

# Western Cape Province Mortality 1997 – 2002

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

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## Acronyms and Abbreviations

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

## Executive Summary

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

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

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

Throughout the period, non-communicable diseases dominate the mortality profile of the province. These affect older people and impact on mortality among the 45-59 year age group, and vastly dominate mortality in older adults. At 60 years and above, mortality patterns are very similar for males and females, but female deaths occurred at much older ages. The patterns showed very little change from 1997 to 2002.

Injury deaths are very high among males, especially among the 15 to 29 year age group. Among children under the age of 14, though death due to injuries is high, there is very little differentiation by sex.

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

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

This analysis has revealed important information about changes in the mortality profile in the Western Cape. In addition, although there have been substantial improvements in vital registration in South Africa since 1994, there is a clear need for further improvement including:

- training in the certification of cause of death
- improvements in the registration of the deaths of children
- resolving some coding issues that exist
- making data available at a sub-province level.

Although this study provides valuable public health information, a burden of disease assessment that makes use of multiple sources of data and adjusts for the under-registration of deaths and the mis-classification of causes is needed.

# Introduction

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

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

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

Since 1994 there have been substantial improvements in the completeness of death registration. Since 1997, the coding of the causes of death from the death notifications has been standardized and Statistics South Africa has reported on the national cause of death statistics that have been processed in a standard manner. However, these statistics require careful analysis as they still suffer from some deficiencies. Although the national data has been made available for further analysis,

it has only been possible to obtain the data for 1997 – 2002 for the province. It has not been possible to obtain sub-provincial level data.

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

# Methods

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## 1.1 Data source

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

## 1.2 Burden of disease list

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

comprises 140 conditions and is presented in Appendix I. The list also allows for the ill-defined classifications within categories eg., ill-defined perinatal conditions.

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

### ***1.3 Comparison with numbers of deaths on population register***

The total number deaths for the province reported by Stats SA are compared with the number registered on the population register and the numbers estimated by the ASSA2003 model in order to assess the consistency. Details of deaths logged on the population register by the Department of Home Affairs are sent to the MRC on a monthly basis and included in a database used for rapid mortality surveillance. The database consists of registered deaths where a South African ID was also available. Therefore the population register data is essentially a subset of the Stats SA death data. Non-natural deaths can be separated in this database via an algorithm based on key descriptive words developed to distinguish between the natural and non-natural causes of death.

### ***1.4 Comparison with numbers of deaths from ASSA2003***

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

### **1.5 *Premature mortality (YLLs)***

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

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

## Results

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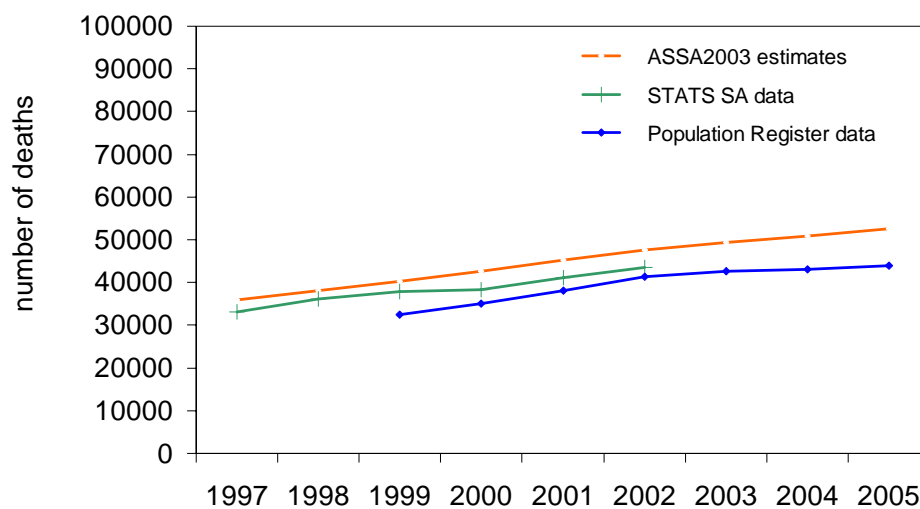
### 2.1 Number of deaths

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

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

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

Total mortality (all ages)



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

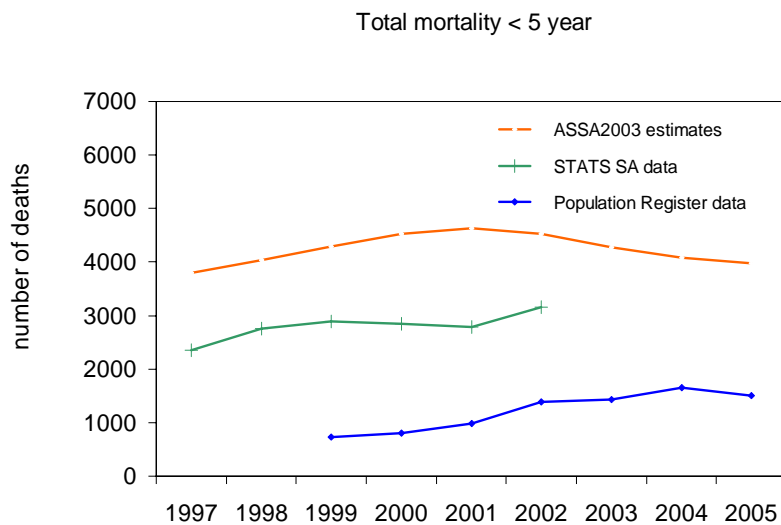
- The number of recorded deaths reported by Stats SA increased from 33166 in 1997 to 43570 in 2002.
- Based on ASSA2003 model estimates, there is very good coverage of death registration in the Western Cape.

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

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

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

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



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

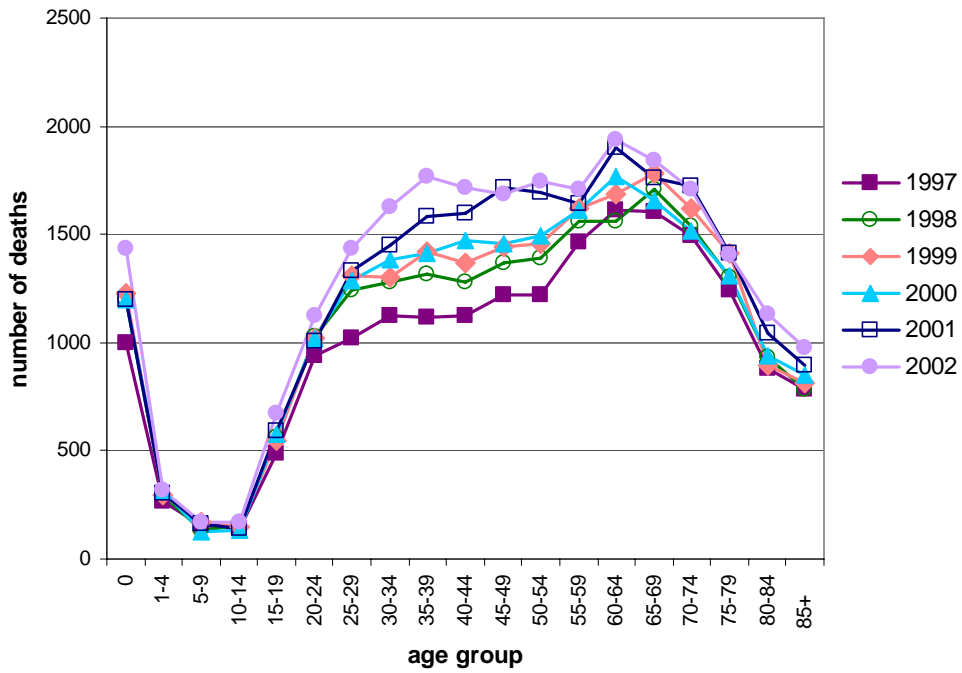
- The number of under-five deaths recorded by Stats SA increased from 2354 in 1997, to 3151 in 2002.
- However, mortality data for children is poor relative to that of adults, and interpretation should be made with caution.

## 2.2 Trends in numbers of deaths by age and sex

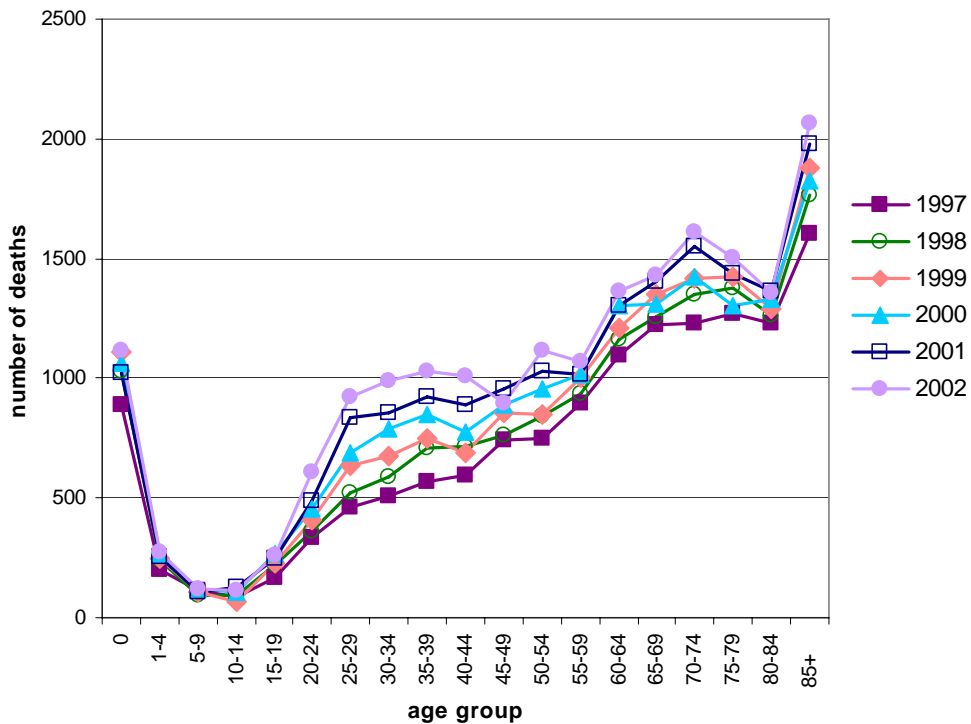
The age specific distribution of deaths in the Western Cape Province reported by Stats SA for the year 1997 through 2002 are shown in Figure 3. These show very distinctive age patterns in the increase. After age 14, mortality increases sharply and the distribution of deaths begins to differentiate by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

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

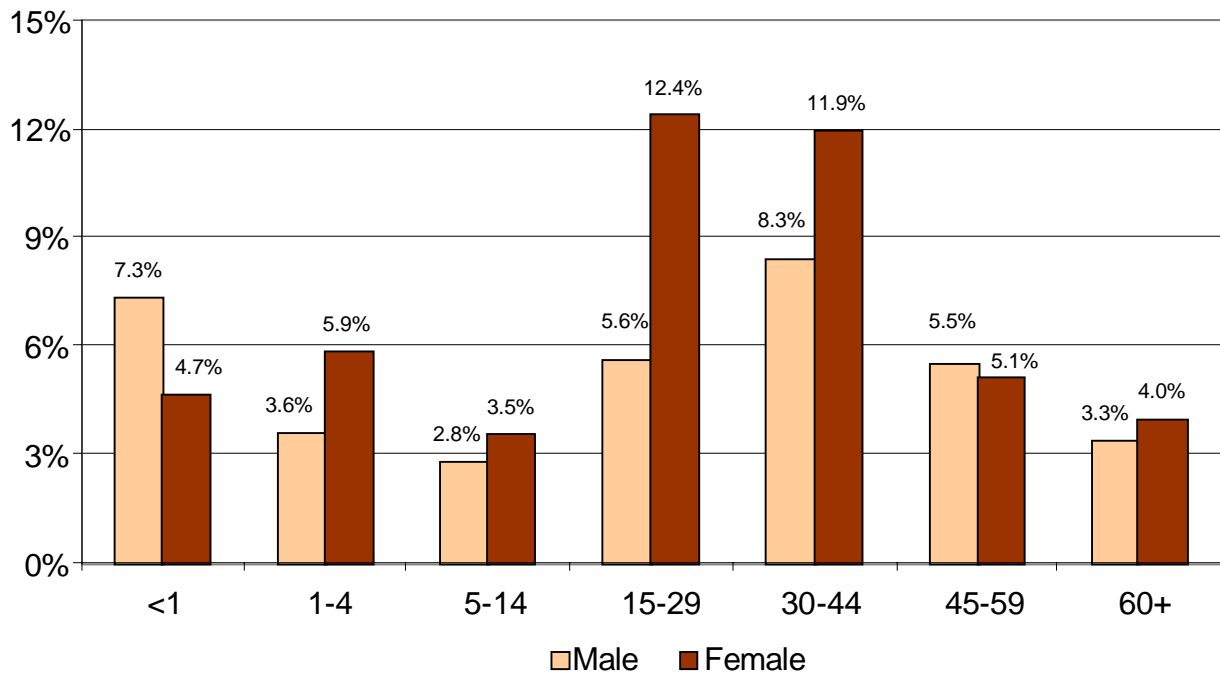
**Total male deaths, Western Cape  
Stats SA data**



