14 Burden of disease

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This is the sixth attempt to assess and compare the cause of death profiles for each of the 52 health districts in South Africa. Currently, Statistics South Africa (StatsSA) compiles cause of death statistics based on death notifications, but reports only limited information at district level. Furthermore, data quality issues 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.[a] In addition, data completeness at the time of analysis has become an issue since 2013, particularly for KwaZulu-Natal (KZN) and has been noticed to be erratic in the Eastern Cape (EC).

Nonetheless, 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. Despite the data quality concerns it is essential to start making use of the available data at the same time as initiating improvement strategies. Calls have been made to improve medical certification[b,c] and problems with the external cause of injury details have been identified.[d]

By assuming that the metropolitan districts 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.

Methodology

Data source

Unit records for the 1997–2015 mortality data, aligned to the 2011 boundaries, were provided by StatsSA.[e,f,g,h,i,j,k,l] These included age, sex, district of death and underlying cause of death coded to the International Statistical Classification of Diseases (ICD-10).[m] 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,[n] which is a condensed list of conditions containing the most prevalent diseases across South Africa, including those of public health importance. The NBD list has recently been updated,[o] and differs slightly from the list used for the first district mortality profiles prepared for the 2010/11 *District Health Barometer*.[p] Vital statistics data are updated annually with late registrations. For these reasons, the data were re-analysed using the updated dataset as released in August 2017. Stillbirths were excluded from the data prior to analysis.

a 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].

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

c Burger EH, Groenewald P, Rossouw A, Bradshaw D. 2015. Medical certification of death in South Africa – moving forward. S Afr Med J, 105(1): 27–30.

d Prinsloo M, Bradshaw D, Joubert J, Matzopoulos R, Groenewald P. 2017. South Africa's vital statistics are currently not suitable for monitoring progress towards injury and violence Sustainable Development Goals. S Afr Med J, May 24,107(6):470–471.

e 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].

f 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].

g 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].

h 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].

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

j 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].

k 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].

l Statistics South Africa. Mortality and causes of death in South Africa, 2015: findings from death notification. Statistical Release P0309.3. Pretoria. StatsSA, 2016. Available from: http://www.statssa.gov.za/publications/P03093/P030932015.pdf [Accessed 22 August 2017].

m 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].

n 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].

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

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

Aggregation of causes of death

The NBD list of causes was aggregated into three broad cause groups, namely communicable diseases together with perinatal, maternal and nutritional conditions (Comm/Mat/Peri/Nutr); non-communicable diseases (NCDs); 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.

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 and sex proportionally by known age and sex across each of the known causes of death and districts. Causes of death used as pseudonyms for AIDS, 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)[q] 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,[r] 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.

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.[s]

Completeness of death registration for 2010,[d] 2011,[e] 2012,[f] 2013,[g] and 2014,[h] was reported to be 94% and 96% for 2015. 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 metropolitan districts 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. Metropolitan districts death rates were age-standardised to eliminate differences in observed mortality

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

r 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].

s 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).

rates caused by differences in the age structure of the population in different areas.[t] 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 9 808 624 deaths was reported for 1997–2015, of which 255 956 stillbirths were excluded from further analysis (Table 2). There was an increase in the total number of deaths from 1997 until 2008, with a decline in the total number of deaths until 2015 as well as a decline in mortality rates.[u]

Between 2008 and 2012, large fluctuations were noted in the total number of deaths in various districts, as reported previously.[v] Among the metropolitan districts, there have been worrying declines in the number of deaths between 2010 and 2011 in Nelson Mandela Bay and Buffalo City (both EC), after 2010 in eThekwini (KZN) and between 2014 and 2015 in Tshwane (Gauteng (GP)) (Figure 1). In Buffalo City (EC) the number of deaths increased again in 2014 and remained at a similar level in 2015. In Nelson Mandela Bay (EC), the deaths appeared to be back at expected levels for early 2014 but fell off dramatically after July 2014 and then picked up again through 2015. An increase in deaths in Cape Town (Western Cape (WC)) was noted in the winter of 2015. In addition, between 2010 and 2011 an increase in deaths was noted in OR Tambo (EC) with a corresponding decrease in Alfred Nzo (EC), and similarly in Xhariep (Free State (FS)) and Mangaung (FS), suggesting some boundary issues in allocating these deaths to districts.

While some of these observations may be due to an increase in the number of deaths with 'unknown district' noted since 2006 (reaching a peak of 23 587 in 2011), it appears that there may also be a delay in the transfer of death notification forms to StatsSA in some areas, e.g. in eThekwini (KZN). A drop was noted in 2014 data but was resolved with the data update for 2015. The similar drop in 2015 indicates that the late transfer problem remains. The number of deaths with 'unknown district' was reduced to 2 280 in 2015. Mortality rates for the metropolitan districts have been reported for 2015, however, these need to be interpreted with caution since incomplete reporting affects absolute mortality rates. The relative mortality measures, such as the percentage of YLLs by cause, have been reported up to 2015 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.

Table 2: Number of registered deaths and stillbirths nationally, 1997–2015

				Unknown district #*	
Year	Deaths	Stillbirths	Total	N	%
1997	317 860	5 982	323 842	128	0.04
1998	366 585	7 730	374 315	171	0.05
1999	382 624	11 969	394 593	224	0.06
2000	417 191	12 566	429 757	241	0.06
2001	456 238	14 186	470 424	382	0.08
2002	503 335	13 291	516 626	379	0.08
2003	558 388	14 661	573 049	481	0.09
2004	578 355	15 850	594 205	713	0.12
2005	599 593	13 829	613 422	707	0.12
2006	614 158	14 383	628 541	4 674	0.76
2007	606 112	14 356	620 468	4 281	0.71
2008	598 165	14 948	613 113	4 143	0.69
2009	583 419	14 291	597 710	4 512	0.77
2010	551 320	15 135	566 455	6 726	1.22
2011	515 427	14 240	529 667	23 587	4.58
2012	493 493	14 690	508 183	18 623	3.77
2013	475 510	15 051	490 561	10 127	2.13
2014	474 659	15 096	489 755	15 428	3.25
2015	460 236	13 702	473 938	2 280	0.50
Total	9 552 668	255 956	9 808 624	97 807	1.02

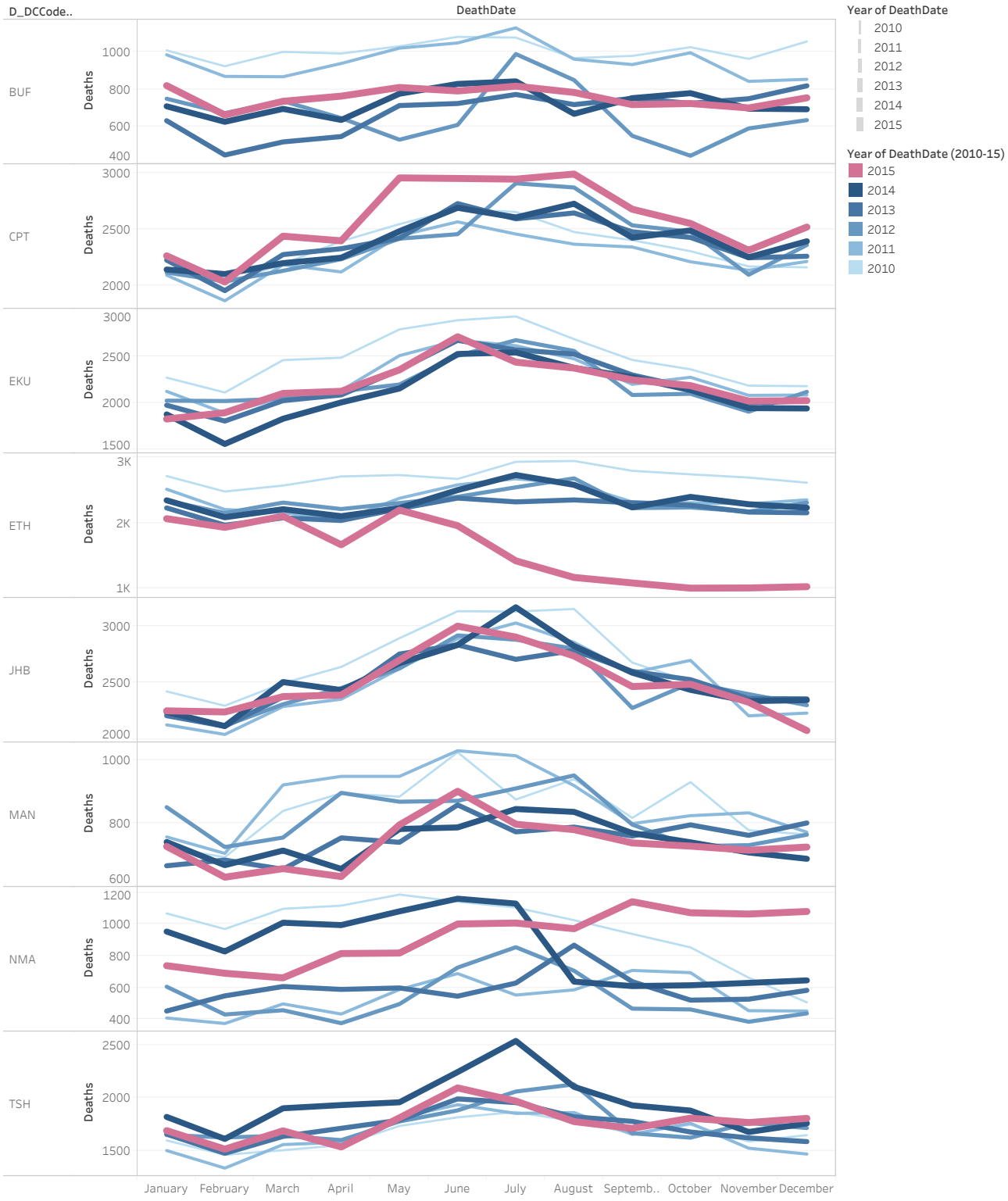
* Refers to percentage of deaths excluding stillbirths. # Outside SA, unspecified or unknown

t 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.

u 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].

