

# Introduction and Overview

## Background

The 2013/14 District Health Barometer (DHB) provides an overview of the delivery of primary health care (PHC) in the public health sector across the provinces and districts in South Africa. The DHB has been issued every year since 2005, and draws data from the District Health Information Software (DHIS), Statistics SA (Stats SA), the National HIV and Syphilis Antenatal Sero-prevalence Survey, the National Health Laboratory Service (NHLS), the National Treasury (BAS data) and the national Electronic Tuberculosis (TB) Register (ETR.Net). The publication seeks to highlight inequities in health outcomes, health resource allocation and delivery, and to track the efficiency of health processes across all provinces and districts.

Compilation of the DHB is guided by an advisory committee made up of managers from the National Department of Health (NDoH), as well as various experts in the health field.

The timely publication of the DHB is inextricably linked to the availability of the resources from which it draws the relevant data.

The DHB is available at <http://www.hst.org.za> and on CD from Health Systems Trust.

## Methodology and Data Sources

### Indicators used in the 2013/14 DHB

The indicators<sup>9</sup> in this DHB have been approved by the NDoH. The chosen indicators are those linked to measuring the Millennium Development Goals, the NDoH's Annual Performance Plan, the District Health Plans of the health districts and those that measure important aspects of the burden of disease. All the indicators in this publication are categorised according to the 2013 National Indicator Data Set (NIDS) and the indicator names are also, where applicable, replicated from the NIDS.

This year, five new indicators have been added. These are:

- ◆ DTaP-IPV/Hib 3 – Measles 1st dose drop-out rate
- ◆ TB Rifampicin resistance confirmed client rate
- ◆ HIV testing coverage
- ◆ TB/HIV co-infected client on ART (ETR.Net)
- ◆ Percentage of TB cases with known HIV status (ETR.Net)

Two indicators reported on in previous years have been dropped, namely:

- ◆ Ratio ambulatory to inpatient days
- ◆ Measles 1st to 2nd dropout rate

This year, four additional chapters are included. These are:

- ◆ Progress toward equity
- ◆ Burden of disease
- ◆ Ranking district health system performance
- ◆ Data quality

Most of the indicators in this report, excluding the socio-economic, financial and certain prevention of mother-to-child transmission (PMTCT) and TB indicators, were updated from the DHIS data files at facility level (NDoH5) for the financial years ending March, up to 2013/14, received in June 2014. Data for the selected indicators were exported into a single MySQL database to facilitate uniform coding of districts and trend analysis across the entire period (2000/01 to 2013/14). As in previous reports, data for selected indicators are given for district hospitals only. These are average length of stay, bed utilisation rate, Caesarean section rate, OPD new client not referred rate and expenditure per patient day equivalent.

a A table with definitions, references and terms for each indicator used in this report is available in Appendix 1.

## PMTCT indicators

Gaps in the completeness of the DHIS data affect national averages, interpretation, analysis and trends for the NIDS indicator Infant 1st PCR test positive around 6 weeks rate. This indicator has been compared with another indicator, namely percentage of PCR tests HIV positive for infants under two months of age.

The NHLS indicator on the percentage of PCR tests HIV positive for infants under two months of age has been calculated as the proportion of valid tests in infants under two months that are positive, i.e. positive tests/(positive + negative tests). Tests with equivocal results or unsuitable or insufficient specimens were excluded from the denominator. This change in methodology has been applied retrospectively to all the data presented for this indicator.

The NHLS indicator on early infant HIV diagnosis coverage is reported according to the methodology applied by the NHLS in their monthly reports on this indicator. The estimated number of HIV-exposed infants in need of PCR testing (denominator) was calculated from Stats SA recorded live births multiplied by HIV prevalence (Antenatal Survey). There are some substantial differences in the number of live births at district level reported by the DHIS compared to Stats SA, and therefore there will be differences in coverage estimates reported in this DHB from the two sources. In addition, there is a range of uncertainty associated with the antenatal HIV prevalence estimates, which results in an uncertainty range for the number of HIV-exposed infants in each district.

## District health financing indicators

Provincial health expenditure from 2004/05 to 2013/14 was extracted from the National Treasury Basic Accounting System (BAS) database. All expenditure allocated to specific health facilities was coded to the latest DHIS facility information, and based on this, coded to districts. All other expenditure that could not be clearly allocated to a specific district was allocated to each district in proportion to the population share of the areas involved. For example, provincial-level expenditure is allocated to each of the districts in the province.

Provincial expenditure was coded according to the programmes and sub-programmes published by the National Treasury. Expenditure from sub-programmes 2.2–2.7 (community health clinics, community health centres, community-based services, other community services, and HIV and nutrition) constitutes the non-hospital PHC expenditure under District Health Services. Total DHS expenditure includes all sub-programmes under Programme 2: District Health Services, except sub-programme 2.8 (Coroner services).

