12 Burden of disease

Pam Groenewald, Debbie Bradshaw, Candy Day and Ria Laubscher

This is the fifth attempt to assess and compare the cause of death profiles for each of the 52 health districts in South Africa. District-level mortality information is extremely important for health managers and programme planners to monitor health status, assess effectiveness of priority programmes and identify emerging health issues and vulnerable groups. Such data can also be used to gauge inequities in health among districts. Currently, Statistics South Africa (StatsSA) compiles cause of death statistics based on death notifications but reports only limited information at district level.

Methodology

Data source

Unit records for the 2008–2014 mortality data were provided by StatsSA.[a,b,c,d,e,f,g] These included age, sex, district of death and underlying cause of death coded to the International Statistical Classification of Diseases (ICD-10).[h] Vital statistics data are updated annually with late registrations. For these reasons, the data for 2008–2013 were re-analysed using the 2014 data. Stillbirths were excluded from the data prior to analysis.

Aggregation of causes of death

The ICD classification contains a detailed list of causes of mortality that is too extensive for public health use. For this reason the ICD codes were aggregated according to the National Burden of Disease (NBD) list,[i] which is a condensed list of conditions adapted from the Global Burden of Disease list,[j] and containing the most prevalent diseases across South Africa, including those of public health importance. The NBD list has recently been updated,[k] and differs slightly from the list used for the first district mortality profiles prepared for the 2010/11 *District Health Barometer*.[l]

The NBD list of causes was aggregated into three broad cause groups, namely communicable diseases together with perinatal, maternal and nutritional conditions; non-communicable diseases; and injuries, as indicated in the 2000 NBD study[j] (Table 1). Given the large burden caused by HIV-related deaths, which form part of the communicable disease group, these deaths were separated into a fourth group. Since many HIV deaths are misclassified to tuberculosis (TB), the TB deaths were reported with the HIV deaths.

a Statistics South Africa. Mortality and causes of death in South Africa, 2008: findings from death notification. Statistical Release P0309.3. Pretoria: StatsSA; 2010. Available from: http://www.statssa.gov.za/publications/P03093/P030932008.pdf [Accessed 23 September 2014].

b Statistics South Africa. Mortality and causes of death in South Africa, 2009: findings from death notification. Statistical Release P0309.3. Pretoria: StatsSA; 2011. Available from: http://www.statssa.gov.za/publications/P03093/P030932009.pdf [Accessed 23 September 2014].

c Statistics South Africa. Mortality and causes of death in South Africa, 2010: findings from death notification. Statistical Release P0309.3. Pretoria: StatsSA; 2013. Available from: http://www.statssa.gov.za/publications/P03093/P030932010.pdf [Accessed 23 September 2014].

d Statistics South Africa. Mortality and causes of death in South Africa, 2011: findings from death notification. Statistical Release P0309.3. Pretoria: StatsSA; 2014. Available from: http://www.statssa.gov.za/publications/P03093/P030932011.pdf [Accessed 22 August 2016].

e Statistics South Africa. Mortality and causes of death in South Africa, 2012: findings from death notification. Statistical Release P0309.3. Pretoria: StatsSA; 2014.

f Statistics South Africa. Mortality and causes of death in South Africa, 2013: findings from death notification. Statistical Release P0309.3. Pretoria: StatsSA; 2015. Available from: http://www.statssa.gov.za/publications/P03093/P030932013.pdf [Accessed 22 August 2016].

g Statistics South Africa. Mortality and causes of death in South Africa, 2014: findings from death notification. Statistical Release P0309.3. Pretoria: StatsSA; 2015. Available from: http://www.statssa.gov.za/publications/P03093/P030932014.pdf [Accessed 22 August 2016].

h World Health Organization. International Statistical Classification of Diseases and Health Related Problems. 10th revision. Volume 2. 2nd ed. Geneva: WHO; 2004. Available from: http://www.who.int/classifications/icd/ICD-10_2nd_ed_volume2.pdf [Accessed 30 October 2012].

i Bradshaw D, Groenewald P, Laubscher R, Nannan N, Nojilana B, Norman R, et al. Initial burden of disease estimates for South Africa, 2000. Cape Town: South African Medical Research Council; 2003. Available from: www.mrc.ac.za/bod/initialbodestimates.pdf [Accessed 30 October 2012].

j GBD 2005. Operations Manual. Final Draft. Harvard University, Institute for Health Metrics and Evaluation at the University of Washington, John Hopkins University, Queensland University and the WHO, 2009. Available at http://www.globalburden.org/GBD_Study_Operations_Manual_Jan_20_2009.pdf

k South African National Burden of Disease Team, Medical Research Council, personal communication [2016].

l Day C, Barron P, Massyn N, Padarath A, English R, editors. District Health Barometer 2010/11. Durban: Health Systems Trust; January 2012.

Table 1: Examples of causes of death in each broad cause group

Broad cause group	Examples
Communicable diseases (excluding HIV and TB) maternal, perinatal and nutritional disorders (Comm/Mat/Peri/Nut)	Diarrhoeal diseases Meningitis & encephalitis Maternal conditions Perinatal conditions Nutritional disorders
HIV related and TB (HIV and TB)	HIV related Tuberculosis
Non-communicable diseases (NCDs)	Cerebrovascular disease Diabetes Mellitus Ischaemic heart disease Cancer
Injuries	Transport injuries Interpersonal violence

Adjustments to data

STATA 14 was used to adjust the data, firstly by redistributing deaths of unknown age (N=1169) and sex (N=3039) proportionally by known age and sex across each of the known causes of death and districts. Causes of death used as pseudonyms for AIDS (N=24126), e.g. 'retroviral disease' or 'immune suppression' were combined with the HIV deaths. Deaths misclassified to ill-defined signs and symptoms (ICD chapter XVII) and other 'garbage codes' (intermediate causes of death, e.g. septicaemia; mechanisms of death, e.g. cardiac arrest; partially specified causes, e.g. cancer with unknown site of the disease; or risk factors, e.g. hypertension)[m] were proportionally redistributed to specified causes within each age and sex category.

Cause of death information for injuries was particularly problematic, with a very high proportion of 'undetermined cause' due to the manner of death (accident, homicide, suicide) not being specified on the death notification form. To accommodate a coding change implemented by StatsSA in 2007,[n] whereby unspecified injuries are coded to accidental injuries according to ICD-10 guidelines, injuries were redistributed using a different redistribution algorithm. This involved identifying the proportion of accidental injuries that would previously have been coded as unspecified based on 2006 data and re-allocating these proportionally to homicide, suicide and accidental intent. In the absence of district-level information, the estimated national proportions were applied to each district, based on the assumption that the change in coding was consistent across the country.

m Naghavi M, Makela S, Foreman K, O'Brien J, Pourmalek F, Lozano R. Algorithms for enhancing public health utility of national causes of death data. Population Health Metrics, 2010; 8:9.

n Statistics South Africa. Mortality and causes of death in South Africa, 2007: findings from death notification. Statistical Release P0309.3. Pretoria: StatsSA; 2009. Available from: http://www.statssa.gov.za/publications/P03093/P030932007.pdf [Accessed 30 October 2012].

Analysis

The proportions of deaths and years of life lost (YLLs) due to the four broad cause groups were calculated for each of the 52 districts. Years of life lost is a measure of premature mortality based on the age at death and thus highlights the causes of death that should be targeted for prevention. In line with the initial South African NBD study, the highest observed national life expectancy was selected as the standard against which YLLs are calculated.[o]

Completeness of death registration for 2008 was reported to be 81% nationally,[b] but Dorrington and Bradshaw estimate that it was higher at 90%.[p] Completeness for 2009 was reported to be 93.5% at national level.[c] Death registration completeness for 2010,[d] 2011,[e] 2012,[f] 2013[g] and 2014,[h] was reported to be 94%. However, estimates of completeness were not available at district level and since variation in completeness at district level can distort death rates, rates were not calculated except for the eight metros where completeness was likely to be good. The number of deaths, age distribution and the seasonal trends for each year were examined and compared for all districts. Metro death rates were age standardised to eliminate differences in observed mortality rates caused by differences in the age structure of the population in different areas.[q] Rates were calculated using the population estimates from the District Health Information Software (DHIS), based on 2002–2018 district cohort estimates developed by StatsSA (2013).

Results

A total of 3 767 401 deaths were reported for 2008–2014, of which 102 519 stillbirths were excluded from further analysis (Table 2). There was a decline in the total number of deaths between 2008 and 2014 as well as a decline in mortality rates.[r]

Between 2008 and 2012, large fluctuations were noted in the total number of deaths in various districts, as reported previously.[s] Among the metros, this was clearly apparent in N Mandela Bay and Buffalo City (both Eastern Cape (EC)), although it was more difficult to assess the impact in the other metros. In Buffalo City, the number of deaths appeared to be at a lower level than expected from 2012 to 2014 (Figure 1). In Ekurhuleni (Gauteng (GP)), the number of deaths early in 2014 appeared to be lower than expected. In addition, the number of deaths recorded in eThekwini (KZN) declined by 36.9% between 2013 and 2014, with a distinct fall off over the year that is quite clearly different from the usual seasonal trends. A similar trend was noted in a number of other districts in KwaZulu-Natal, suggesting that deaths across the province were incomplete for 2014. In N Mandela Bay (EC), the deaths appeared to be back at expected levels for early 2014 but fell off dramatically after July 2014.

While some of these observations may be due to an increase in the number of deaths with 'unknown district' noted between 2013 and 2014 (an increase from 10 072 to 15 250 deaths), it appears that there may also be a delay in the transfer of death notification forms from the Department of Home Affairs to StatsSA in some areas, e.g. in eThekwini. A similar problem was noted in 2013 data but was resolved with the data update for 2014. For this reason mortality rates for the metros were only reported until 2013, since incomplete reporting affects absolute mortality rates. The relative mortality measures, such as the percentage of YLLs by cause, have been reported up to 2014 based on the assumption that the incomplete death records represent a similar profile of ages and causes to those that have been captured. The observed trends support this as they generally show consistent year-on-year changes by cause.

o This standard is represented by a model life table, Coale and Demeny West level 26, with a life expectancy at birth of 82.5 years for Japanese females and 80 for males. Years of life lost are estimated for each age, sex and cause category by multiplying the observed number of deaths in each category by the expected life expectancy in each age category, implying that YLLs are greater when age at death is younger. Since people value years of life gained in the future less than years gained in the present, a 3% discount rate is applied. In contrast to the first NBD study, an age-weighting function that assigns greater value to a year of life lived in the economically active age groups than it assigns to years lived in childhood or old age was not applied, in line with the latest Global Burden of Disease protocol (http://www.dcp2.org/pubs/GBD).

p Dorrington R, Bradshaw D. Maternal mortality in South Africa: lessons from a case study in the use of deaths reported by households in censuses and surveys. J Pop Research. 2011; 28:49–73.

q Ahmad OB, Boschi-Pinto C, Lopez AD, Murray CJL, Lozano R, Inoue M. Age standardisation of rates: A new WHO standard. GPE Discussion Paper Series No. 31. Geneva: World Health Organization; 2001.

r Bradshaw D, Dorrington RE, Laubscher R. Rapid Mortality Surveillance Report 2011. Cape Town: Medical Research Council; 2012. Available from: www.mrc.ac.za/bod/RapidMortality2011.pdf [Accessed 30 October 2012].

s Massyn N, Day C, Peer N, Padarath A, Barron P, English R, editors. District Health Barometer 2013/14. Durban: Health Systems Trust; October 2014.