**Total female deaths, Western Cape  
Stats SA data**



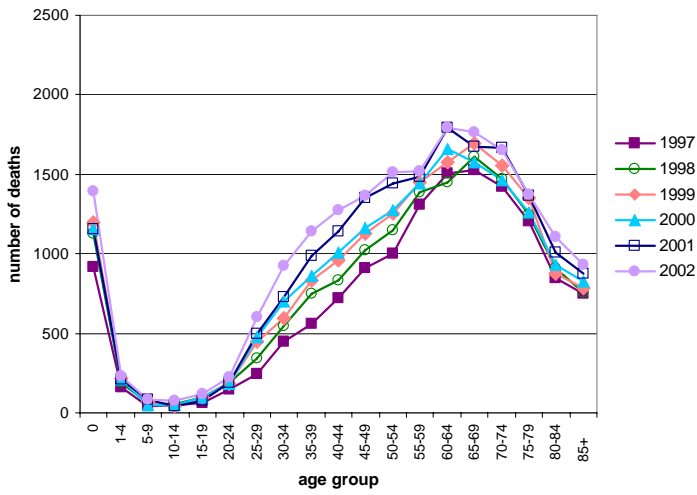
**Figure 3: Number of Western Cape deaths by age and sex, Stats SA 1997-2002**



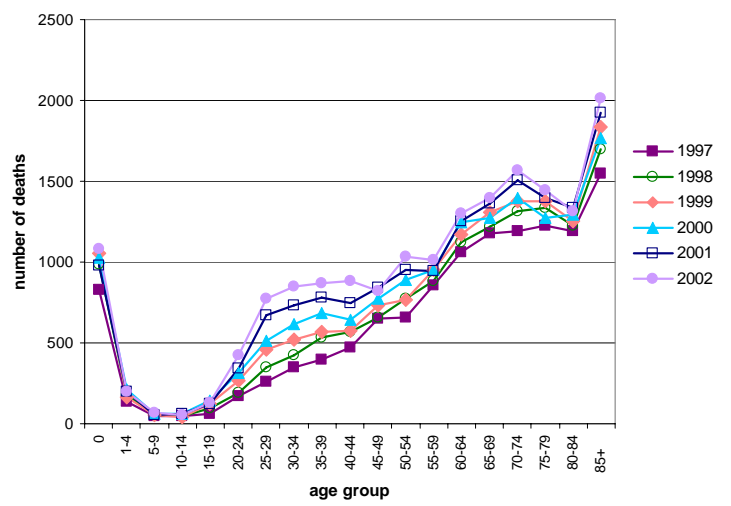
**Figure 4: Annual growth rate in recorded deaths by Stats SA between 1997 and 2002 by age and sex, Western Cape**

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

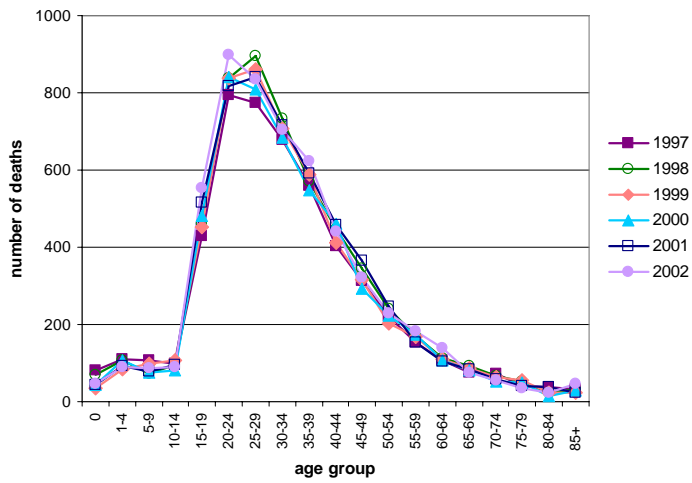
Natural deaths male, Western Cape  
Stats SA data



Natural deaths female, Western Cape  
Stats SA data



Non-natural deaths male, Western Cape  
Stats SA data



Non-natural deaths female, Western Cape  
Stats SA data

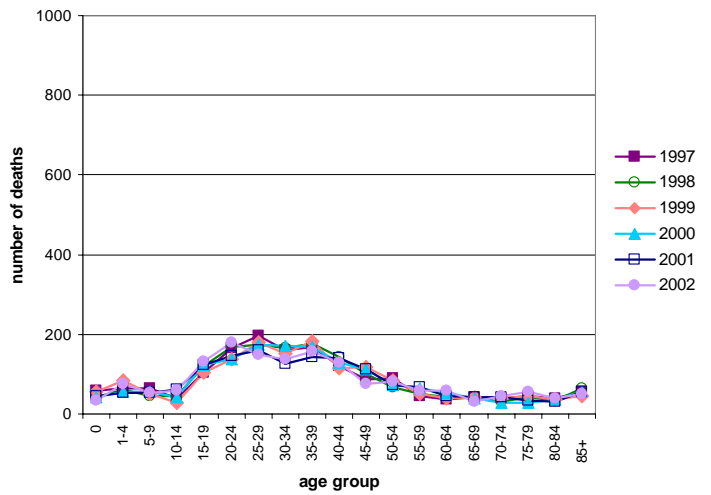


Figure 5: Number of Western Cape natural and non-natural deaths by age and sex, Stats SA 1997-2002

## 2.3 Trends in cause of death

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

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

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

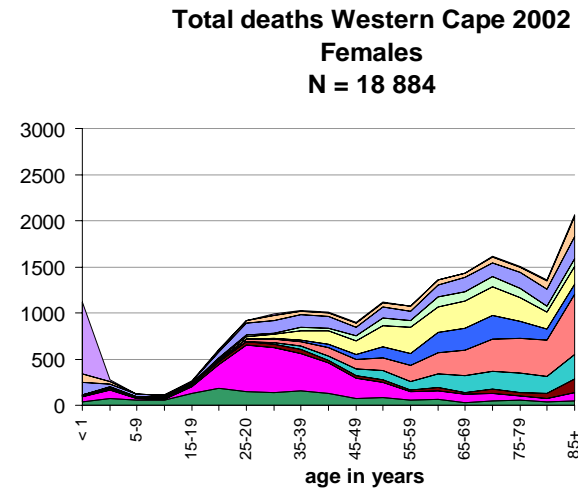
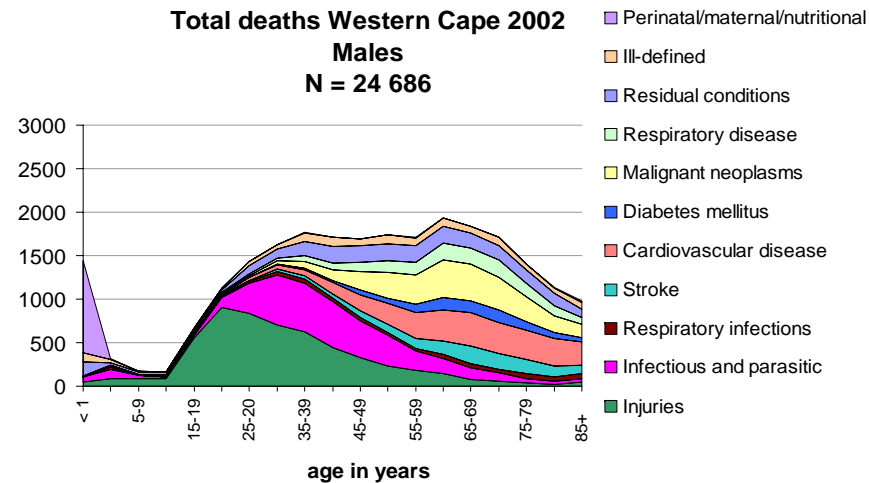
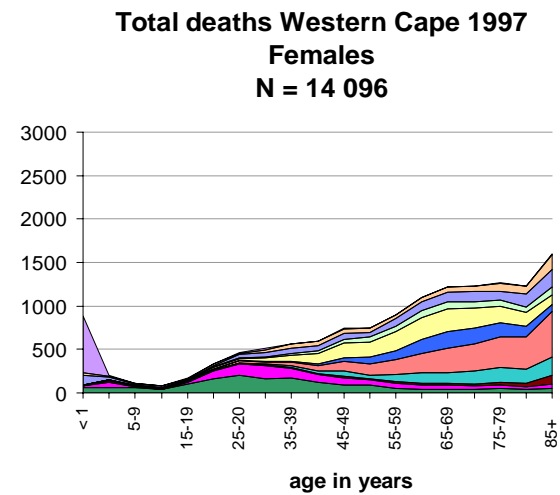
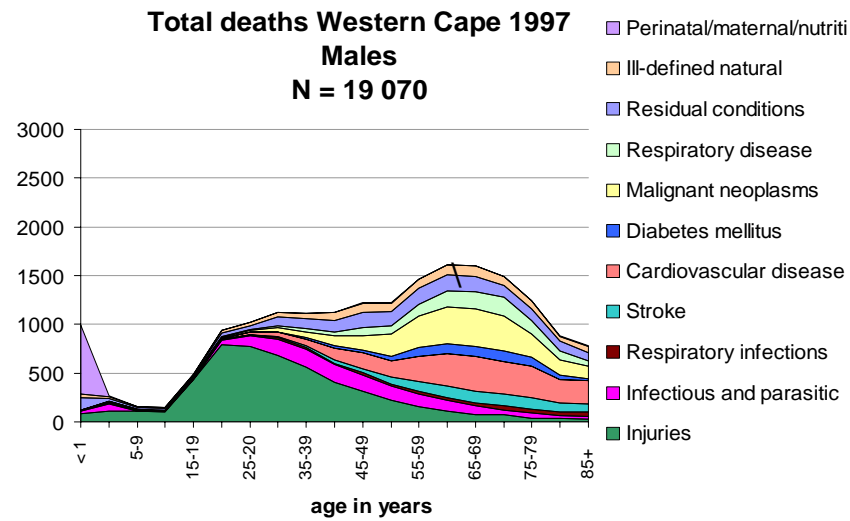
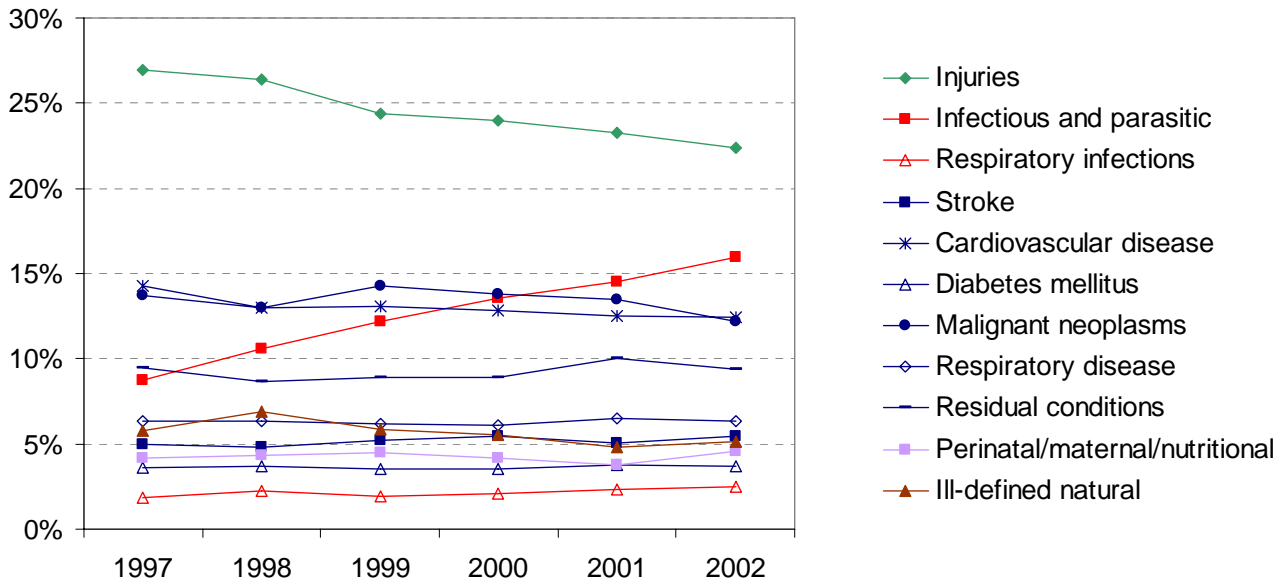