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

Figure 1: Monthly trends in deaths for the metropolitan districts, 2010–2015



Data quality

The two main dimensions 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.[w] In South Africa, the total ill-defined and garbage codes has declined from 41% in 1998 to 29% in 2015 (data not shown) with variable changes in the provinces (Figure 2). A

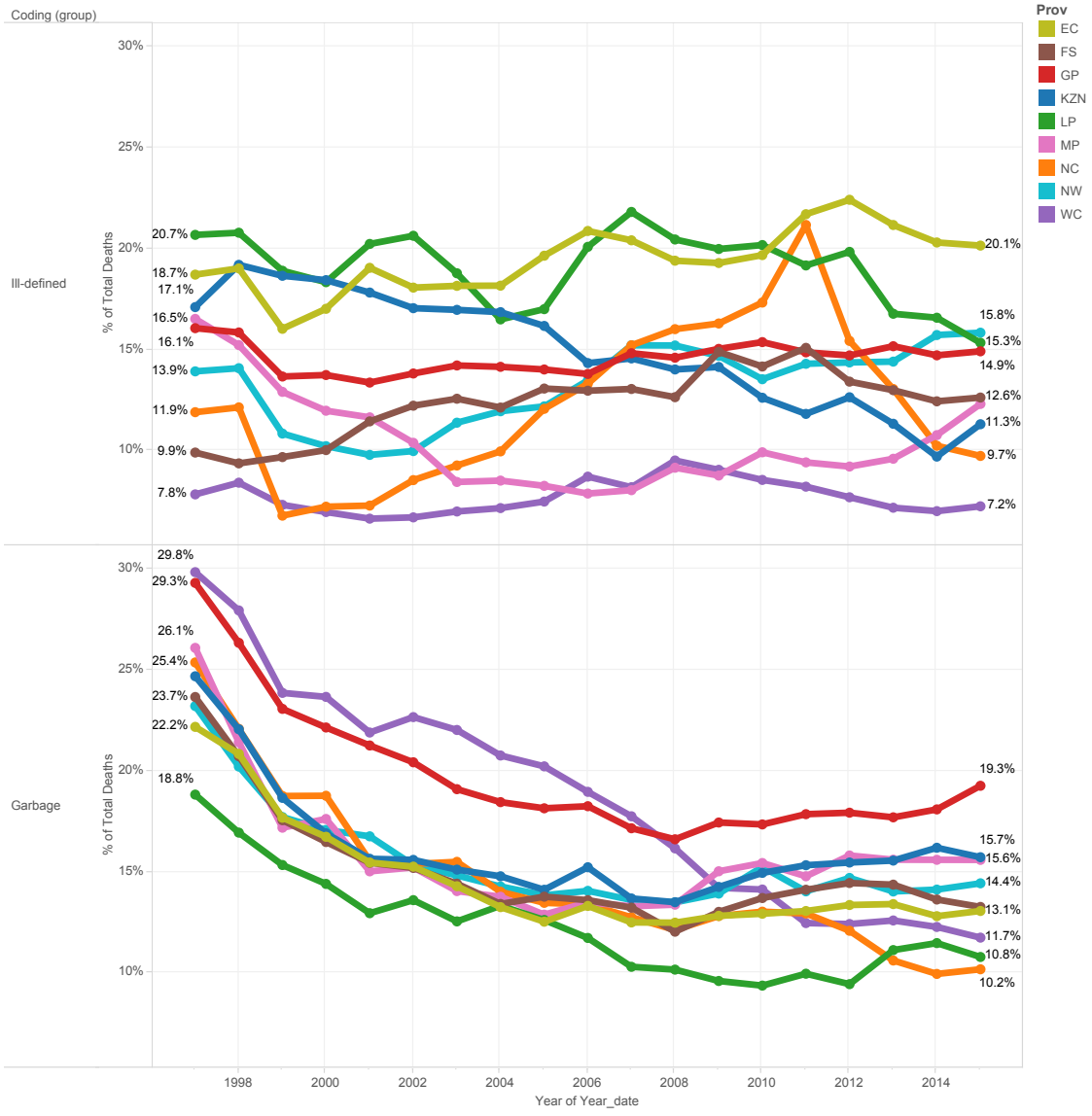
w Mathers CD, Ma Fat D, Inoue M, Rao C, Lopez AD. Counting the dead and what they died from: an assessment of the global status of cause of death data. Bulletin of the World Health Organization. 2004. 83:171–7.

large component of the garbage codes results from inadequate specification of the cause of death, e.g. cancer, without the site specified. Part of the decline in the proportion of garbage codes has resulted from the reduction in injury deaths, many of which are inadequately specified. Western Cape has the lowest proportion of ill-defined deaths and garbage codes at 18.9% which is still substantially higher than the international recommendation. In order to reduce the proportion of ill-defined deaths and garbage codes, it will be imperative to train doctors in death certification, on the one hand, and to consider implementing alternative methods of establishing the underlying cause of death in rural areas such as the use of verbal autopsy, on the other. Revision of the death notification form to include the manner of death for external causes (i.e. whether a homicide, suicide or accident) will also reduce the garbage codes.

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 2015, ill-defined causes were reported for 13.8% of deaths in South Africa, and ranged from 4.3% (Eden (WC) and Central Karoo (WC)) to 54.1% (Alfred Nzo (EC)) across districts (Figure 3 and Map 1). As might be expected, the percentage of ill-defined deaths was lowest in the districts within the highest socio-economic quintiles (SEQs 3–5)[x] and highest in the most-deprived districts.

In 2015, garbage codes were reported for 14.7% of deaths in South Africa and ranged from 6.4% in JT Gaetsewe (Northern Cape (NC)) to 20.8% in Sedibeng (GP) (Figure 4). In Alfred 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.[y]

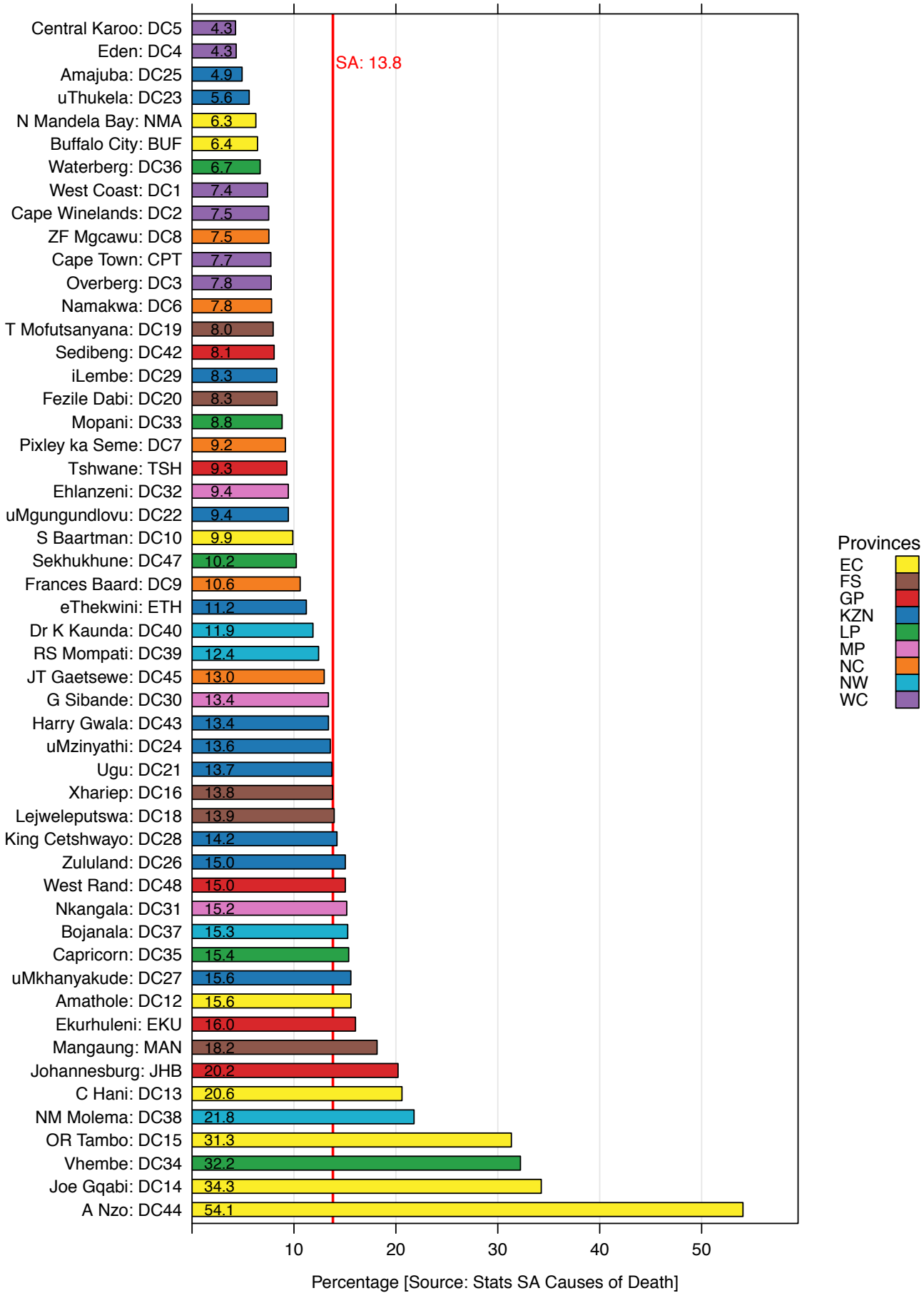
Figure 2: Trend in deaths coded to ill-defined causes and garbage codes by province, 1997–2015