Table 2: Number of registered deaths and stillbirths nationally, 2008–2014

Year	Deaths	Stillbirths	Total	Unknown district	
				N	%*
2008	597 781	14 932	612 713	4 122	0.7
2009	582 956	14 279	597 235	4 531	0.8
2010	550 401	14 989	565 396	6 745	1.2
2011	514 938	14 216	529 154	23 560	4.6
2012	492 062	14 676	506 738	18 590	3.8
2013	473 384	15 008	488 392	10 072	2.1
2014	453 360	14 413	467 773	15 250	3.4
Total	3 664 882	102 519	3 767 401	82 870	2.3

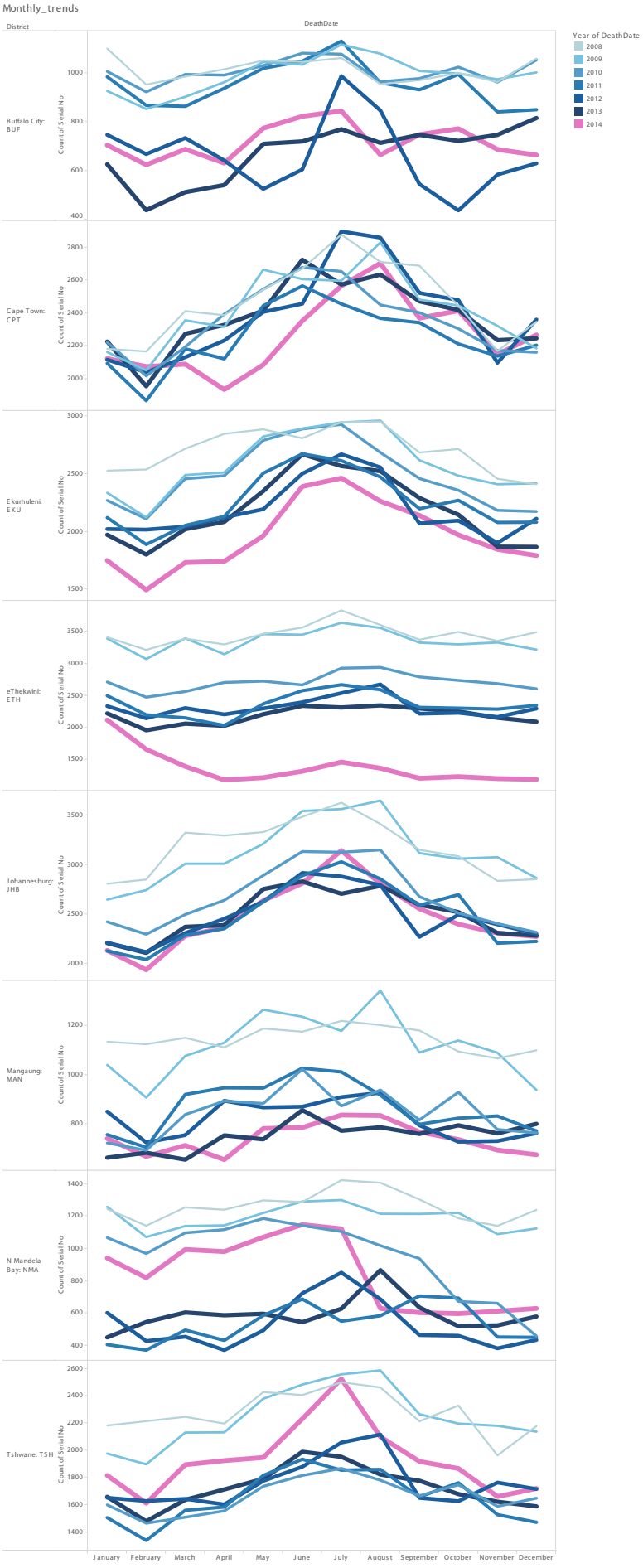
* Refers to percentage of deaths excluding stillbirths.

Furthermore, data quality issues affecting national mortality data have been identified, including a high proportion of ill-defined causes, misclassification of HIV and AIDS deaths, and poor specification of external causes of injury deaths.[t] In addition, data completeness at the time of analysis has become an issue since 2013, particularly for KwaZulu-Natal (KZN).

Despite the data quality concerns, it is essential to start making use of the available data, at the same time as initiating improvement strategies. By assuming that the metro areas have near-complete death registration, it is possible to obtain death rates for these areas. While it is not yet possible to provide reliable mortality rates for each district, the epidemiological mortality profiles can be used as part of a measure of need for equitable resource allocation and priority setting.

t Bradshaw D, Pillay-van Wyk V, Laubscher R, Nojilana B, Groenewald, Nannan N. Cause of death statistics for South Africa: Challenges and possibilities for improvement. Cape Town: Medical Research Council; 2011. Available from: www.mrc.ac.za/bod/cause_death_statsSA.pdf [Accessed 30 October 2012].

Figure 1: Monthly trends in deaths for the eight metros, 2008–2014



Data quality

The two main indicators of data quality include the completeness of registration (which is unknown at district level) and the percentage of deaths classified to ill-defined causes and 'garbage codes' as described earlier. The annual fluctuations in numbers of deaths by district and the changing proportions of deaths from "unknown district" by year suggest that completeness at district level is variable and that trends need to be interpreted with caution. Internationally the recommended standard is less than 10% ill-defined and garbage codes; no districts in South Africa met this standard.[u] In South Africa, the total ill-defined and 'garbage codes' has declined from 39% in 1998[v] to 29.0% in 2009, and declined again slightly to 28.4% in 2014. However, there have been marked improvements in both ill-defined (9.5% to 6.9%) and garbage codes (16.1% to 12.2%) in the Western Cape since 2008 and Northern Cape since 2011 in contrast with other provinces over this period (Figure 2).This may reflect the increased efforts to improve death certification in the Western Cape, as a result of the implementation of a local mortality surveillance system in that province. It is not clear what is responsible for the improvement in the Northern Cape. In order to reduce the proportion of ill-defined deaths it will be imperative to train doctors in death certification in areas with high ill-defined and garbage code. In rural areas with limited access to medical doctors it may be useful to consider implementing alternative methods of establishing the underlying cause of death, such as the use of verbal autopsy, within the civil registration and vital statistics system.

For the purposes of this study, the proportion of deaths coded to ill-defined causes was used as an indicator of the quality of mortality data. In 2014, ill-defined causes were reported for 13.8% of deaths in South Africa and ranged from 3.6% (Eden, WC) to 54.8% (A Nzo, EC) across districts (Figure 3 and Map 1). The percentage of ill-defined deaths in the eight metros was 12.3% and ranged between 3.6% in Eden and 54.8% In A Nzo. As might be expected, the percentage of ill-defined deaths was lowest in the districts within the highest socio-economic quintiles (SEQs 3–5)[w] and highest in the most deprived districts.

In 2014, garbage codes were reported for 14.6% of deaths in South Africa and ranged from 6.9% in JT Gaetsewe (NC) to 20.5% in Sedibeng (GP) (Figure 4). In A Nzo (EC), OR Tambo (EC), Vhembe (Limpopo (LP)) and Joe Gqabi (EC) more than 40% of deaths were coded to ill-defined causes and garbage codes. Interestingly, the percentage of garbage codes was on average highest in districts within the highest socio-economic quintiles (SEQs 4–5) and lowest in districts in the lowest SEQs, although there was quite a range across districts within each quintile. This may reflect better access to health services and medical information but poor certification practices on the part of the doctors.[x]

u Mathers CD, Ma Fat D, Inoue M, Rao C, Lopez AD. Counting the dead and what they died from: an assessment of the global status of cause of death data. Bulletin of the World Health Organization. 2004; 83:171–7.

v Pillay-van Wyk V, Bradshaw D, Groenewald P, Laubscher R. Improving the quality of medical certification of cause of death: the time is now! S Afr Med J. 2011 Sep 5; 101(9):626.

w See Introduction to the DHB for details of the deprivation index and socio-economic quintiles.

x Meel BL. Certification of deaths at Umtata General Hospital, South Africa. Journal of Clinical Forensic Medicine. 2003; 10(1):13–5.

Figure 2: Trend in deaths coded to ill-defined causes and garbage codes by province, 2008–2014

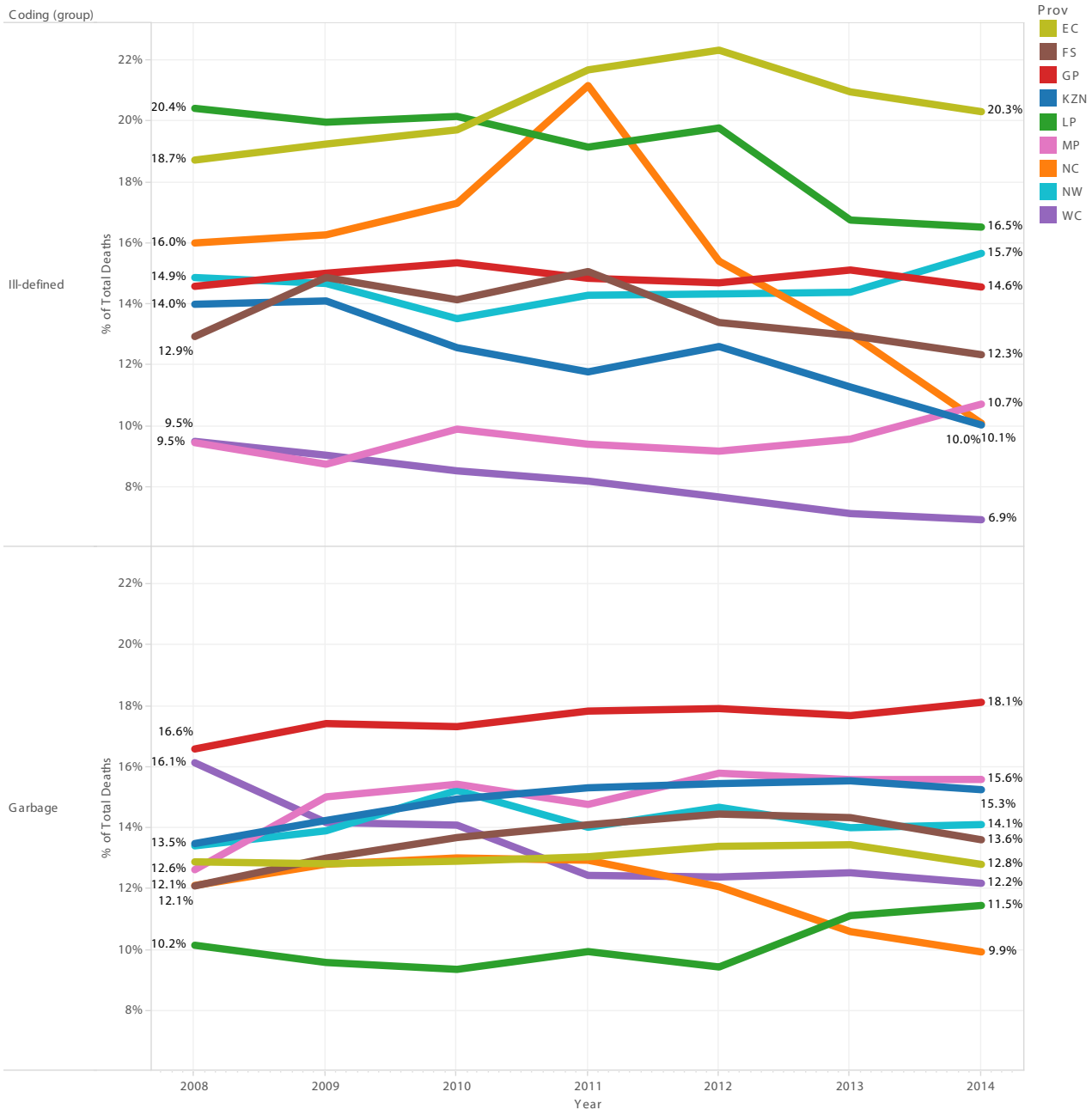
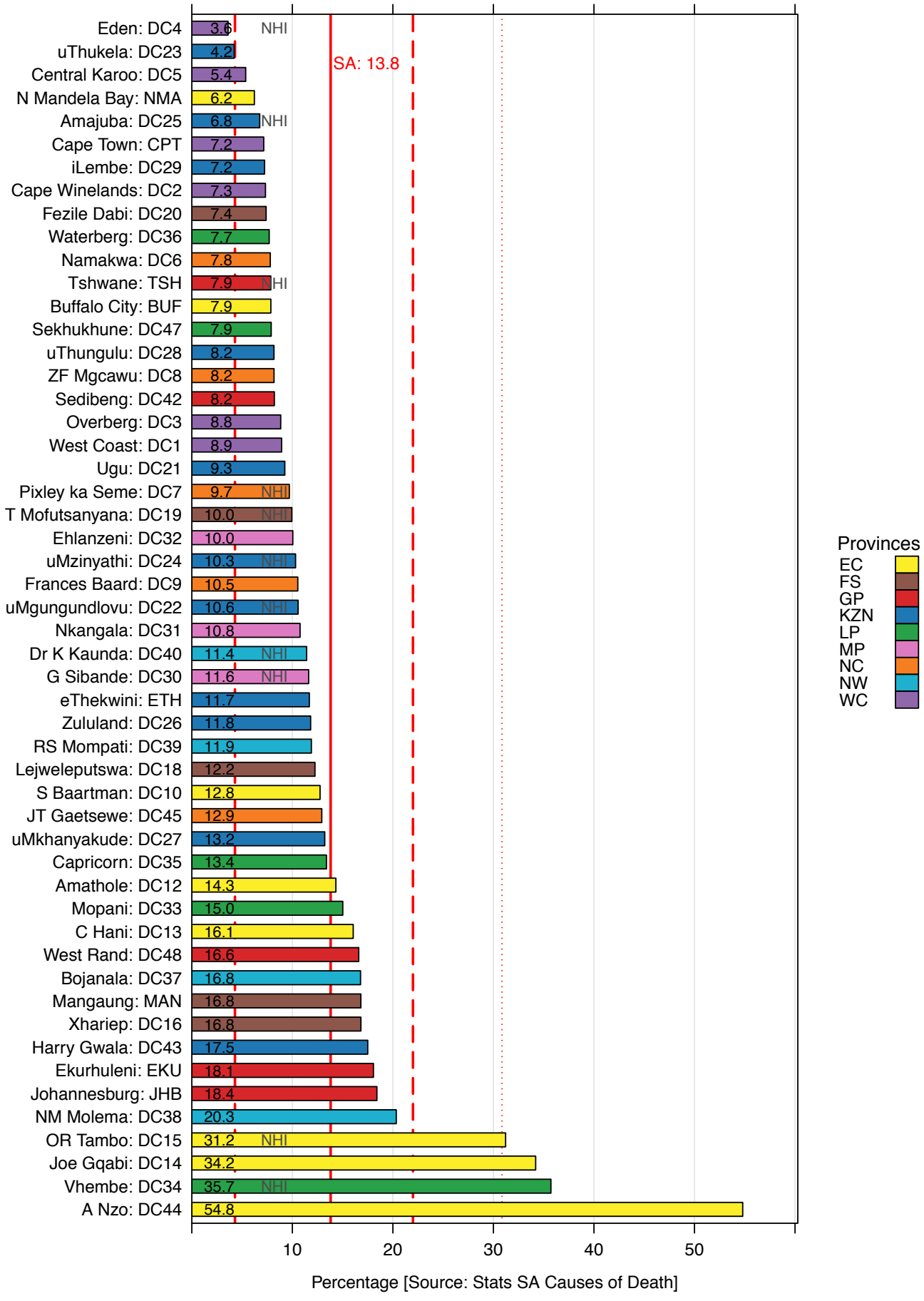


