

Cause of death profile

South Africa, 1996

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Burden of Disease Research Unit Report

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Introduction

Statistics South Africa routinely compiles cause of death statistics as part of the function of the national statistical office. The statistics are based on the information provided by medical practitioners on the notice of death required for registration by the Department of Home Affairs. Comprehensive death statistics are reported annually and started as far back as 1926¹. Reports were produced regularly for the period 1926 – 1938, followed by intermittent reports for the period 1938 – 1962. Figures for whites cover the entire period but those for coloureds and Asians are available only from 1938 onwards. Information about deaths of Africans occurring in the principal municipalities are available from 1941 until 1987 when a separate report series was introduced². In 1992, after the repeal of the Population Registration Act, the cause of death statistics were reported for all groups combined in a single report. The most recent year for full cause of death statistics is 1996³. Statistics South Africa are currently analysing a 15% sample of deaths certificates for 1997 – 2001 so as to provide more timely statistics of the causes of death.

While full details are provided in the statistical reports, the information is generally not accessible to public health practitioners. The latest available cause of death data³ have been analysed from a public health perspective as part of the national burden of disease study, and are presented in this report so as to make the statistics accessible to other researchers and policy makers. The key results as well as a full discussion of the limitations of the data and the implications can be found in an accompanying article by Bradshaw *et al*⁴.

Data

There were 327253 deaths reported in South Africa for 1996, comprising 186538 male deaths and 140530 female deaths. The 1376 deaths which had missing details about sex or age were excluded from the analysis. Not all deaths are registered and preliminary estimates by Statistics South Africa suggest that these data reflect 67% of all the deaths³ that occurred in that year. Based on indirect demographic techniques,

Dorrington *et al*⁵. estimate that 85% of adult deaths (15 years and older) are registered⁵ and when compared to model projections⁶, we estimate that the figure for all ages is 80%.

Over 96% of the recorded deaths were certified by a medical practitioner; a substantial increase from the 1995 figure of 80%. However, deaths due to external causes (injuries), generally did not have the manner of death specified and are consequently classified as having an external cause with undetermined cause and undetermined intent. This information gap resulted from the 1992 change in the Birth and Death Act and has been amended in part with the new death certificate introduced in 1998⁷.

The death data for 1996 were coded by Statistics South Africa using both ICD-9⁸ and ICD-10⁹. Based on the ICD-9 codes, the deaths were aggregated using the South African Burden of Disease list (Appendix 1) that has been developed from the Global Burden of Disease list¹⁰. In this list, the causes that share a common etiology or common intervention have been grouped. The list has been adapted to include conditions of importance to South Africa by consideration of the South African data.

The distribution of causes of deaths for males and females are reported in pie charts that include the groupings of causes that account for 5% or more of the deaths. The residual categories are grouped according to broad burden of disease type: Type 1 for infectious diseases, maternal and perinatal conditions and malnutrition, Type 2 for non-communicable diseases and Type 3 for injuries including intentional and unintentional. The ill-defined natural causes are not allocated to either Type 1 or Type 2 but form a separate group. The top 20 single causes of death for males and females are displayed in bar graphs. It should be noted that the level of aggregation of causes influences the ranking of the causes. If cancers were considered as a single cause of death, they would obviously rank higher than when each cancer site is considered separately. Using the international standard is therefore desirable and has been done in this analysis where possible. It has not been possible to separate the external causes adequately due to data limitations.

The years of life lost are calculated using the standard life expectancy for each age, age weights and discounting of 3% as used in the Global Burden of Disease Study¹⁰.

Overall cause of death profile

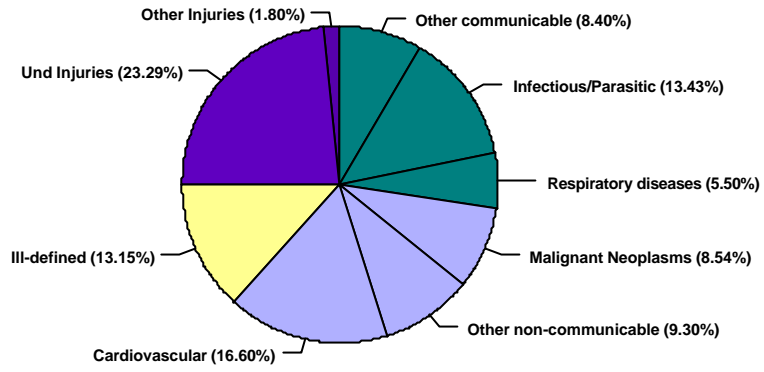
The cause of death profiles, based on the number of deaths in 1996, are shown in Figure 1. It can be seen that a large proportion of deaths (14.7%) were ill-defined natural causes, which accounted for 13.2% of male deaths and 16.7% of female deaths. In total, the average proportion of ill-defined deaths has declined from 17.1% in 1995 to 14.7% in 1996.

In the case of males, there were almost equal numbers of injury related deaths as there were non-communicable or communicable, while for females, the non-communicable diseases account for almost half of the deaths. Injuries accounted for 25% of male and 10.2% of female deaths. Cardiovascular diseases accounted for 24.3% of female and 16.6% of male deaths, malignant neoplasms accounted for 9.3% of female and 8.5% of male deaths. Infectious and parasitic diseases accounted for 12.9% of female and 13.3% of male deaths and respiratory diseases accounted for around 5% of all deaths for both males and females. The top 20 causes of death in 1996 are shown in Figure 2 for males and females separately. HIV/AIDS, as recorded on the death certificate, accounted for 1.9% of males and 2.5% of female deaths. No allowance has been made for the cases where the immediate cause has been recorded and not underlying cause of HIV.