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

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

Figure 3: Percentage of deaths ill-defined by district, 2015



Map 1: Percentage of deaths ill-defined by district, 2015

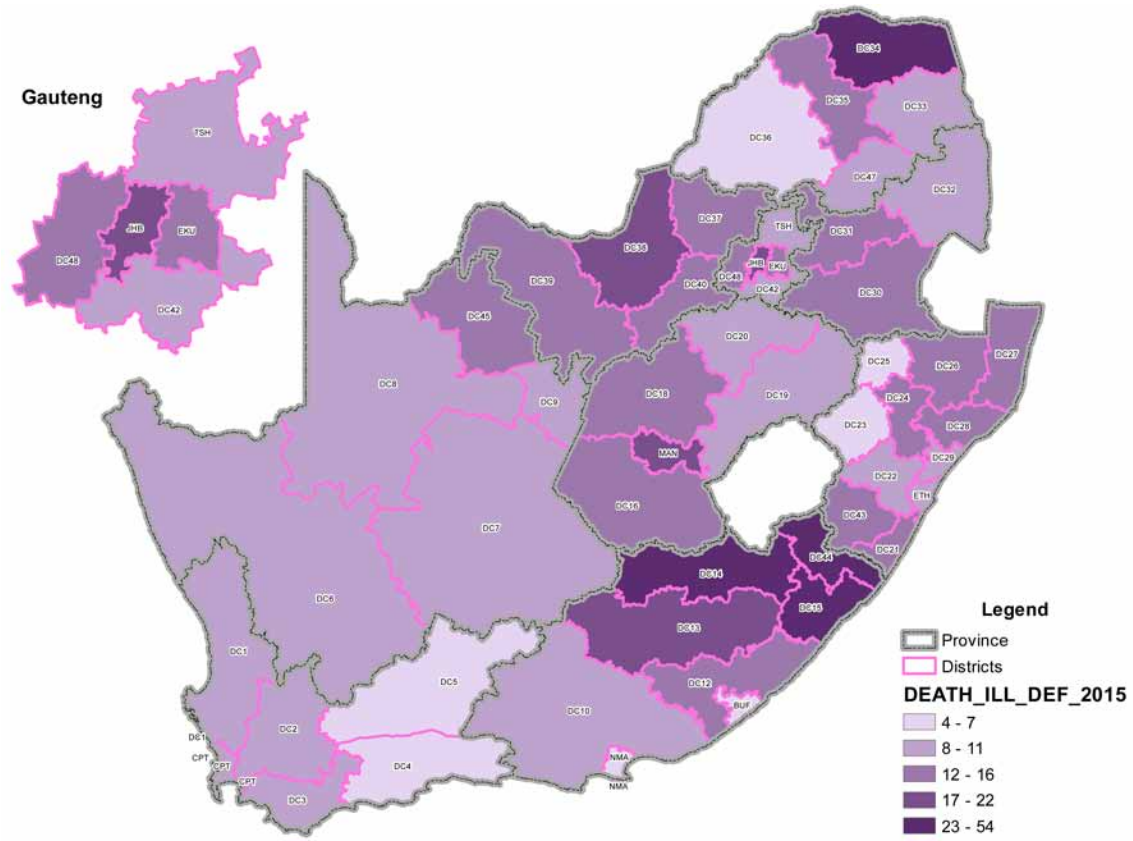
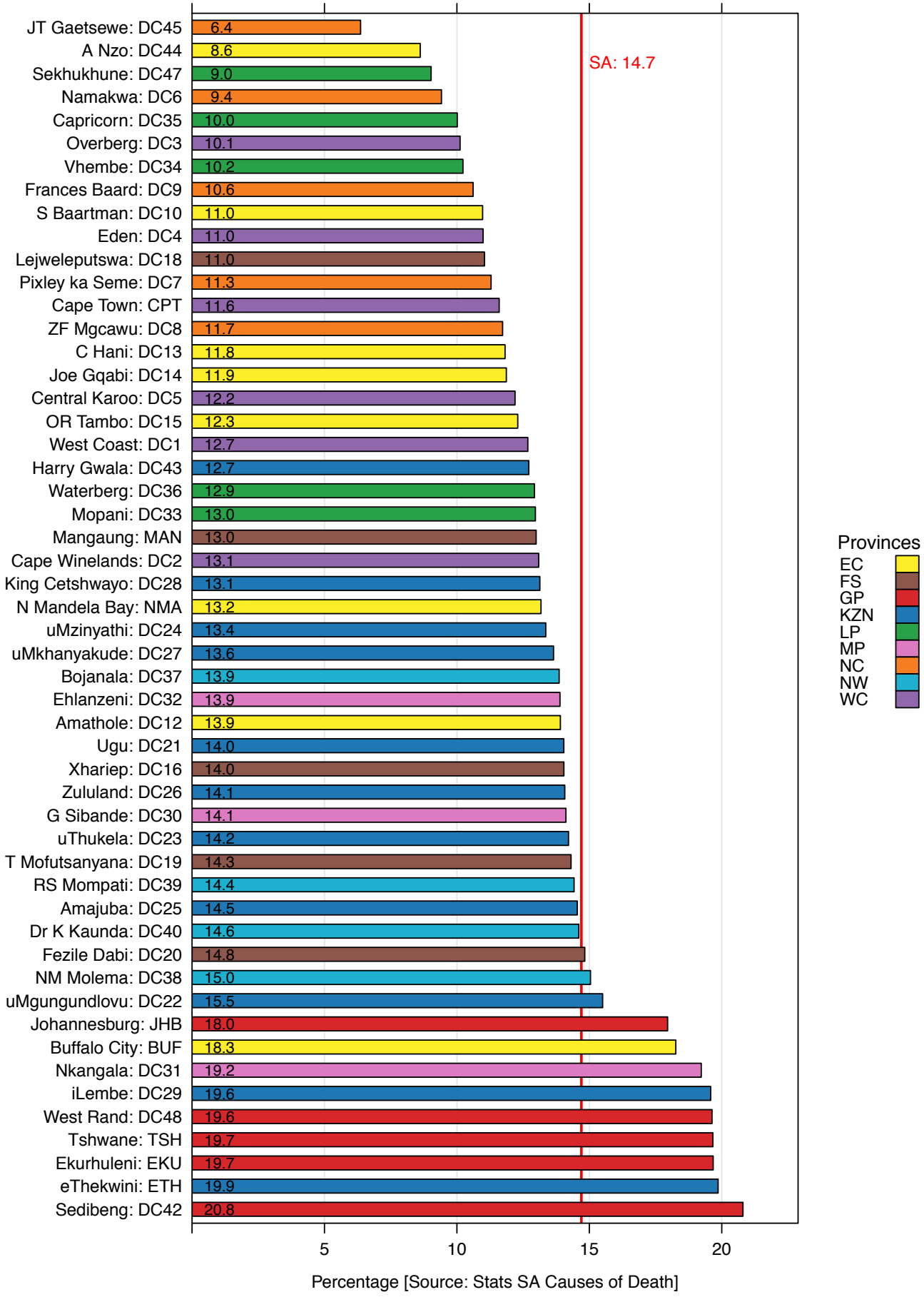


Figure 4: Percentage of deaths with garbage codes by district, 2015

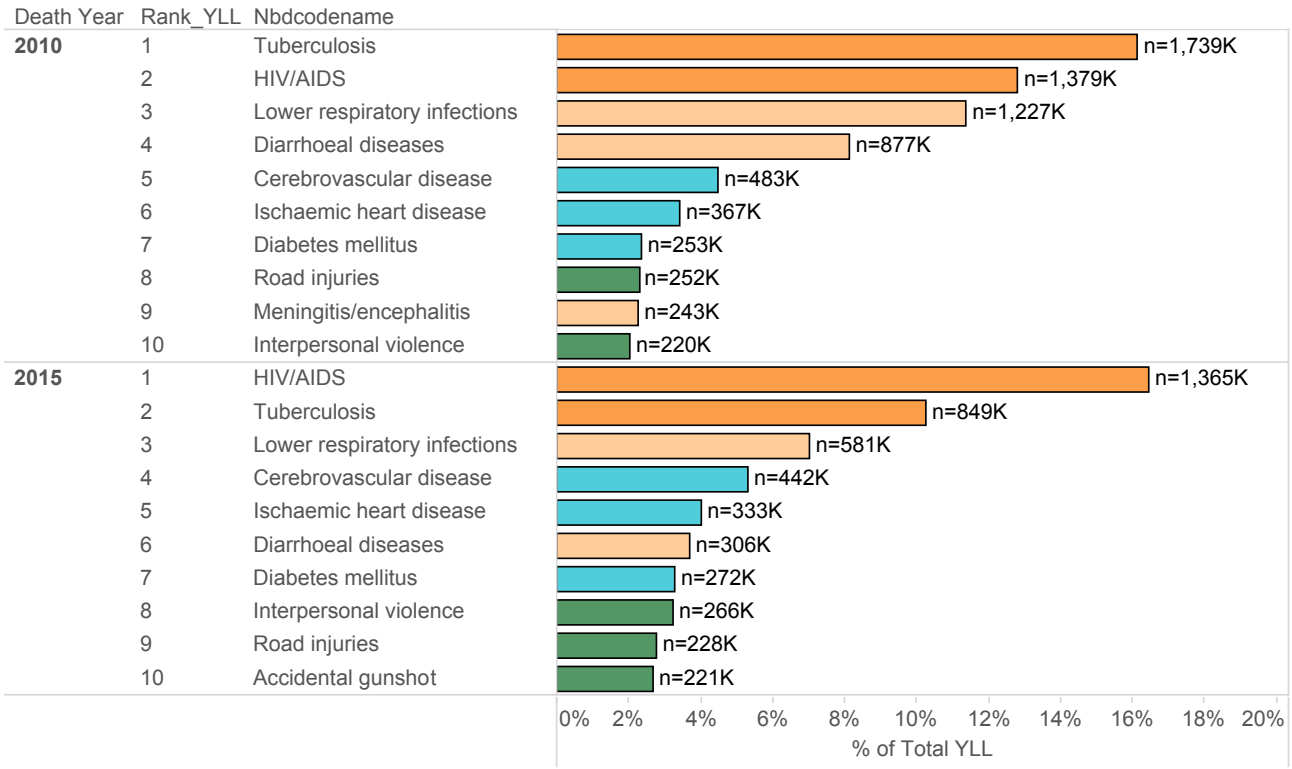


Leading causes of premature mortality

The results presented here differ from the results presented in the StatsSA 2010–2015 cause of death reports[g-l] 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 a large proportion of HIV deaths has been misattributed to immediate causes of death such as TB, diarrhoeal diseases and lower respiratory infections,[z,aa] and that since many injury-related deaths are misclassified to ill-defined intent,[ab] the ranking of injury causes may be unreliable.