Additional data sources used include:

- ◆ Data on local government expenditure on primary health care from the National Treasury. Net expenditure was used, i.e. expenditure less revenue (which includes transfers from provinces to local government).
- ◆ Factors for inflation adjustments based on CPIX were obtained from the National Treasury to convert expenditure for all years to real 2013/14 prices.
- ◆ Medical scheme coverage from the Stats SA General Household Surveys (GHS) was used to calculate the uninsured population. The GHS is the only source of district-level estimates of medical scheme coverage, but these were available only for 2005 to 2007 and there were some anomalies in the data in that period. Over time, reliable extrapolation of coverage at district level, in addition to adjusting for the change in boundaries, has thus become difficult. Looking retrospectively to 2001, it is clear that overall the GHS and the Council for Medical Schemes (CMS) data correlate, although in some years the GHS deviates substantially. Overall, the level has also remained remarkably static at around 16%±1%. Therefore, for the purpose of this analysis, it was considered adequate to apply a single-year estimate of medical scheme coverage to the time series population, since the variation in coverage between districts is more relevant than changes in coverage over time. The year 2009 was chosen as the most recent year when the overall rate in GHS was comparable with CMS and historical trends. This estimate uses the pooled 2005 to 2007 district-level estimates, adjusted according to the change in provincial coverage between the two periods (for example, where GP and WC were clearly under-reported in 2005 to 2007). Estimates for districts affected by boundary changes were made by distributing beneficiaries within each province according to expected patterns for metro/non-metro districts and the socio-economic quintile of the districts and constituent local municipalities.
- ◆ Data on health facilities, population, patient day equivalents and PHC headcount from the DHIS.

Per capita expenditure indicators use public sector expenditure divided by the uninsured population. It is noted, however, that the GHS and other sources indicate that there is significant use of the private sector by the uninsured population and also some use of the public sector by the insured population. As such, it is acknowledged that there is a wide range of uncertainty surrounding the true size of the population that is dependent on the public sector and this will affect the accuracy of the per capita expenditure indicators. The indicators have also been calculated using the total population for comparison.

Net local government expenditure on health services was added to provincial expenditure on district health services.

All the figures have been adjusted to take the effect of inflation into account and are presented in real 2013/14 prices. This means that increases in expenditure over time reflect greater availability of resources rather than merely increases to cover the increasing cost of health care due to inflation.

## Population data

Indicators that require population denominators use the mid-year population estimates for the relevant year that were available at the time of calculation. The district population estimates (5-year age groups) developed by Stats SA for 2002 to 2018 (based on the best available information from the Census 2011 and other sources of demographic information) were modified by NDoH to single-year age groups. These are the same population estimates currently included in the DHIS. There are some dramatic differences in the new population estimates and the previously available time series, particularly in the population under 1 year of age, a key denominator for many child health indicators. This has resulted in a substantial decline in coverage indicators such as immunisation coverage. Data for population-denominated indicators were thus retrospectively updated from the latest data file back to 2011/12 in most cases; denominators for immunisation coverage were revised according to the new population estimates back to 2002/03.

## Deprivation index and socio-economic quintiles

The composite indicator of deprivation was replaced this year with a new index of multiple deprivation developed by Noble et al., based on a basket of variables from the Census 2011.<sup>b</sup> This South African Index of Multiple Deprivation (SAIMD) includes indicators from four domains: income and material deprivation, employment deprivation, education deprivation and living environment deprivation measured at either the individual or household level according to the indicator. The overall SAIMD combines each of these individual domains of deprivation using equal weights. The results were produced at the ward level, with the most deprived ward given a rank of 1 and the least deprived a rank of 4 277. The population weighted average rank of the wards was then calculated at local municipality, district municipality and provincial levels.

The SAIMD thus provides a measure of relative deprivation across districts within South Africa. Each district was ranked according to levels of deprivation and categorised into socio-economic quintiles (SEQ). Districts that fall into Quintile 1 (lowest quintile) are the most deprived districts. Those that fall into Quintile 5 are the least deprived (best-off). Since the SAIMD had not been calculated for the 2001 Census or the 2007 Community Survey according to the current boundaries and using the latest methodology at the time of compiling this DHB, the 2011 deprivation ranks have been assumed to remain constant over the time period included in the DHB. Although not ideal, comparison of the latest findings with those from the previous analyses suggests that although there have been reductions in the level of deprivation, there has been little change in the relative amount of deprivation (i.e. the spatial distribution of deprivation has remained quite similar).