Figure 6: Western Cape deaths by category, age and sex, Stats SA 1997 and 2002

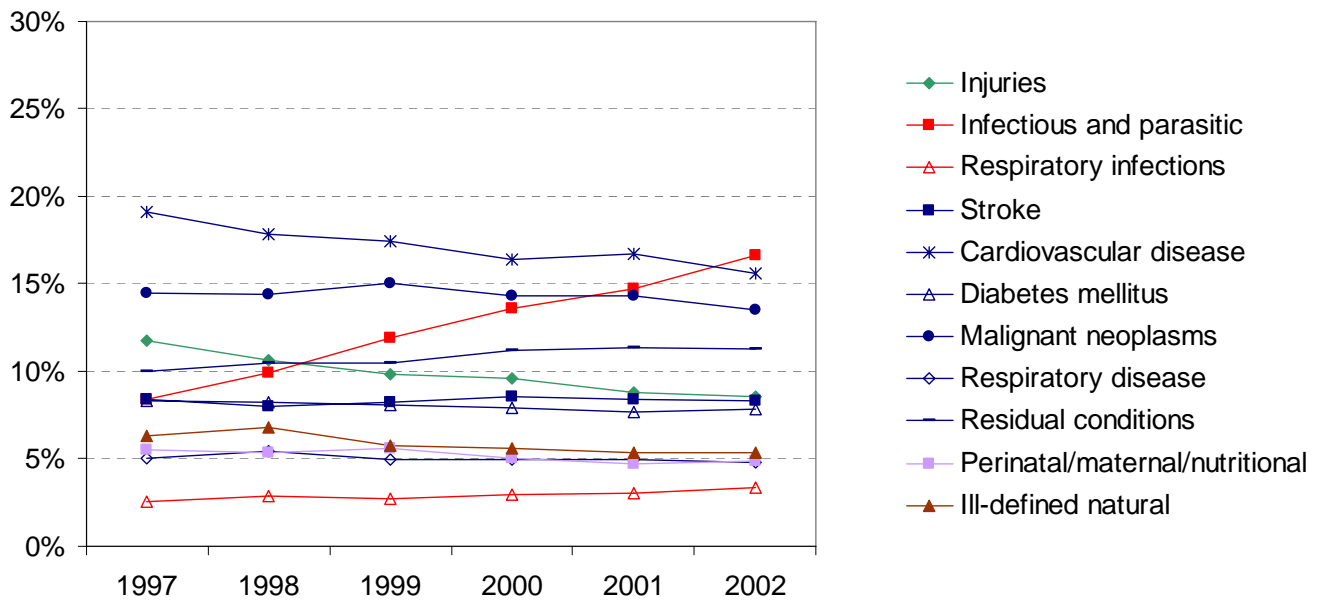
Figure 7 shows the trend in the proportion of deaths by category of diseases. Among both males and females, the proportion of deaths due to infectious and parasitic diseases increased steeply from 1997 to 2002. In females, this category surpassed cardiovascular disease and malignant neoplasms, contributing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

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

### Male deaths 1997 - 2002

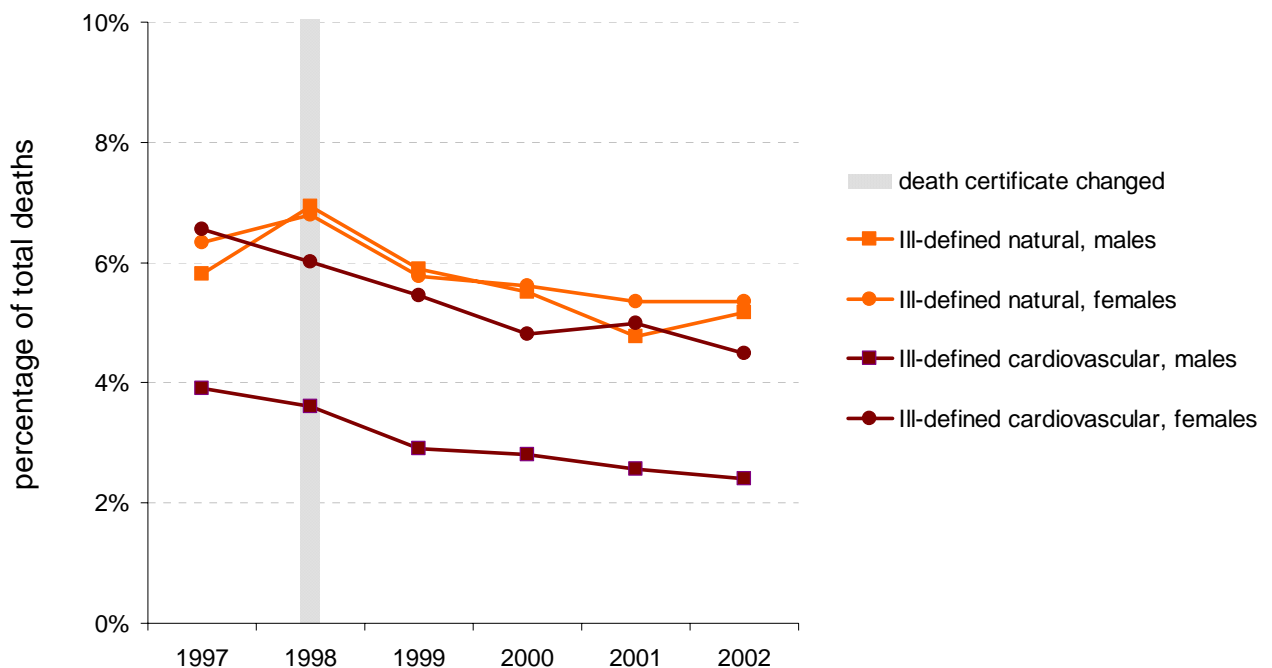


### Female deaths 1997 - 2002



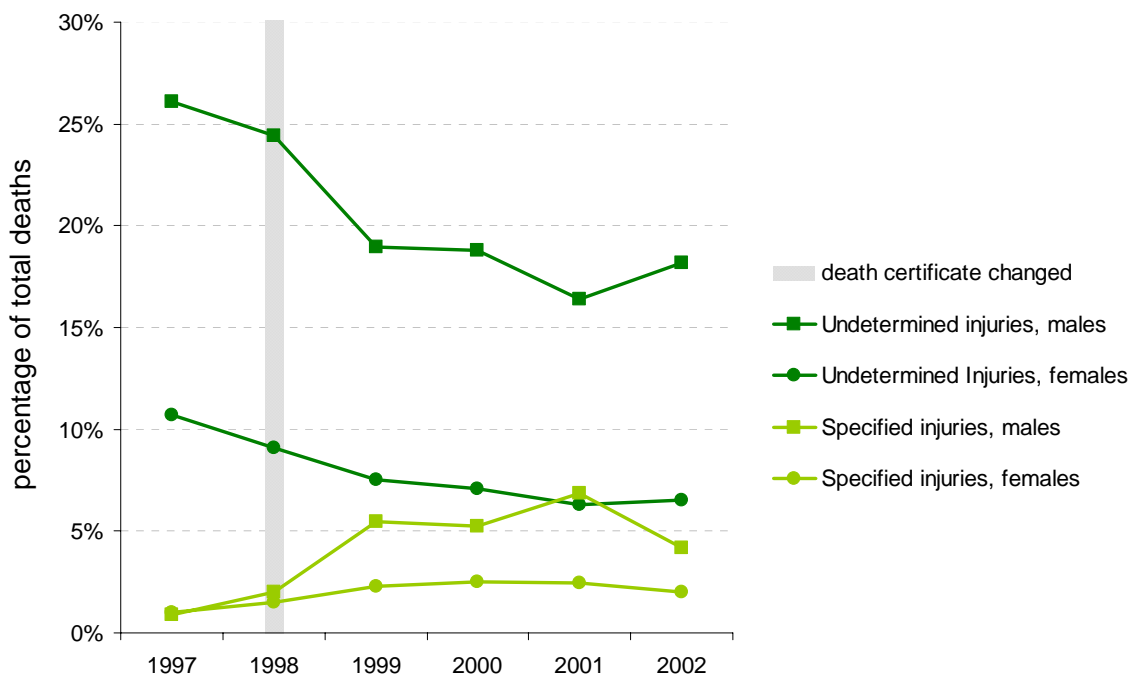
**Figure 7: Proportion of total Western Cape deaths by category, Stats SA 1997-2002**

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



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

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



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

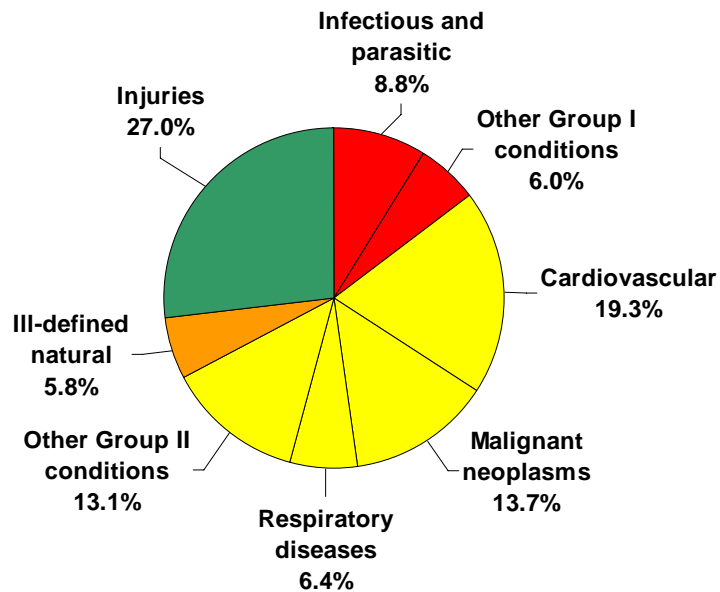
- The proportion of deaths due to undetermined injuries declined from 1997 to 2002, but the proportion of specified injuries increased, particularly since 1998, the year the new death certificate was introduced.
- The proportion of deaths due to ill-defined causes increased from 6% to 7% in 1998 and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

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

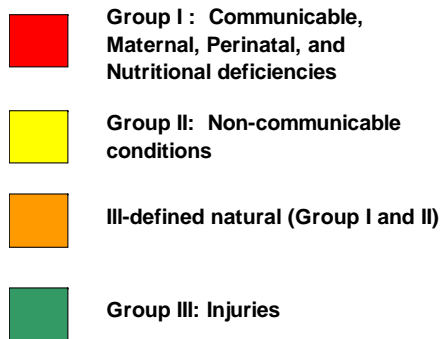
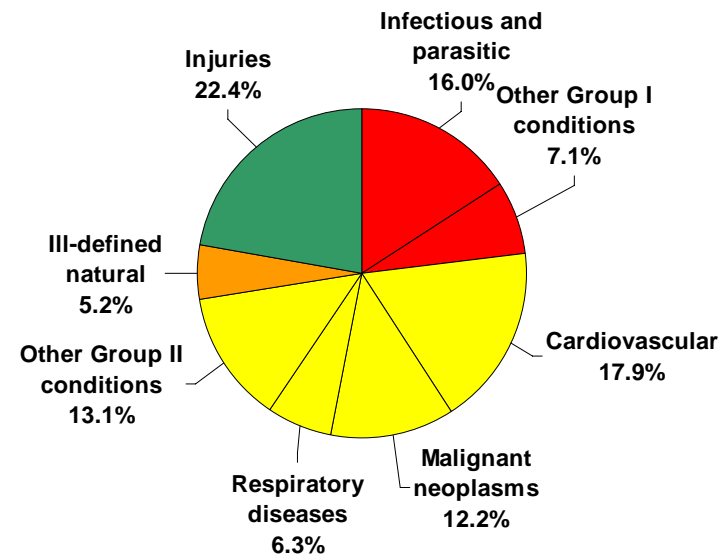
A marked increase in deaths from 1997 to 2002 among both males and females was due to deaths from Group I conditions (communicable diseases, maternal conditions, perinatal conditions, and nutritional deficiencies). In 1997, Group I conditions accounted for 16% of male deaths and 17% of female deaths.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

