Monitoring of non-communicable diseases such as hypertension in South Africa: Challenges for the post-2015 global development agenda

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Background. Examining the non-communicable disease (NCD) profile for South Africa (SA) is crucial when developing health interventions that aim to reduce the burden of NCDs.
Objective. To review NCD indicators in national data sources in order to describe the burden of NCDs in SA, using hypertension as an example.
Methods. Age, gender, district of death and underlying cause of death data were obtained for 2008 and 2009 mortality unit records from Statistics SA and adjusted using STATA 11. Data for raised blood pressure were obtained from four national household surveys: the South African Demographic and Health Survey 1998, the Study on Global Ageing and Adult Health 2007, and the National Income Dynamics Study 2008 and 2010.
Results. The proportion of years of life lost due to NCDs was highest in the metros and least-deprived districts, with all metros (especially Mangaung) showing high age-standardised mortality rates for ischaemic heart disease, cerebrovascular disease and hypertensive disease. The prevalence of hypertension has increased since 1998. National household surveys showed a measured hypertension prevalence of over 40% in adults aged ≥25 years in 2010. Treatment coverage was 35.7%. Only 36.4% of hypertensive cases (on treatment) were controlled.
Conclusion. Further work is needed if NCD monitoring is to be enhanced. Priority targets for NCDs must be integrated into national health planning processes. Surveillance requires integration into national health information systems. Within primary healthcare, a larger focus on integrated chronic care is essential.

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The idea of universal health coverage (UHC) as a goal of health policy development has gained wide acceptance at both national and global levels since the publication of the *World Health Report 2010*.[1] UHC is now also being seen as a critical component of sustainable development and as such has been proposed as one of the key goals of the post-2015 development agenda that it is envisaged will extend the development challenges posed by the Millennium Development Goals.[2] Its aim is to ensure that all have access to needed healthcare of sufficient quality to be effective and that all have financial protection from the costs associated with using such health services. Reducing non-communicable diseases (NCDs) and their risk factors is one of the neglected priorities within this goal.

In March 2013, the World Health Assembly adopted the comprehensive global monitoring framework for NCDs[3] and urged member states to develop national targets and indicators. In August 2013, the South African (SA) national Department of Health (DoH) released its *Strategic Plan for the Prevention and Control of Non-communicable Diseases 2013-17*,[4] setting out national goals and targets. Table 1 shows these targets, together with those of the World Health Assembly. Such a strategy was crucial, given that estimates had predicted that the burden of disease relating to NCDs would continue to rise in SA if left unchecked.[5,6]

In order to identify health interventions that will focus on reducing the burden of NCDs, it is important to examine the burden of NCD profile for the country. This study aimed to do this by reviewing NCD indicators in national data sources in SA.

Methods

The burden of disease analysis was based on the unit records for 2008 and 2009 mortality data provided by Statistics SA. These included age, sex, district of death and underlying cause of death coded to the 10th revision of the *International Statistical Classification of Diseases and Related Health Problems* (ICD-10). STATA 11 was used to adjust the data, firstly by redistributing deaths of unknown ages proportionally by age and gender across each of the known causes of death. Causes of death used as pseudonyms for AIDS were combined with the HIV deaths. Deaths misclassified to ill-defined signs and symptoms and other 'garbage codes' (intermediate causes of death such as septicaemia; mechanisms of death such as cardiac arrest, which could be produced by a variety of different causes; partially specified causes such as cancer with unknown site of the disease; or risk factors such as hypertension) were proportionally redistributed to specified causes within each age and gender category. The ICD codes were aggregated according to the updated National Burden of Disease (NBD) list, which is a condensed list of conditions containing the most prevalent diseases across SA, including those of public health importance. 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. YLLs are a measure of premature mortality based on the age at death and therefore highlight the causes of death that should be targeted for prevention. In line with the initial SA NBD study, the highest observed national life expectancy was selected as the standard against which YLLs are calculated.

