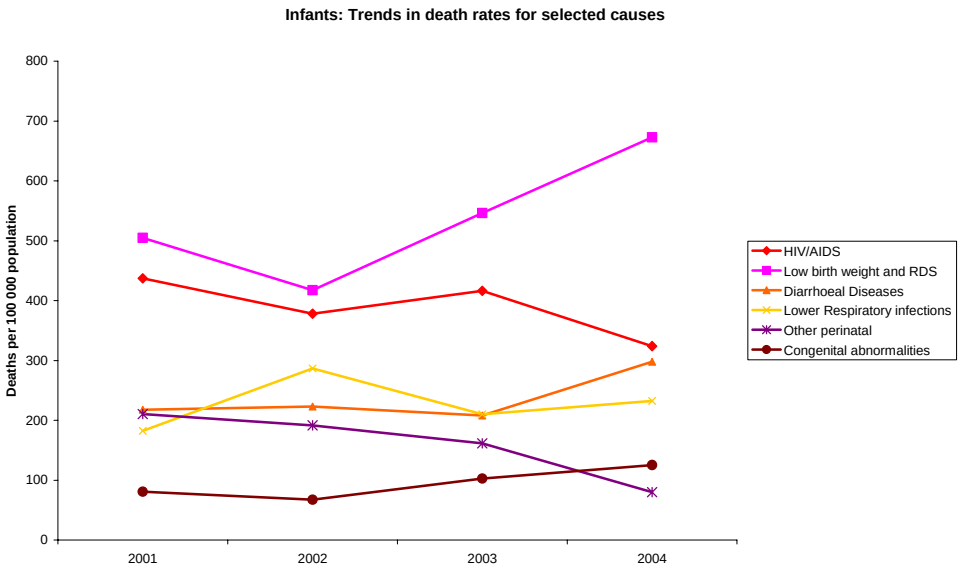
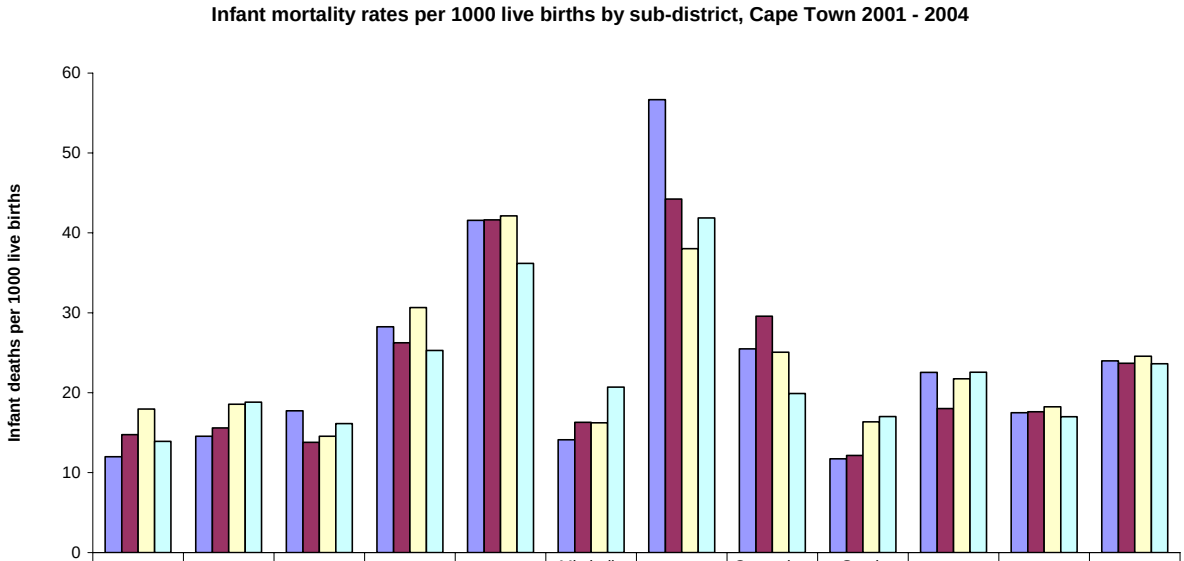


Figure 21: Trends in <1 year mortality rates per 100 000 population for selected conditions, Cape Town, 2001 – 2004

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.

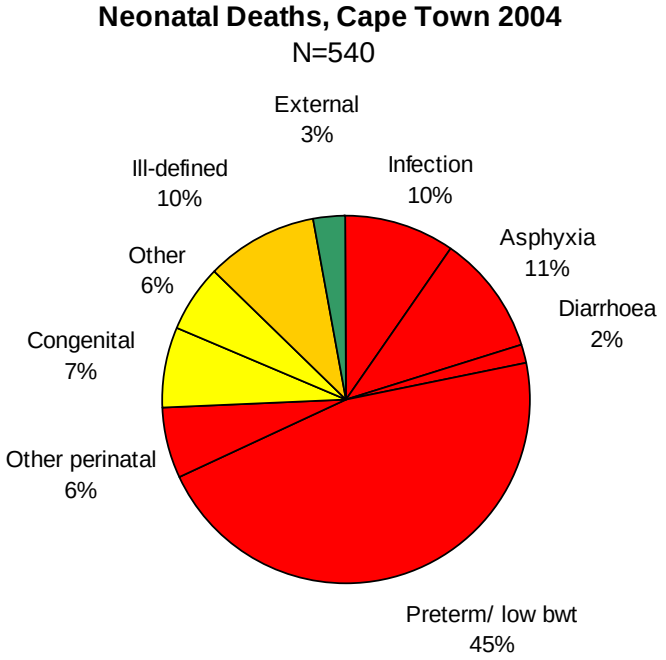


Figure 23: Neonatal cause of death profile, Cape Town, 2004

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.