Figure 1. The cause of death for males and females, 1996.

1996 Male deaths

N=185 790



1996 Female deaths

N=140 087

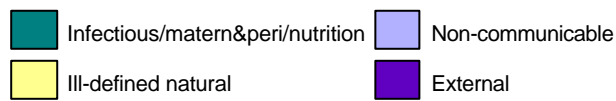
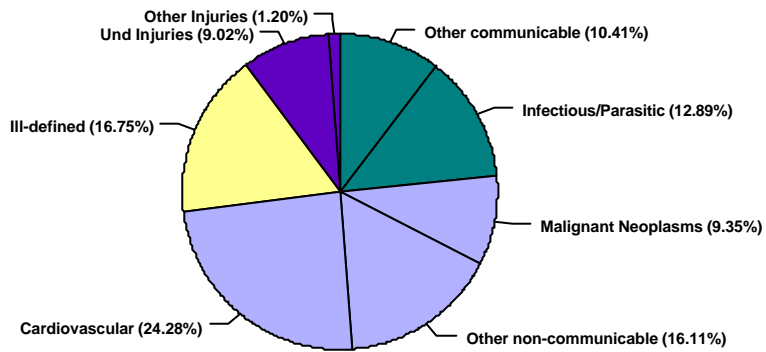
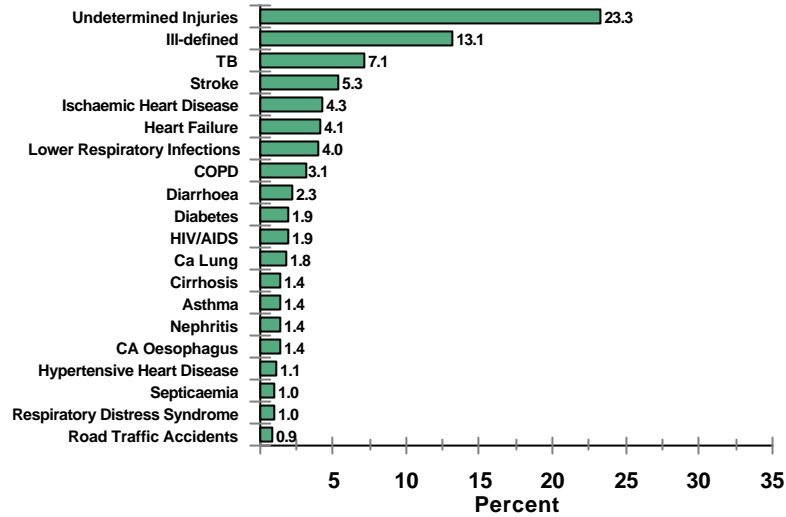
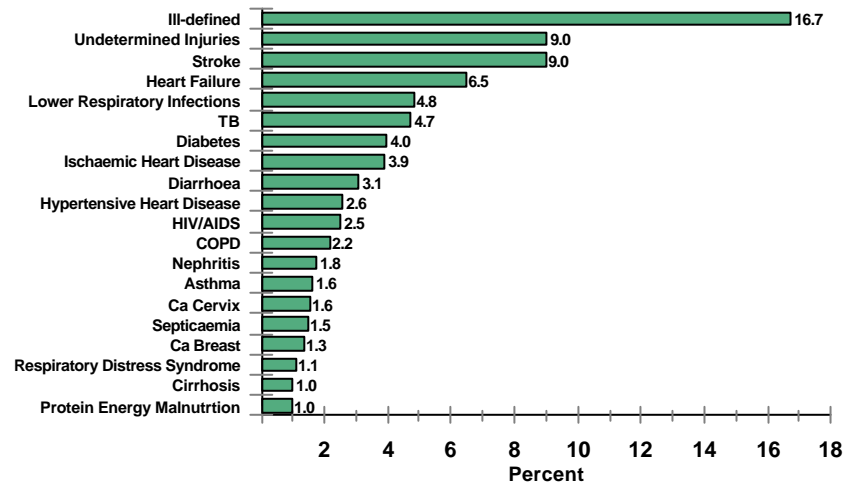


Figure 2. The top causes of death for males and females, 1996.