In 2000, 2005, 2010 and 2015, the three leading single causes of YLLs in South Africa were HIV-related conditions, TB and pneumonia, with diarrhoea ranking fourth in 2000 and sixth in 2015, 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 ten leading causes of YLLs across South Africa are cerebrovascular diseases, ischaemic heart disease, diabetes mellitus, interpersonal violence and road injuries. Accidental gunshot also appears in the top ten but probably reflects homicide cases that have been miscoded.[ac] With some minor differences, the following conditions are among the top causes of premature mortality across most districts in South Africa: pre-term birth complications (North West); chronic obstructive pulmonary disease (COPD) (Western Cape and Northern Cape); lung cancer (Western Cape); meningitis and encephalitis (Limpopo); and nephritis/nephrosis or renal failure (Gauteng, KwaZulu-Natal and Limpopo) (Figures 5, 6 and 7).

Figure 5: Leading causes of years of life lost (YLLs) for South Africa, 2010 and 2015



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

z Groenewald P, Nannan N, Bourne D, Laubscher R, Bradshaw D. 2005. Identifying deaths from AIDS in South Africa. AIDS. 19:193–201.

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

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

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

Figure 6: Ten leading causes of years of life lost (YLLs) by province, 2015

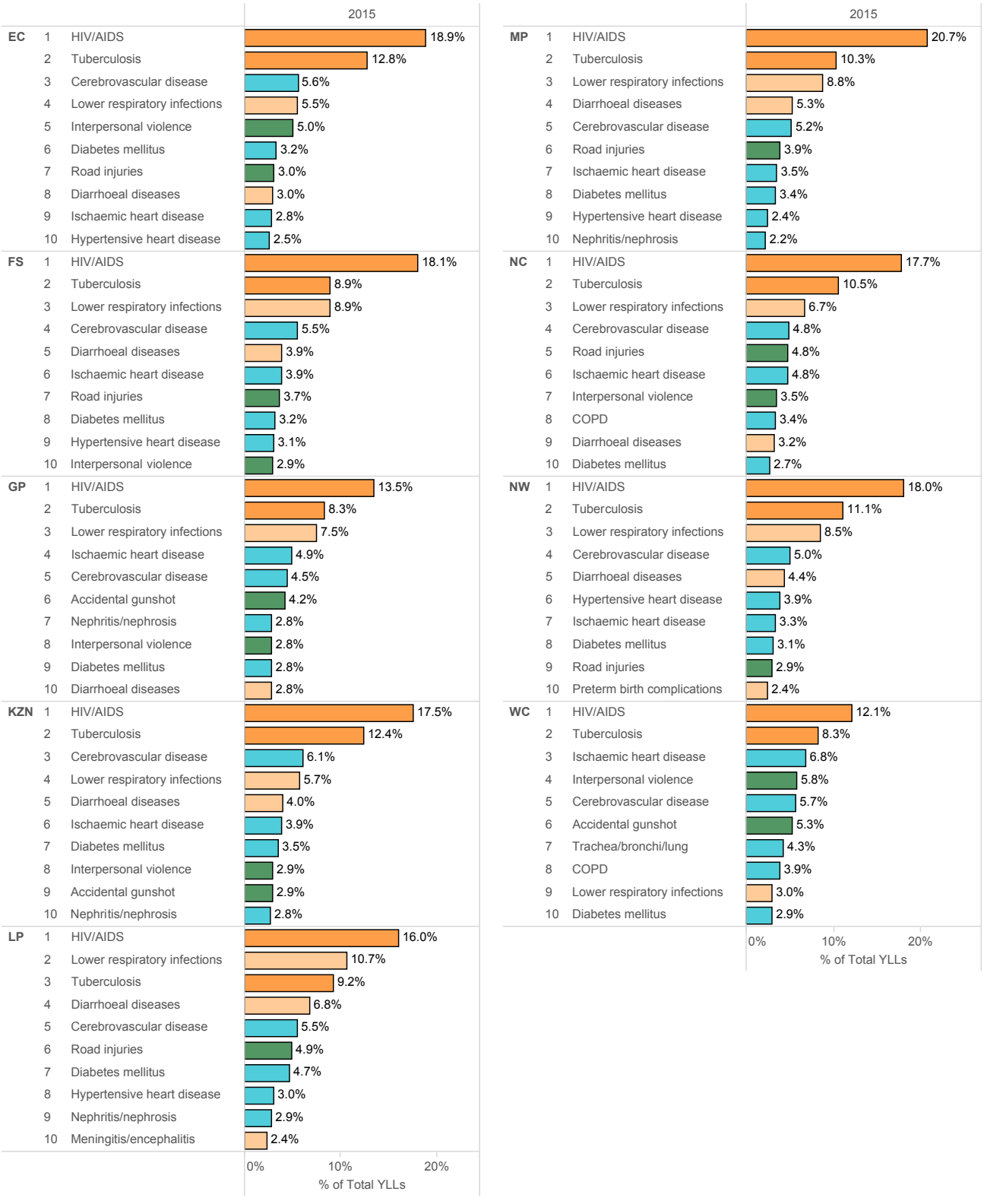


Figure 7: Ranking of 20 leading causes of years of life lost (YLLs) by district, 2015

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	Sepsis/other newborn infectious	Peptic ulcer	Prostate	Malaria
EC	A Nzo: DC44	1	2	3	5	4	13	7	8		10	6	11	9	19		16	18	14	15	12				
	Amathole: DC12	1	2	3	4	6	14	11	7	18	10	5	17	9		12	19			8	13				
	Buffalo City: BUF	1	2	5	4	19	6	8	16	18	12	3	11	9		7				10	20				
	C Hani: DC13	1	2	3	4	9	13	6	11	20	7	5	14	8		12				10	15				
	Joe Gqabi: DC14	1	2	3	4	6	9	7	11		10	5	14	8		12	18				17				
	N Mandela Bay: NMA	1	2	7	3		4	5	10	6	14	9	8	17	16	13			20	12	15				
	OR Tambo: DC15	1	2	4	6	7	16	8	5	12	9	3	13	11			15		19	18	14				
	S Baartman: DC10	1	2	4	3	15	5	9	8		11	6	12	10		7				16	14				
FS	Fezile Dabi: DC20	1	2	3	4	7	6	8	5		9	14	10	12	11	15			13		17				
	Lejweleputswa: DC18	1	3	2	5	4	7	9	6	13	10	8	11	15	19	17			14		16				
	Mangaung: MAN	1	2	4	3	9	7	8	10	13	12	6	5	11	18	15		16	14						
	T Mofutsanyana: DC19	1	2	3	4	5	7	9	8		6	10	12	11	13	16	20		17		15				
	Xhariep: DC16	1	3	2	4	9	5	11	7	14	8	6	13	12		10		19	15		16				
GP	Ekurhuleni: EKU	1	2	3	6	10	5	9		4	15	7	12	11	8	13	14	16	19						
	Johannesburg: JHB	1	2	3	6	12	5	11		4		8	7	9	13	14	19	10	18						
	Sedibeng: DC42	2	3	1	4	8	5	10		7	12	6	11	9	13	16	14	15	19	20		18			
	Tshwane: TSH	1	2	3	5	9	4	6	11	10	7		8	12	16	15		13	17						
	West Rand: DC48	1	3	2	5	9	4	10	16	7	12	6	11	8	17	13	18	14	15						
KZN	Amajuba: DC25	1	2	3	4	6	11	7	5	16	8	12	9	13	10		18	20	14		19				
	Harry Gwala: DC43	1	2	3	4	5	10	6	7		9	12	8	20	13		14		19	15	16				
	King Cetshwayo: DC28	1	2	4	3	6	13	5	7	8	16	9	10	12	11			15	20						
	Ugu: DC21	1	2	4	3	7	10	6	8	11	12	5	13	9	17	16		18		15	14				
	Zululand: DC26	1	2	3	5	4	12	6	9	11	10	8	14	7	13		16	20	18		17				
	eThekwini: ETH	1	2	5	4	11	3	9	12	6	14	8	7	10	13		16	17	18	19					
	iLembe: DC29	2	1	5	3	4	6	9	11	8	15	13	10	7	14		12	17		20	18				
	uMgungundlovu: DC22	1	2	5	3	8	4	6	13	10	11	7	9	12	19		16	17	18						
	uMkhanyakude: DC27	1	2	5	3	4	10	8	6	9	13	11	12	7	16						18				
	uMzinyathi: DC24	1	2	3	4	5	10	8	7	6	12	11	13	15	9		20	14	17						
	uThukela: DC23	1	2	3	5	4	7	8	6	9	11	13	14	10	15		12	17	20		16				
LP	Capricorn: DC35	1	3	2	8	4	11	6	5		7	17	9	10	12	18	13	16	19						
	Mopani: DC33	1	3	2	6	4	13	7	9		11	16	8	12	10		5	18			20				
	Sekhukhune: DC47	1	3	2	5	4	13	7	6	17	8		10	12		15	14	9		20	18				
	Vhembe: DC34	1	2	3	6	4	13	5	7		11	16	8	10	14		19	12	18						20
	Waterberg: DC36	1	2	3	6	4	7	8	5		9	14	10	11	12		13		18						
MP	Ehlanzeni: DC32	1	2	3	5	4	7	8	6	11	14	17	9	12	15		10	16	18						
	G Sibande: DC30	1	2	3	5	4	12	8	6	14	10	7	13	9	11	16			15	20					
	Nkangala: DC31	1	3	2	4	5	6	7	9	13	8		10	12	16	14	20		17				19		
NC	Frances Baard: DC9	1	2	4	5	7	6	10	3		11	8	15	12	14	9		17	18						
	JT Gaetsewe: DC45	1	3	2	9	4	7	8	5		6	10			11	18	20	17	19		14	16			
	Namakwa: DC6	3	2	12	6	17	1	9	5		11	8	14	10	13	4				16	19				
	Pixley ka Seme: DC7	1	2	4	3	13	5	9	7		10	8	12	16	14	6			17		20				
	ZF Mgcawu: DC8	1	2	3	7	10	6	9	4		11	5	18		17	8				19	14				
NW	Bojanala: DC37	1	2	3	5	4	9	7	8	11	6	14	12	10	15	17	20	13	16						
	Dr K Kaunda: DC40	1	2	3	4	8	7	9	17	15	11	5	6	10	12	13		19	20						
	NM Molema: DC38	1	2	3	4	5	8	9	7		6	14	11		10	20		17	13	15	18				
	RS Mompati: DC39	1	2	3	5	6	4	10	18		8	9	15	11	7	19	16		12		17				
WC	Cape Town: CPT	1	3	10	6	18	4	9	16	2	17	5	11	12	14	8		20							
	Cape Winelands: DC2	1	2	11	4	17	3	9	16	13	19	5	10	8	18	6									
	Central Karoo: DC5	1	2	8	6	18	7	10	3		13	5	11	12	16	4				20	15				
	Eden: DC4	1	2	8	4		3	10	9		15	7	11	12	13	6			18		20				
	Overberg: DC3	3	1	9	5		2	11	7	18	14	6	13	10	17	8									
	West Coast: DC1	2	1	8	3		4	9		12	14	5	13	11	19	6					18			20	