Figure 3: Percentage of deaths ill-defined by district, 2014



Map 1: Percentage of deaths ill-defined by district, 2014

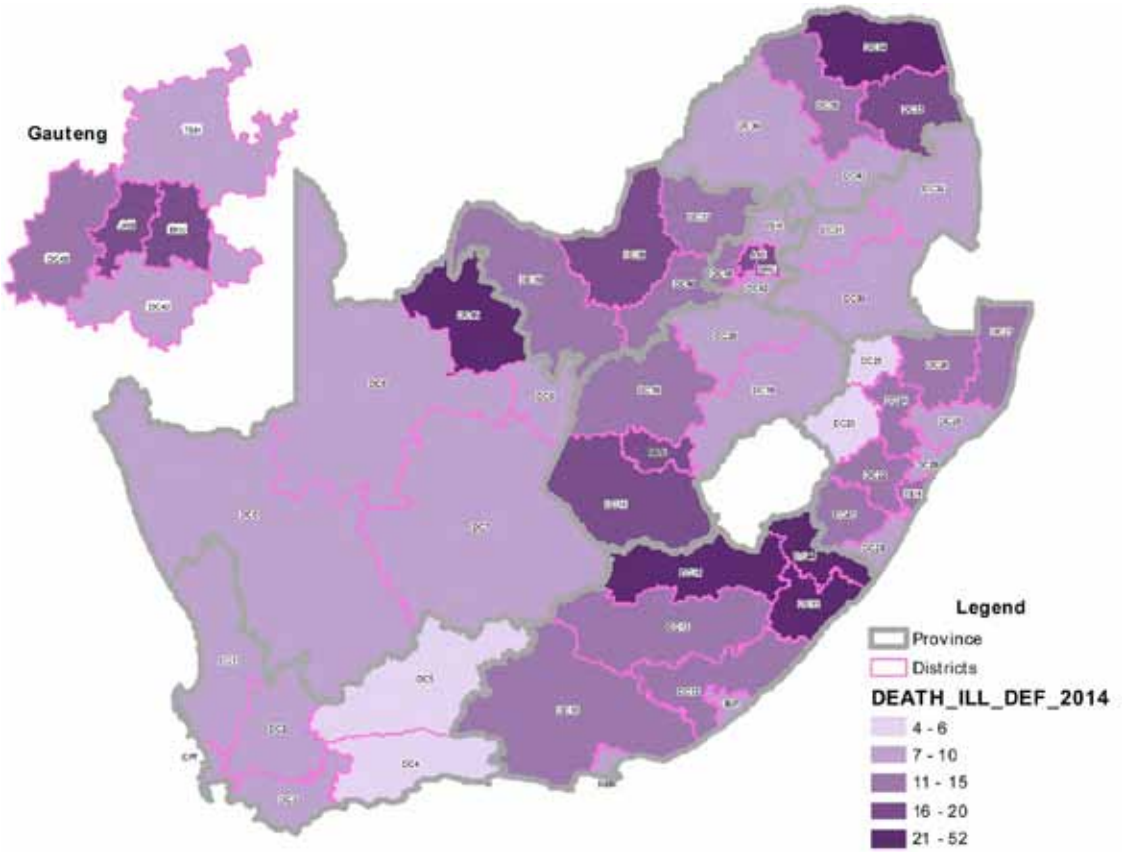
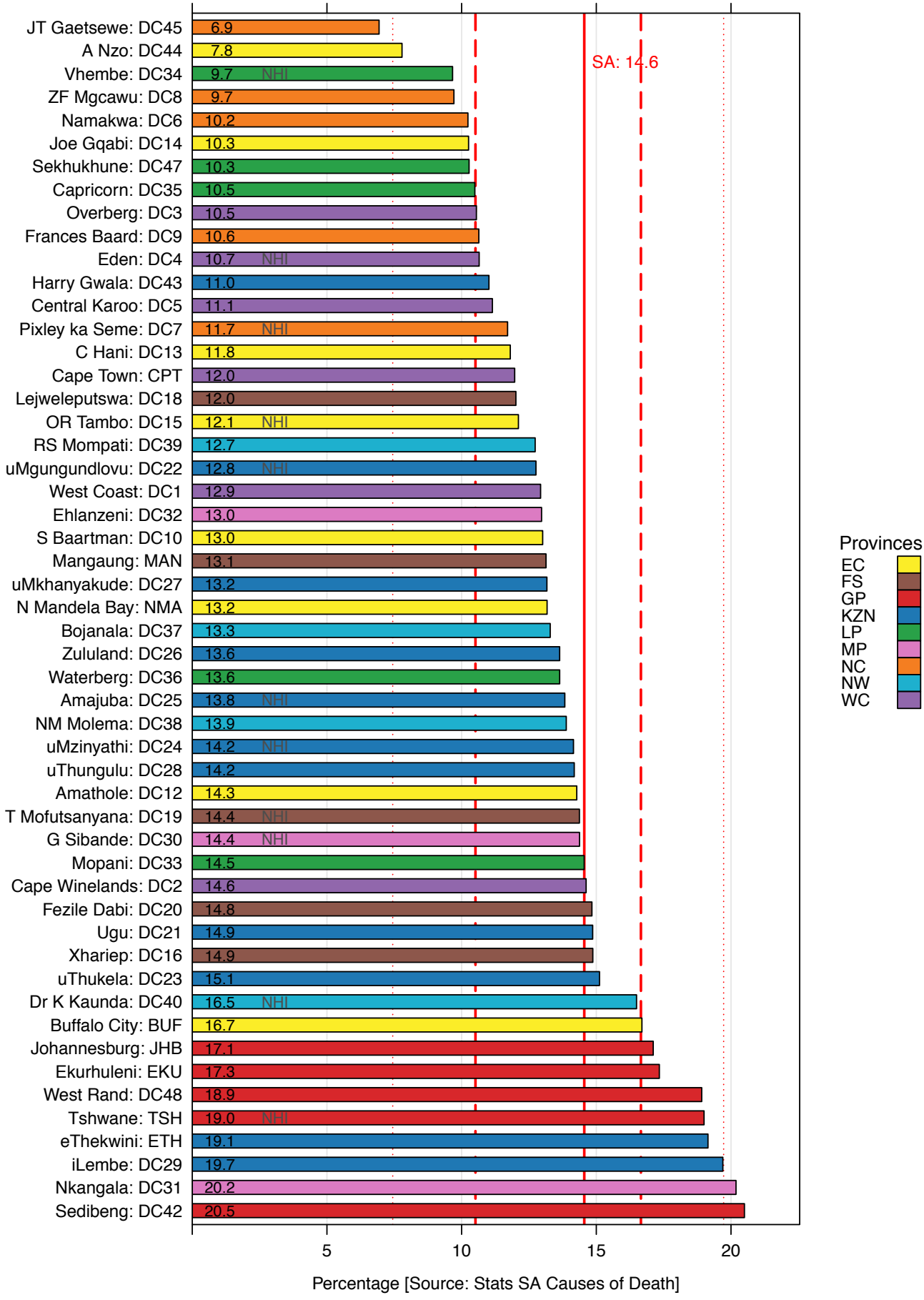


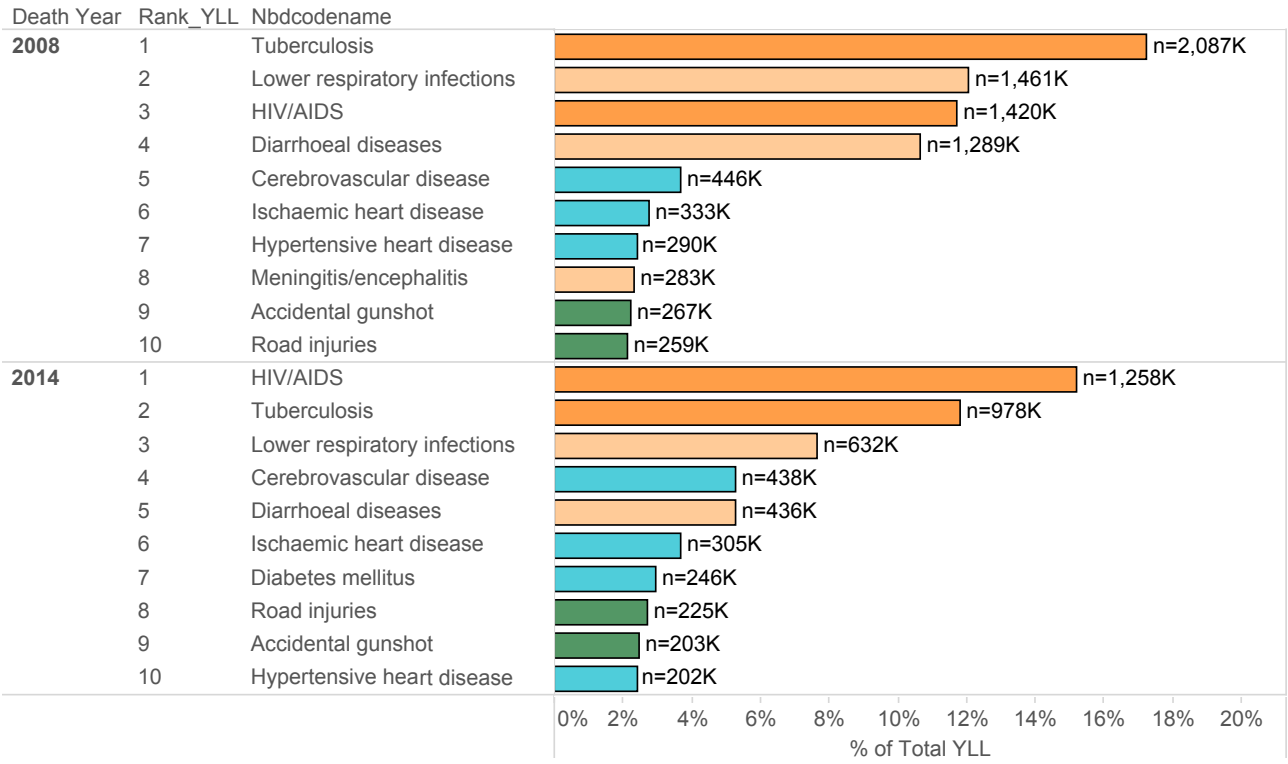
Figure 4: Percentage of deaths with garbage codes by district, 2014