1996 Male deaths, N=185 790



1996 Female deaths, N=140 087

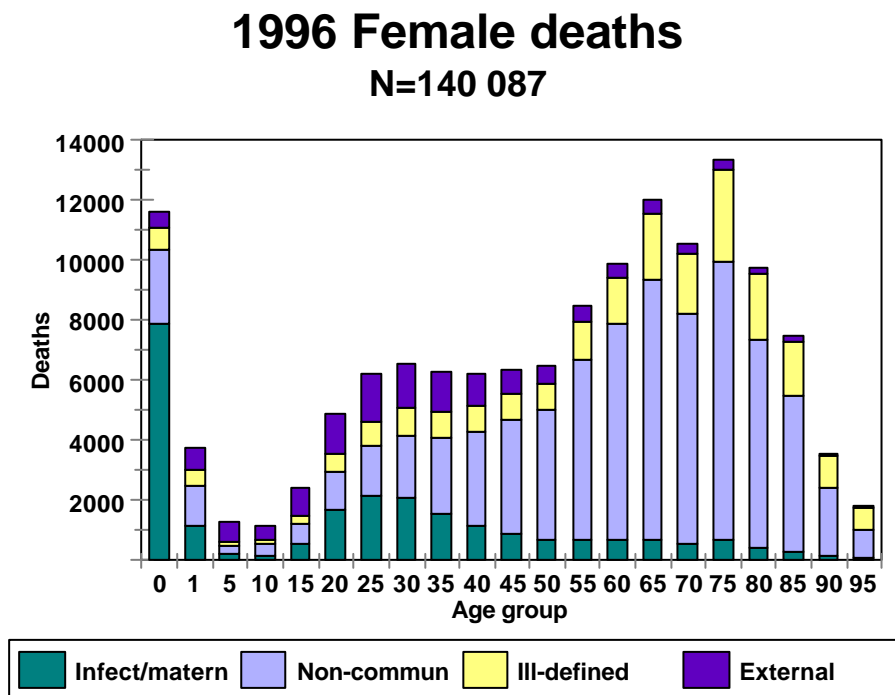
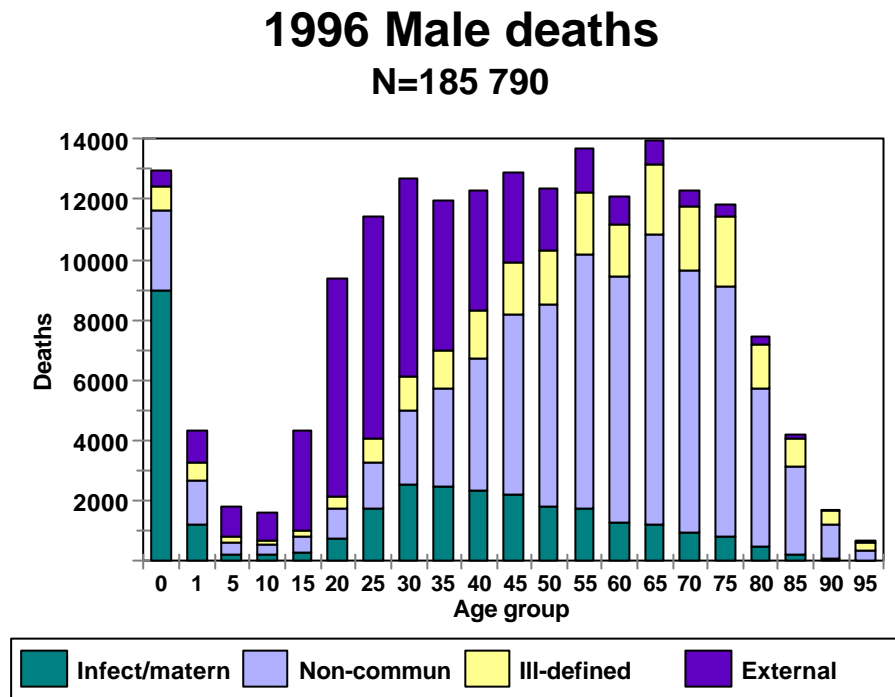


Age specific cause of death profile

Figure 3 shows the number of deaths by 5 year age groups presented separately for males and females according to the 3 broad types of cause of death and the ill-defined category. (The under 5-year age group is divided into infants, less than 1 year of age, and 1-4 year olds). Deaths due to undetermined injuries, whether intentional or unintentional, are exceptionally high in young adult males. In addition, deaths due to infectious diseases for the perinatal period are extremely high for both males and females. The infectious diseases as cause of death are also relatively high for both young adult males and females. Males generally have more deaths from infectious causes than females especially in the older age groups. A notable exception is for the young adult females in the 15-25 age range where the pattern is reversed. The proportion of ill-defined causes increases with age, especially for women.

From Figure 3 it can be seen that both male and female deaths display digit preference in the older ages. The alternate age groups 50-54, 60-64 and 70-74 appear to be under-represented for males and in the case of females, the 60-64 and the 70-74 age groups appear to be under-represented. The over-representation in the adjacent age groups appear to correspond to the birth date of the deceased having occurred at the beginning of the decades 1930 and 1940 for males and 1920 and 1930 for females. The age groups that appear to be under-represented correspond with birth dates in the middle of the decades. For example, people who died at age 60 were born in 1936 and not at the start of the decade or the beginning of the next. This age pattern in the older age groups suggests that there may be a bias towards particular years in the registered dates of birth, with a preference for 1920, 1930 and 1940. It is possible that this could have arisen as a result of approximate dates of birth being endorsed on ID documents, some time after the birth of the individual and warrants further investigation.

Figure 3. Age distribution of male and female deaths according to type, 1996.



When the age at death is taken into account and the loss of premature life is calculated using the Global Burden of Disease methodology, it can be seen that there was a striking loss of life due to injuries for males (Figure 4). The years of life lost due to infectious and parasitic diseases was 16% for males and when added to perinatal conditions and other communicable diseases, Type 1 conditions make up 27% of the total years of life lost. A similar proportion, 28%, of the total years of life lost resulted from non-communicable diseases, mostly cardiovascular (10%) and cancers (5.5%). The ill-defined cause of death category contributed the remaining 10% for males.