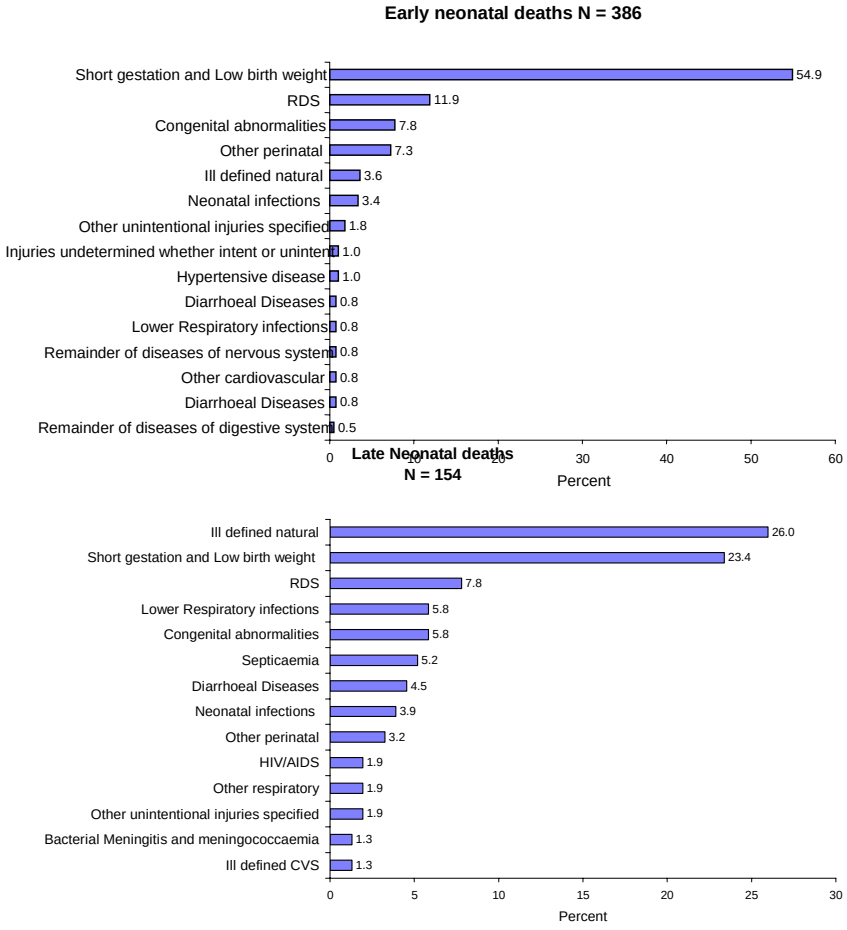


Figure 24: Leading causes of deaths in early neonatal infants (0 - 7 days) and late neonatal infants (8 - 28 days), Cape Town, 2004

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.

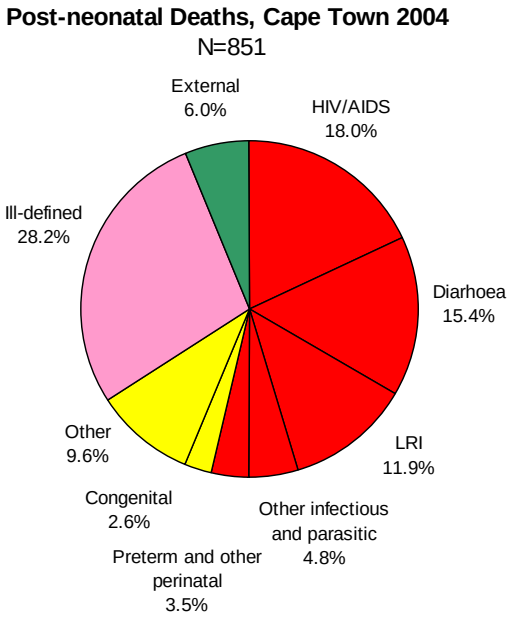


Figure 25: Cause of death profile, post-neonatal infants (1-11 months), Cape Town, 2004