Leading causes of premature mortality

The results presented here differ substantially from the results presented in the StatsSA 2008–2014 cause of death reports[b-h] in that ill-defined causes have been redistributed across other specified causes and specific causes of injury are presented. It is important to note that more than 90% of HIV deaths have been misattributed to immediate causes of death such as TB, diarrhoeal diseases and lower respiratory infections,[y,z] and that since many injury-related deaths are misclassified to ill-defined intent,[aa] the ranking of injury causes may be unreliable. In 2008 and 2014, the three leading single causes of YLLs in South Africa were HIV-related conditions, TB and pneumonia, with diarrhoea ranking fourth in 2008 and fifth in 2014, suggesting that HIV-related mortality remains the leading cause of YLLs in the majority of districts in South Africa (Figure 5). Also in the top 10 leading causes of YLLs across South Africa are cerebrovascular diseases, hypertensive heart disease, ischaemic heart disease, diabetes, and road injuries. Accidental gunshot also appears in the top 10 but reflects homicide cases that have been miscoded.[ab] With some minor differences, the following conditions are among the top causes of premature mortality across most districts in South Africa : preterm birth complications (North West (NW) and NC); chronic obstructive pulmonary disease (COPD) (WC and NC); lung cancer (WC); meningitis and encephalitis (LP); and nephritis/nephrosis or renal failure (GP, KZN and LP) (Figures 5, 6 and 7).

Figure 5: Leading causes of years of life lost (YLLs) for South Africa, 2008 and 2014



Note: Graph labelled with the number of years of life lost (YLLs) in thousands.

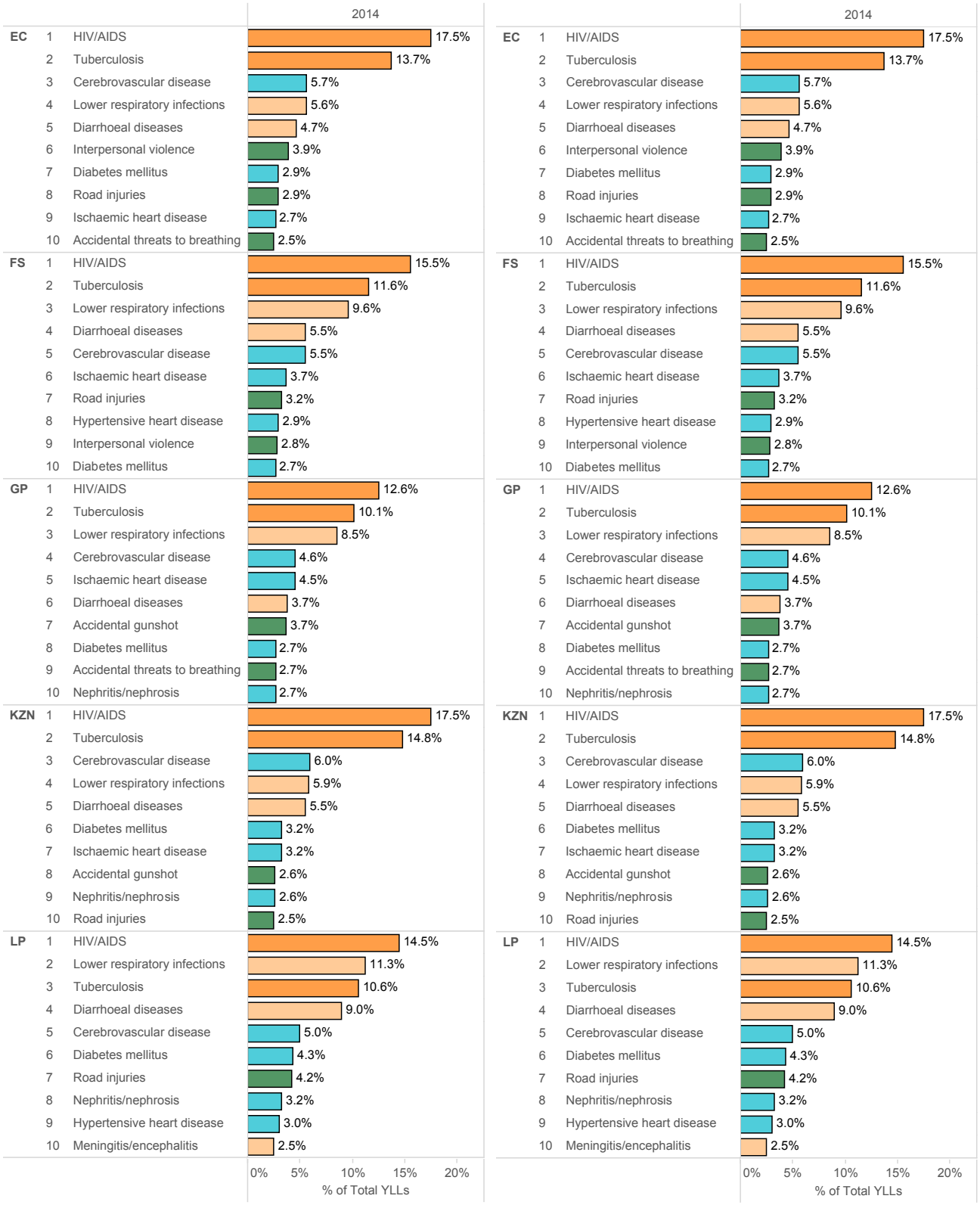
y Bradshaw D, Bradshaw D, Msemburi W, Dorrington R, Pillay-van Wyk V, Laubscher R, Groenewald P. On behalf of the SA NBD team HIV/AIDS in South Africa – how many people died from the disease between 1997 and 2010? AIDS 2016 Mar 13;30(5):771–8.

z Yudkin PL, Burger EH, Bradshaw D, Groenewald P, Ward AM, Volmink J. Deaths caused by HIV disease under-reported in South Africa. AIDS. 2009 Jul 31; 23(12):1600–2.

aa Norman R, Matzopoulos R, Groenewald P, Bradshaw D. The high burden of injuries in South Africa. Bulletin of the World Health Organization. 2007; 85:695–702.

ab Matzopoulos R, Groenewald P, Abrahams N, Bradshaw D. Where have all the gun deaths gone? S Afr Med J. 2016; 106(6):589–91.

Figure 6: Ten leading causes of years of life lost (YLLs) by province, 2014



2014
EC
1 HIV/AIDS 17.5%
2 Tuberculosis 13.7%
3 Cerebrovascular disease 5.7%
4 Lower respiratory infections 5.6%
5 Diarrhoeal diseases 4.7%
6 Interpersonal violence 3.9%
7 Diabetes mellitus 2.9%
8 Road injuries 2.9%
9 Ischaemic heart disease 2.7%
10 Accidental threats to breathing 2.5%
FS
1 HIV/AIDS 15.5%
2 Tuberculosis 11.6%
3 Lower respiratory infections 9.6%
4 Diarrhoeal diseases 5.5%
5 Cerebrovascular disease 5.5%
6 Ischaemic heart disease 3.7%
7 Road injuries 3.2%
8 Hypertensive heart disease 2.9%
9 Interpersonal violence 2.8%
10 Diabetes mellitus 2.7%
GP
1 HIV/AIDS 12.6%
2 Tuberculosis 10.1%
3 Lower respiratory infections 8.5%
4 Cerebrovascular disease 4.6%
5 Ischaemic heart disease 4.5%
6 Diarrhoeal diseases 3.7%
7 Accidental gunshot 3.7%
8 Diabetes mellitus 2.7%
9 Accidental threats to breathing 2.7%
10 Nephritis/nephrosis 2.7%
KZN
1 HIV/AIDS 17.5%
2 Tuberculosis 14.8%
3 Cerebrovascular disease 6.0%
4 Lower respiratory infections 5.9%
5 Diarrhoeal diseases 5.5%
6 Diabetes mellitus 3.2%
7 Ischaemic heart disease 3.2%
8 Accidental gunshot 2.6%
9 Nephritis/nephrosis 2.6%
10 Road injuries 2.5%
LP
1 HIV/AIDS 14.5%
2 Lower respiratory infections 11.3%
3 Tuberculosis 10.6%
4 Diarrhoeal diseases 9.0%
5 Cerebrovascular disease 5.0%
6 Diabetes mellitus 4.3%
7 Road injuries 4.2%
8 Nephritis/nephrosis 3.2%
9 Hypertensive heart disease 3.0%
10 Meningitis/encephalitis 2.5%
0% 5% 10% 15% 20%
% of Total YLLs

Figure 7: Ranking of 20 leading causes of years of life lost (YLLs) by district, 2014