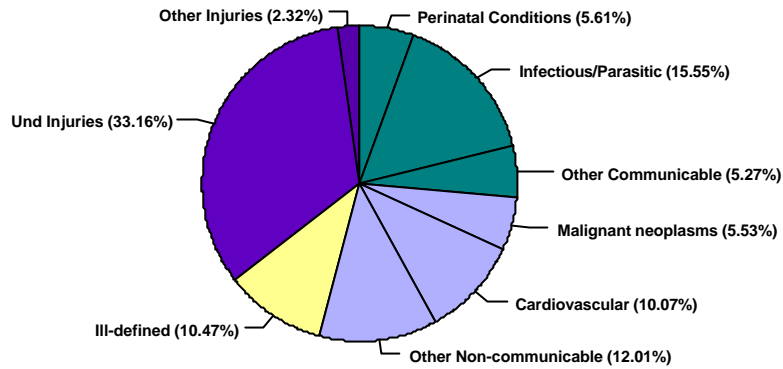
The most striking characteristic of the female years of life lost shown in Figure 4, is the large proportion attributed to Type 1 and Type 2 cause of death categories, 35% and 36% respectively. The ill-defined category contributes about 13% for females.

Comparing the number of deaths with the number of years of life lost, it can be seen that injuries account for a quarter male deaths but 35% of the YLLs by males. An examination of the age distribution in Figure 2 helps to interpret these figures, as it shows that a large proportion of the external deaths occur in the younger males thus contributing substantially to early loss of life. In the case of females, what is most striking when considering the number of deaths is the high proportion of Type 2 deaths, constituting about 50%. Figure 4 shows that Type 2 diseases constitute 35% of the female YLLs, reflecting that the deaths occur in older women. The converse applies in the case of infectious and maternal causes of death that account for 23% of the female deaths and 35% of the YLLs. The YLLs for Type 1 diseases include many young female deaths.

Figure 4. The cause of years of life lost for males and females, 1996.

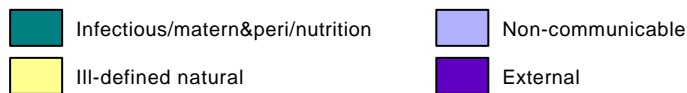
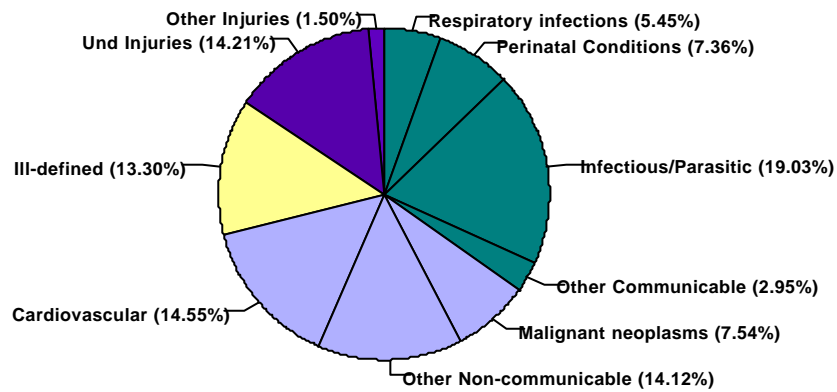
1996 Male years of life lost

N=3 657 372



1996 Female years of life lost

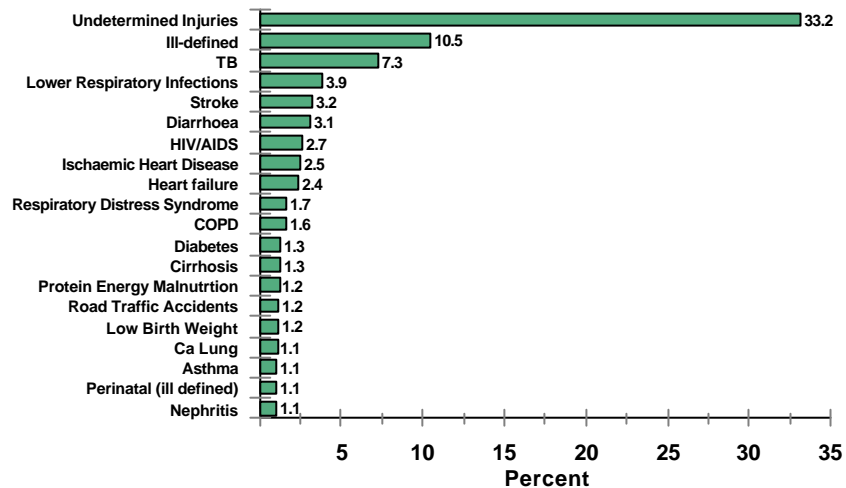
N=2 378 289



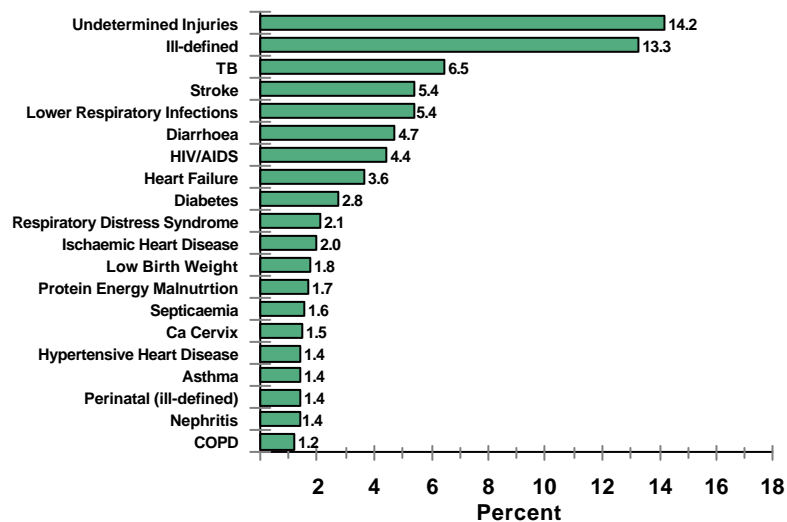
The top 20 causes of premature mortality based on the years of life lost are shown in Figure 5 for males and females. The undetermined injuries ranked first for males, accounting for 33% and the ill-defined group was ranked second at about 10%. The same pattern was observed for females, but the proportion of undetermined injuries was much lower (14%) than for males. (It should be noted that the ranking of causes of death will depend on the level of aggregation selected in the analysis.)