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

**1997 Male deaths, all ages  
N = 19 070**



**2002 Male deaths, all ages  
N = 24 686**



**Ten leading specific causes of death  
Males all ages**

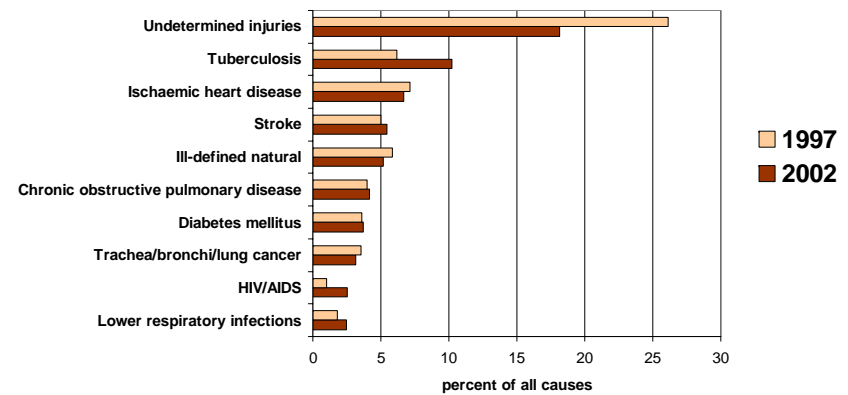
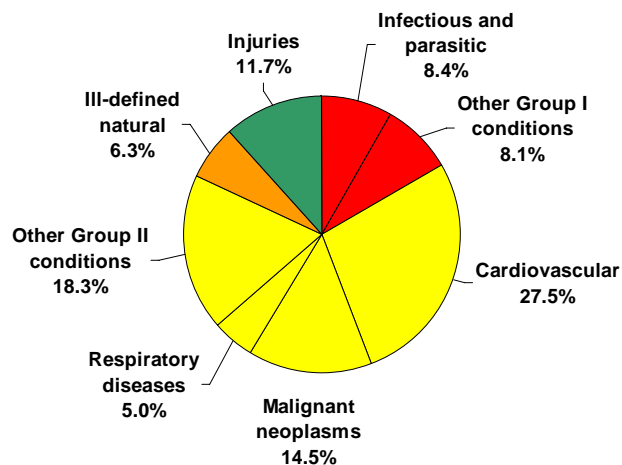
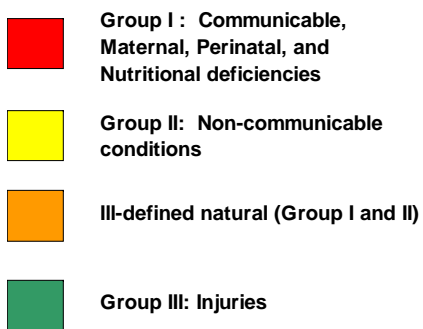
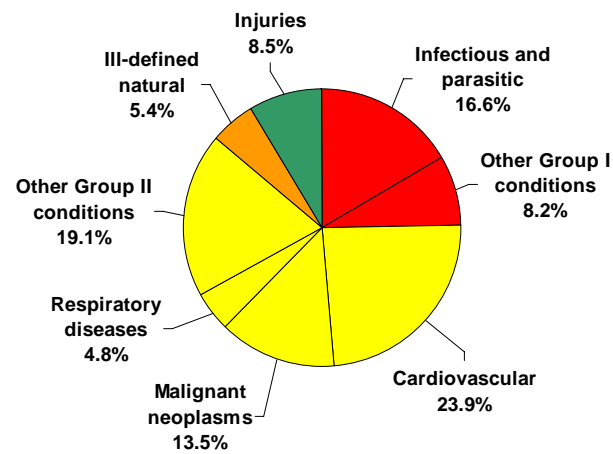


Figure 10: Cause of male deaths (all ages) Western Cape, Stats SA 1997 and 2002

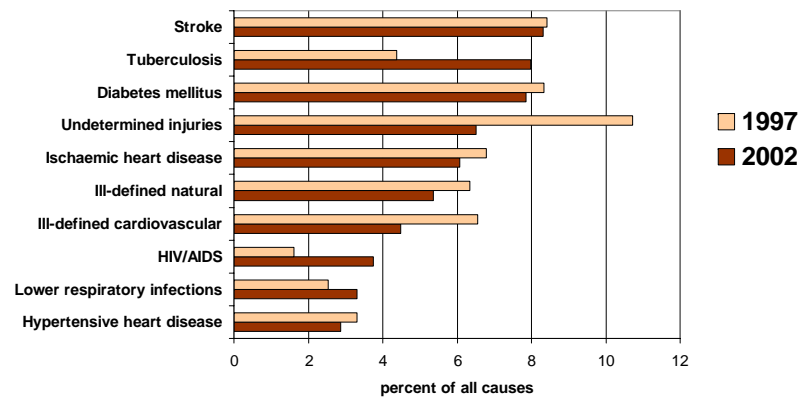
**1997 Female deaths, all ages**  
**N = 14 096**



**2002 Female deaths, all ages**  
**N = 18 884**



**Ten leading specific causes of death**  
**Females all ages**



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

## 2.4 Trends by age group

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

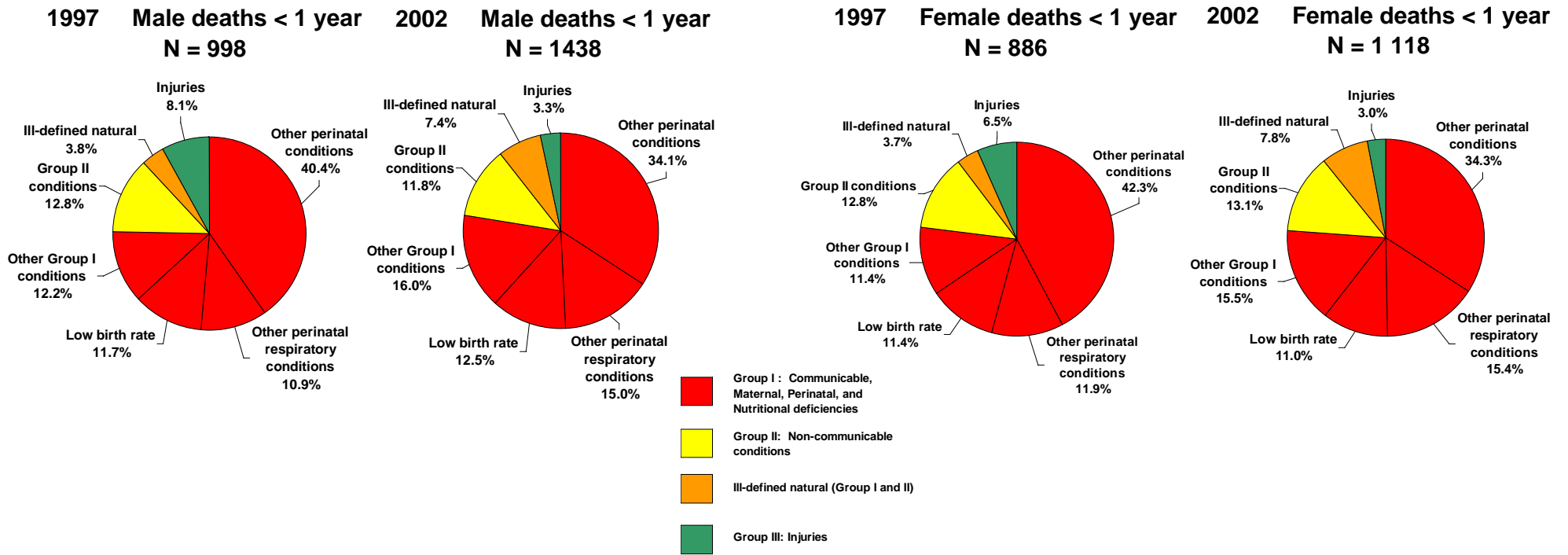
### 2.4.1 Infants (less than 1 year)

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

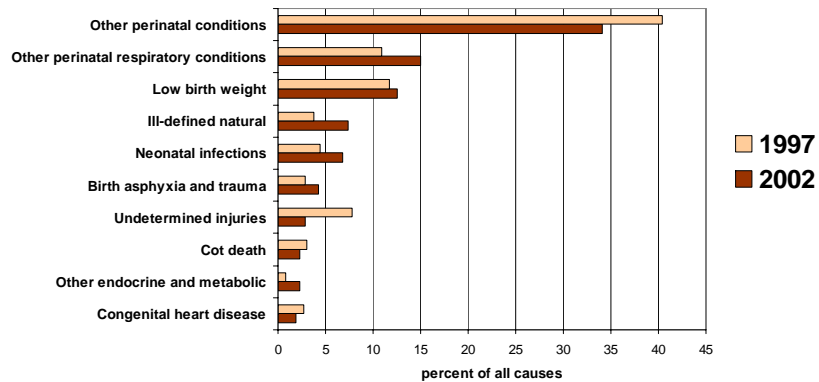
The bar graphs in Figure 12 show the ten leading specific causes of death in 1997 and 2002 for male and female infants under 1 year. The rankings were very similar for males and females. Undetermined injuries and ill-defined natural causes ranked among the ten leading specific causes of death during the period. Other infectious and parasitic diseases, other endocrine and metabolic conditions, and cot death also ranked among the leading ten. However the majority of Group I causes that dominate this age group and rank among the leading ten specific causes of death, fell within the category of Perinatal Conditions (equivalent to the ICD-10 chapter "Certain conditions origination in the perinatal period"). The leading cause of death in under ones was *other perinatal conditions*. Analysis of the national data at a finer age resolution, based on a special

tabulation provided by Stats SA, suggests that the data for under-ones, as it is currently coded, is not be a true reflection of the mortality of this age group (Appendix C). This analysis revealed that deaths due to perinatal conditions were recorded as occurring across all ages up to 1 year and not just in the first week. Discussions with Stats SA have indicated that causes of death were preferentially given perinatal codes if the death occurred before the first birthday, and that these codes were not restricted to causes *originating* in the first week of life in accordance with the ICD definitions. This coding practice has resulted in a substantial inflation of perinatal conditions and a corresponding under representation of the actual causes of death prior to 12 months of age, making it very difficult to interpret these data. Stats SA have changed this coding practice for deaths occurring from 2006 onwards.

- Interpretation of the cause of death profile in infants is difficult as there has been incorrect coding of causes to perinatal conditions, even when the deceased was older than 1 week. For example, diarrhoea does not appear as an explicit condition in the leading causes as they have been mis-coded to perinatal causes.
- The numbers of registered infant deaths (aged under 1 year) has increased substantially between 1997 and 2002.
- Deaths from Group I conditions predominate the under 1 age group, primarily perinatal and neonatal causes.



Ten leading specific causes of death  
Males < 1 year



Ten leading specific causes of death  
Females < 1 year

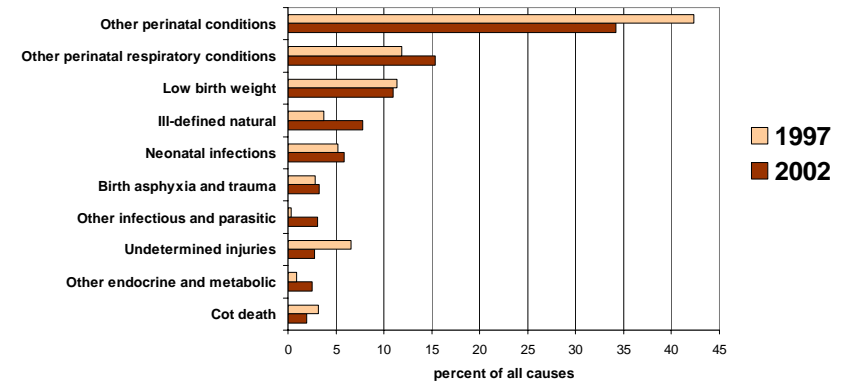
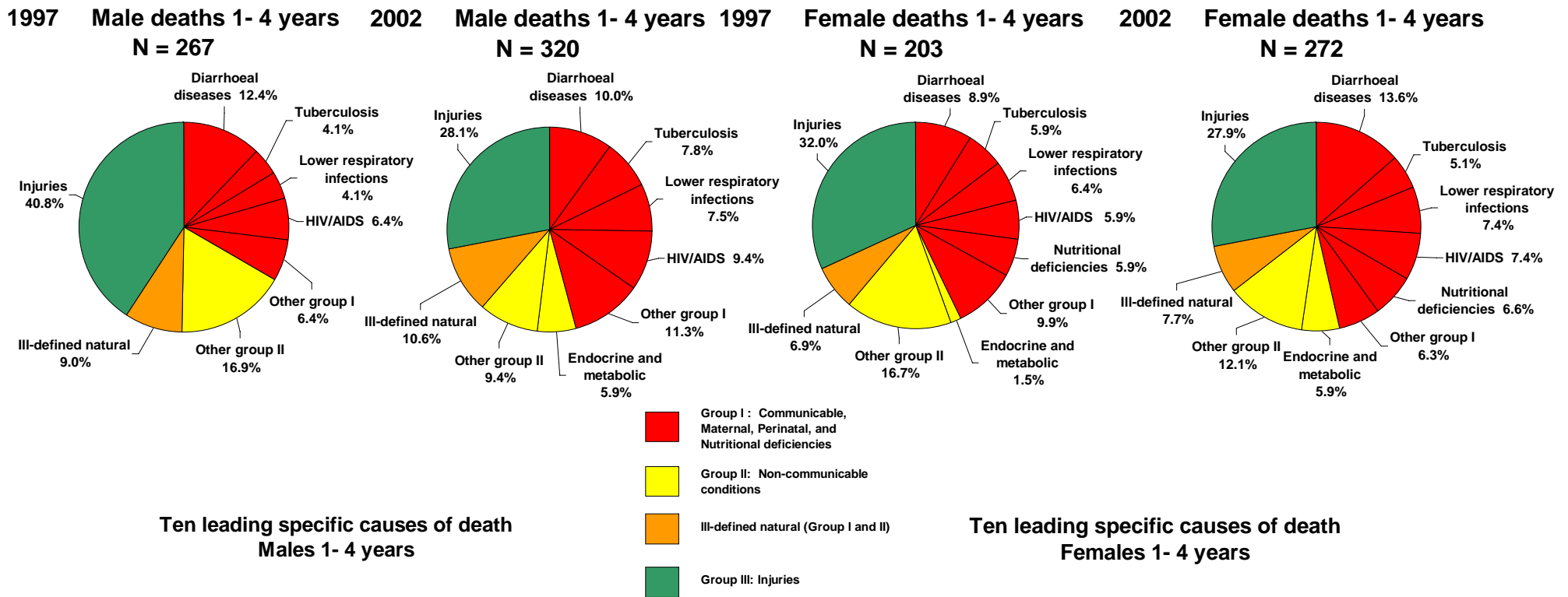