Data for raised blood pressure are presented from four national household surveys: the South African Demographic and Health Survey (SADHS) 1998,[7] the Study on Global Ageing and Adult Health (SAGE) 2007,[8] and the National Income Dynamics Study (NiDS) 2008[9] (wave 1) and 2010[10] (wave 2). (Note: The third wave of the NiDS has been released, together with updates to the previous two waves, since this analysis was completed.)

Individuals were classified as hypertensive if their average systolic blood pressure was ≥140 mmHg or their diastolic blood pressure ≥90 mmHg, or if they used blood pressure medication. The data were checked for outlier values, which were excluded from the analysis. Individuals without a valid blood pressure measurement who were not on blood pressure medication were omitted from the analysis. (A valid blood pressure measurement complies with the following set of rules: systolic 80 - 240 mmHg; diastolic 35 - 140 mmHg; systolic at least 15 units more than the corresponding diastolic; absolute difference between two systolic or diastolic measurements not more than 5 units.)

While the surveys had similar procedures for measuring hypertension, the sampling procedures were slightly different. Triangulation of multiple data sources was therefore undertaken to better describe the burden of disease and effective treatment coverage of hypertension.

Table 1. Non-communicable disease prevention and control goals and targets set by the World Health Assembly and the South African Strategic Plan for the Prevention and Control of Non-communicable Diseases

WHO, 66th World Health Assembly – a set of voluntary global targets for the prevention and control of NCDs: Global targets for 2025 and selected indicators	South African Strategic Plan for the Prevention and Control of Non-communicable Diseases: 2020 goals and targets
Premature mortality from non-communicable disease	1. Reduce by at least 25% the relative premature mortality (<60 years) from NCDs by 2020
Target: A 25% relative reduction in overall mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases	2. Reduce by 20% tobacco use by 2020
Behavioural risk factors	3. Reduce by 20% the per capita consumption of alcohol by 2020
Target: At least a 10% relative reduction in the harmful use of alcohol, as appropriate, within the national context	4. Reduce mean population intake of salt to <5 g per day by 2020
Target: A 10% relative reduction in prevalence of insufficient physical activity	5. Reduce by 10% the percentage of people who are obese and/or overweight by 2020
Indicators:	6. Reduce the prevalence of people with raised BP by 20% by 2020 (through lifestyle and medication)
Prevalence of insufficiently physically active adolescents defined as <60 minutes of moderate- to vigorous-intensity activity daily	7. Increase the prevalence of physical activity (defined as 150 minutes of moderate-intensity physical activity per week, or equivalent) by 10%
Age-standardised prevalence of insufficiently physically active persons aged ≥18 years (defined as <150 minutes of moderate-intensity activity per week, or equivalent)	8. Every woman with sexually transmitted diseases to be screened for cervical cancer every 5 years, otherwise every woman to have three screens in a lifetime (and as per policy for women who are HIV-positive)
Target: A 30% relative reduction in mean population intake of salt/sodium	9. Increase the percentage of people controlled for hypertension, diabetes and asthma by 30% by 2020 in sentinel sites
Target: A 30% relative reduction in prevalence of current tobacco use in persons aged ≥15 years	10. Increase the number of people screened and treated for mental disorders by 30% by 2030 [sic]
Biological risk factors	
Target: A 25% relative reduction in the prevalence of raised BP, or contain the prevalence of raised BP according to the national circumstances	
Indicator: Age-standardised prevalence of raised BP among persons aged ≥18 years (defined as systolic BP ≥140 mmHg and/or diastolic BP ≥90 mmHg)	
Target: Halt the rise in diabetes and obesity	
Indicators:	
Prevalence of overweight and obesity in adolescents	
Age-standardised prevalence of overweight and obesity in persons aged ≥18 years (defined as BMI ≥25 for overweight and BMI ≥30 for obesity)	
National systems response	
Target: At least 50% of eligible people receive drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes	
Indicator: Proportion of eligible persons (defined as aged ≥40 years with a 10-year cardiovascular risk ≥30%, including those with existing cardiovascular disease) receiving drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes	
Target: An 80% availability of the affordable basic technologies and essential medicines, including generics, required to treat major non-communicable diseases in both public and private facilities	

WHO = World Health Organization; NCDs = non-communicable diseases; BP = blood pressure; BMI = body mass index (kg/m²).