Figure 5. The top cause of years of life lost for males and females, 1996.

1996 Male YLLs, N=3 657 372



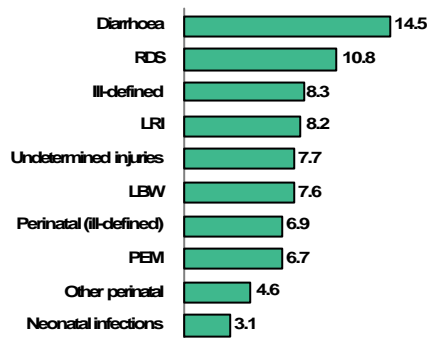
1996 Female YLLs, N=2 378 292



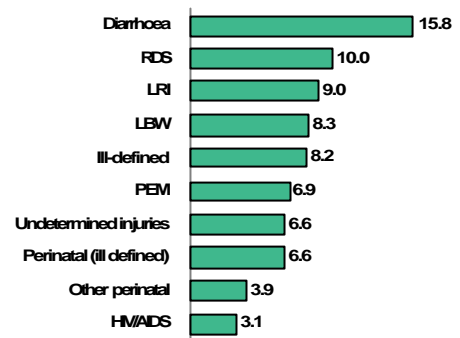
The ten leading causes of death in five age groups are shown in Figure 6 for males and females separately. The patterns change over the age groups and are described according to the broad disease type.

Figure 6a. The top causes of death for males and females age 0-14 years, 1996.

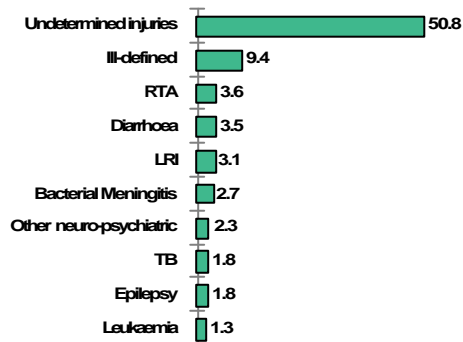
MALE 0-4 YEARS, N = 17294



FEMALE 0-4 YEARS, N = 15325



MALE 5-14 YEARS, N = 3418



FEMALE 5-14 YEARS, N = 2435

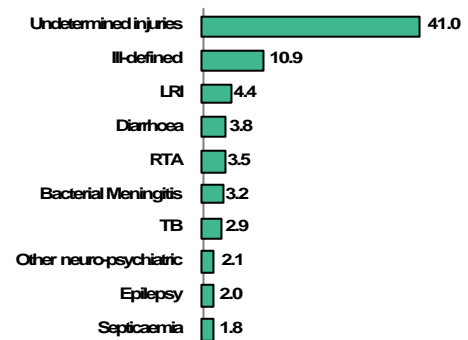
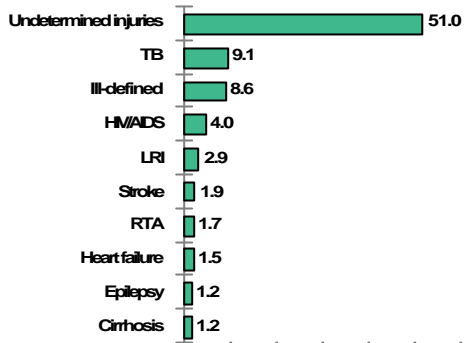
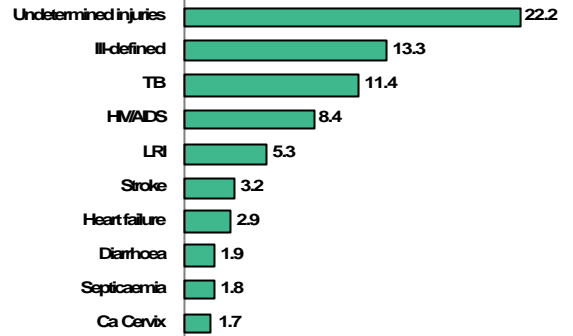


Figure 6b. The top causes of death for males and females age 15+ years, 1996.