Figure 12: Cause of death of infant males and females, aged under-1, Western Cape, Stats SA 1997 and 2002

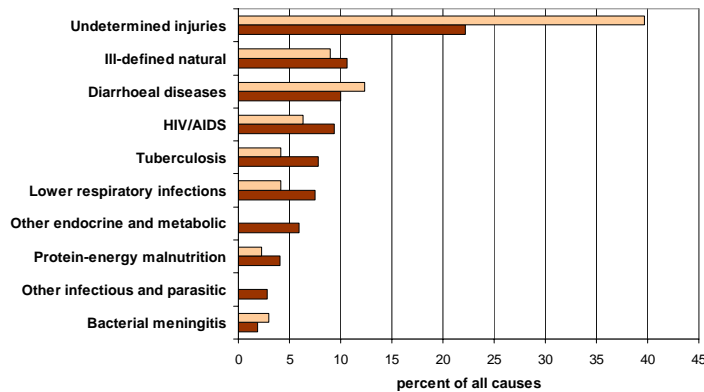
### **2.4.2 Children 1-4 years**

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

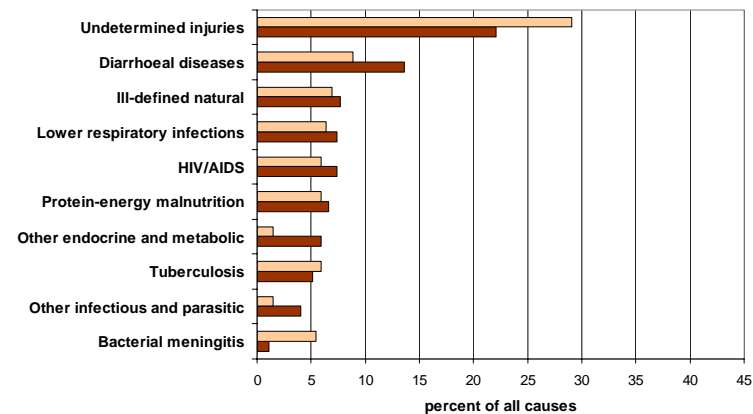
- The number of registered child deaths, aged 1-4 years, increased between 1997 and 2002.
- The proportion of injury deaths is high in both male and female children aged 1-4 years. Details on the causes of the injuries are not available as most are unspecified on the death certificate.
- The proportion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



**Ten leading specific causes of death Males 1- 4 years**



**Ten leading specific causes of death Females 1- 4 years**



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

### **2.4.3 Children 5-14 years**

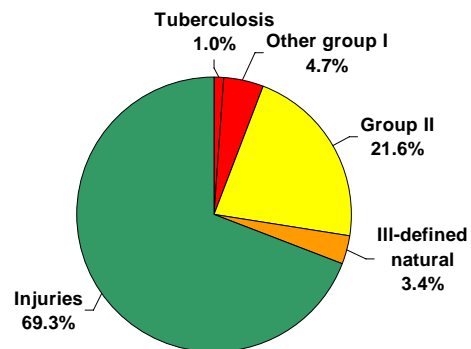
For each female death in the age group 5-14 years there are 1.5 male deaths. In 1997 the sex ratio was 1.51 and in 2002 the ratio was 1.48, showing little change.

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

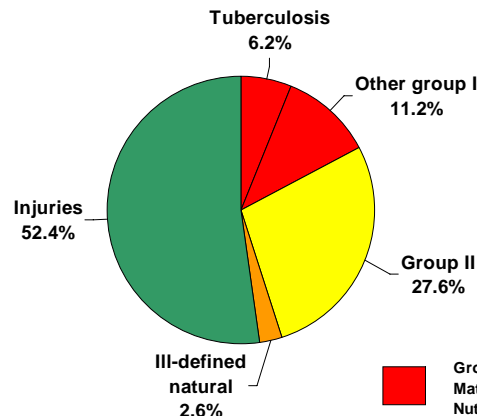
Deaths due to infections and nutritional conditions (Group I) increased considerably in this age group from 1997 to 2002. In 1997, Group I conditions accounted for 6% of the total deaths among male children aged 5-14, and 10% among females. By 2002 this had increased to 29% of male deaths and 18% of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

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

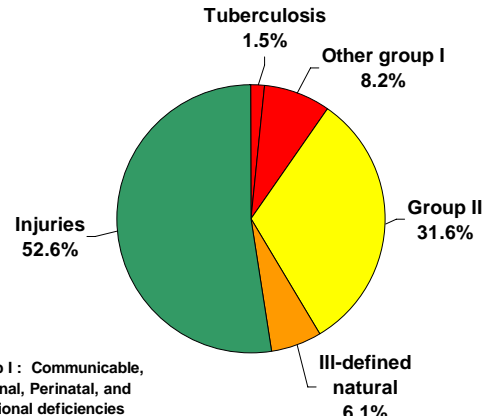
**1997 Male deaths 5-14 years  
N = 296**



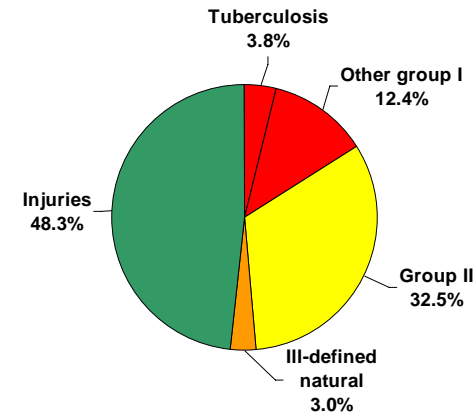
**2002 Male deaths 5-14 years  
N = 340**



**1997 Female deaths 5-14 years  
N = 196**

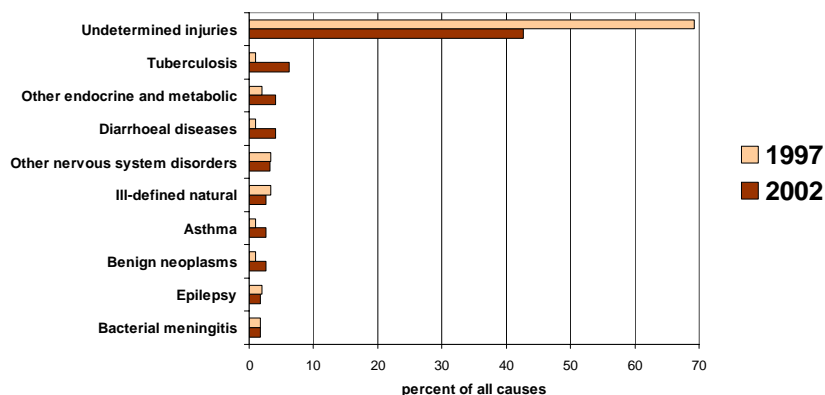


**2002 Female deaths 5-14 years  
N = 234**

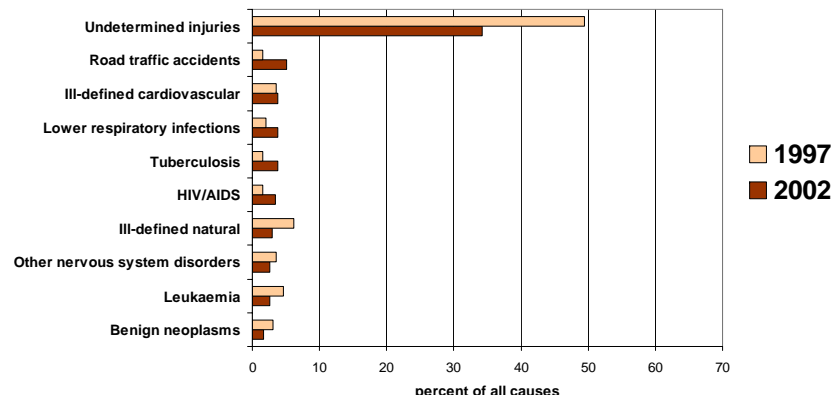


■ Group I : Communicable, Maternal, Perinatal, and Nutritional deficiencies  
■ Group II: Non-communicable conditions  
■ III-defined natural (Group I and II)  
■ Group III: Injuries

**Ten leading specific causes of death  
Males 5-14 years**



**Ten leading specific causes of death  
Females 5-14 years**



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

#### **2.4.4 Adults 15-29 years**

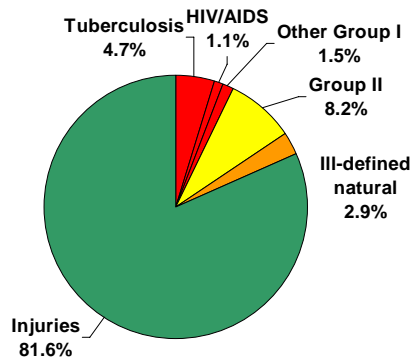
Death due to injury is a major cause of mortality in young males aged 15-29 years (Figure 15). In 1997, 82% of the total males deaths in this age group were due to injuries, while the figure for females was 49%. Homicide, road traffic accidents and ill-defined accidents ranked among the ten leading specific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

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

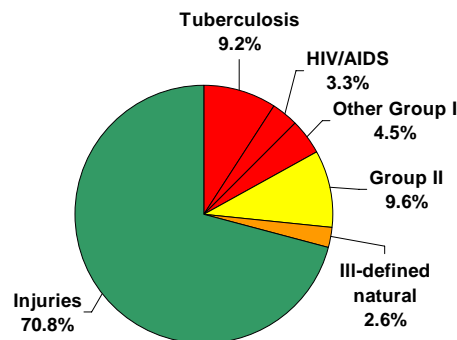
Non-communicable (Group II) contributed 8% to the total mortality of males aged 15 to 29 years in 1997 and 10% in 2002. Among females these figures were 18% and 19% respectively. Ill-defined natural causes contributed from 2.6% to 4.6% to the total deaths of each sex in 1997 and 2002.

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

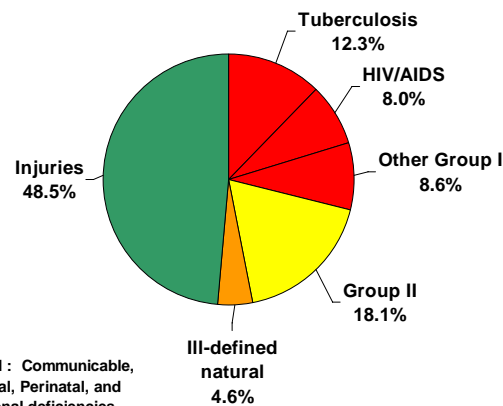
**1997 Male deaths 15-29 years  
N = 2 447**



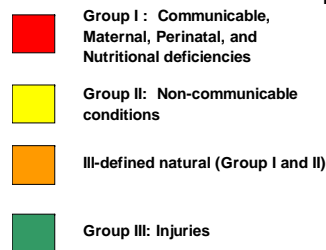
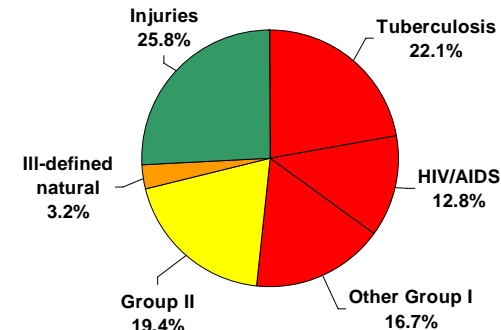
**2002 Male deaths 15-29 years  
N = 3 233**



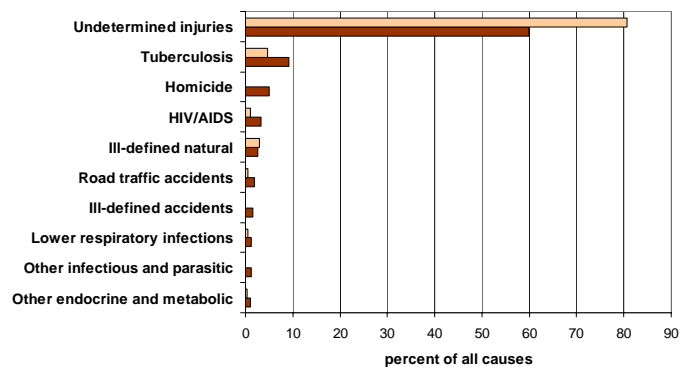
**1997 Female deaths 15-29 years  
N = 963**