Results

The burden of disease analysis shows that NCDs have become the largest broad cause of YLLs in South Africa (32.0% of YLLs in 2009). The percentage of YLLs per district by broad cause group is shown in Fig. 1, highlighting substantial differences in the burden due to NCDs relative to that caused by injuries, HIV, tuberculosis, communicable, maternal, perinatal and nutrition-related diseases. The percentage of YLLs due to NCDs tends to be highest in the metros and least-deprived districts. Individual causes of death due to NCDs feature strongly in the ten leading causes of mortality. All metros show high age-standardised mortality rates for ischaemic heart disease, cerebrovascular disease and

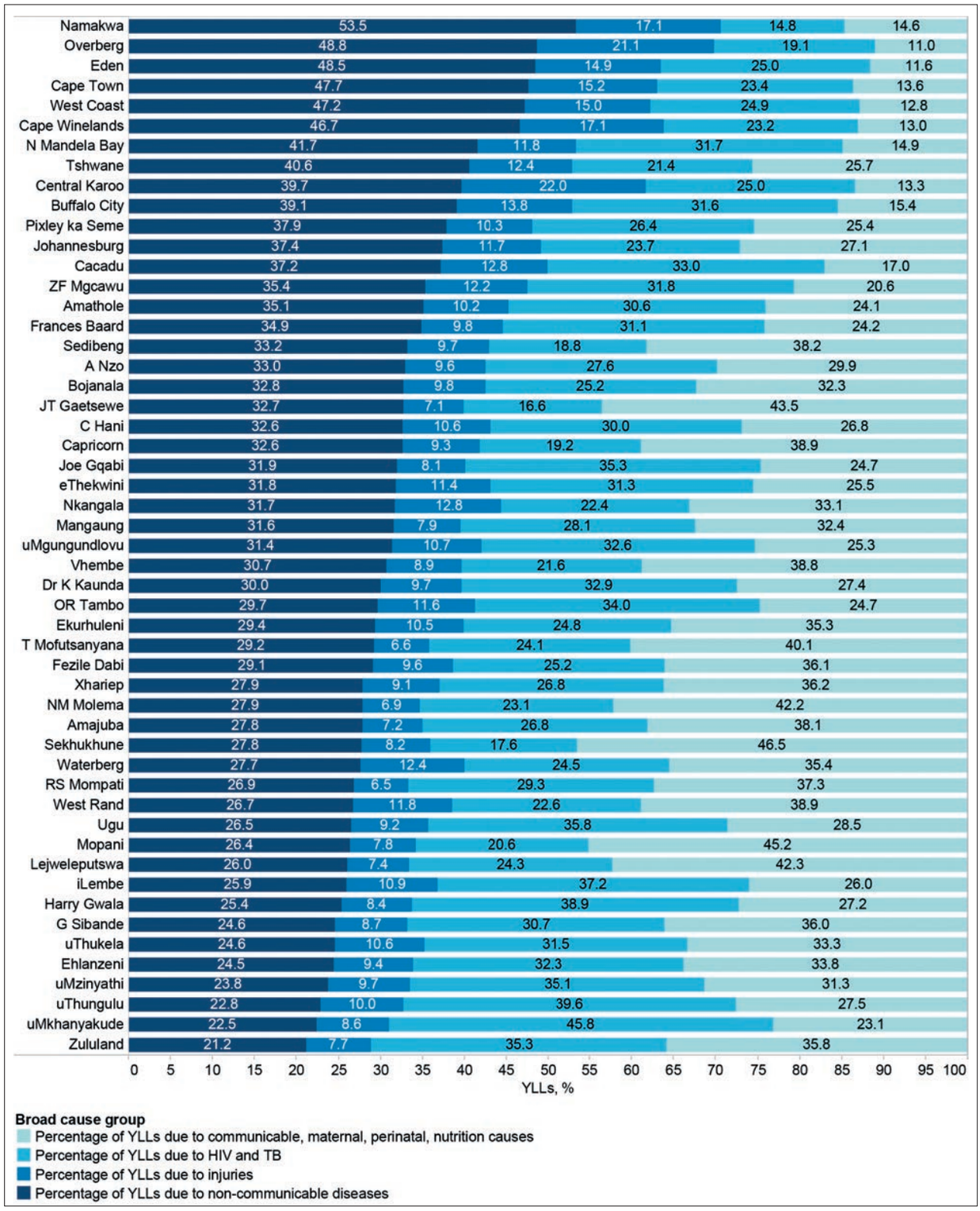

Fig. 1. Percentage of YLLs by broad cause group, by district, 2009. (YLLs = years of life lost; NCD = non-communicable disease; TB = tuberculosis.)