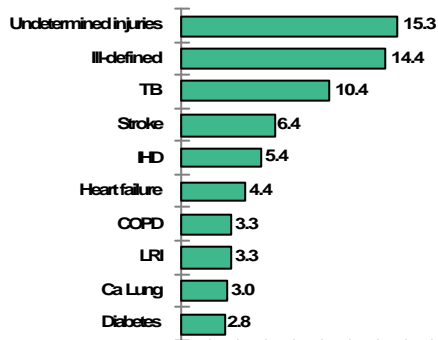
MALE 15-44 YEARS, N = 62078



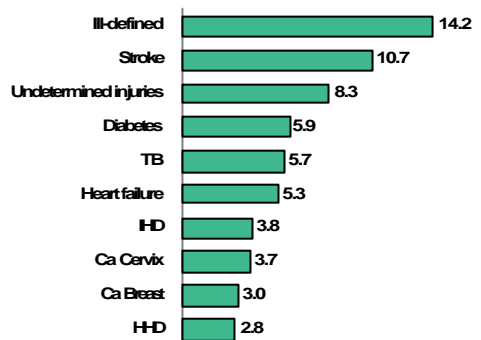
FEMALE 15-44 YEARS, N = 32615



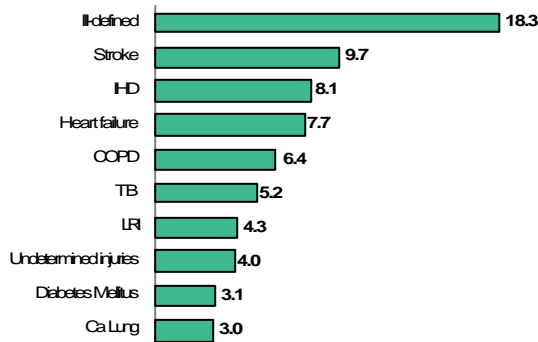
MALE 45-59 YEARS, N = 38925



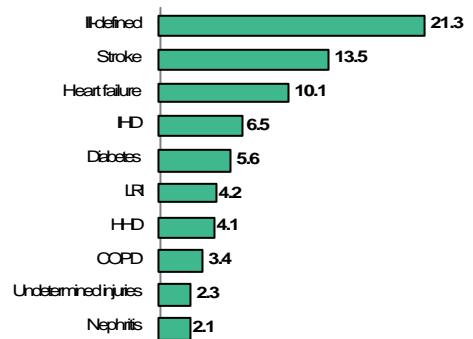
FEMALE 45-59 YEARS, N = 21305



MALE 60+ YEARS, N = 64075



FEMALE 60+ YEARS, N = 68407



Ill-defined

In general, there was an increase in the proportion of ill-defined deaths with increasing age, especially for women. In the 0-4 year age group the ill-defined category was about 8% for males and females while it is the leading cause of death for females in the 45-59 year and 60+ age groups, accounting for 14% and 21% of the deaths respectively. For males in the 45-59 year age group, ill-defined causes also accounted for about 14% of the deaths and was the leading cause of death in the 60 and older age group (18%).

The ill-defined cause of death category is a pervasive, problem code. Ill-defined signs and symptoms are coded when the exact cause of death is not specified on the death certificate. This may arise when:

- the medical practitioner does not have access to the full medical record for certification;
- the diagnostic tests have not been done prior to the death;
- the autopsy has not been done or;
- the Death Report form (BI 1680) has been used and the death has been certified as natural by a traditional leader or a headman.

Injuries

Undetermined injuries i.e. unnatural deaths with no details as to the manner of death, accounted for 8% and 7% of the deaths in the 0-4 year old age group in males and females, respectively. Injuries were the leading cause of death in the 5-14 year old and 15-44 year old males and females. For males, the undetermined injuries accounted for about 51% of the deaths in both these age groups. The corresponding figures for females were 41% and 22% respectively. In males in the 45-59 year old age group, the leading cause of death was also undetermined injuries, which accounted for 15% of the deaths. It ranked third for females in this age group and accounted for 9% of the deaths.

Infectious and maternal causes

In the 0-4 year age group, diarrhoea was the leading cause of death, accounting for 15% of male deaths and 16% of female deaths. In the 5-14 year age group diarrhoea

contributed to about 4% of male and female deaths. Respiratory distress syndrome in the 0–4 year age group accounted for about 11% of both male and female children's deaths. Low birth weight accounted for about 8% of male and female deaths in this age group. Ill-defined perinatal conditions and protein-energy malnutrition accounted for about 7% each, with slightly different rankings for males and females in the 0–4 year age group. Other perinatal conditions contributed to 5% of male deaths and 4% of female deaths in the first age group.

Lower respiratory infections accounted for 9% of female deaths and 8% of male deaths in the youngest age group. It remains at about 3% of the male deaths for the next three age groups and increases to 4% in the 60 and older age group. For females it was 4% of deaths in the 5-14 year age group, 5% in the 45-59 year age group and 4% in the 60 and older age group.

The most common infectious disease resulting in death was TB, contributing a substantial proportion in all age groups except for the 0-4 year old age group and females over 60 years old. The percentage of deaths was highest for females in the 15-44 year old age group, (11%). This represents a substantial increase from 2,9% in the 5-14 year old female age group. The corresponding percentages for TB deaths for males increased from about 1.8% to 9.1%. This represents an even greater increase in the TB deaths for males from childhood to adulthood, with a five-fold increase for males, compared to a fourfold increase for females in the older group. There was a further increase in TB deaths to just over 10% of the deaths in the 45-59 year age group for males. It was reduced to 5% in the 60 and older age group for males. For females, the TB deaths were about 6% in the 45-59 year age group.

HIV/AIDS accounted for 3% of female deaths in the 0–4 year old age group. It accounted for 8% of the 15-44 year female deaths and 4% of male deaths in the same age group. HIV/AIDS, as a cause of death, was ranked fourth for both males and females in the 15-44 year age group. However, the percentage of female HIV/AIDS deaths is more than double that of males of the same age.

Non-communicable diseases

Stroke, as cause of death, is ranked second in the 45-59 year and 60 and older age groups for females, accounting for 11% and 14% of deaths, respectively. It was also the second leading cause of death for males in the 60 and older age group at 10%. Stroke accounted for 2% of the male deaths in the 15-44 year old age group and 6% of the male deaths in the 45-59 year age group.