Prov	District	HIV/AIDS	Tuberculosis	Lower respiratory infections	Cerebrovascular disease	Diarrhoeal diseases	Ischaemic heart disease	Diabetes mellitus	Road injuries	Accidental gunshot	Hypertensive heart disease	Interpersonal violence	Nephritis/nephrosis	Accidental threats to breathing	Preterm birth complications	COPD	Meningitis/encephalitis	Septicaemia	Endocrine nutritional,blood, immu..	Asthma	Epilepsy	Other perinatal conditions	Malaria	Alzheimers and other dementias
EC	A Nzo: DC44	1	2	4	5	3	13	12	7	18	9	6	11	8	20	16	10		14		17			
	Amathole: DC12	1	2	3	4	5	9	11	14	17	10	6	16	8		12				7	13			
	Buffalo City: BUF	1	2	5	3	13	6	9	7	18	12	4	11	10		8		20		14				
	C Hani: DC13	1	2	3	4	5	15	7	12		9	6	16	8		14	18		17	11	13			
	Joe Gqabi: DC14	2	1	3	4	5	9	8	10		7	6	13	11		12	15			17	16			
	N Mandela Bay: NMA	1	2	6	3	15	4	5	12	7	16	10	8	13	17	9			19	14	18			
	OR Tambo: DC15	1	2	4	5	3	20	8	6	12	10	7	13	11			14		17	18	15			
	S Baartman: DC10	1	2	3	4	14	5	11	7	18	10	6	12	9		8				15	17			
FS	Fezile Dabi: DC20	3	1	2	5	6	7	8	4		9	15	10	12	13	14		20	11					
	Lejweleputswa: DC18	2	3	1	5	4	7	11	8	18	9	6	10	14	12	17	19		16					
	Mangaung: MAN	1	2	3	4	7	6	9	15	10	12	5	8	14	16	17	20	11	13					
	T Mofutsanyana: DC19	1	2	3	5	4	6	8	9		7	11	10	13	12	16	19		15					
	Xhariep: DC16	1	2	3	4	6	7	12	5	13	9	8		10	17	11				20	18			
GP	Ekurhuleni: EKU	1	2	3	4	5	7	8		6	12	14	11	9	10	15	13	17	19					
	Johannesburg: JHB	1	2	3	5	9	6	13		4	20		7	8	10	12	14	11	16					
	Sedibeng: DC42	3	1	2	5	6	4	8		7	13	10	11	9	15	16	12	17	19					
	Tshwane: TSH	1	2	3	5	6	4	7	10	12	8		9	11	15	16	19	13	14					
	West Rand: DC48	1	3	2	5	6	4	10	11	7	12	9	13	8	18	14	16	15	17					
KZN	Amajuba: DC25	3	2	1	5	4	12	9	6	14	10	11	16	7	8		20		15					
	Harry Gwala: DC43	1	2	4	5	3	12	6	7	13	8	9	16		15		14	20	18	11				
	Ugu: DC21	1	2	4	3	5	8	6	13	10	11	9	12	7	15	16	20	17		14	19			
	Umgungundlovu: DC22	1	2	5	3	4	6	7	11	10	12	8	9	13	14		20	19	16					
	Umkhanyakude: DC27	1	2	5	4	3	11	7	6	10	13	12	9	8	19			16	17					
	Umzinyathi: DC24	1	2	3	5	4	7	9	6	11	10	13	12		8		17	19	15					
	Uthukela: DC23	1	2	4	5	3	6	8	11	9	10	14	7	13	18		12	16	15		17			
	Uthungulu: DC28	1	2	5	3	6	13	8	4	11	12	9	10	18	7		16	14	15					
	Zululand: DC26	2	1	3	5	4	12	6	7	14	10	11	16	9	8		13		18		20			
	eThekwini: ETH	1	2	4	3	7	5	10		6	14	16	8	9	11	20	12	13	15	19				
	iLembe: DC29	2	1	6	3	4	7	9	5	10	12		8	15	13		14	16		17	20			
LP	Capricorn: DC35	1	3	2	6	4	12	7	5		8		9	10	11	18	13	14	16	20				
	Mopani: DC33	1	2	3	7	4	12	8	11		10	20	6	13	9		5	18						
	Sekhukhune: DC47	1	4	2	5	3	15	7	6	20	9		10	14	19	17	11	8		13				
	Vhembe: DC34	1	2	4	5	3	18	6	8		10	19	7	9	15		16	13	12				17	
	Waterberg: DC36	1	2	3	6	4	7	8	5		9	19	10	12	11	18	13		17					
MP	Ehlanzeni: DC32	1	2	3	5	4	7	8	6	16	13	18	11	12	17		10	9	14					
	G Sibande: DC30	1	2	3	5	4	9	8	6	18	7	12	13	10	11	17	15	19	16					
	Nkangala: DC31	1	3	2	4	5	6	9	11	16	8		10	7	20	14	18	17	15	19				
NC	Frances Baard: DC9	1	2	4	3	6	7	11	5		13	8	10	17	9	12		20	15					
	JT Gaetsewe: DC45	1	4	2	6	3	10	11	5		8	9	14		7				18		20	17		
	Namakwa: DC6	5	2	9	6	15	1	13	3		11	7	19	12	10	4								
	Pixley ka Seme: DC7	1	2	4	3	8	7	15	5		11	6		12	10	9			18		19			
	ZF Mgcawu: DC8	1	2	3	5	8	4	10	6		18	7	16		15	9		20		13	14			
NW	Bojanala: DC37	1	2	3	5	4	9	7	8	14	6	13	11	10	18	17		12	16					
	Dr K Kaunda: DC40	1	2	3	5	4	7	11		20	13	17	8	6	9	14		16						
	NM Molema: DC38	1	2	3	5	4	9	8	7		6	15	13		11		20	18	12	16	19			
	RS Mompati: DC39	1	2	4	5	3	8	12			6	13	17	10	7		18	20	15					
WC	Cape Town: CPT	1	3	8	6	15	4	9	14	2	18	5	10	12	16	11		17						
	Cape Winelands: DC2	1	2	12	4	15	3	10		14	19	8	11	7	17	5								
	Central Karoo: DC5	3	1	9	7	18	5	15	2	20	11	6	12		10	4			16		13			
	Eden: DC4	1	2	8	4	15	3	12	5		14	10	11	16	9	6			18		17			
	Overberg: DC3	6	2	9	5	13	1	12	4		19	3	10	16	11	7			17					18
	West Coast: DC1	2	1	12	5	16	3	9		8	14	6	15	11	18	4								

Broad cause

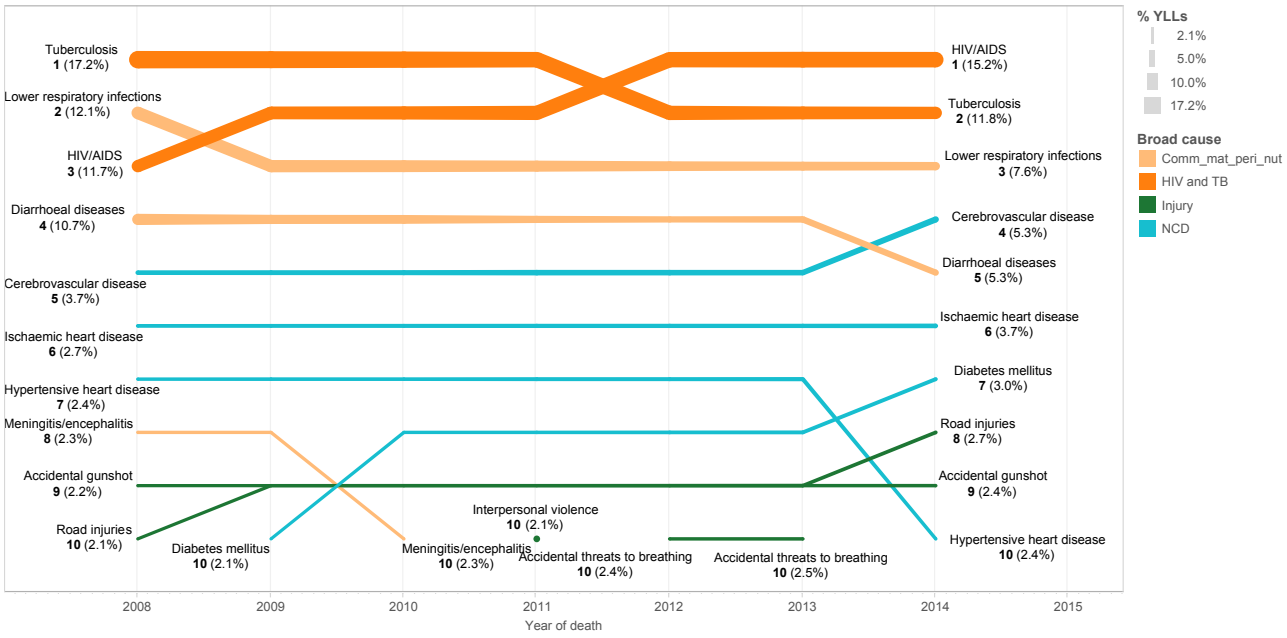
- Comm_mat_peri_nut
- HIV and TB
- Injury
- NCD

Trends in leading causes of premature mortality

Between 2008 and 2014 HIV moved from third to first place in the ranking for premature mortality in South Africa, displacing TB and lower respiratory infections; this reflects increased reporting of HIV on death certificates rather than an increase in mortality from HIV (Figure 8). Cerebrovascular disease displaced diarrhoea and moved into 4th place in 2014. Diabetes mellitus moved from 10th to 7th place between 2009 and 2014, and road injuries moved from 10th to 8th position over the same period.

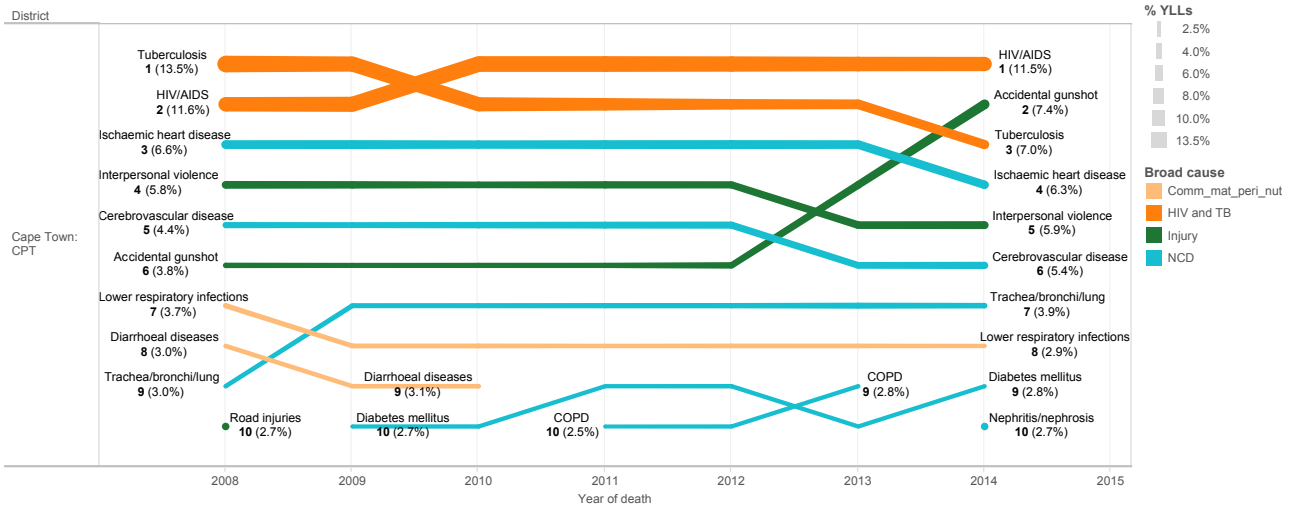
The trends in leading causes of premature mortality for individual districts are available at http://www.hst.org.za. The trends in KwaZulu-Natal districts should be interpreted with caution as the 2014 data are incomplete, as noted earlier. HIV climbed in the ranking to first place in all Limpopo districts from 2010, reflecting less reluctance among medical certifiers to report HIV as a cause of death. Of concern is the dramatic increase in 'accidental' gunshots (actually interpersonal violence) since 2012 in Cape Town (WC) (Figure 9). The increase in interpersonal violence in Cape Town since 2012 has been noted elsewhere, and is thought to be associated with increased availability of illegal firearms.[ac]

Figure 8: Trends in 10 leading causes of years of life lost (YLLs), South Africa, 2008–2014



ac Republic of South Africa National Assembly. Question no. 3408, Internal Question Paper no. 37; 4 September 2015.

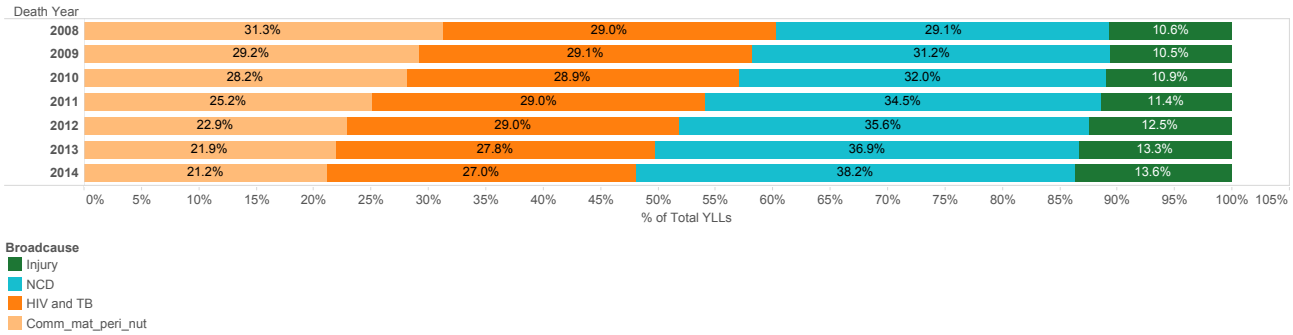
Figure 9: Trends in 10 leading causes of years of life lost (YLLs), Cape Town (WC), 2008–2014



Cause of death profile

South Africa still faces a quadruple burden, namely communicable diseases with maternal, perinatal and nutritional conditions (Comm/Mat/Peri/Nutr); HIV and TB; non-communicable diseases (NCDs); and injuries. However, the percentage of the burden due to HIV and TB and Comm/Mat/Peri/Nutr declined between 2008 and 2014 from 60% to 48%, with a corresponding increase in the burden due to NCDs (from 29% to 38%) and to a lesser extent injuries (from 11% 13.6%) (Figure 10).

Figure 10: Percentage of years of life lost (YLLs) by broad cause, South Africa, 2008–2014



In 2014, the quadruple burden varied across provinces, with the Western Cape having a higher proportion due to injury (19.0%) and NCDs (50.7%) than any other province (Figure 11). KwaZulu-Natal, Mpumalanga, Limpopo and North West had the highest proportions due to HIV and TB and Comm/Mat/Peri/Nutri (approximately 55%). Among the districts, uMkanyakude (KZN) had the highest burden due to HIV and TB (40.2%), while Overberg (WC) had the lowest (14.3%) (Figure 12 and Map 2). Districts in the two highest SEQs (SEQs 4 and 5) had higher proportions of YLLs due to injuries and NCDs, while those in the three lowest SEQs had higher proportions of YLLs due to HIV and TB and Comm/Mat/Peri/Nutr.