Broad cause

- Comm_mat_peri_nut
- HIV and TB
- Injury
- NCD

Trends in leading causes of premature mortality

Between 2010 and 2015 HIV moved from second to first place in the ranking for premature mortality in South Africa, displacing TB; 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. Ischaemic heart disease displaced diarrhoea in 2015 and moved up into 5th place. Diabetes mellitus remained in 7th place between 2010 and 2015. Interpersonal violence moved from 7th place to 8th place in 2015 displacing road injuries. Accidental gunshot remained in 10th place.

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 2015 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.[ad]

Figure 8: Trends in 10 leading causes of years of life lost (YLLs), South Africa, 2010–2015

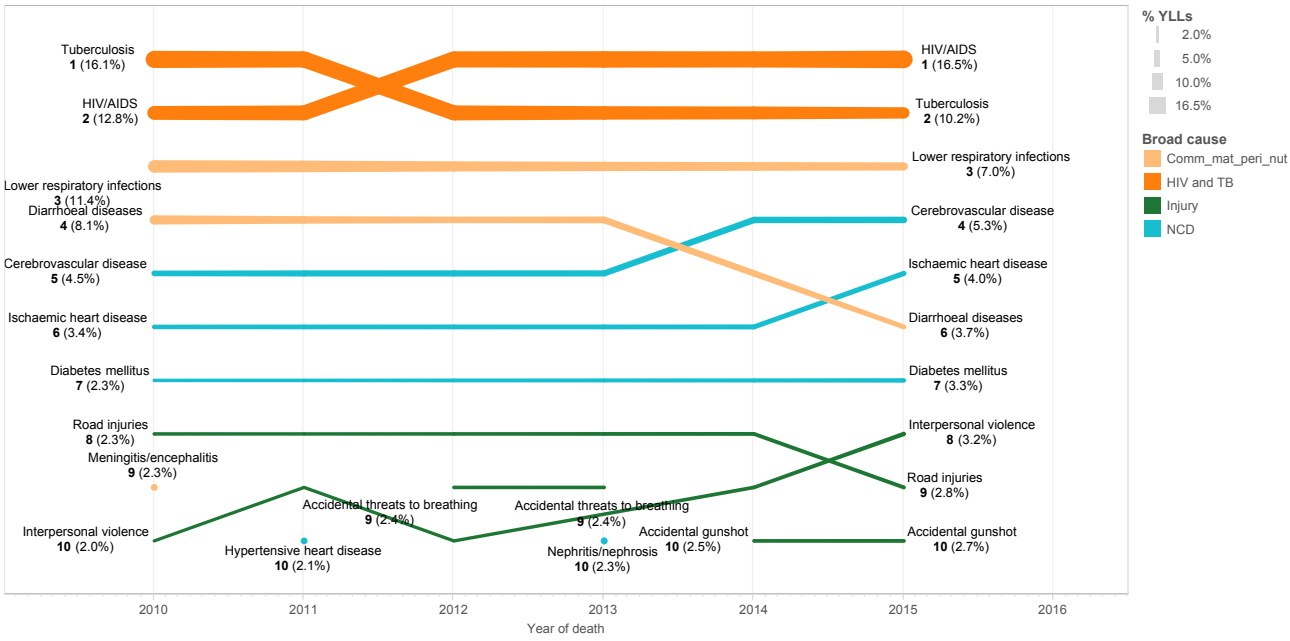
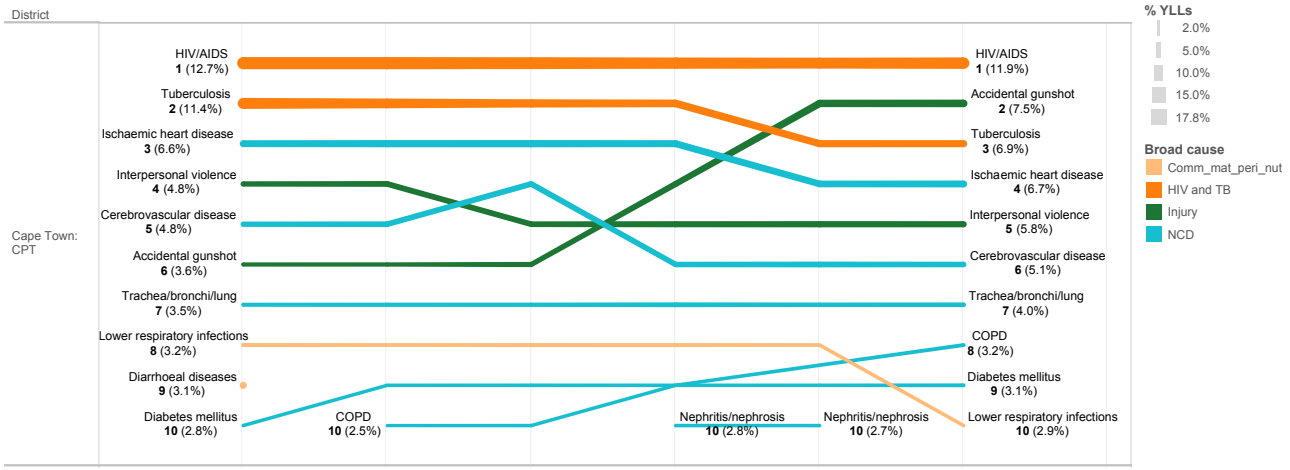


Figure 9: Trends in 10 leading causes of years of life lost (YLLs), Cape Town (WC), 2010–2015

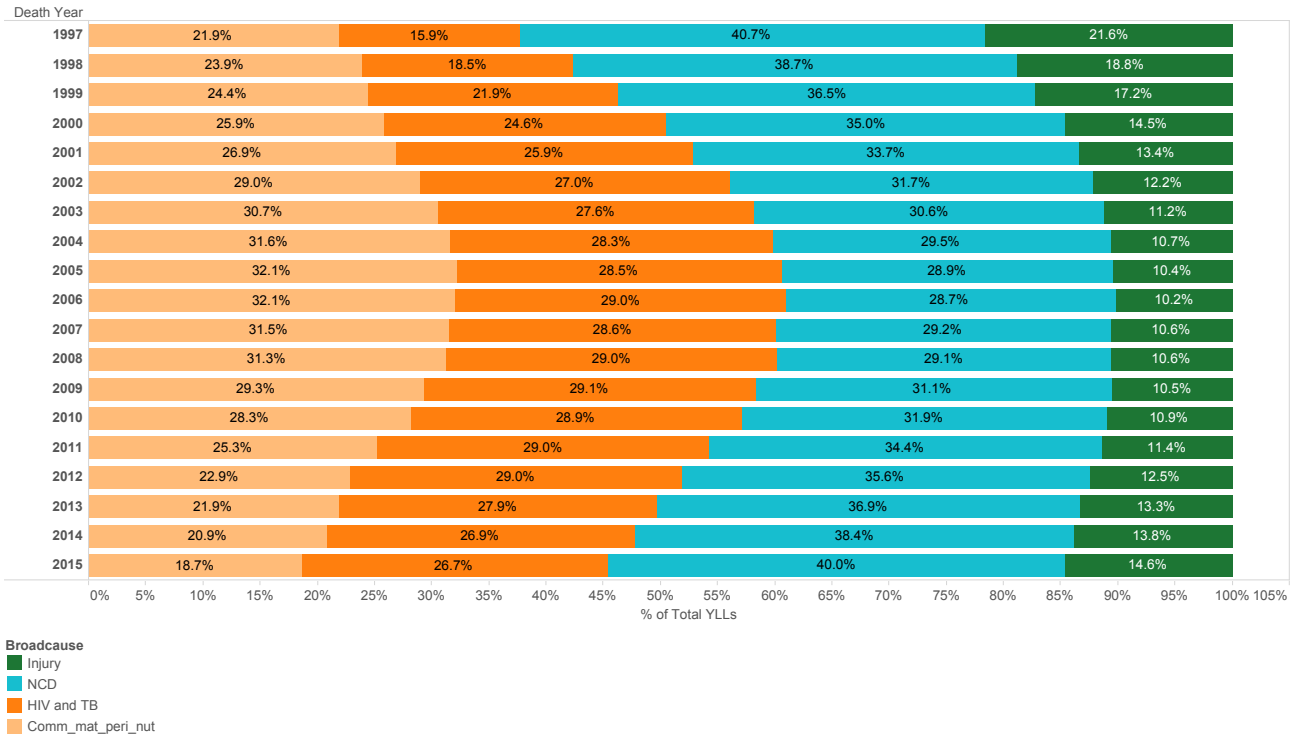


ad Republic of South Africa National Assembly. Question no. 3408, Internal Question Paper no. 37, 4 September 2015.