Ischaemic heart disease accounted for 5% of deaths in males and 4% of deaths in females in the 45-59 year age group and 8% and 7% for males and females respectively in the 60 and older age groups. Heart failure featured as a leading cause of death in the last three age groups. For males the respective contributions were 2%, 4% and 8%. The corresponding values for females were 3%, 5% and 10%. Heart failure as a cause of death is not an exact cause of death and is probably a death resulting from ischaemic heart disease or some other more specific cause of death.

Diabetes mellitus accounted for approximately 6% of female deaths in the two oldest age categories. It accounted for 3% of the male deaths in each of these two age groups. In the 60 and older age group for females, diabetes mellitus accounted for a further 6% of the deaths. Hypertensive heart disease featured in the two last age groups for women, accounting for 3% in the 45-59 year age group and 4% in the 60 and older age group.

With respect to neoplasms as a cause of death, lung cancer in males accounted for over 3% of deaths in the 45-59 and 60 and older age groups respectively, but was not in the top ten causes of deaths for females in any age group. This probably reflects earlier male smoking patterns. Cervical cancer caused 2% of female deaths in the 15-44 year old group and 4% in the 45-59 year old age group. Breast cancer ranked 9th in the latter age group and accounted for 3% of female deaths.

Other neuro-psychiatric disorders accounted for about 2% of the causes of death in the male and female 15-44 year age groups.

Discussion

Under-reporting of deaths and mis-classification of causes make the interpretation of this data difficult. However, it is clear that South Africa is undergoing a protracted bipolar transition with the coexistence of both diseases of poverty and emerging chronic diseases. In 1996, these accounted for similar proportions of the premature loss of life, about 27% for males and 35% for females with injuries accounting for 35% of the YLLs in males and 16% in females. TB, lower respiratory infections, diarrhoea, HIV/AIDS, perinatal diseases, malnutrition and septicemia contributed to the Type 1 conditions, while stroke, diabetes, ischaemic heart disease, hypertensive heart disease, asthma, chronic obstructive lung disease, cancer of the lung in men and cancer of the cervix in females contributed to the premature loss of life due to Type 2 diseases.

Another important consideration when interpreting this data is the rapidly changing cause of death profile due to the HIV/AIDS epidemic⁴. This highlights the need for a national burden of disease study that makes use of other data sources and expert opinion to estimate the extent of under-reporting and misclassification so as to develop consistent and coherent estimates of mortality. Furthermore, attempts to estimate the extent of disability arising from diseases and injuries are needed to provide a more comprehensive assessment of the burden of disease.

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- ⁷ Bradshaw D, Kielkowski D, Sitas F. New birth and death registration forms – a foundation for the future, a challenge for health workers? *South African Medical Journal* 1998; **88**: 971-974.
- ⁸ International Classification of Diseases. *Manual of the International Statistical Classification of Diseases, ICD - Ninth Revision*. World Health Organisation: Geneva, 1977.
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- ¹⁰ Murray C, Lopez A. *The Global Burden of Disease. Vol 1*. Harvard University Press, Cambridge Ma., 1996.

Appendix I. South African Burden of Disease list.

Type I		
INFECTIOUS, MATERNAL & PERINATAL, NUTRITION		
ZA Code	Disease	ICD-9 code
A	Infectious and parasitic	001-139, 209, 279, 320-322, 511, 614-616
1	Tuberculosis	010-018, 137, 511
2	STD excluding HIV	090-099, 614-616
3	HIV/AIDS	209, 279
4	Diarrhoeal diseases	001, 002, 004, 006-009
5	Childhood (Vaccine preventable) cluster	032, 033, 037, 045, 050, 055, 056, 138
6	Bacterial meningitis	036, 320-322
7	Hepatitis	070
8	Malaria	084
9	Schistosomiasis and other tropical diseases	085, 086, 120, 125
10	Leprosy	030
11	Intestinal parasites	126-129
12	Septicaemia	038
13	Other infectious and parasitic	003, 005, 020-027, 031, 034, 035, 039-041, 046, 047, 048, 049, 051-052, 053, 054, 057, 060-066, 071-079, 080-083, 087, 088, 100-104, 110-118, 121-124, 130-136, 139
B	Respiratory infections	460-466, 480-487, 381-383
14	Lower respiratory infections	466, 480-487
15	Upper respiratory infections	460-465
16	Otitis media	381-383
C	Maternal conditions	630-676
17	Maternal haemorrhage	640, 641, 666
18	Maternal sepsis	670
19	Hypertension in pregnancy	642
20	Obstructed labour	660
21	Abortion	630-639
22	Other maternal	643-659, 661-665, 667-669, 617-676
D	Perinatal conditions	760-779
23	Low birth weight	764-765, 769
24	Birth asphyxia and trauma	767-768
25	Other respiratory conditions	770
26	Neonatal infections	771
27	Foetal alcohol syndrome	760.7
28	Other perinatal	760.0-760.6, 760.8-760.9, 761-763, 766, 772-778
E	Nutritional deficiencies	243, 260-269, 280-281, 285
29	Protein-energy malnutrition	260-263
30	Deficiency anaemias	280-281, 285
31	Other nutritional deficiencies including pellagra and vitamin A deficiency	243, 264-269