Figure 11: Percentage of years of life lost (YLLs) by broad cause by province, 2014

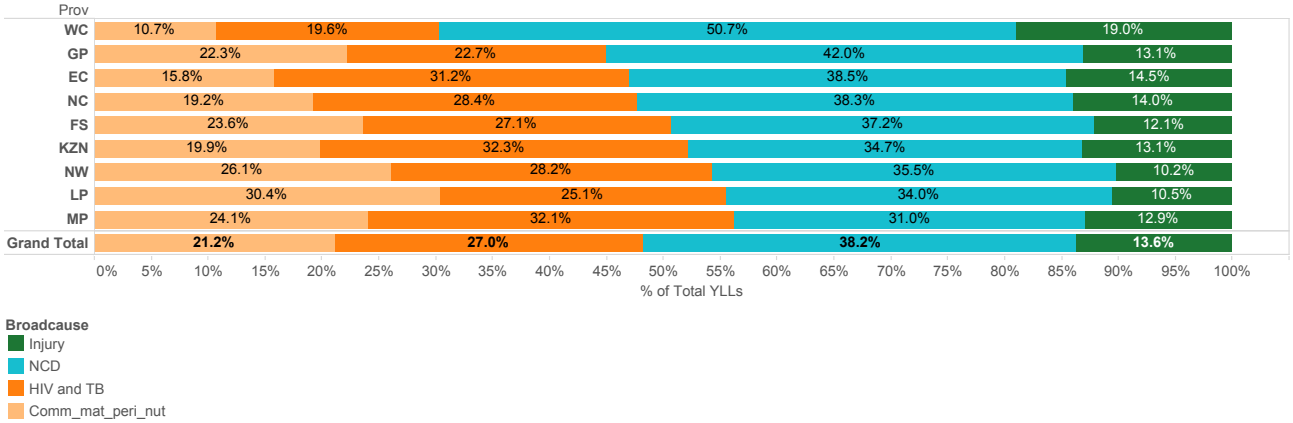
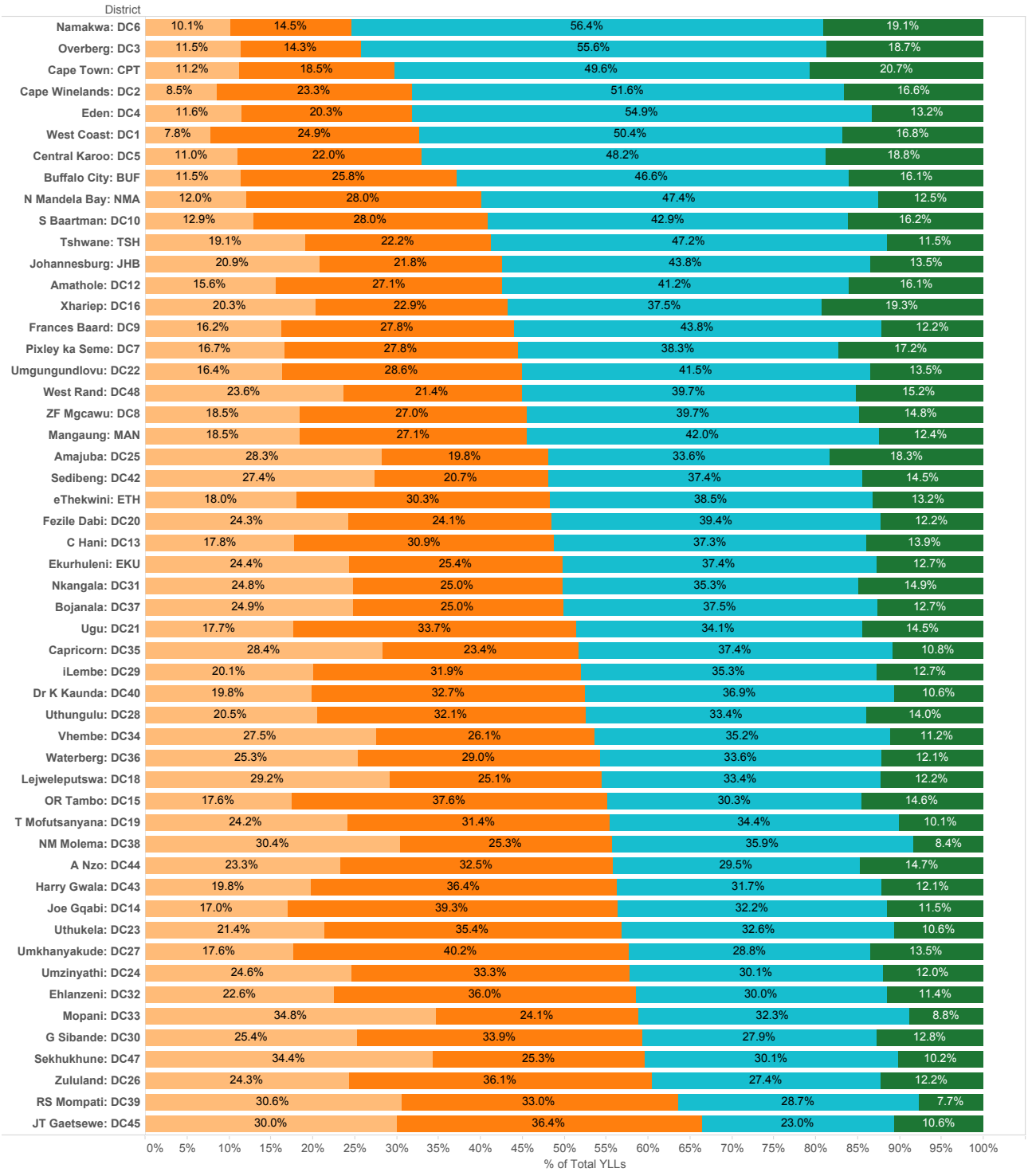


Figure 12: Percentage of years of life lost (YLLs) by broad causes, by district, 2014

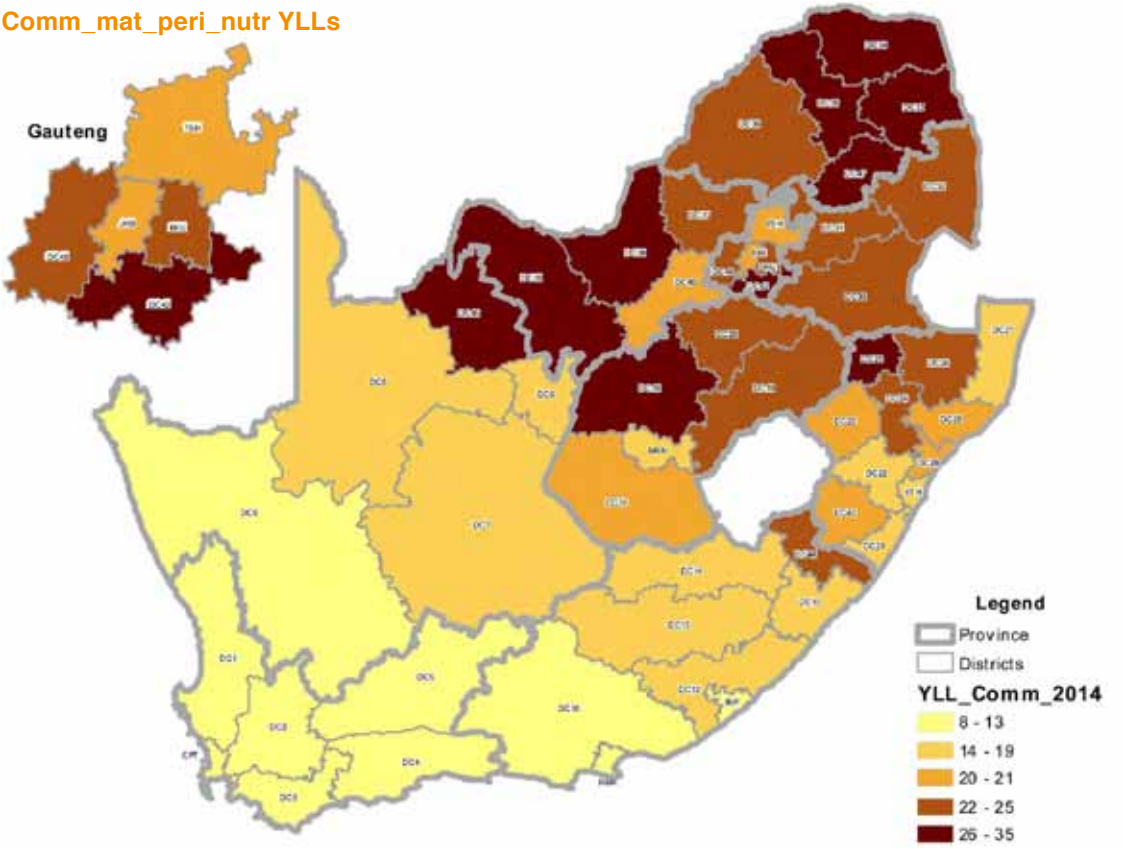


YLLs sorted in ascending order of the combined proportion of Communicable and Maternal YLLs and YLLs due to HIV and TB.

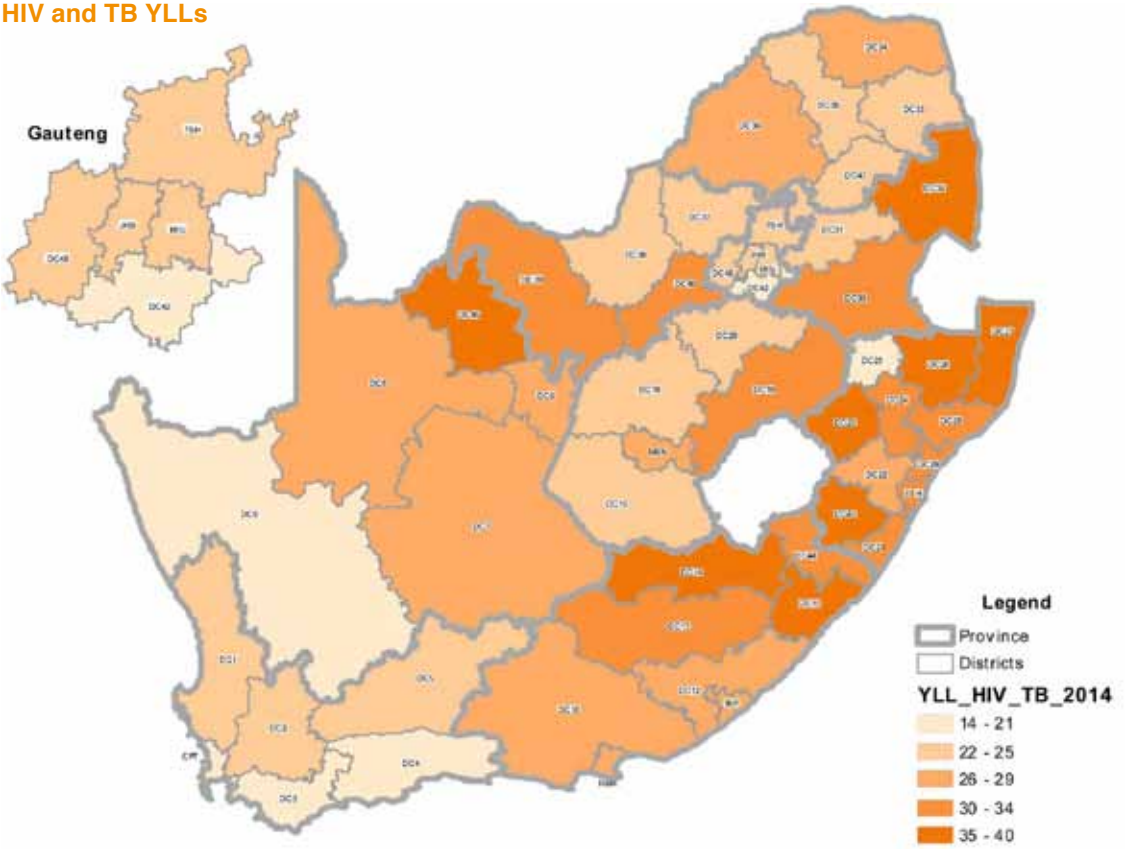
Broadcause
- Injury
- NCD
- HIV and TB
- Comm_mat_peri_nut