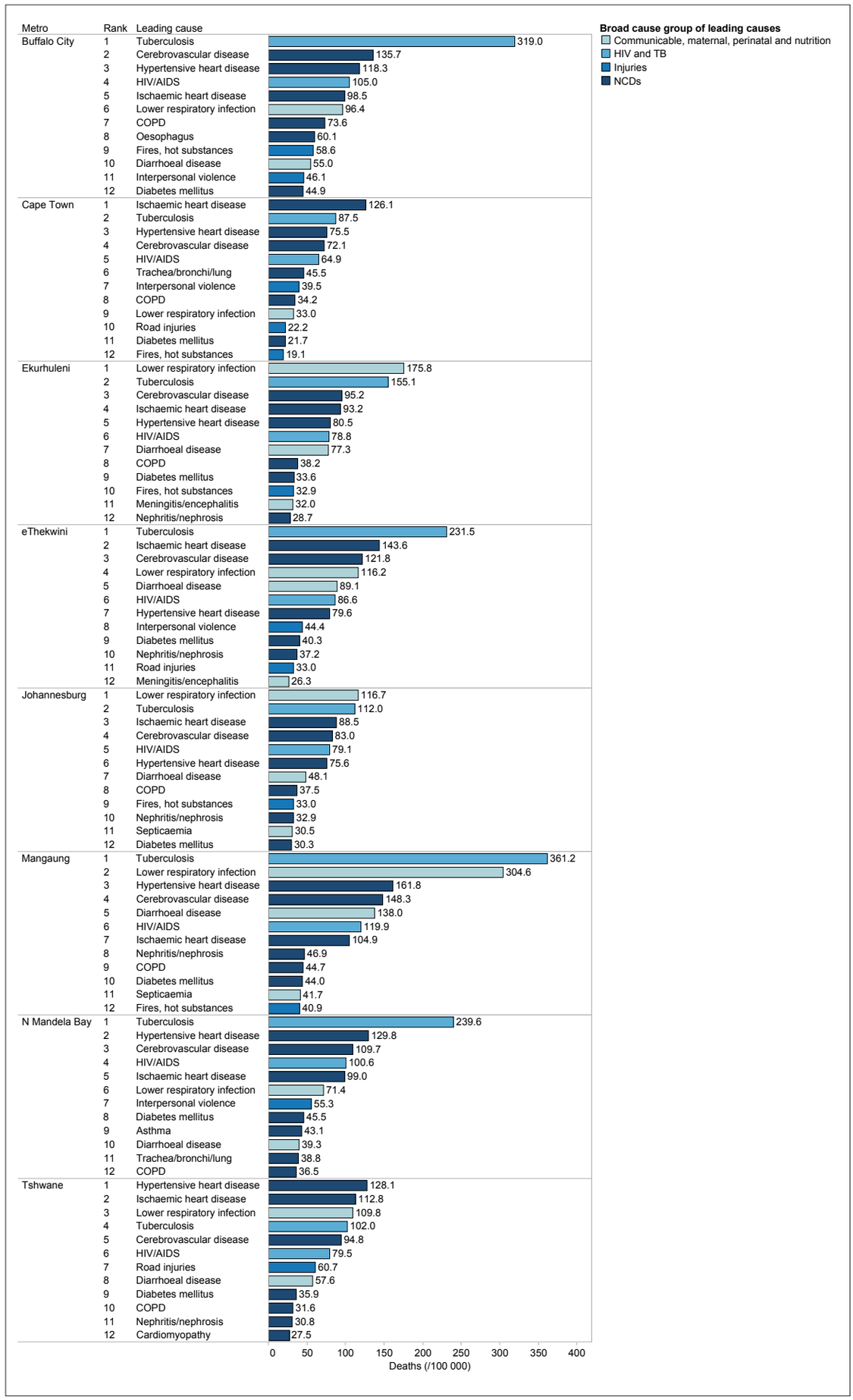

Fig. 2. Leading age-standardised mortality rates (deaths/100 000 population) by metro, highlighting NCD causes, 2009. (NCD = non-communicable disease; COPD = chronic obstructive pulmonary disease; TB = tuberculosis.)