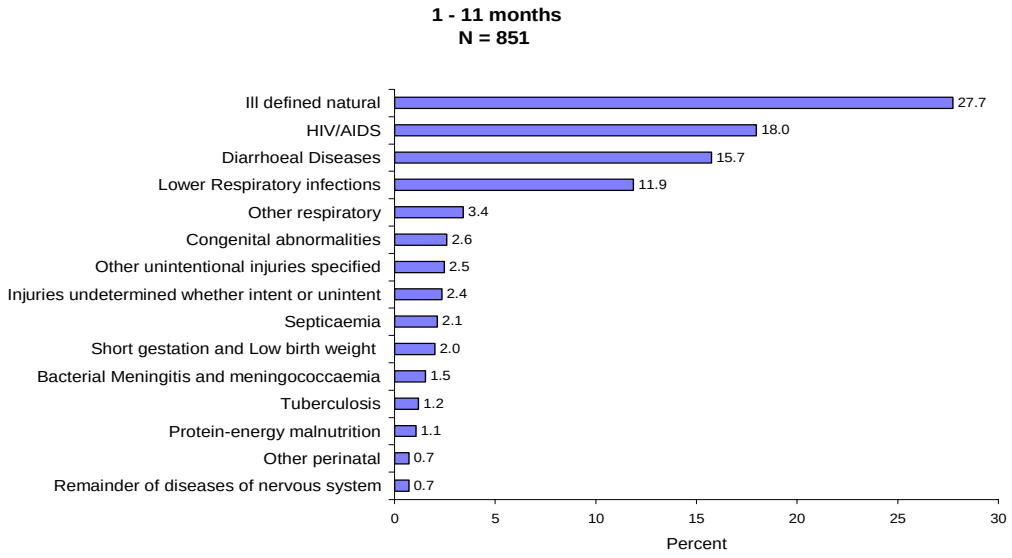


Figure 26: Leading causes of deaths in post neonatal infants (1 – 11 months), Cape Town 2004

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.

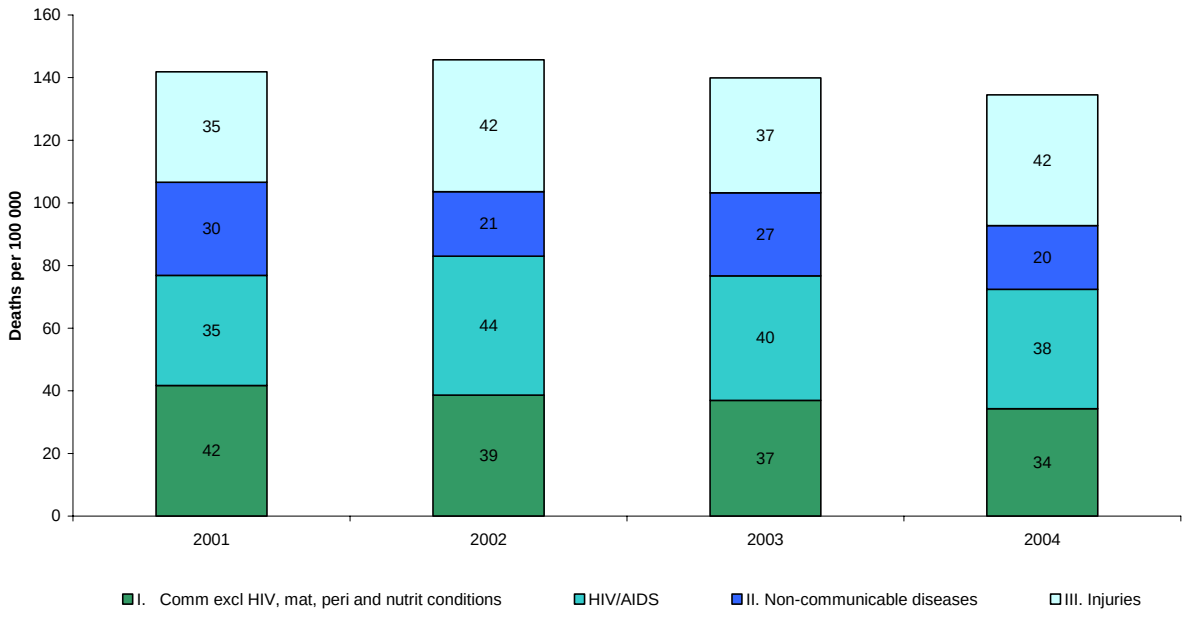


Figure 27: Trend in 1 – 4-year mortality rates per 100 000,
Cape Town, 2001 – 2004

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.