Cause of death profile

South Africa faces a quadruple burden, namely Comm/Mat/Peri/Nutr; HIV and TB; NCDs; and injuries. The impact of the HIV epidemic is clearly demonstrated in Figure 10 with the percentage of the burden due to HIV and TB and Comm/Mat/Peri/Nutr increasing from 37.8% in 1997 to a peak of 62.1% in 2006, and declining steadily thereafter to 45.4% in 2015. The decline in HIV and TB and Comm/Mat/Peri/Nutr was associated with a corresponding increase in the burden due to NCDs (from 29% to 40%) and to a lesser extent injuries (from 11% to 14.6%) (Figure 10).

Figure 10: Percentage of years of life lost (YLLs) by broad cause, South Africa, 1997–2015



In 2015, the quadruple burden varied across provinces, with the Western Cape having a higher proportion due to injury (18.6%) and NCDs (51.7%) than any other province (Figure 11). Limpopo (53.5%), Mpumalanga (52.7%) and North West (51.9%) had the highest proportions due to HIV and TB and Comm/Mat/Peri/Nutri. Among the districts, uMkhanyakude (KZN) had the highest burden due to HIV and TB (39.3%), while Namakwa (NC) had the lowest (16.2%) (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, 2015

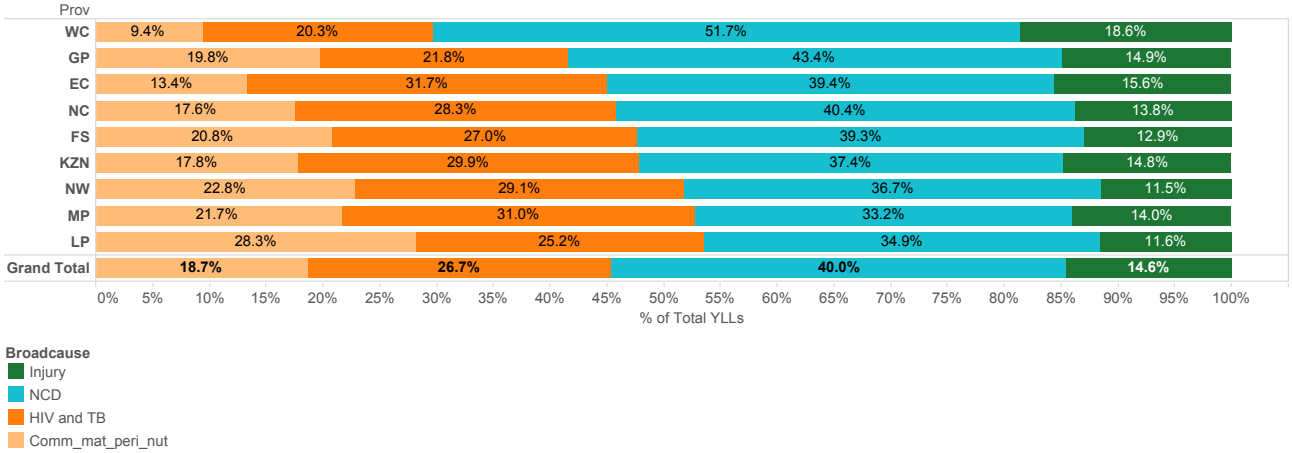
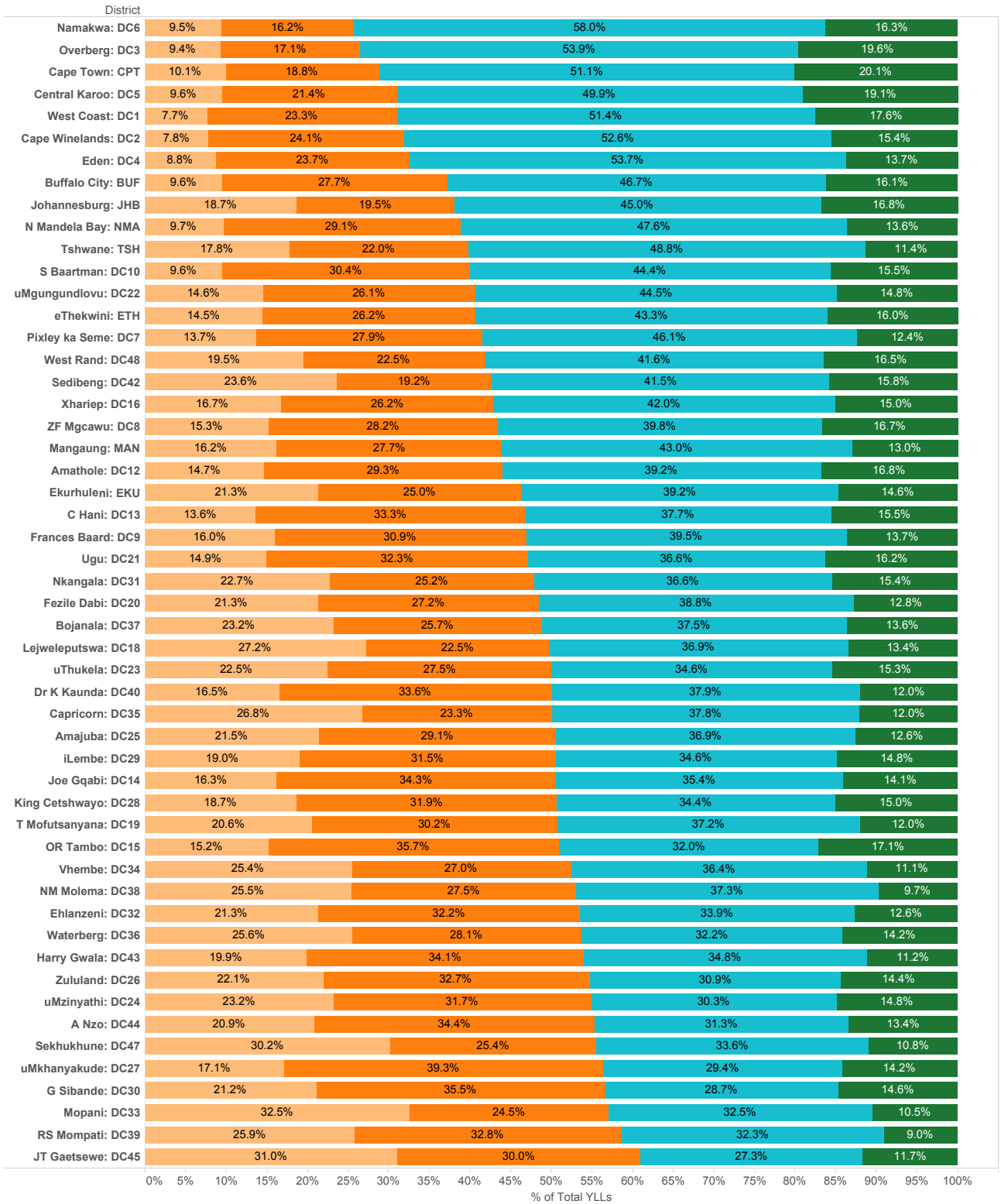