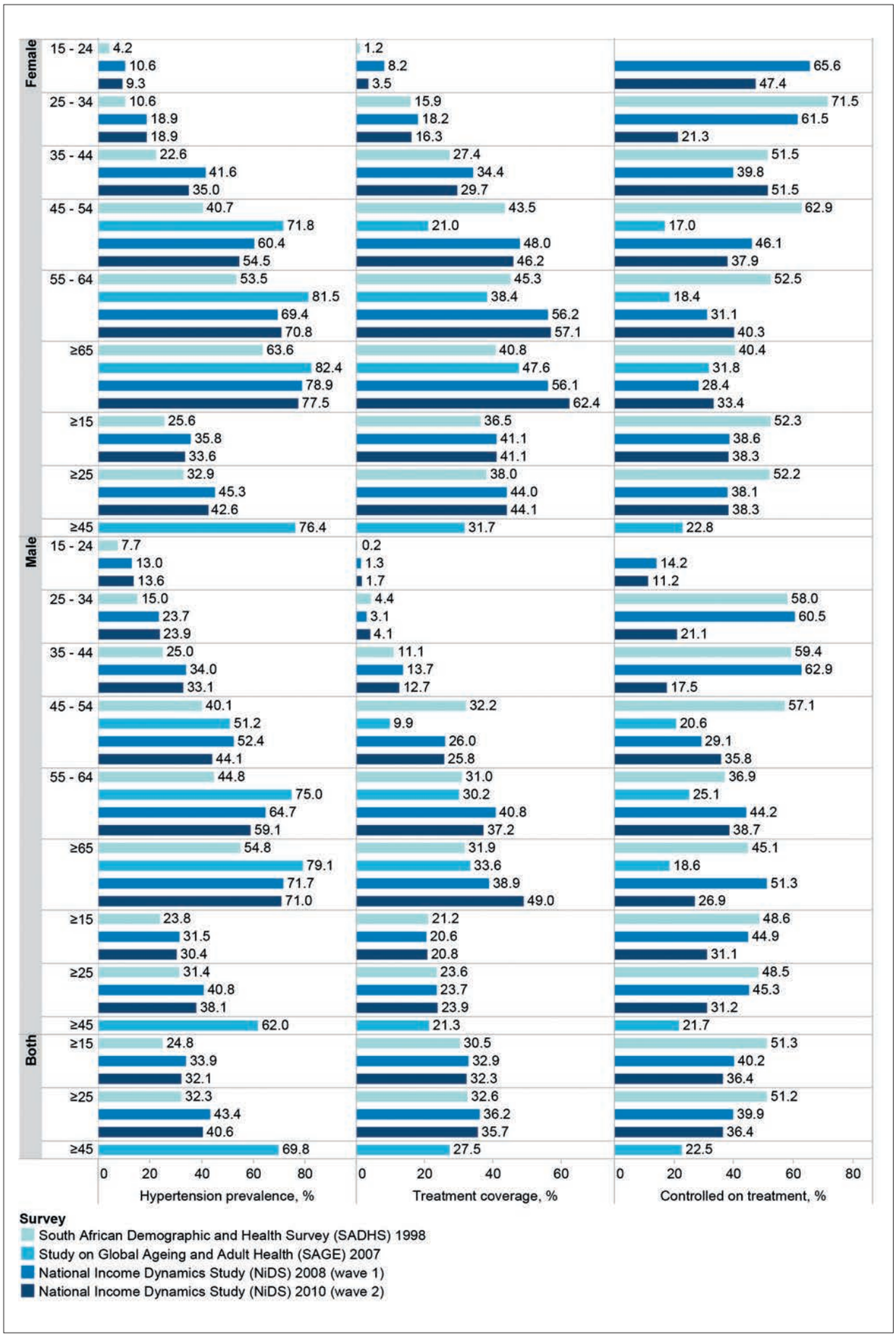

Fig. 3. Hypertension indicators based on four surveys, by gender and age group, 1998 - 2010.

Table 2. Main chronic NCD indicators in the DHIS, SA

		Existing data based on NIDS 2010					
Group	**Indicator**	**2008/09**	**2009/10**	**2010/11**	**2011/12**	**2012/13**	**Status of indicator in NIDS 2013**
Chronic care	Asthma detection rate, %			0.1	0.2	0.1	Discontinued
	Asthma <18 years rate, %			15.5	16.9	18.2	Discontinued
	Diabetes high-risk cases incidence rate (annualised), /1 000			2.3	2.8	1.8	NIDS 2013 – changed to 'Diabetes incidence (annualised)'
	Diabetes mellitus caseload, %	3.1	3.2	2.5	1.7	1.3	Discontinued
	Diabetes mellitus detection rate, %	0.1	0.1	0.1	0.1	0.1	NIDS 2013 (split into <18 and ≥18 years) and changed to /1 000
	Epilepsy detection rate, %			0.1	0.1	0.1	Discontinued
	Epilepsy <18 years rate, %			18.0	17.2	17.2	Discontinued
	Hypertension caseload, %	12.1	12.3	9.0	6.4	5.1	Discontinued
	Hypertension detection rate, %	0.3	0.3	0.4	0.3	0.2	Discontinued
	Hypertension high-risk cases incidence rate (annualised), /1 000			7.6	7.6	4.9	NIDS 2013 – changed to 'Hypertension incidence (annualised)'*
Eye care	Cataract surgery rate (annualised), /million	231.5	387.6	546.9	729.8	553.2	NIDS 2013
Mental health	Mental health caseload, %	0.3	0.3	0.9	1.3	1.4	NIDS 2013 – additional indicators added relating to mental health admissions
	Mental health visits ≥18 years rate, %	94.7	94.0	94.8	95.7	95.6	NIDS 2013
Reproductive health	Cervical cancer screening coverage (annualised), %	46.5	47.6	52.2	55.0	55.4	NIDS 2013

NCD = non-communicable disease; DHIS = District Health Information System; SA = South Africa; NIDS = National Indicator Data Set.
*The NIDS 2013 proposes to measure hypertension incidence (annualised), which includes newly diagnosed hypertension clients (of all ages) initiated on treatment per 1 000 population aged ≥40 years.

hypertensive disease (Fig. 2), although the overall age-standardised mortality for NCDs in Mangaung (1 082.2/100 000 population) is 1.6 times higher than in Cape Town (676.0).