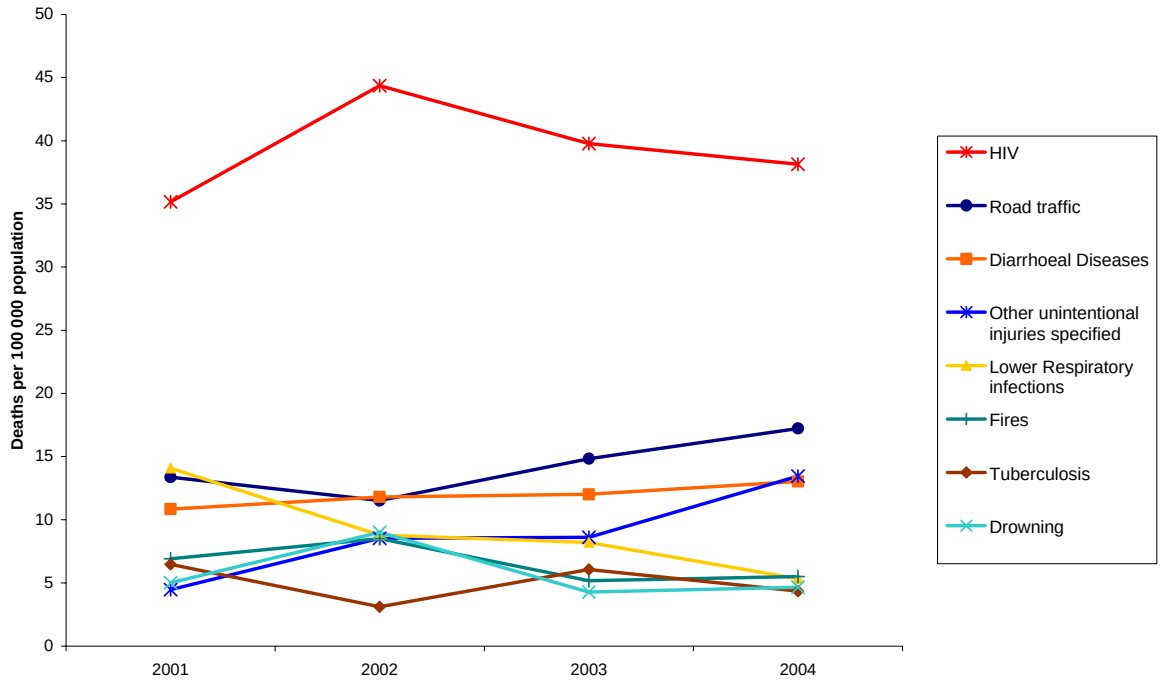
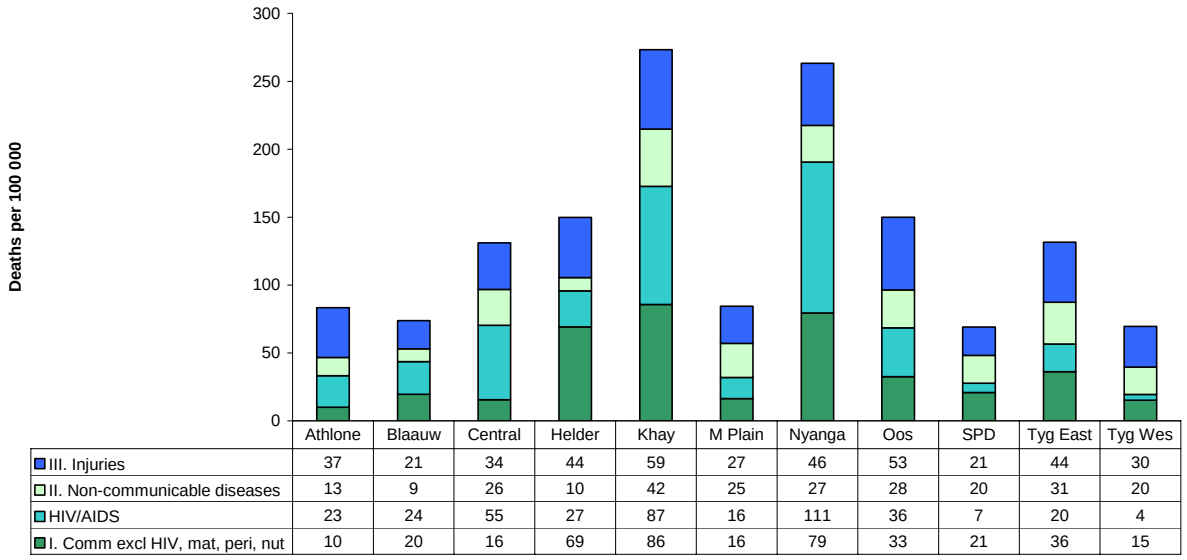


Figure 28: Trend in 1 – 4-year mortality rates per 100 000 population for selected conditions, Cape Town 2001 - 2004

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.