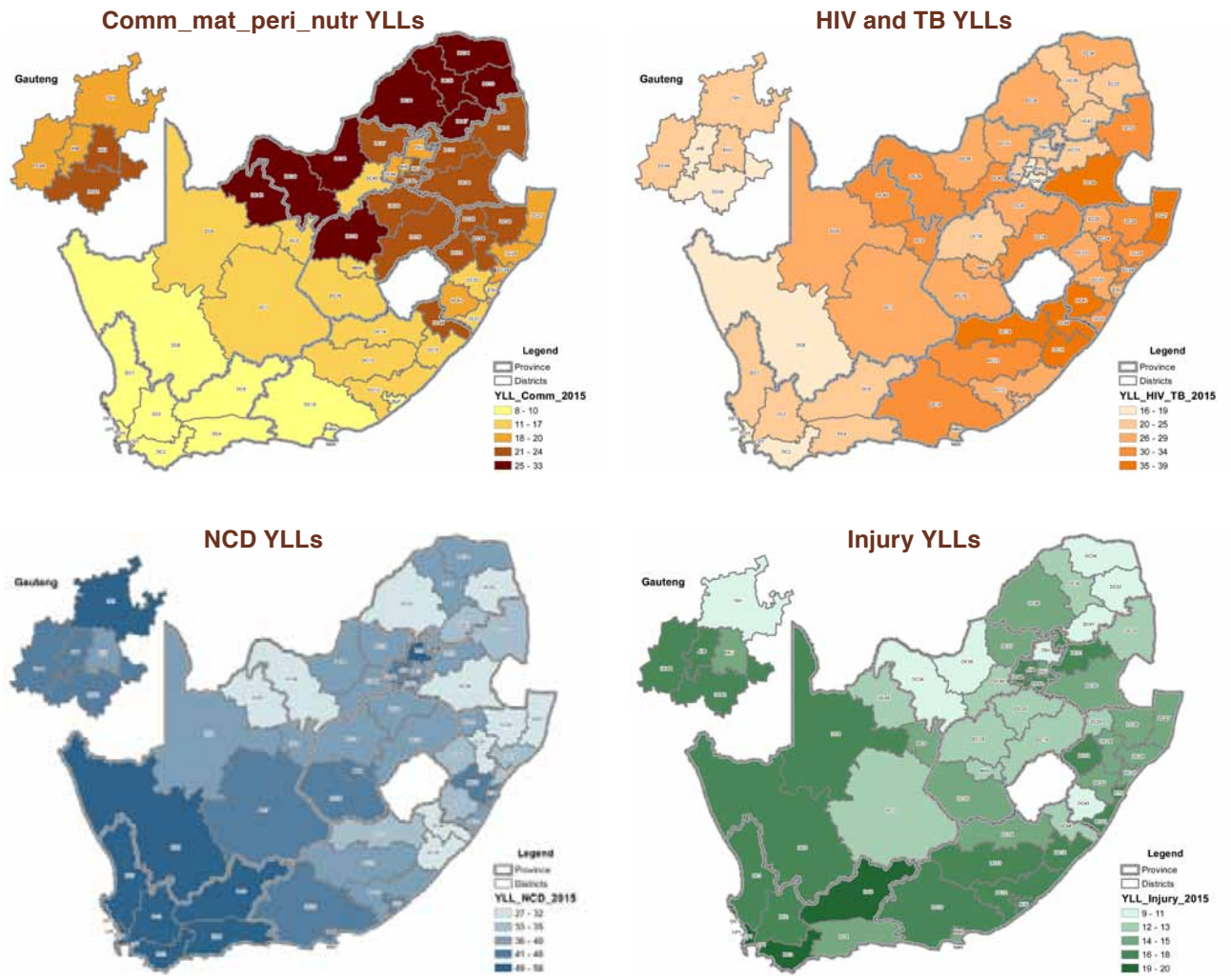
Figure 12: Percentage of years of life lost (YLLs) by broad causes by district, 2015



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, 2015



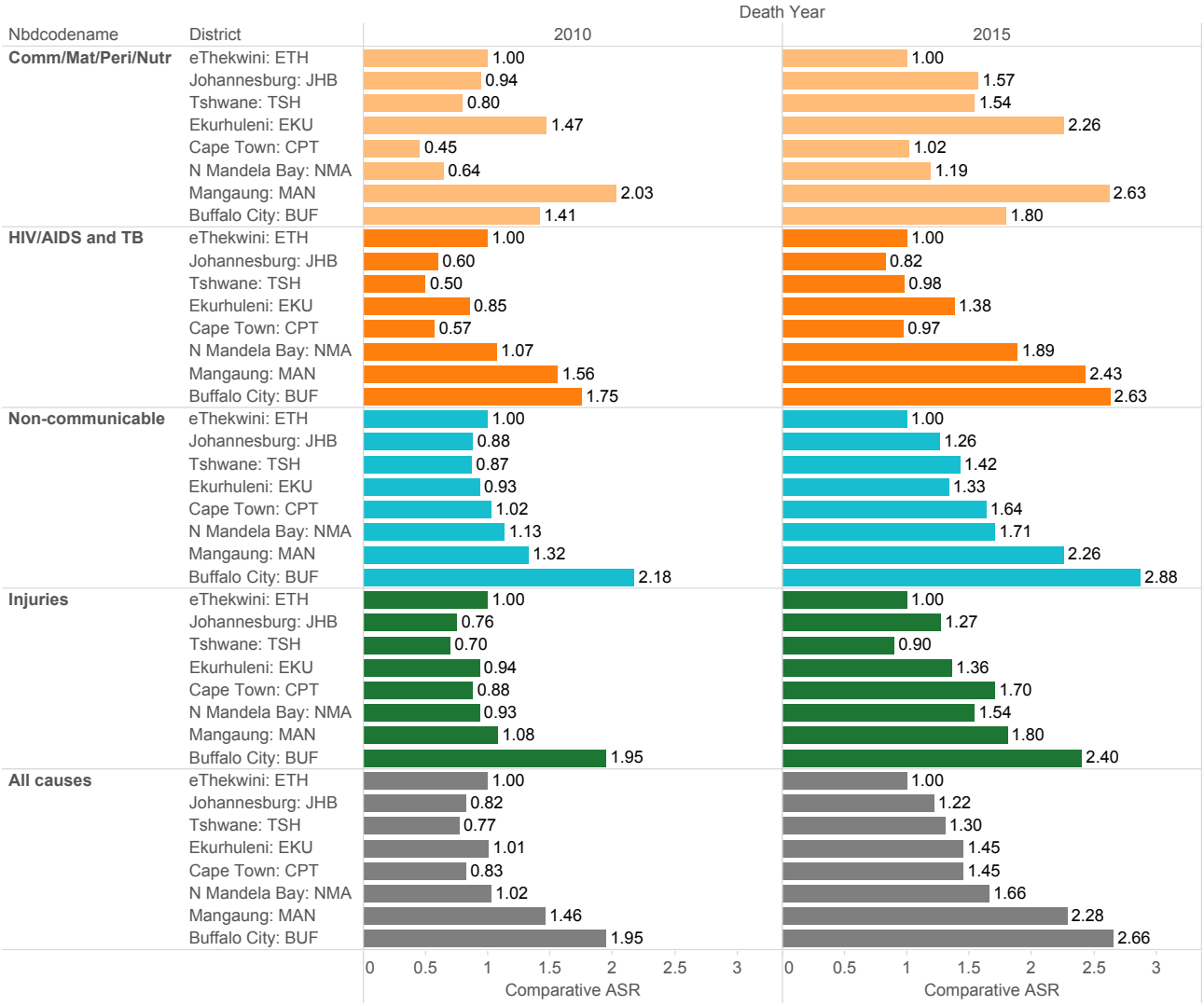
Note: These percentages do not give any indication of the level of mortality due to these causes as would be provided by age-standardised mortality rates, but only of the relative proportion of all YLLs in each district due to each broad group of causes. Thus the percentage of YLLs for the four broad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

Metropolitan districts 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 metropolitan districts.

In 2015, comparative mortality ratios for all-cause mortality across the eight metropolitan districts – with eThekwini (KZN) as the base – showed that eThekwini had the lowest all-cause mortality, and Buffalo City (EC) the highest, with 2.66 times the mortality experienced in eThekwini (KZN) 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 in eThekwini (KZN); it is shown here to highlight vital registration data quality issues. Mortality due to NCDs showed the greatest variation between metropolitan districts in 2015. Mortality from NCDs was lowest in eThekwini (KZN), almost threefold higher in Buffalo City (EC) (2.88), and more than twofold higher in Mangaung (FS) (2.26). Mortality due to injuries showed less variation in the metropolitan districts, with Buffalo City (EC) and Mangaung (FS) having the highest mortality (approximately double that of eThekwini (KZN). In 2010, with late registrations included, Tshwane (GP) had the lowest all-cause mortality rates followed by Johannesburg (GP) and Cape Town (WC). The rates for Buffalo City (EC) and Mangaung (FS) were highest.

Figure 13: Comparative age-standardised mortality ratios by metropolitan districts, 2010 and 2015



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 metropolitan districts based on the crude and age-standardised mortality rates.[ae] Cape Town (WC) had the highest proportion of injury YLLs (20.1%) across all metropolitan districts (Figure 12), yet the age-standardised mortality ratios for injuries ranked third among the metropolitan districts (Figure 13). In contrast, Ekurhuleni (GP) 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 13). Gender differentials were greatest for injury death rates, with male-to-female rate ratios ranging from 3.0 in Tshwane (GP) to 4.7 in Cape Town (WC) (Figure 15).

ae 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 premature mortality (mortality occurring at younger ages, which should be targeted for prevention).

Figure 14: Crude and age-standardised mortality rates by metro, 2015 (interpret with caution)