Type II		NON COMMUNICABLE DISEASE	
ZA Code	Disease	ICD-9 code	
F	Malignant neoplasms	140-208	
32	Mouth and oropharynx	140-149	
33	Oesophagus	150	
34	Stomach	151	
35	Colo-rectal	153, 154	
36	Liver	155	
37	Pancreas	157	
38	Larynx	161	
39	Trachea/bronchi/lung	162, 166	
40	Bone and connective tissue	170-171	
41	Melanoma	172	
42	Other skin cancer	173	
43	Breast	174, 175	
44	Cervix	180	
45	Corpus uteri	179, 181-182	
46	Ovary	183	
47	Prostate	185	
48	Bladder	188	
49	Kidney	189	
50	Brain	191	
51	Lymphoma	200-202	
52	Leukaemia	204-208	
53	Other malignant neoplasm	152.156, 158-160, 163-165, 184, 186-187, 190, 192-194, 203	
G	54	Benign neoplasms	210-239
H	55	Diabetes Mellitus	250
I		Endocrine and metabolic disorder	240-242,244-246, 251-259, 270-278, 282-284, 286-289
	56	Albinism	270.2
	57	Other endocrine and metabolic	270.0-270.1, 270.3-270.9, 240-242, 244-246, 251-259, 271-278, 282-284, 286-289
J		Mental disorders	291-319, 327
	58	Alcohol dependence	291, 303
	59	Drug use	304, 305
	60	Schizophrenia	295
	61	Affective disorders (depression, bipolar)	296
	62	Anorexia	327
	63	Anxiety disorders (obsessive compulsive/panic)	300
	64	Hyperkinetic syndrome of childhood	314
	65	Adjustment reaction (PTSS)	309
	66	Mental disability	317-319
	67	Other mental disorders	292-294, 297-299, 301-302, 306-308, 310, 313, 315-316
K		Nervous system disorders	290, 323-326, 330-337, 340-359
	68	Alzheimer and other dementias	290, 330, 331
	69	Parkinsons disease	332
	70	Multiple sclerosis	340
	71	Epilepsy	345
	72	Encephalitis and brain abscess	323, 324
	73	Other nervous system disorders	325-326, 333-337, 341-344, 346-349, 350-359
L		Sense Organs	360-380, 384-389
	74	Glaucoma	365
	75	Cataracts	366
	76	Other visual disorders	360-364, 367-379
	77	Hearing loss and other disorders	380, 384-389

Type II		NON COMMUNICABLE DISEASE	
M	Cardiovascular		390-402, 404-415, 417-455, 457-459, 514
	78 Rheumatic heart disease		390-398
	79 Ischaemic heart disease		410-414
	80 Stroke		430-438
	81 Inflammatory heart disease		420-422, 425
	82 Hypertensive heart disease		401-402, 404, 405
	83 Non-rheumatic valvular disease		424
	84 Pulmonary embolism		415
	85 Aortic aneurism		441
	86 Peripheral vascular disorders		442-448, 451-455
	87 Other cardiovascular		417, 423, 426, 457, 458, 459, 514
N	Respiratory infections		470-478, 490-496, 500-509, 510-513, 515-519, 416
	88 COPD		490-492, 495-496, 416
	89 Asthma		493
	90 Aspiration pneumonia/lung abscess		507, 513
	91 Other respiratory		470-478, 494, 500-506, 508, 509, 510, 512, 515-519
O	Digestive		456, 530-579, 609
	92 Peptic ulcer		531-533
	93 Cirrhosis of liver		571-572, 609, 456
	94 Appendicitis		540-543
	95 Intestinal obstruction, noninfective gastroenteritis and colitis, peritonitis		551, 552, 560, 558, 567
	96 Gall bladder disease		574-576
	97 Pancreatitis		577
	98 Other digestive		530, 534-537, 550, 553-557, 562-566, 568-570, 573, 579
P	Genital-Urinary		403, 580-608, 610-611, 617-629
	99 Nephritis/nephrosis		580-589, 403
	100 Benign prostatic hypertrophy		600
	101 Stress incontinence		625.6
	102 Other genito-urinary		590-599, 601-608, 610-611, 617-624, 625.0-625.5, 625.7-625.9, 626-629
Q	103 Skin disease		680-698, 700-709
R	Musculo-skeletal		710-739
	104 Rheumatoid arthritis		714
	105 Osteoarthritis		715
	106 Other musculo-skeletal		710-713, 716-739
S	Congenital abnormalities		740-759
	107 Neural tube defects		740-742
	108 Cleft lip/palate		749
	109 Congenital heart disease		745-747
	110 Congenital disorders of GIT		750-751
	111 Down syndrome and other chromosomal anomalies		758
	112 Other congenital abnormalities		743-744, 748, 752-757
T	Oral conditions		520-529
	113 Dental carries		521
	114 Periodontal disease		523
	115 Other oral health		520, 522, 524-529
U	116 Cot death		699, 798 <12 months

Type III		INJURIES
ZA Code	Disease	ICD-9 code
V	Unintentional	E800-807, E810-838, E840-858, E860-880, E980-949
117	Road traffic accidents	E810-819, 826-829
118	Other transport accidents	E800-807, 820-825, 830-838, 840-848
119	Mining accidents	E849
120	Poisoning	E050-858, E860-869
121	Surgical/medical misadventure	E870-879, E875
122	Falls	E880-888
123	Fires	E890-899
124	Natural and environmental factors	E900-909
125	Drowning	E910
126	Suffocation and foreign bodies	E911-915
127	Other unintentional injuries specified	E839, E916-927, E930-949
W	Intentional injuries	E950-979, E990-999
128	Suicide and self-inflicted	E950-959, E979
129	Homicide and violence	E960-E969
130	Legal intervention and war	E889, E970-978, E990-999