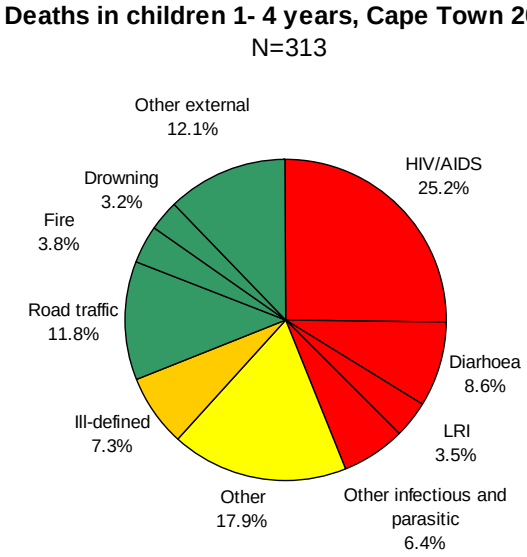


Figure 30: Cause of death profile, children 1 – 4 years, Cape Town, 2004

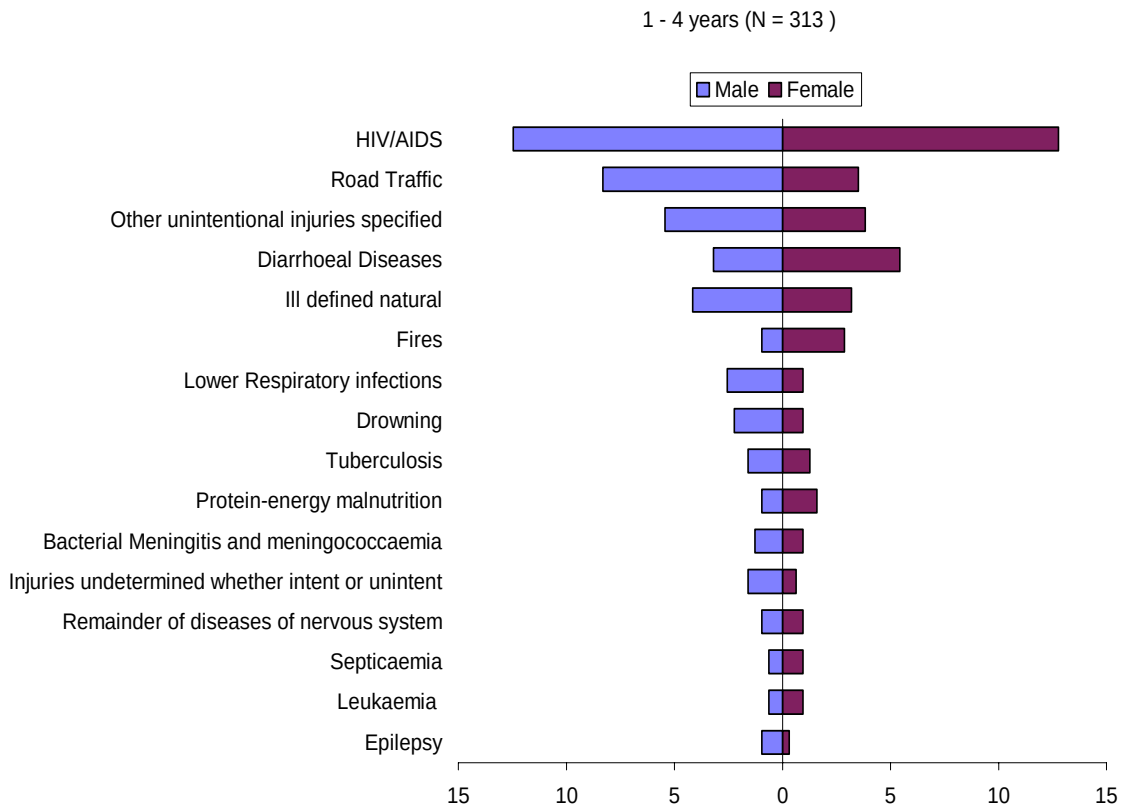


Figure 31: Leading causes of death in the 1 – 4-year age group, Cape Town, 2004

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.

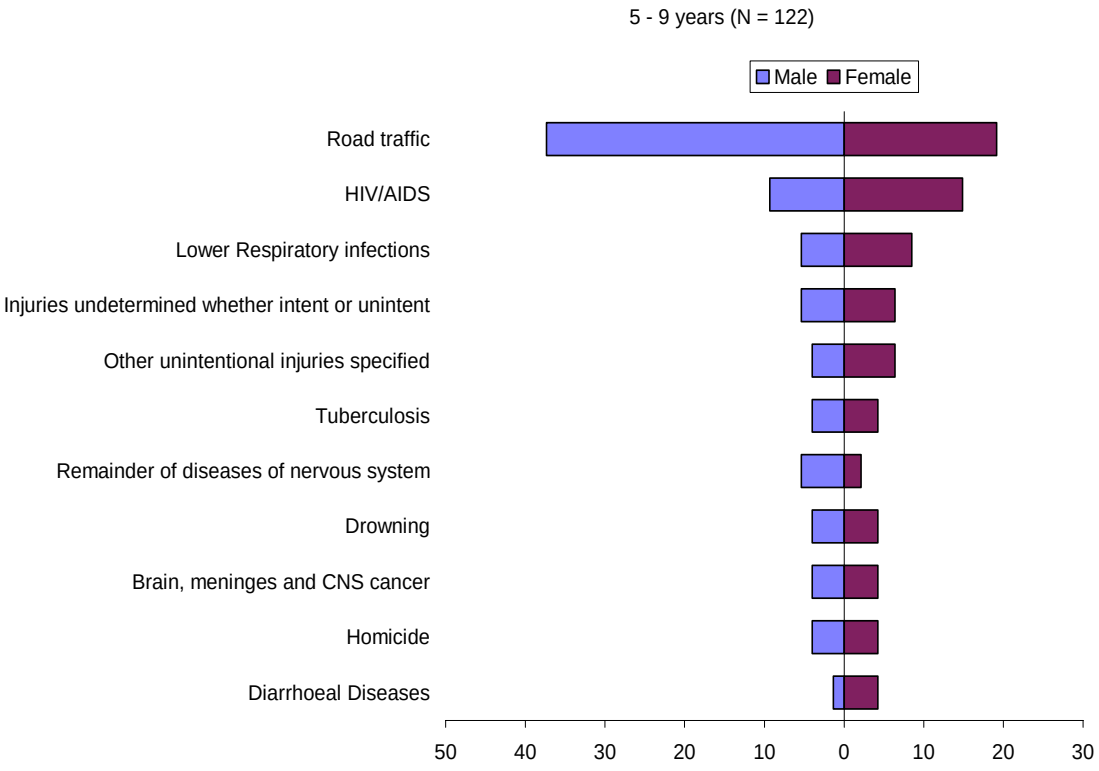


Figure 32: Leading causes of death in 5 – 9-year age group, Cape Town, 2004

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.