Map 2: Percentage of years of life lost (YLLs) by broad cause, by district, 2014

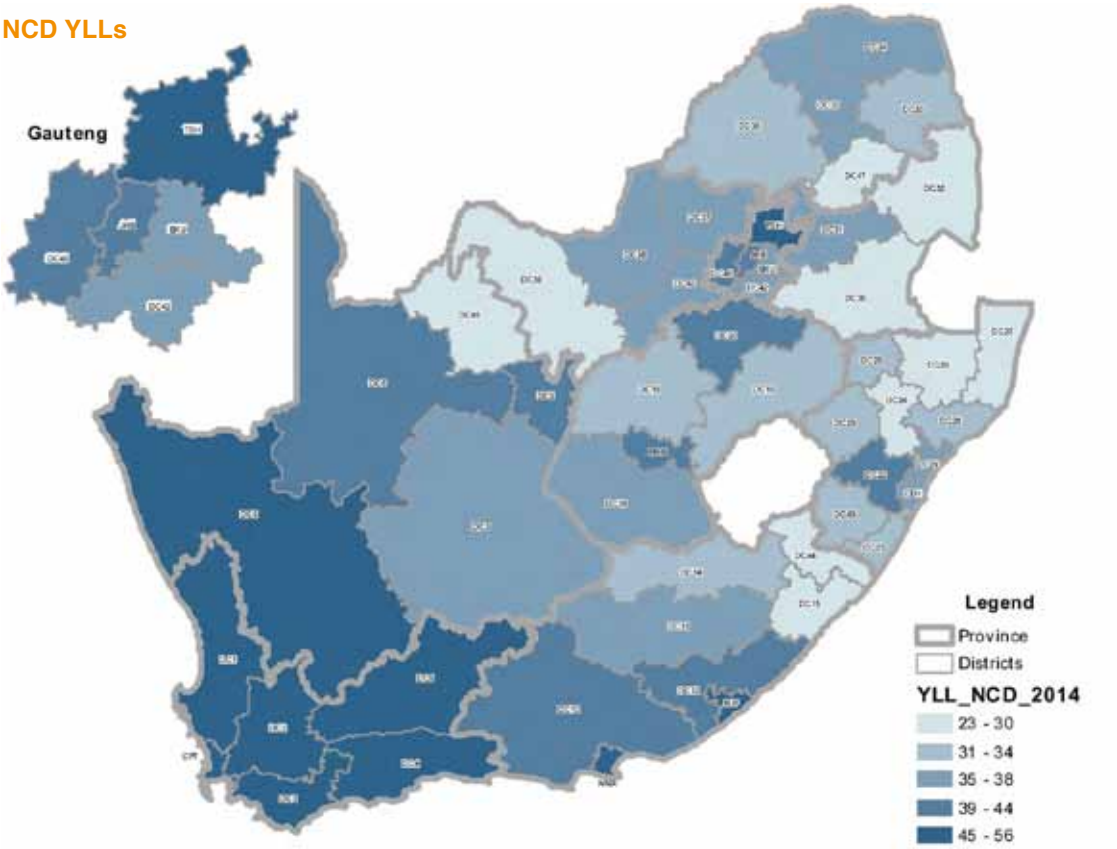
Comm_mat_peri_nutr YLLs



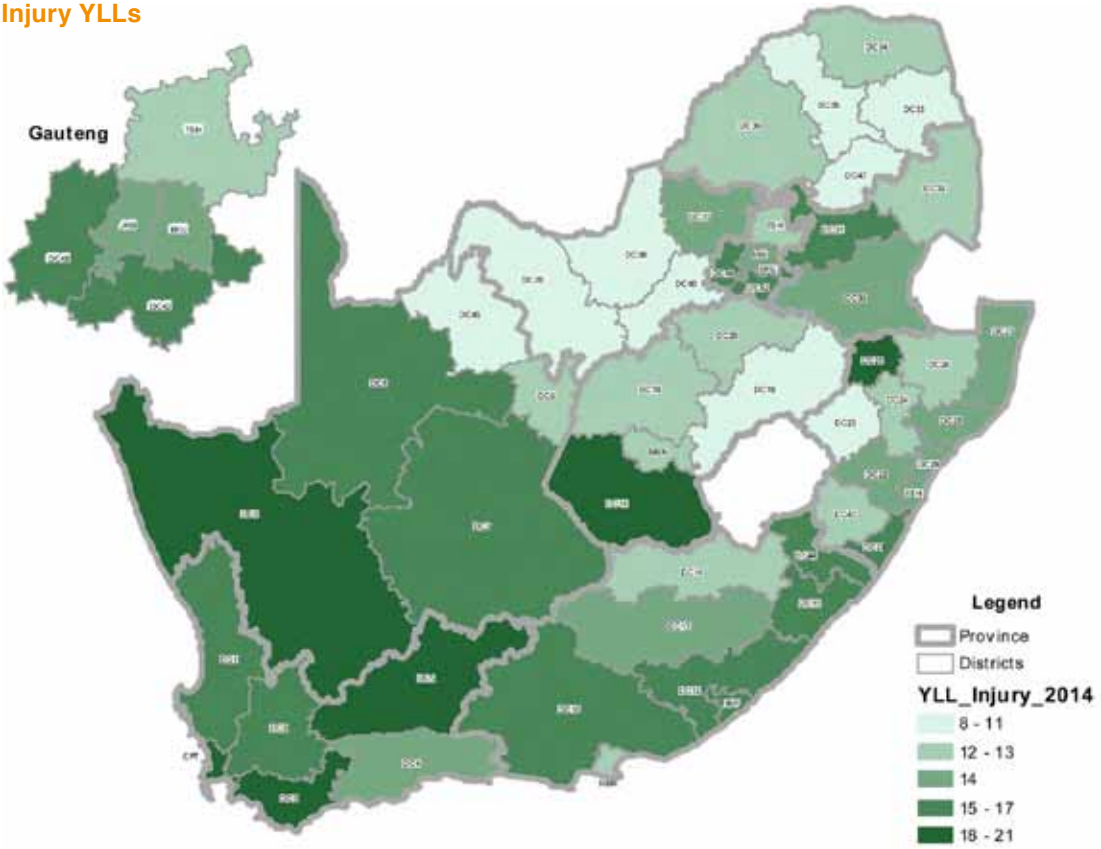
HIV and TB YLLs



NCD YLLs



Injury YLLs



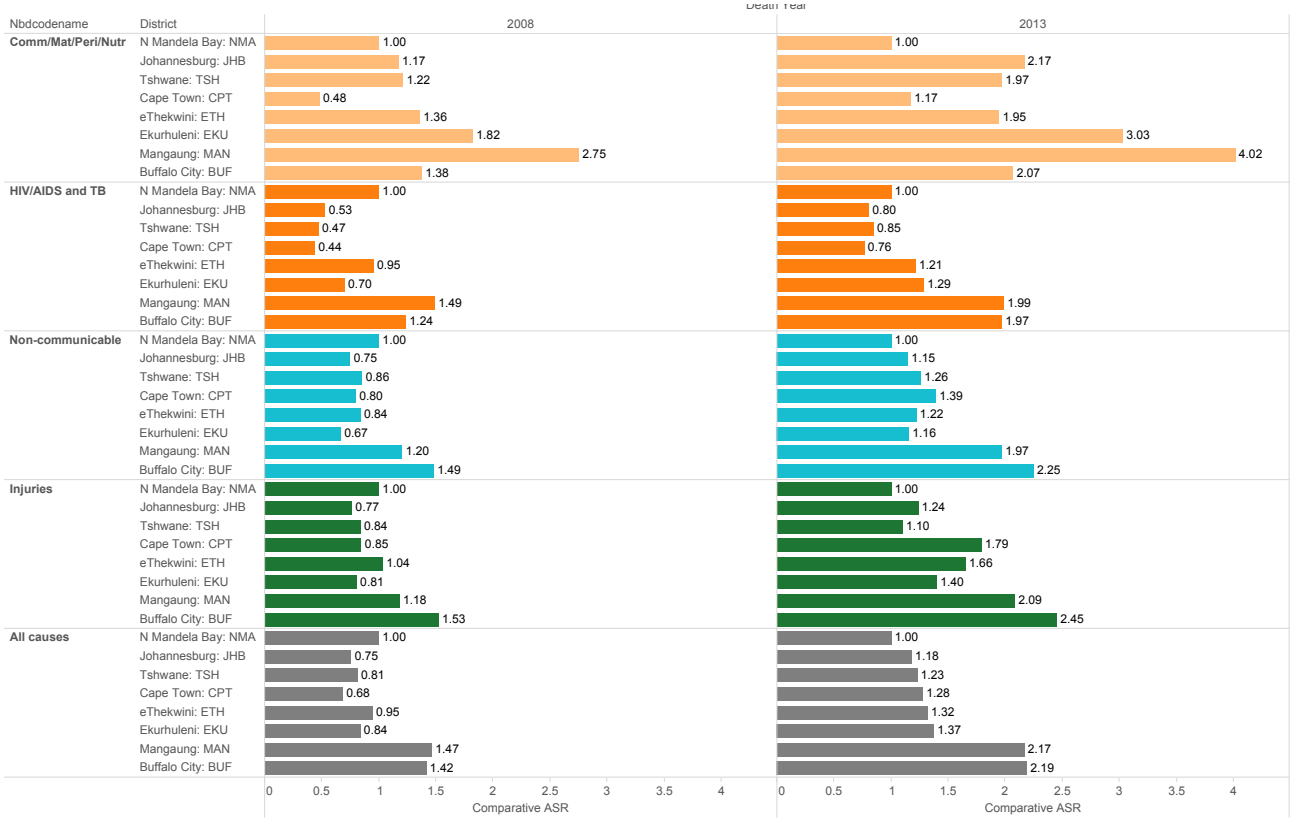
Note: These percentages do not give any indication of the *level* of mortality due to these causes as would be provided by age-standardised mortality rates, but only of the *relative proportion* of all YLLs in each district due to each broad group of causes. Thus the percentage of YLLs for the four broad causes totals 100% for each district.

Metro mortality rates

It is important to note the data challenges and inconsistencies pertaining to the district data as described at the beginning of the Results section when interpreting these results for the metros.

In 2013, comparative mortality ratios for all-cause mortality across the eight metros (with N Mandela Bay metro (EC) as the base) showed that N Mandela Bay had the lowest all-cause mortality, and Buffalo City (EC) the highest, with 2.19 times the mortality experienced in N Mandela Bay after standardising for age (Figure 13). This difference is unlikely to be due to a real difference in mortality but rather due to incomplete data; it is shown here to highlight vital registration data quality issues. Mortality due to Comm/Mat/Peri/Nutr showed the greatest variation between metros in 2012. Mortality from Comm/Mat/Peri/Nutr was lowest in N Mandela Bay and more than fourfold higher in Mangaung (FS) (4.02), more than threefold higher in Ekurhuleni (GP) (3.03), and roughly double in Buffalo City (EC) (2.07), eThekwini (KZN) (1.95), Johannesburg (GP) (2.17) and Tshwane (GP) (1.97). Mortality due to HIV and TB, NCDs and injuries showed less variation in the metros, with Buffalo City (EC) and Mangaung (FS) having the highest mortality (more than double that of N Mandela Bay) for these cause groups.