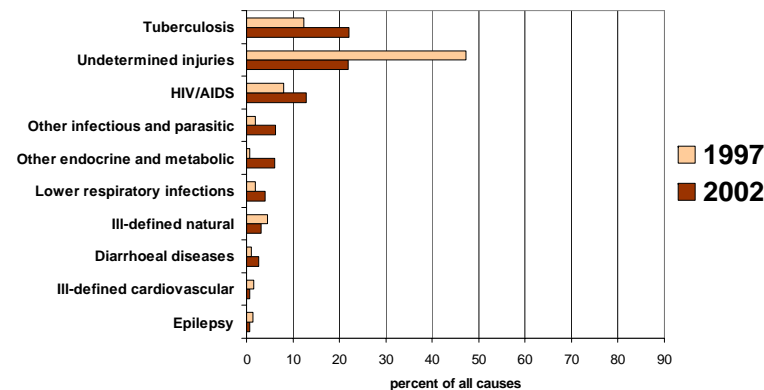
**2002 Female deaths 15-29 years  
N = 1 790**



**Ten leading specific causes of death  
Males 15-29 years**



**Ten leading specific causes of death  
Females 15-29 years**



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

#### **2.4.5 Adults 30-44 years**

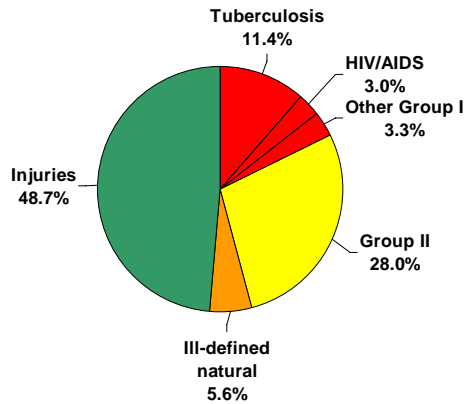
Deaths due to the communicable diseases and maternal and nutritional conditions (Group I) increased among adults aged 30 to 44 years from 1997 to 2002, more so among females. In males, deaths from Group I conditions increased from 18% in 1997 to 35 % in 2002, in females the increase was from 24 % to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

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

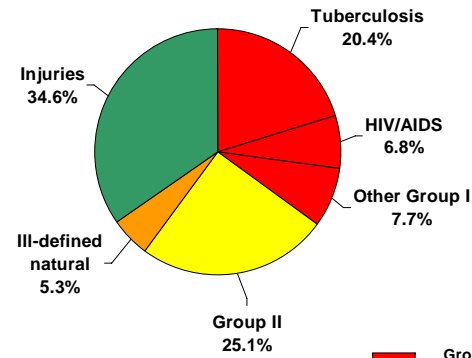
Injury deaths continue to make a substantial contribution to mortality in males of this age group with 49% of the total deaths in 1997 and 35% in 2002. Deaths from ill-defined natural causes contributed from 5.3% to 7.1% to the total deaths of each sex in 1997 and 2002.

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

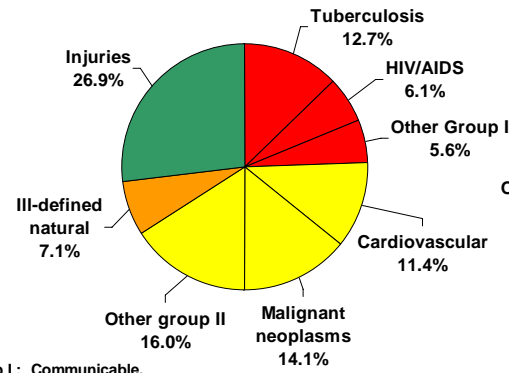
1997 Male deaths 30-44 years  
N = 3 367



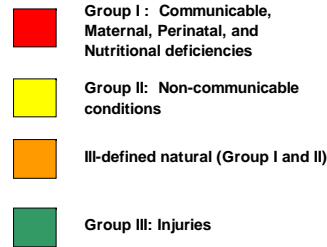
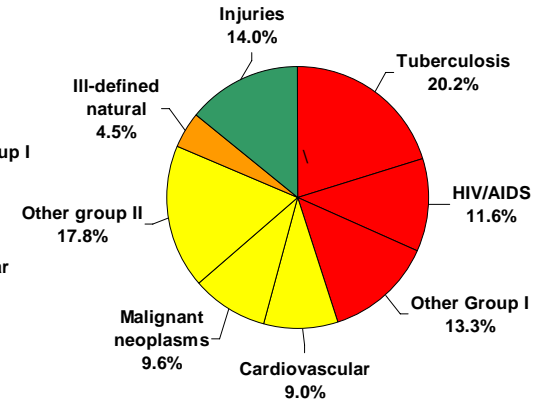
2002 Male deaths 30-44 years  
N = 5 110



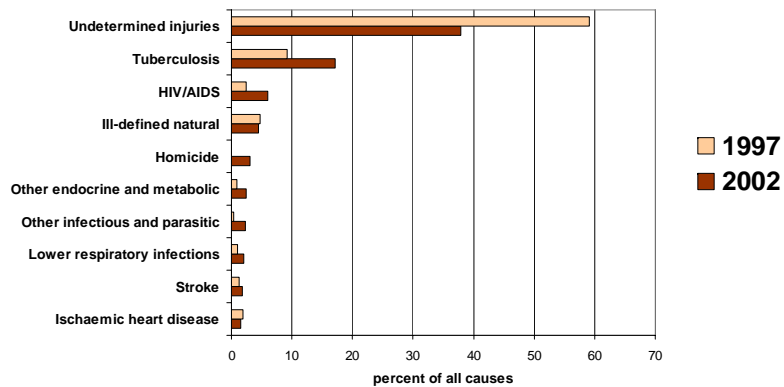
1997 Female deaths 30-44 years  
N = 1 667



2002 Female deaths 30-44 years  
N = 3 082



Ten leading specific causes of death  
Males 30- 44 years



Ten leading specific causes of death  
Females 30- 44 years

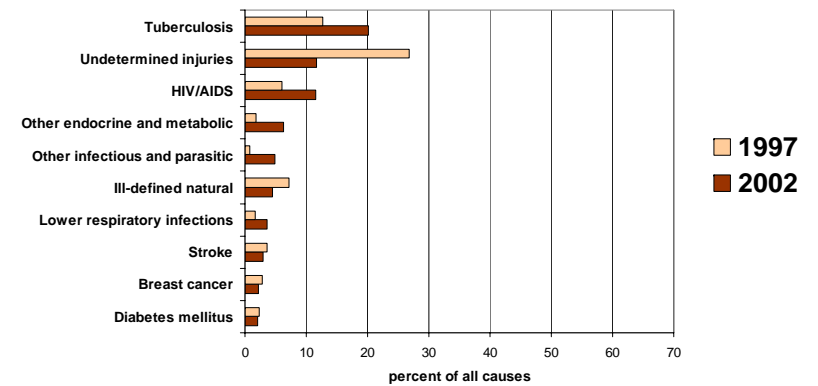


Figure 16: Cause of death of males and females aged 30-44 years, Western Cape, Stats SA 1997 and 2002

#### **2.4.6 Adults 45-59 years**

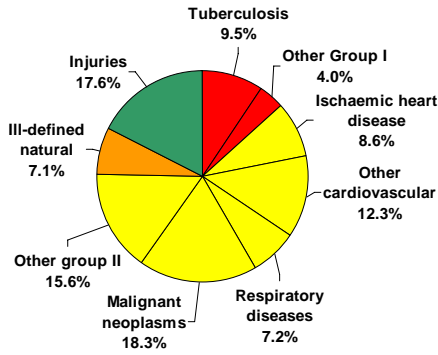
Non-communicable diseases (Group II) contribute the majority of deaths by the ages of 45 to 59 years (Figure 17). Mortality profiles in 1997 were quite similar to those in 2002, but profiles of males differ from profiles of females. Non-communicable diseases accounted for approximately 61% of the total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

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

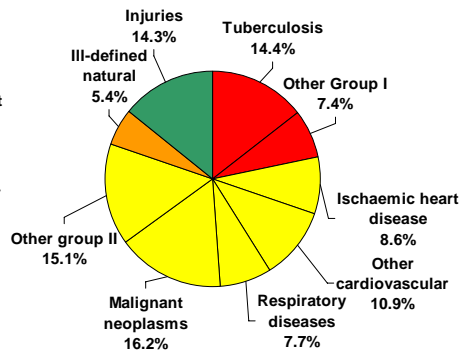
Injury deaths contributed just under 20% of the total deaths among males aged 45 to 59 in 1997 and in 2002, approximately twice that of females. Injuries of undetermined cause ranked as the leading specific cause of death in males in 1997 and the second leading cause, after tuberculosis, in 2002.

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

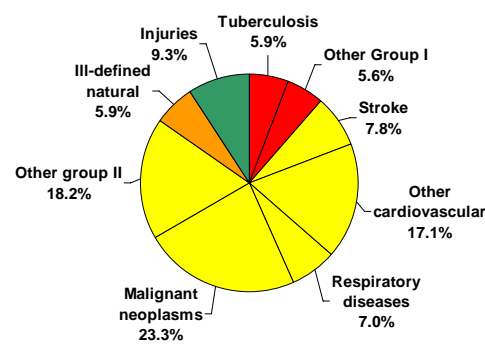
**1997 Male deaths 45-59 years  
N = 3 903**



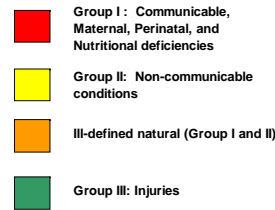
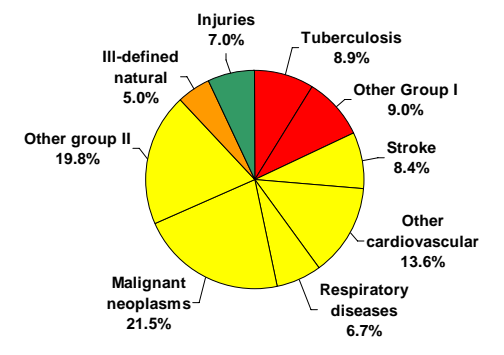
**2002 Male deaths 45-59 years  
N = 5 139**



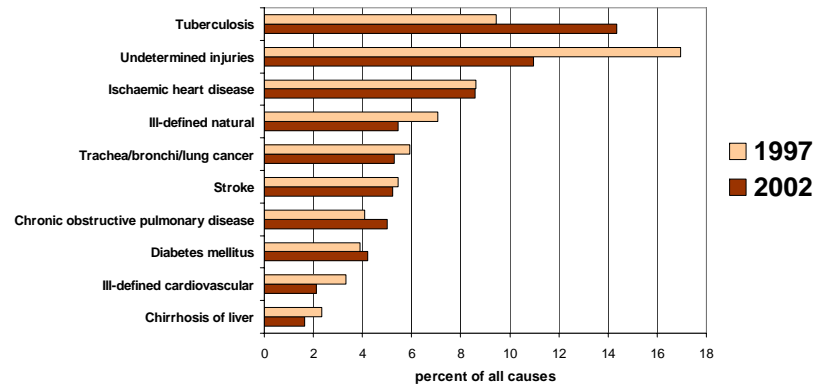
**1997 Female deaths 45-59 years  
N = 2 386**



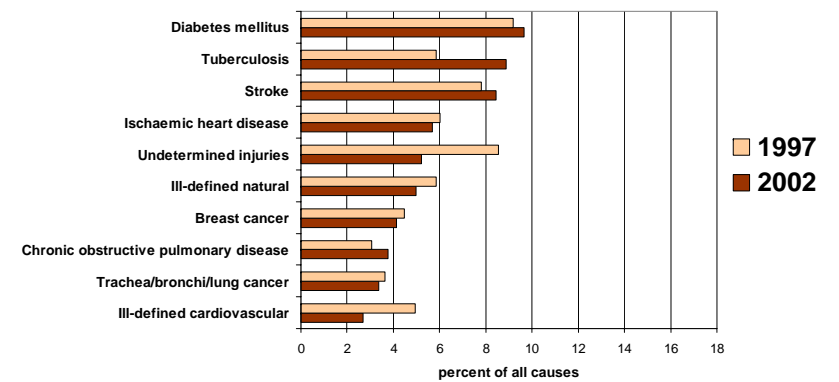
**2002 Female deaths 45-59 years  
N = 3 083**