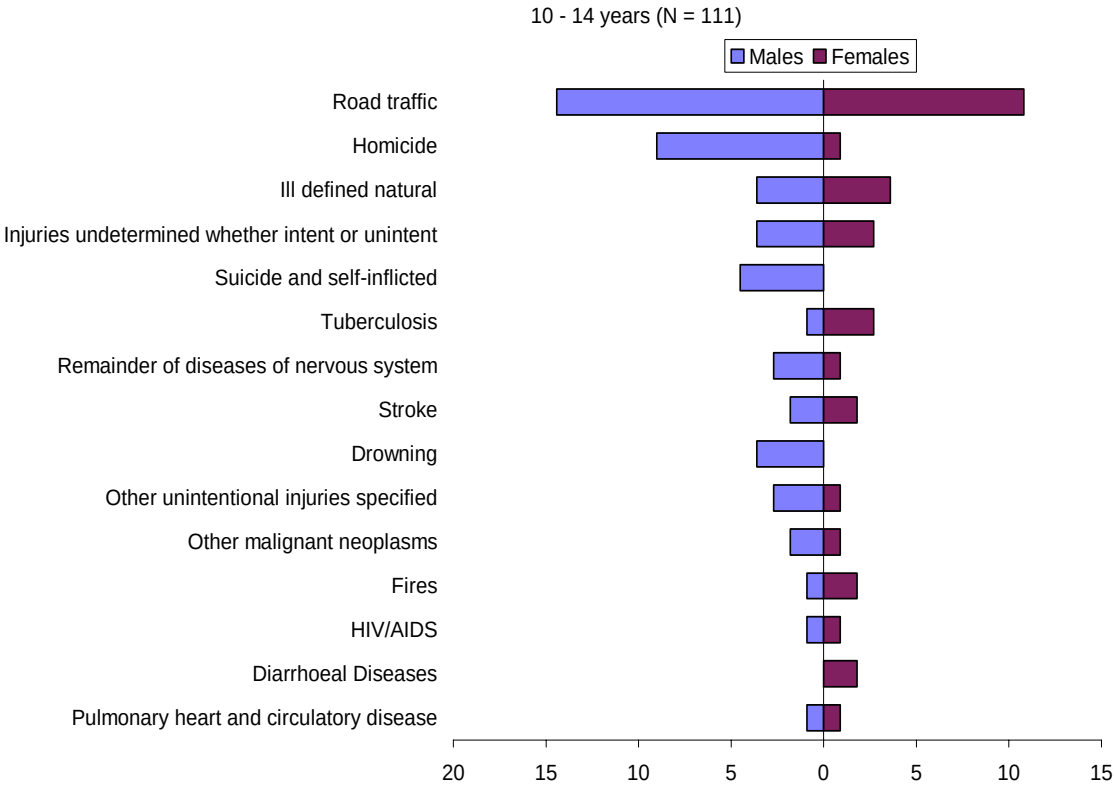


Figure 33: Leading causes of death in 10 – 14-year age group, Cape Town, 2004

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.