Extensive routine information systems exist for key infectious diseases as well as maternal and child health, but minimal information is available on NCDs. Chronic disease rates collected by the District Health Information System (DHIS) are difficult to interpret in terms of disease burden or service coverage.[11] Many indicators are not collected by all provinces, and most indicators have either been discontinued or altered between the 2010 and 2013 National Indicator Data Sets. Table 2 shows the currently available chronic disease indicators at national level.

Fig. 3 shows hypertension indicators based on four surveys: SADHS, SAGE, NiDS 2008 and NiDS 2010. The number of survey respondents (aged ≥15 years) was 13 826 for SADHS 1998, 4 227 for SAGE 2007, 16 878 for NiDS 2008 and 21 955 for NiDS 2010. National household surveys showed a measured hypertension prevalence of over 40% in adults aged ≥25 years in 2010. Self-reported prevalence was much lower, indicating that most cases were not diagnosed. Treatment coverage was very low (35.7%), and only 36.4% of those on treatment were controlled. Results show that the prevalence of hypertension has increased since 1998, and that it increases with advancing age (both genders, all surveys), with high levels of hypertension (typically between 50% and 75%) among individuals aged ≥45 years in all surveys. In general, the prevalence among young males is higher than that among young females, while it is higher among females in the older age categories. The SAGE 2007 generally reports higher prevalences than the NiDS 2008 per gender and age category. In an analysis of the SAGE data for all six countries, SA had the highest hypertension prevalence rate of 77.9% in people aged ≥50 years.[12]

Fig. 4 outlines the number of adults with hypertension, the number on treatment and the number controlled on treatment based on the three most recent surveys. There are about 8.2 million people aged ≥15 years with hypertension in SA, of whom about 2.7 million are on treatment (and about 0.9 million controlled on treatment). The estimated diagnosed cases of hypertension reported in the South African Health Review 2011 (based on the total population and disease incidence rates extrapolated from the private sector risk equalisation fund study) was 3.3 million (with 2.1 million on treatment).[13] Similarly, the Statistics SA General Household Survey 2010 indicates that 3.2 million adults aged ≥25 years have self-reported hypertension.[14] Multiple sources therefore confirm the huge number of people with hypertension who are not diagnosed and hence are untreated, and the substantial number on treatment who are not controlled.

Discussion

Burden of disease analysis is useful for monitoring the ultimate impact of NCDs. In 2009, YLLs due to NCDs surpassed those from communicable and related causes. NCDs such as cerebrovascular, hypertensive and ischaemic heart disease are in the leading ten age-standardised causes of death in all metros. Improved quality and completeness of death registration are needed for reliable results.