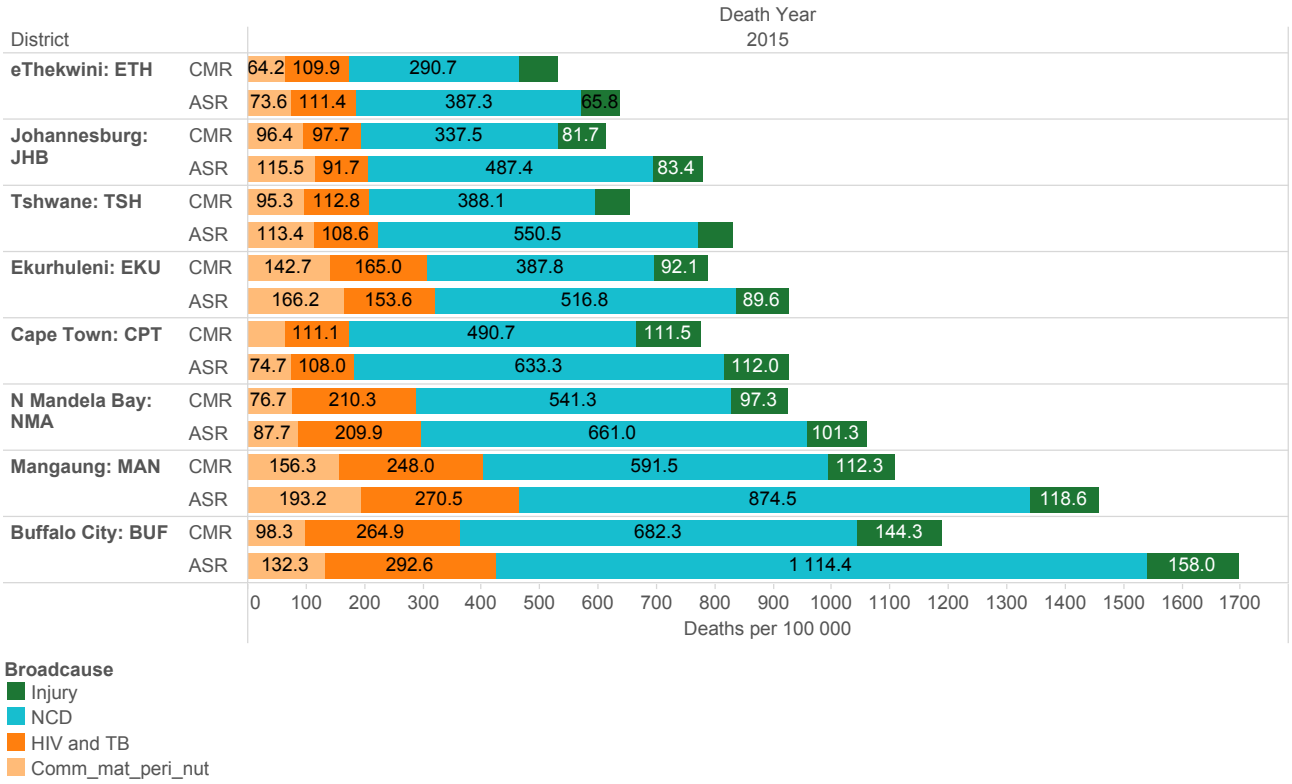


Figure 15: Age-standardised mortality rates by gender, by metro, 2015 (interpret with caution)

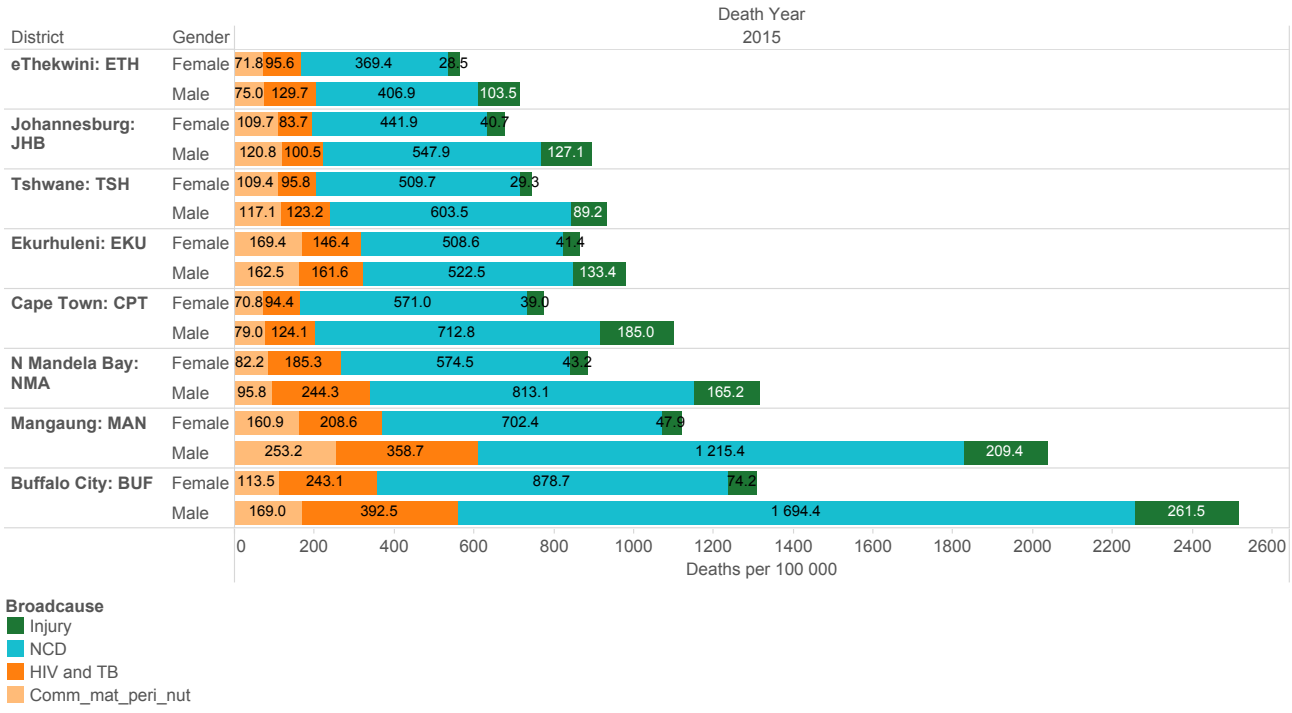
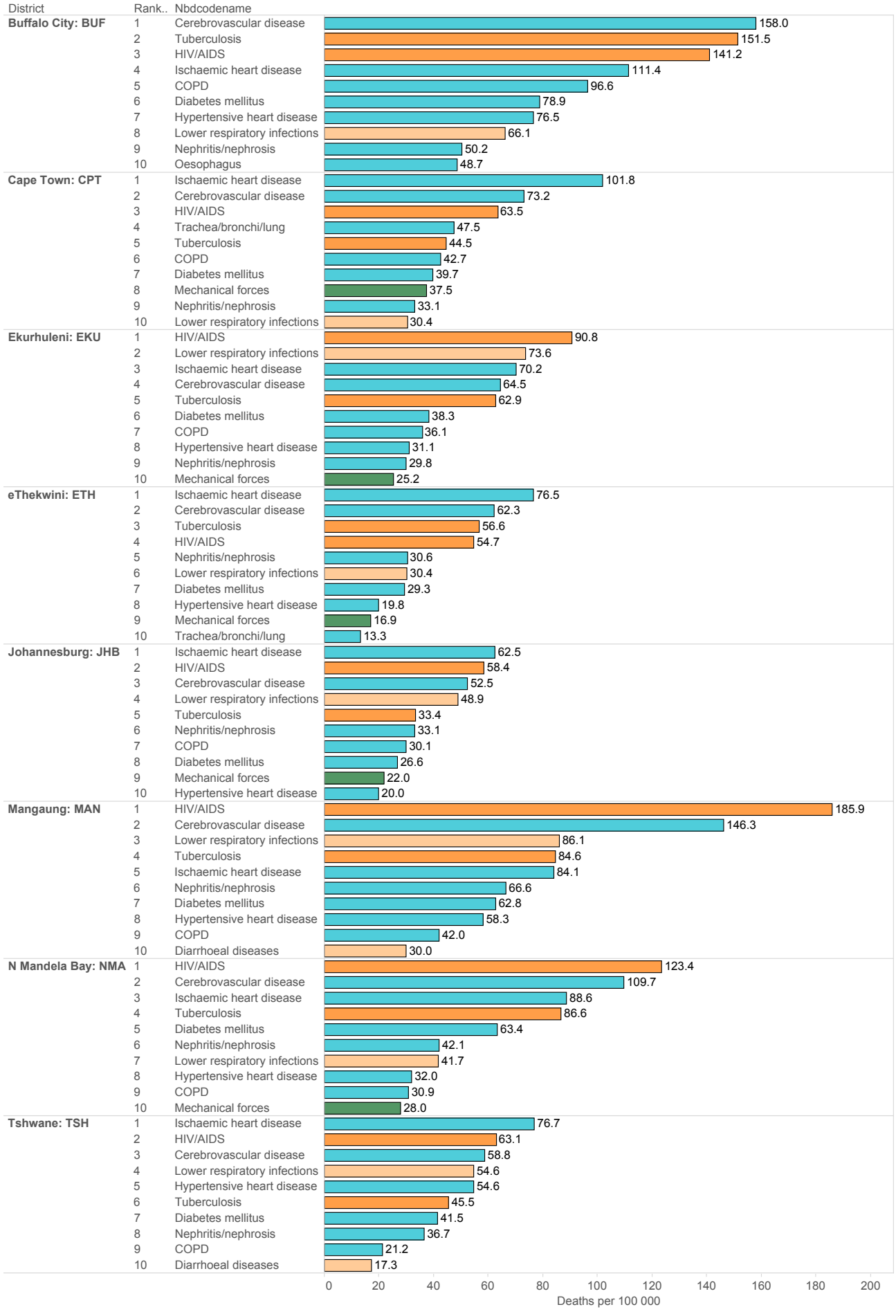


Figure 16 shows the ten causes with the highest age-standardised mortality rates for each metro. The results from eThekwini (KZN) and Nelson Mandela Bay (EC) should be interpreted with particular caution as death records appear incomplete. Extremely high TB mortality rates are noted in Buffalo City (EC) (151.5 per 100 000) and very high HIV/AIDS mortality rates are noted in Mangaung (FS) (185.9 per 100 000) and Nelson Mandela Bay (EC) (123.4 per 100 000). Cardiovascular diseases and diabetes featured in all metropolitan districts, 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 Nelson 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 (EC) and lung cancer mortality rates featured in Cape Town (WC).

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

Figure 16: Leading age-standardised mortality rates by metro, 2015



Conclusion

Mortality rates in South Africa increased between 1997 and 2006 and declined thereafter until 2015, mainly due to the HIV epidemic and the roll-out of ARTs. 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. The cause of death information for injuries is particularly unreliable and it is not clear where interpersonal violence and road traffic accidents rank.

The proportion of garbage codes declined across all provinces between 1997 and 2008, however, the trend is variable after that, with only the Western Cape and Northern Cape showing a consistent downward trend after 2008. The trend in the proportion of ill-defined conditions between 1997 and 2015 has been variable across provinces, with the Western Cape, Northern Cape and Limpopo Province showing consistent downward trends after 2008. 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 are needed to improve the quality of injury mortality information in the national statistics as these are currently misleading. It is essential for the Death Notice Form to be amended to systematically collect more information about the manner of injury deaths.