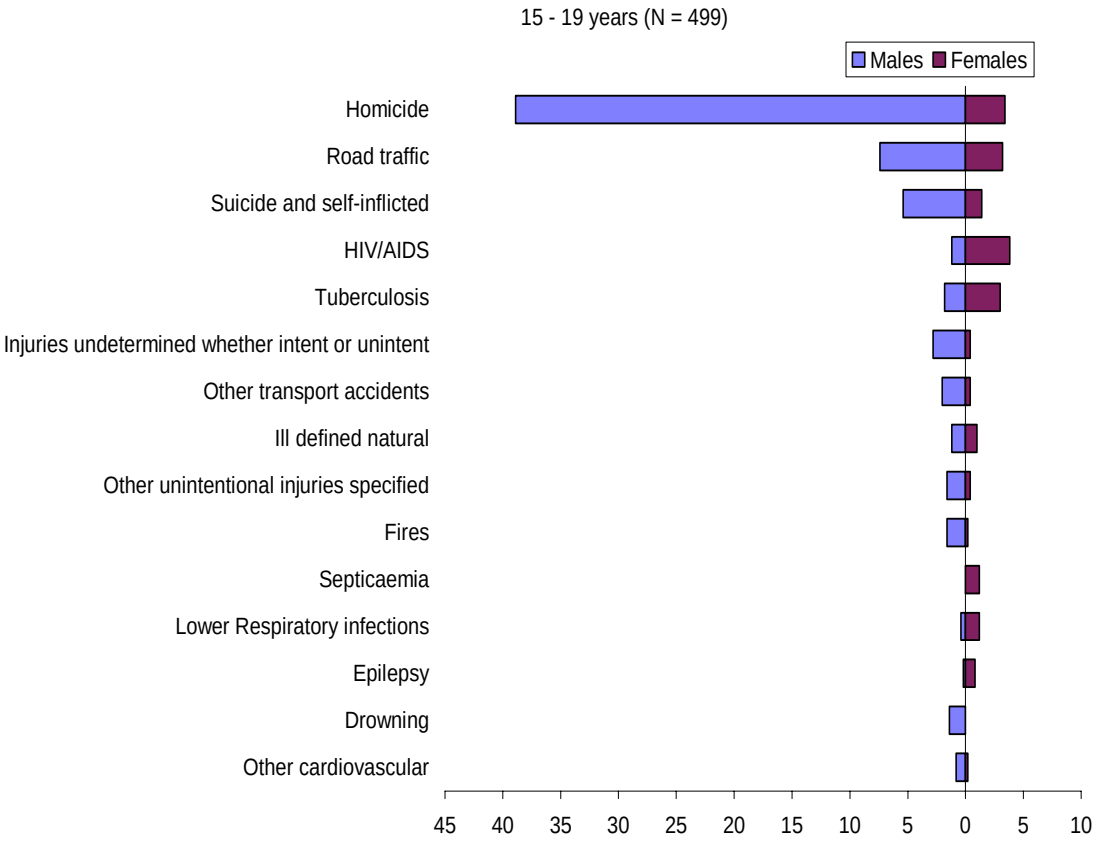


Figure 34: Leading causes of death in 15 – 19-year age group, Cape Town, 2004

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.

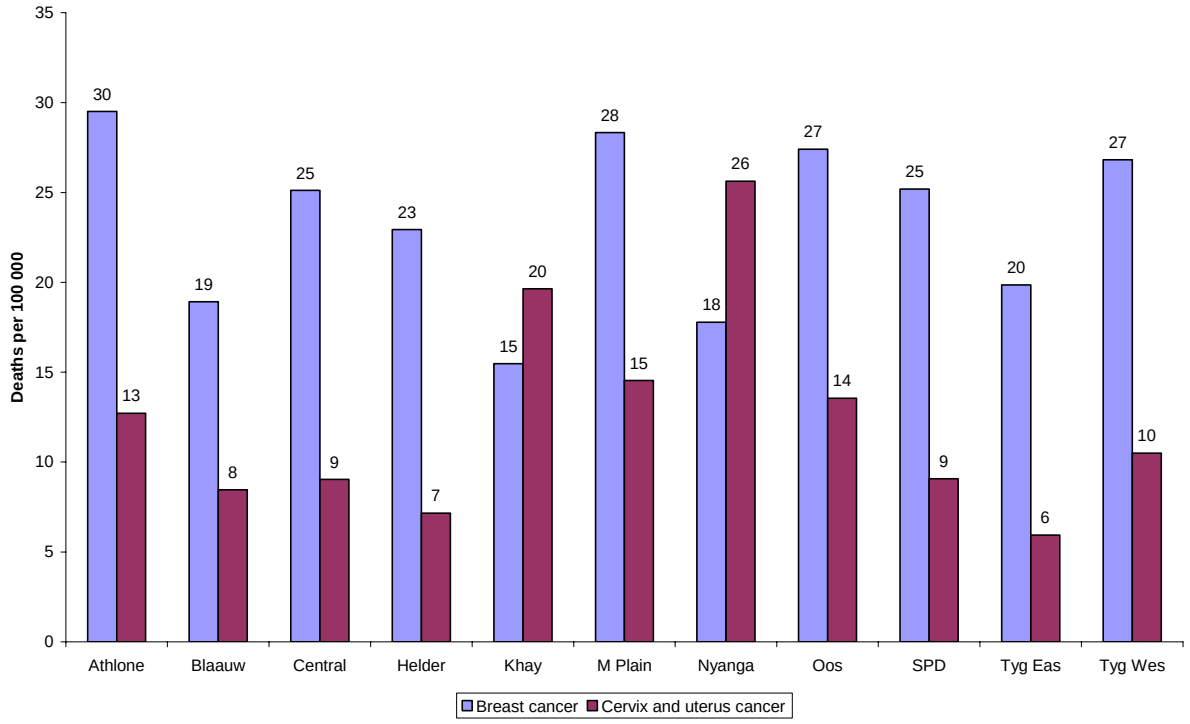


Figure 35: Age-standardised mortality rates (pooled estimates) for cervix and breast cancer by sub-district, Cape Town, 2001 – 2004

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.