**Ten leading specific causes of death  
Males 45-59 years**



**Ten leading specific causes of death  
Females 45-59 years**



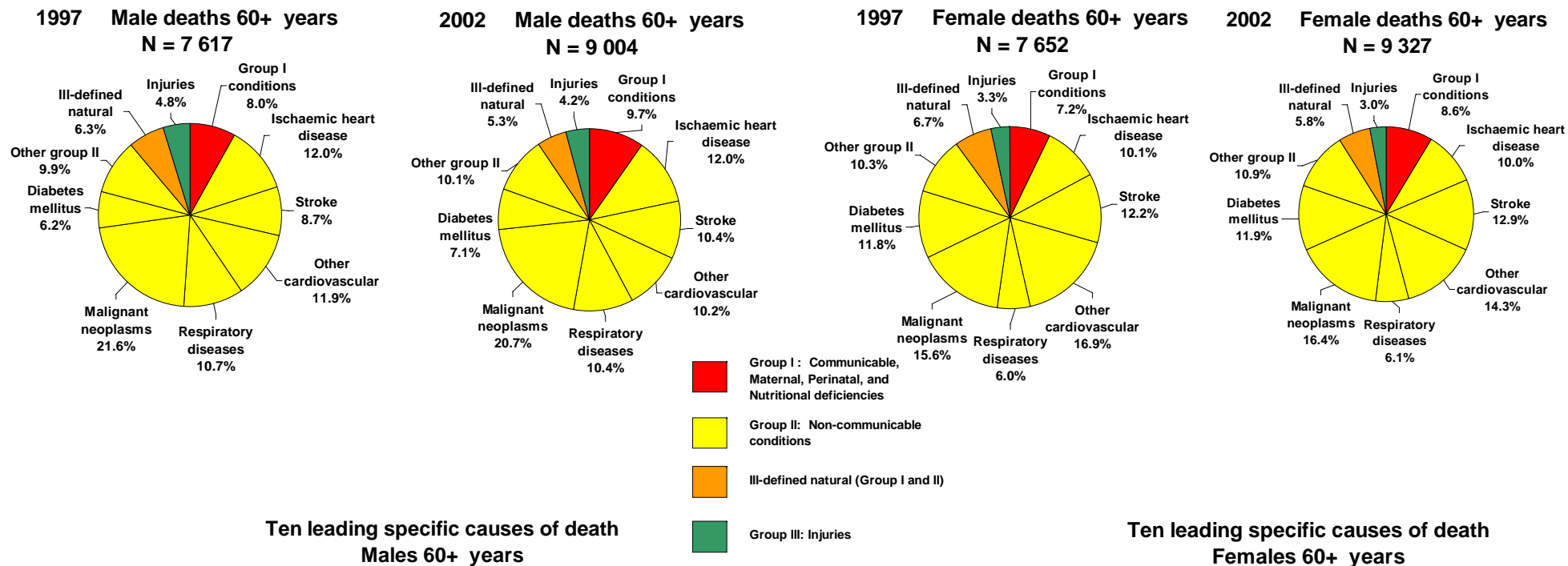
**Figure 17: Cause of death of males and females aged 45-59 years, Western Cape, Stats SA 1997 and 2002**

### **2.4.7 Adults 60+ years**

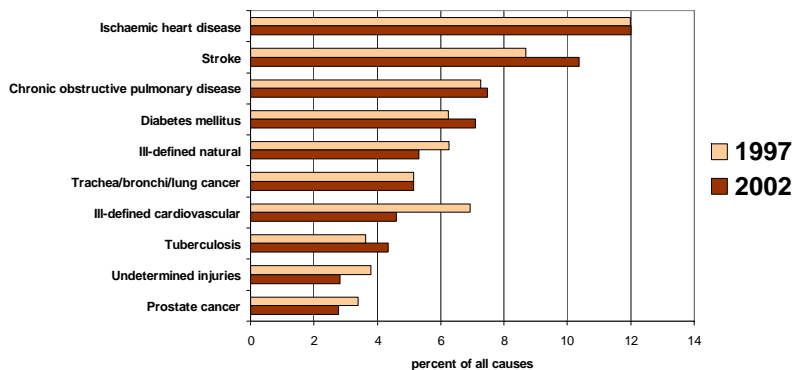
Mortality profiles changed very little from 1997 to 2002 in the over 60 age group. Profiles for males and females were similar. Non-communicable diseases (Group II) contribute the vast majority of deaths in persons aged 60 years and older (Figure 18). In 1997, 80% of the total deaths among males of this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

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

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



Ten leading specific causes of death Males 60+ years



Ten leading specific causes of death Females 60+ years

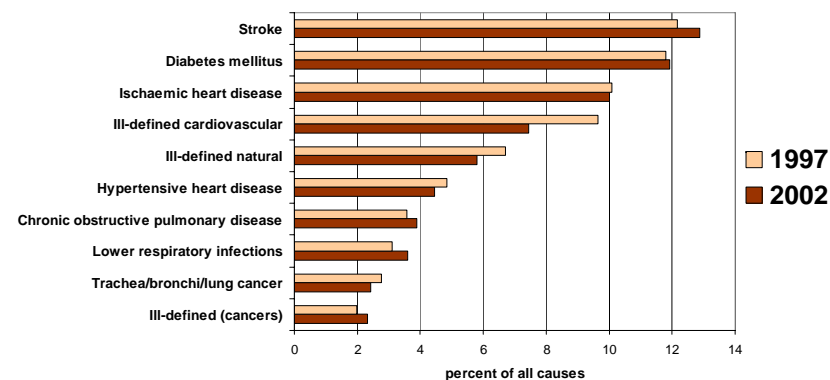


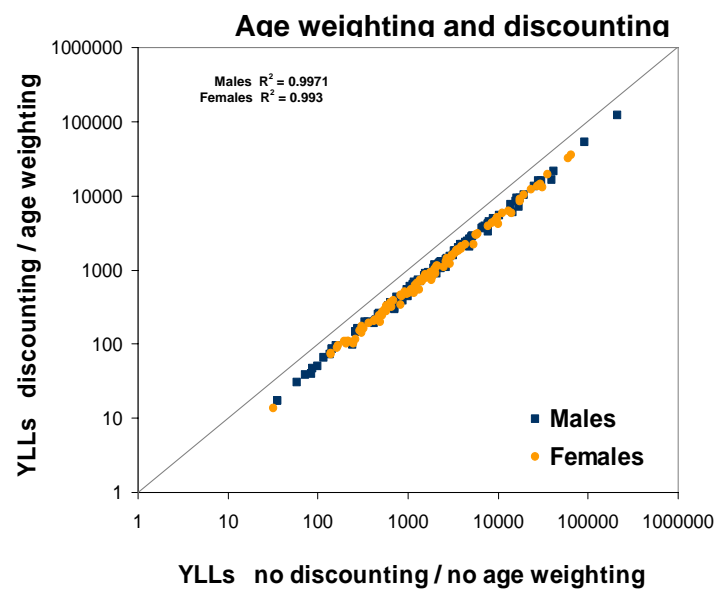
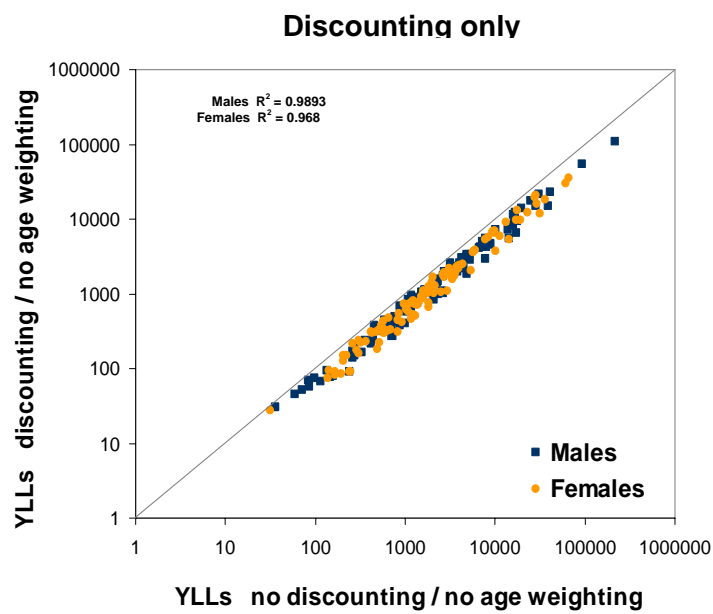
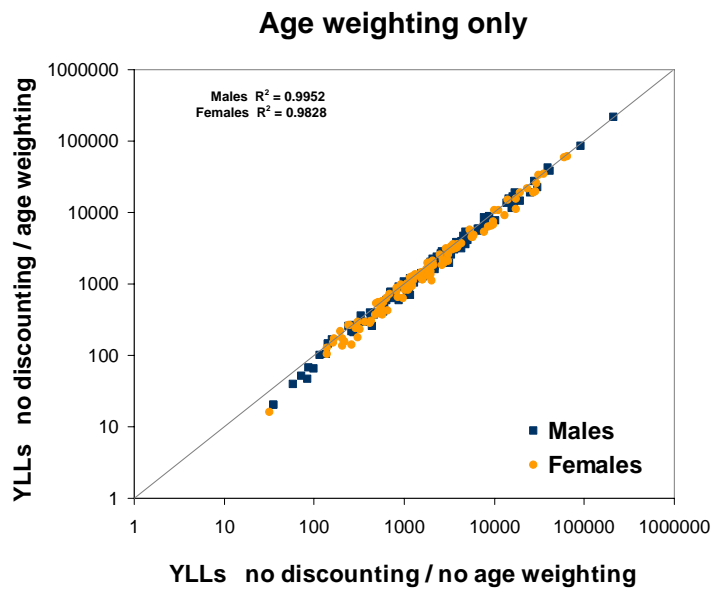
Figure 18: Cause of death of males and females aged 60+ years, Western Cape, Stats SA 1997 and 2002

## 2.5 Years of life lost (YLLs)

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

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

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



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

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

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

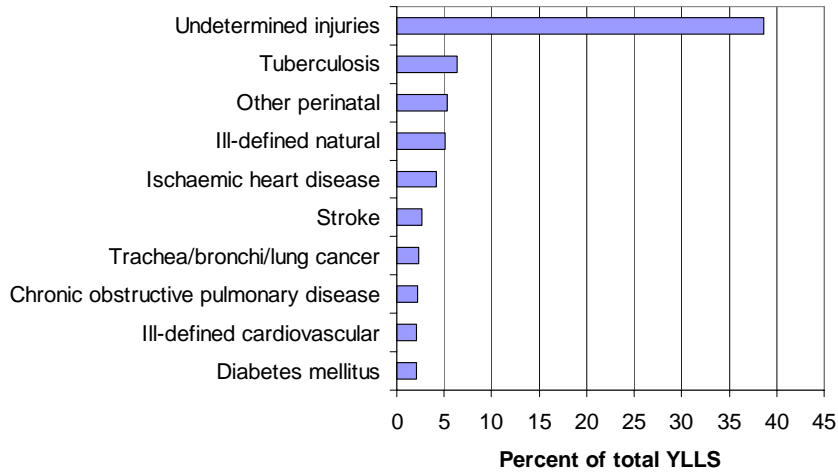
Most group II conditions moved down in importance in YLLs as compared to percentage of total deaths. Most dramatically, stroke was ranked as the leading cause of death in females in 2002 but 7<sup>th</sup> in YLLs in that year. Stroke, ischaemic heart disease, Diabetes mellitus and ill-defined cardiovascular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

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

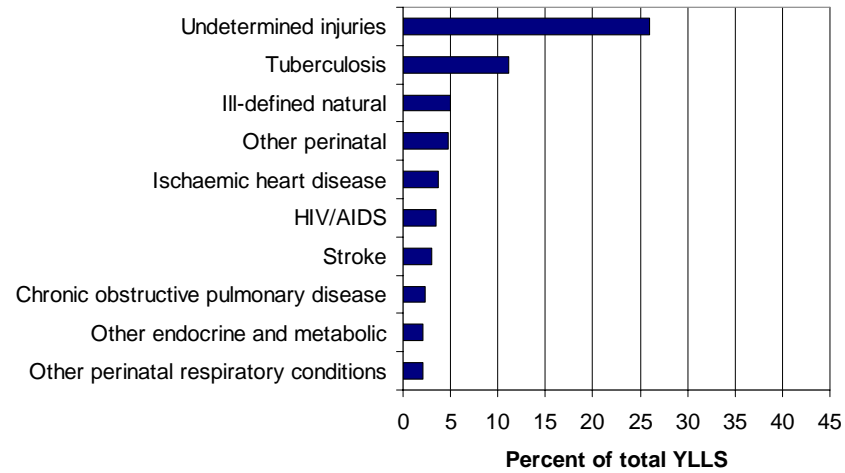
<b>Males 2002</b>						
	<b>Deaths</b>	<b>%</b>	<b>no discounting, no age weighting</b>	<b>%</b>	<b>3% discounting only</b>	<b>%</b>
1	Undetermined injuries	18.2	Undetermined injuries	25.9	Undetermined injuries	23.7
2	Tuberculosis	10.2	Tuberculosis	11.2	Tuberculosis	11.6
3	Ischaemic heart disease	6.7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