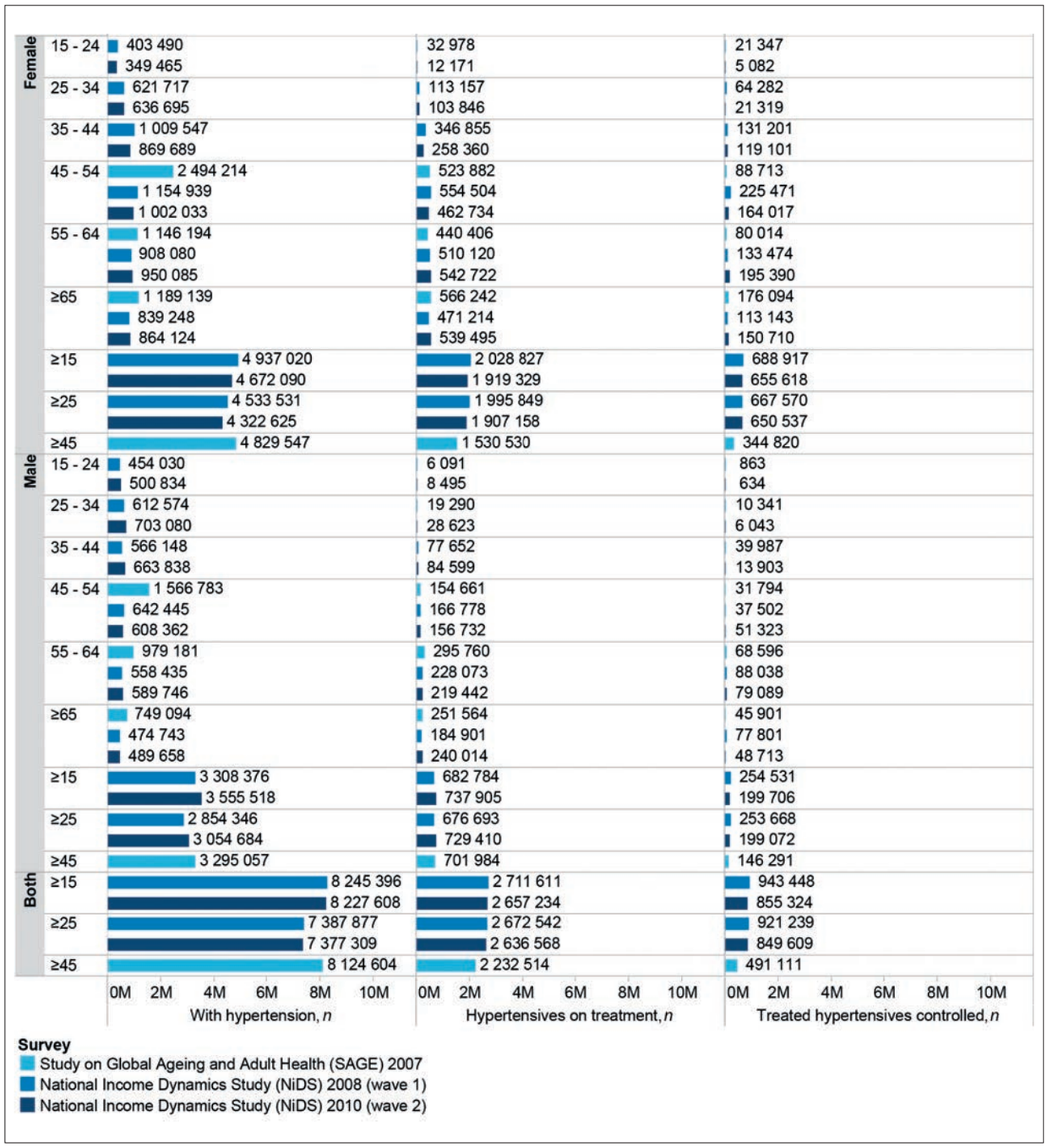

Fig. 4. Estimated numbers with hypertension, on treatment and controlled on treatment, based on three surveys, by gender and age group, 2007 - 2010. (M = million.)

The DHIS has potential to monitor health service delivery for NCDs, but late adoption of well-formulated indicators has limited its utility so far.

Surveys provide limited geographical disaggregation and trend analysis, yet they address some monitoring gaps and are better suited to understanding the complex interplay of risk factors, demographics, equity, service availability and quality that are components of achieving UHC. The South African National Health and Nutrition Examination Survey[15] is expected to provide rich data for evaluation of NCDs. The reported prevalence of hypertension of 10.2% for participants aged ≥15 years is substantially lower than expected, but cannot be directly compared with other sources because it only measures high blood pressure (systolic ≥140 mmHg and diastolic ≥90 mmHg) and excludes patients on medication and controlled. There is a need to standardise the definition of hypertension indicators in terms of the age categories included (World Health Organization ≥18 years, SA not specified but ≥15 years usually reported) and whether controlled hypertensives are included (hypertension prevalence) or not (raised systolic and/or diastolic pressure prevalence), so as to ensure uniformity across all current monitoring frameworks.

More work is needed to refine NCD monitoring in SA, to enable the ten goals of the National Strategic Plan to be assessed. The priority

targets for NCDs need to be integrated into national health planning processes, and surveillance requires integration into national health information systems. Finally, a greater focus on integrated chronic care within primary healthcare is needed at all levels to meet the long-term requirements for the effective management of NCDs.

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