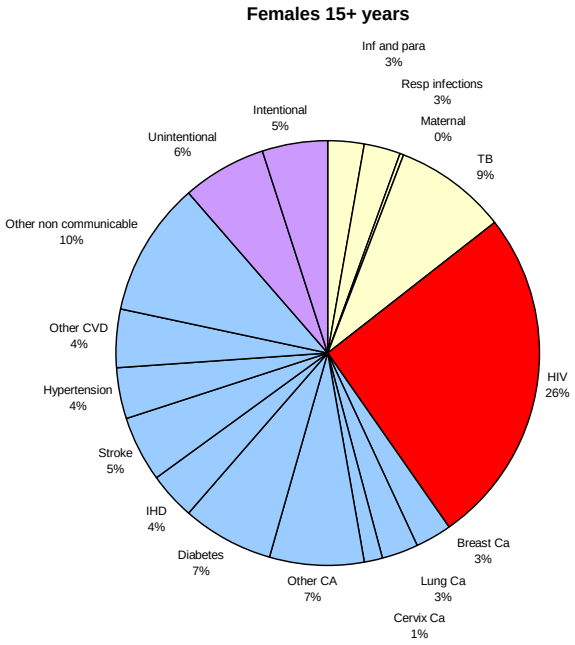


Figure 36: Premature mortality (YLLs) cause profile for women of 15+ years, Cape Town, 2004

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.

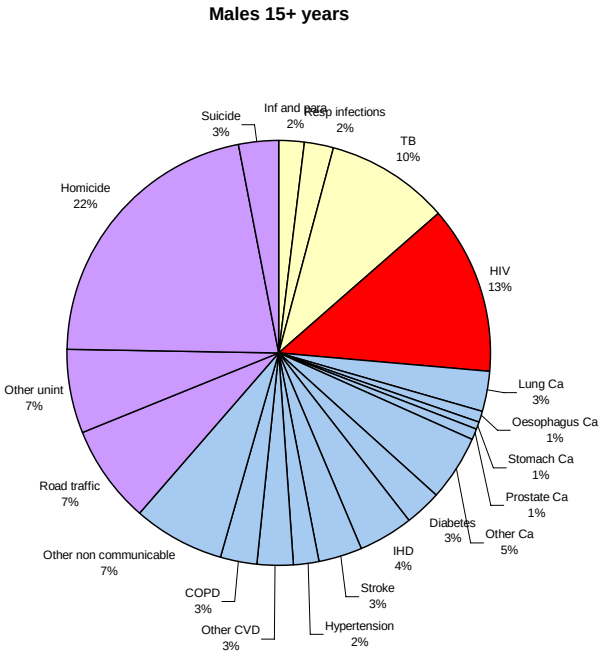


Figure 37: Premature mortality (YLLs) cause profile for men 15+ years, Cape Town, 2004

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.

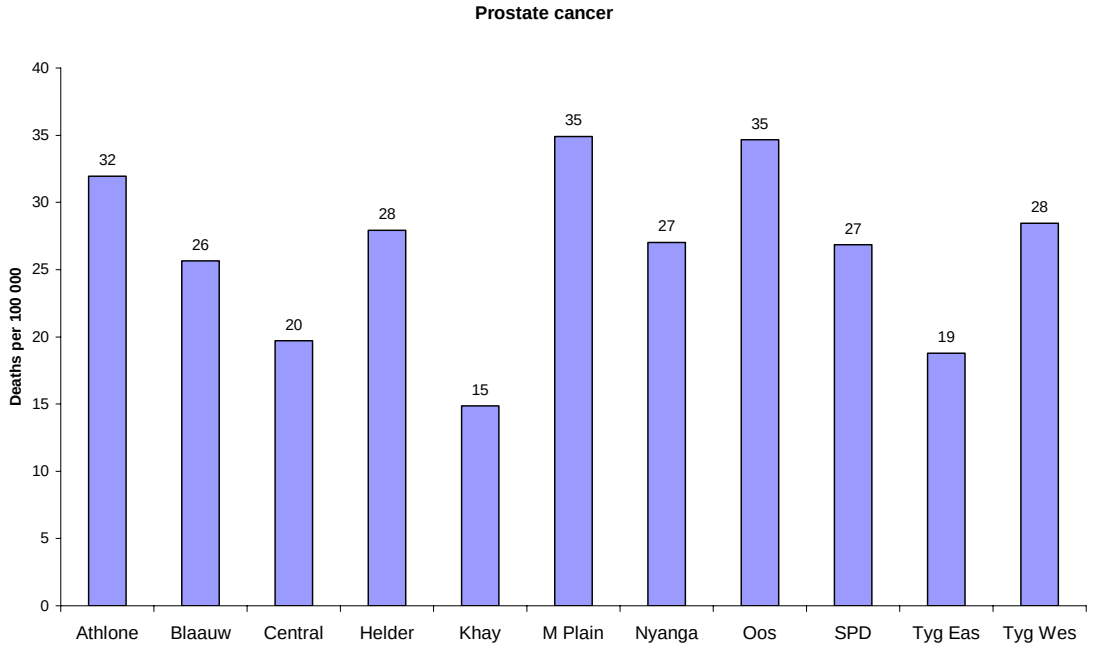


Figure 38: Age-standardised mortality rates (pooled estimates) for prostate cancer by sub-district, Cape Town, 2001 – 2004

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.

[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.

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.

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

[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.

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-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

[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.

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.

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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