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

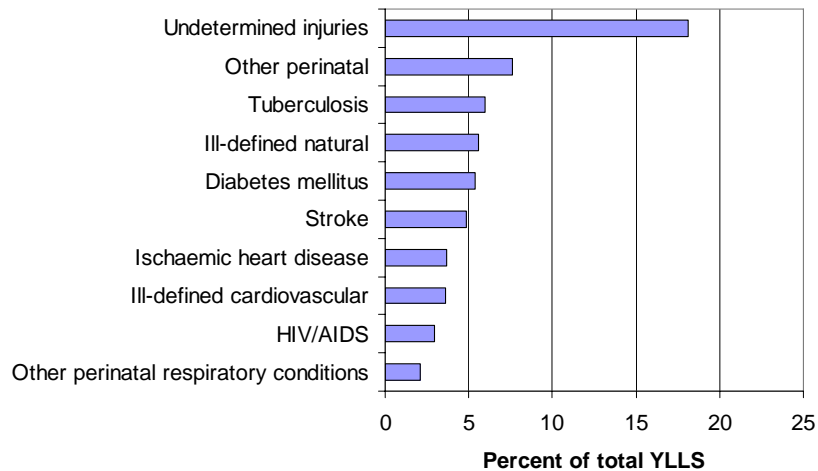
**Males, 1997**



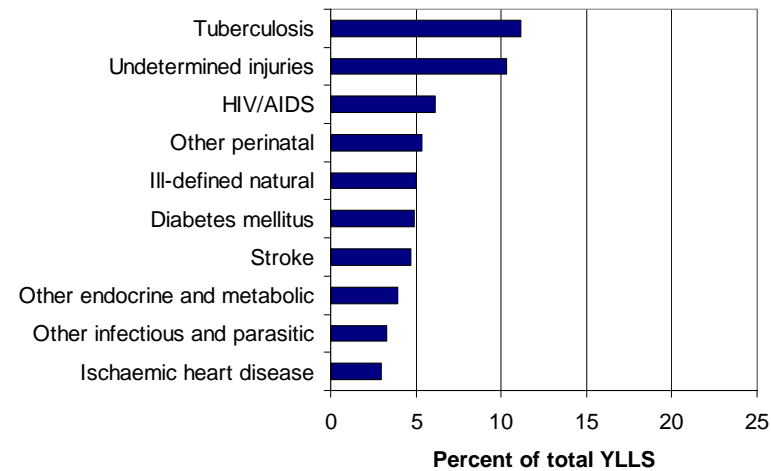
**Males, 2002**



**Females, 1997**



**Females, 2002**



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

### 3. Discussion

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

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

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

There are pronounced gender differences in the registered deaths. There are consistently more male deaths than females, although the province has more females

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

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

#### **4. Conclusion**

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

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

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Bradshaw D, Groenewald P, Laubscher R, Nannan N, Nojilana B, Norman R, Pieterse D, Schneider M, Bourne D, Timæus I, Dorrington R, Johnson L. 2003b. Initial Burden of Disease Estimates for South Africa, 2000. *South African Medical Journal*; 93: 682–688.

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# Appendix A: South Africa Burden of Disease List

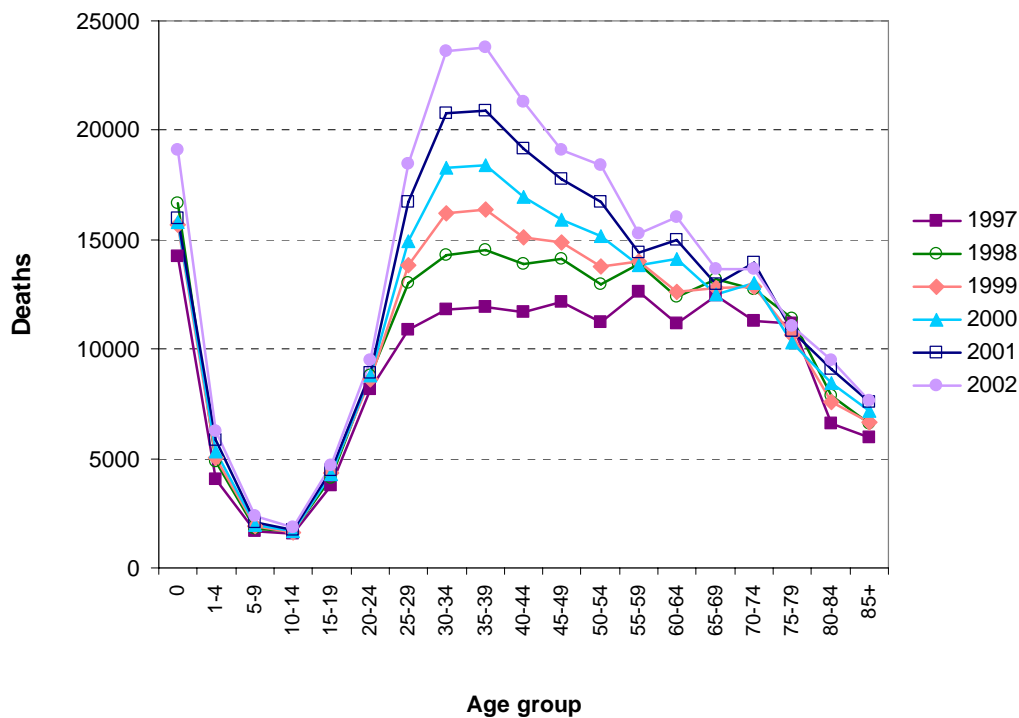
SA NBD code	Title of SA NBD cause	ICD-10 Code
<b>I</b>	<b>Communicable, maternal, perinatal and nutritional Diseases</b>	<b>A00-A99, B00-B99, C46, D50-D53, D64, E00-E02, E40-E46, E50-E64, G00,G03, H65-H66, J00-J22, J90, N70-N73, O00-O99, P00-P96</b>
<b>I A</b>	<b>Infectious and parasitic</b>	<b>A00-A99,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

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

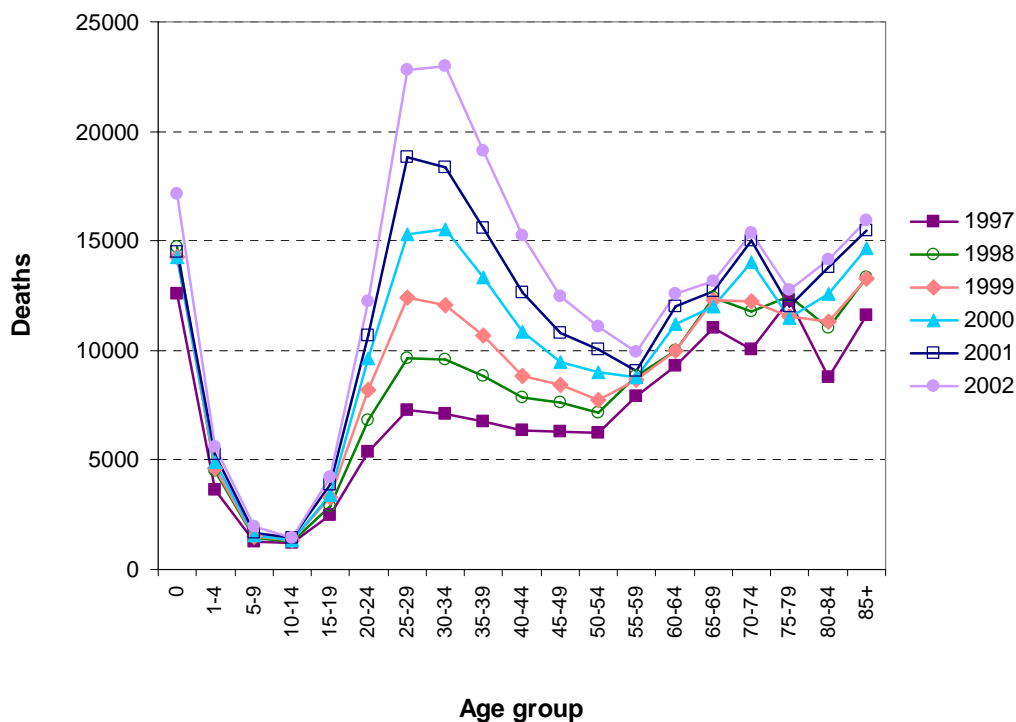
SA NBD code	Title of SA NBD cause	ICD-10 Code
<b>II O</b>	<b>Digestive</b>	<b>K20-K38, K40-K63, K65-K93, I85</b>
<b>II O ZA92</b>	Peptic ulcer	K25-K28
<b>II O ZA93</b>	Appendicitis	K35-K37
<b>II O ZA94</b>	Noninfective gastroenteritis and colitis	K50-K52
<b>II O ZA95</b>	Cirrhosis of liver	K70, K74,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

# Appendix B: Deaths for South Africa, 1992-2002

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



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

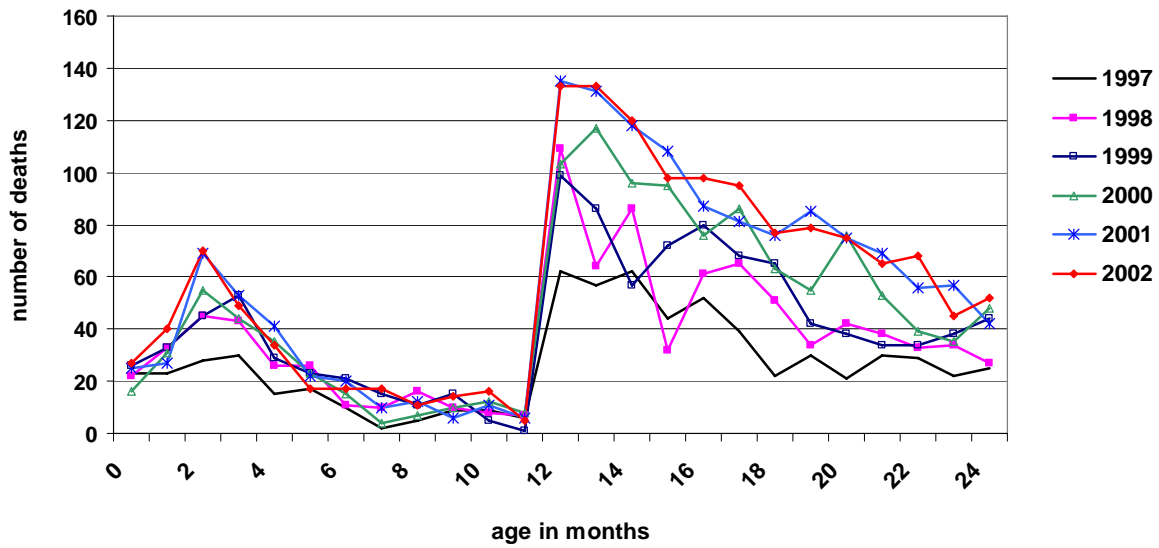


## **Appendix C: Deaths under one year of age, South Africa**

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

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

**Deaths due to *Diseases of the Respiratory system (J00-J99)***  
**Stats SA national data**



**Deaths due to *Certain conditions originating in the perinatal period (P00-P96)***  
**Stats SA national data**

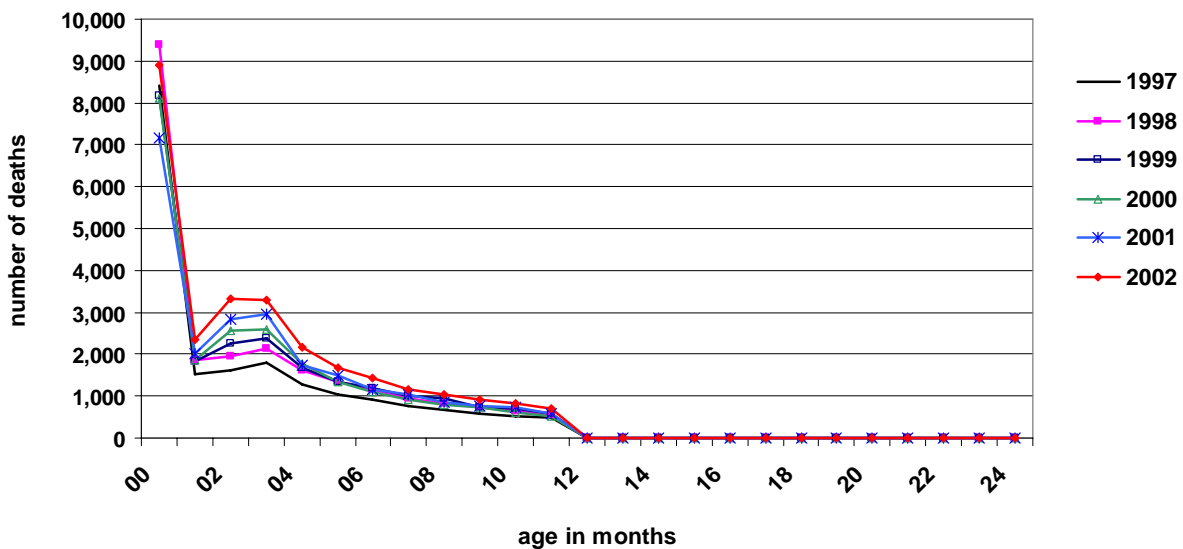


Figure C1. Number of deaths in South Africa recorded by Stats SA between 1997 and 2002 by age in months, Chapter X: *Diseases of the respiratory system* and ICD-10 Chapter XVI: *Certain conditions originating in the perinatal period*, National data, Stats SA