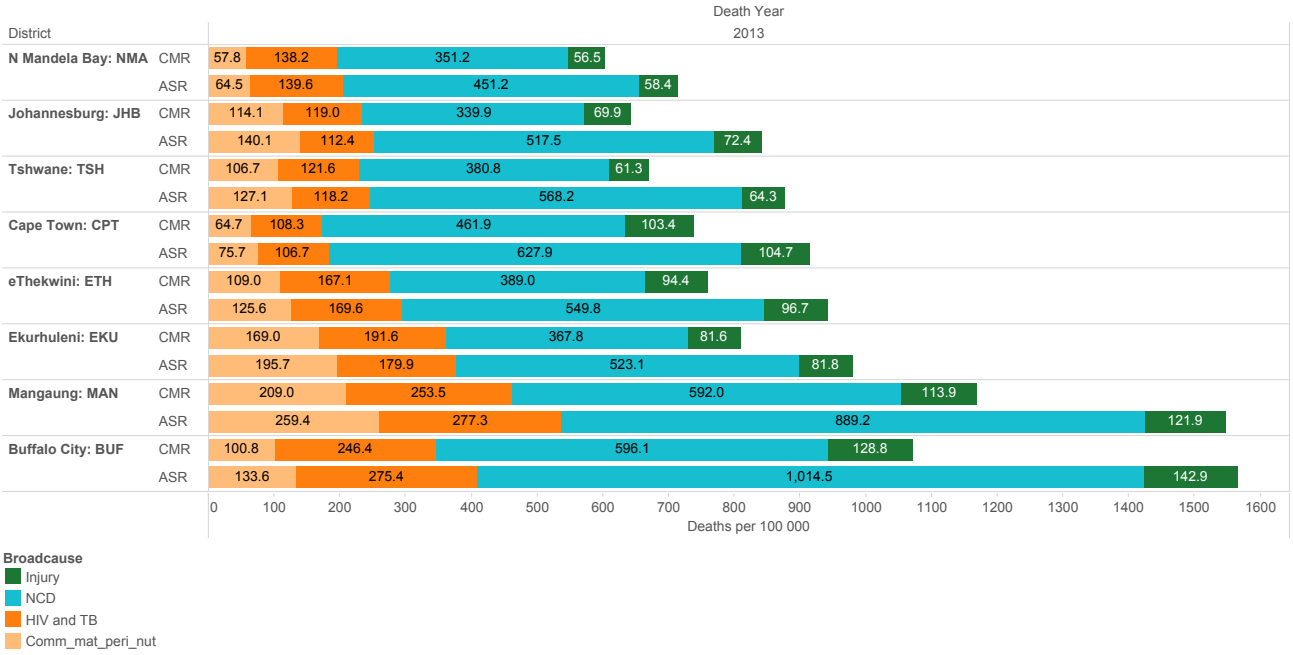
Figure 13: Comparative age-standardised mortality ratios by metro, 2008 and 2013 (interpret with caution)



The Comparative ASR uses the lowest all cause age-standardised mortality rate for the latest year as the comparator (in this case N Mandela Bay in 2013).

Figure 14 shows the cause of death profile in the metros based on the crude and age-standardised mortality rates.[ad] Cape Town (WC) had the highest proportion of injury and NCD YLLs across all metros (Figure 12), yet the age-standardised mortality ratios for injuries and NCDs were not the highest among the metros (Figure 13). In contrast, Mangaung (FS) had the highest proportions of YLLs due to Comm/Mat/Peri/Nutr and HIV and TB (Figure 12) and the highest age-standardised death rates for these cause groups (Figure 14). Gender differentials were greatest for injury death rates, with male-to-female rate ratios ranging from 2.6 in Tshwane and Ekurhuleni (both GP) to 4.9 in Cape Town (WC) (Figure 15).

Figure 14: Crude and age-standardised mortality rates by metro, 2013 (interpret with caution)



ad Crude mortality represents the actual mortality burden experienced, while the age-standardised mortality rate is a weighted average of the age-specific mortality rates per 100 000 persons, where the weights are the proportions of persons in the corresponding age groups of the WHO standard population. YLLs represent the premature mortality (mortality occurring at younger ages, which should be targeted for prevention).

Figure 15: Age-standardised mortality rates by gender, by metro, 2013 (interpret with caution)

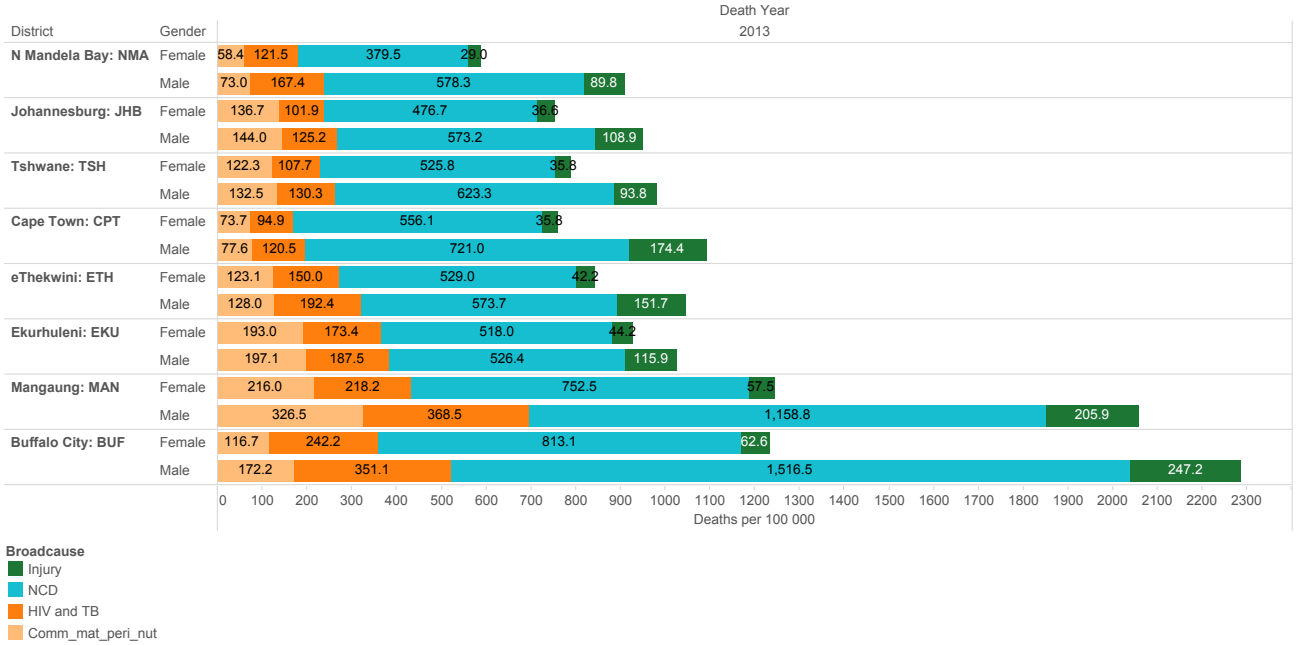
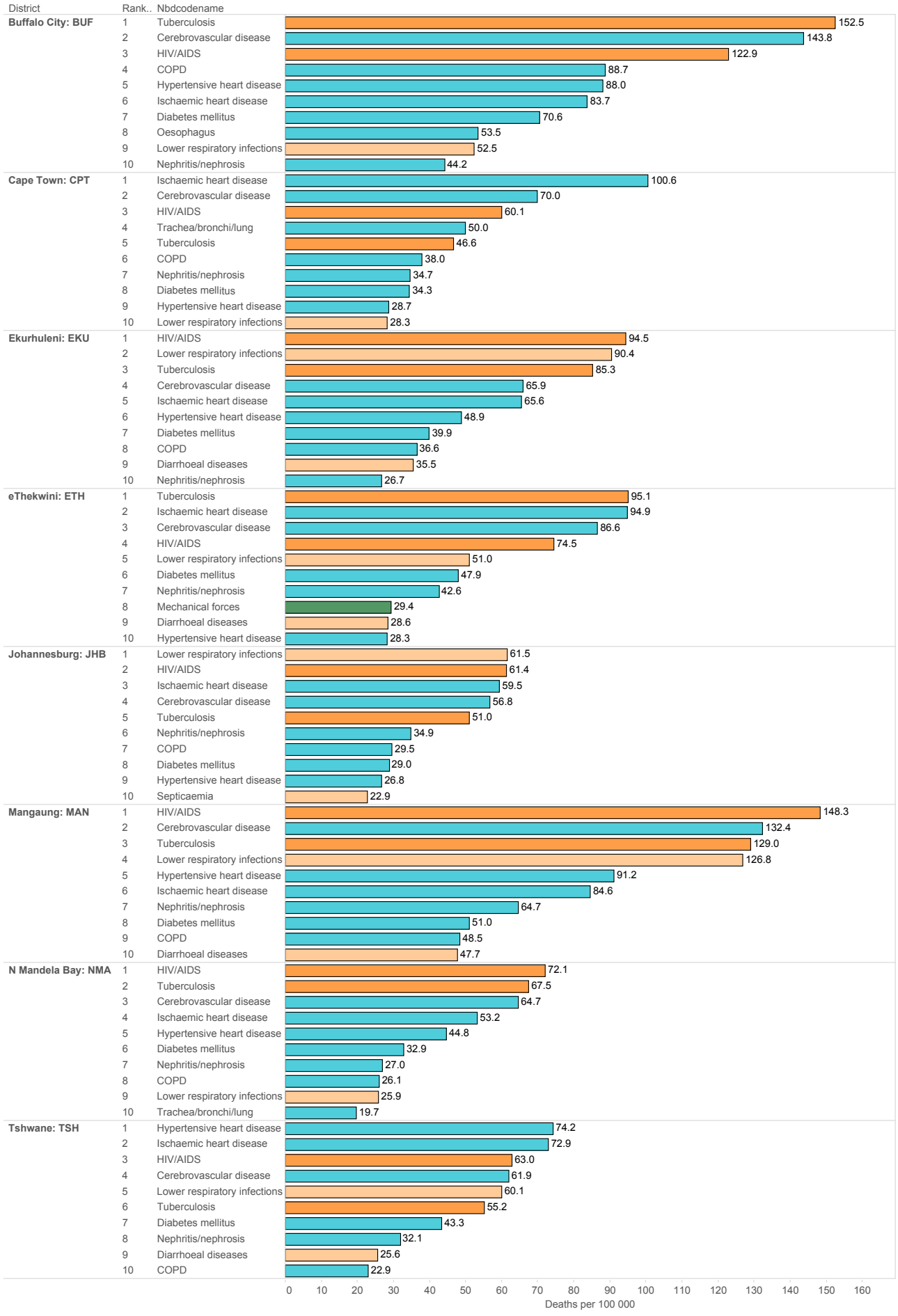


Figure 16 shows the 10 causes with the highest age-standardised mortality rates for each metro. High rates of mortality from TB, lower respiratory infection and HIV featured in all metros, with extremely high TB mortality rates in Buffalo City (EC) (152.5 per 100 000) and Mangaung (FS) (148.3 per 100 000). Mangaung had the highest mortality rates for lower respiratory infection (126.8 per 100 000) and HIV (148.3 per 100 000). Cardiovascular diseases and diabetes featured in all metros, with mortality rates for ischaemic heart disease higher than for cerebrovascular disease in Cape Town (WC), Ekurhuleni (GP), eThekwini (KZN), Johannesburg and Tshwane (both GP), and cerebrovascular disease higher than ischaemic heart disease in Buffalo City (EC), Mangaung (FS) and N Mandela Bay (EC), suggesting that urban populations are at different stages of the health transition. Chronic obstructive pulmonary disease and oesophageal cancer mortality rates were very high in Buffalo City and lung cancer mortality rates featured in Cape Town.

Mortality rates for Buffalo City (EC) and Mangaung (FS) were very high, with mortality rates for TB, lower respiratory infection, and HIV and AIDS much higher than in any of the other metros, suggesting that HIV and AIDS-related deaths are a major cause of the high mortality. However, death rates from cerebrovascular causes were also higher here than in other metros, suggesting that health services are suboptimal in these metros, or that these metros are heavily burdened as referral centres for severely ill patients from their surrounding areas.

Figure 16: Leading age-standardised mortality rates by metro, 2013



Conclusion

Mortality rates in South Africa declined between 2008 and 2014, mainly due to a decline in HIV-related mortality. Despite this, HIV and AIDS and associated conditions still stand out as being a leading cause of YLLS together with cerebrovascular diseases, ischaemic heart disease, diabetes mellitus, road injuries, interpersonal violence and hypertensive heart disease.

A reduction in the percentage of deaths coded to ill-defined causes was noted in the Western Cape. This suggests that the Western Cape local mortality surveillance system, which included a provincial training initiative in medical certification of cause of death as well as increased utilisation of mortality information for health policy making, may have had a positive impact on the quality of medical certification. However, until the completeness of death registration is consistently high across all districts and the quality of medical certification has improved, the district-level mortality profiles need to be interpreted cautiously. In particular, the lack of reliability of the injury profile and the misclassification of HIV and AIDS need to be taken into consideration. Efforts to utilise mortality profile information at district level need to be accompanied by initiatives to improve medical certification of the cause of death as well as the geographical coding of place of residence and place of death. Urgent initiatives, such as including a field to capture the manner of death on the death notification form, are required to improve the quality of injury mortality information in the national statistics as these are currently misleading.