There are some systematic differences in the SAIMD compared to the deprivation index (DI) that was previously used in the DHB due to the choice of the underlying indicators included in the index and the methodology. These are described in more detail in the chapter on equity and were also described in the DHB 2010/11.<sup>c</sup>

## Maternal deaths

In the case of the number of maternal deaths from confidential enquiries, the data were reported according to the old boundaries and were redistributed based on assumptions reported in the 2011/12 DHB to enable alignment with the 2011 boundaries. The National Committee for Confidential Enquiries into Maternal Death (NCCEMD) database is only revised every six years, and due to confidentiality limitations, the information is not available per facility and therefore cannot be easily aligned to new boundaries, as can be done with DHIS.<sup>d</sup>

The Western Cape data on maternal deaths were not in the DHIS in the years prior to 2013/14 due to an issue with linking the correct data element names. Data were obtained from Sinjani<sup>e</sup> and imported into the DHIS.

## HIV prevalence among antenatal clients tested (survey)

The ANC Survey results for 2001 to 2010 were obtained according to the new boundaries in August 2012. The prevalence rates and confidence intervals were calculated at district and provincial level for all years, even though the sample size prior to 2006 was not large enough for district-level outcomes. For the 95% CI, the normal approximation to the binomial distribution was used. Where  $n \cdot p$  or  $n \cdot (1-p)$  was  $< 5$ , the Mid-P exact test of OpenEpi was used.<sup>f</sup>

b Noble M, Zembe W, Wright G, Avenell D. Multiple Deprivation and Income Poverty at Small Area Level in South Africa in 2011. Cape Town: Southern African Social Policy Research Institute and Southern African Social Policy Research Insights (SASPRI); 2013.

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

d Personal communication, Professor Bob Pattinson, 4 November 2013.

e Sinjani is the equivalent of the DHIS used only in the Western Cape Province

f <http://www.openepi.com/OE2.3/Menu/OpenEpiMenu.htm>  
n = number tested, p = proportion positive.

The national prevalence rates were taken from the Antenatal Sero-prevalence Survey reports, since these are calculated using weights for the number of women aged 15 to 49 years in each province, and these weights were not available to us. Since 2011, the Survey results have been reported according to the current demarcation and were therefore taken directly from the published reports.

## TB Indicators

TB indicators based on the drug-susceptibility have been calculated from the individual records from the registers after coding all the facilities to the current districts by mapping the ETR facility names to DHIS facility names. The ETR.Net data are still not aligned to the 2011 boundaries and the data elements are not reliably exported to DHIS due to the lack of alignment in facility names for most provinces.

The indicator TB rifampicin resistance confirmed client rate, which gives an indication of what proportion of TB cases are drug resistant, was calculated from National Health Laboratory Services data on GeneXpert tests. As such, these data do not represent all tests for drug susceptibility as the scale-up of this diagnostic tool is still taking place, albeit rapidly.

## District Boundaries and Maps

Geographic information from the Municipal Demarcation Board is used to define district and provincial boundaries and is the same as is followed by the DHIS. Indicators in this DHB have been aggregated and presented according to the boundaries that came into effect in May 2011.

## Averages

All averages (provincial and national) are **weighted averages**, based on the total numerator and denominator for all the sub-areas included, and are thus not averages of the *district indicator values*. These averages may appear 'skewed' for any indicator in any province where there are districts of very different sizes or workloads, and where a bigger district has a very different value from the other smaller districts in a province.

## Data Display

### Financial year and calendar year

The indicators from DHIS and the BAS financial system cover the 12 months April to March, which is the financial year of the Department of Health. Indicators for financial years are annotated as 2013/14 or FY 2014. Other sources, such as the TB data from ETR.Net, cover a calendar year. Data from the Antenatal HIV Sero-prevalence Survey and Stats SA surveys correspond to the period of the survey. In the Excel file produced with the DHB, the single year indicated for summary purposes is the one including the majority of the data.

### Indicator ranking – is first always best?

The districts are ranked from 1 to 52 (for the various indicators in the league table graphs where number 1 represents the best performance and number 52 the worst performance). However, with some indicators such as Caesarean section rate, expenditure, and chronic disease detection rate, an indicator in the number 1 position does not mean best performance; 'best' is usually in the middle range close to the South African average. For these indicators, their order from top to bottom should therefore not necessarily be considered as best to worst. Individual indicators are therefore ranked as either ascending (low values are best, for example maternal mortality ratios), descending (high values are best, for example immunisation coverage) or central (neither low nor high values are good and the optimal values are approximately central, approximated by the South African average for the indicator).

In the DHB data file, the indicator ranks for all districts are coloured from green to orange to red. It must be noted that this is only a crude indication of performance and is based on the position of a district *relative* to the other 51 districts and not to a target or fixed standard. Therefore, it is possible that an indicator may improve in a district, but it could drop in rank (i.e. go from green to red) if other districts have improved to a greater extent.

Obtaining an overall ranking of district health system performance across the range of indicators included is, however, more complex, as it is neither 'fair' nor statistically sound to simply calculate an equally weighted average of the rank value for each indicator. In order to address this issue, the advisory group for the DHB considered which of the DHB indicators had the greatest technical validity and reliability for ranking performance and suggested a reduced list for the purpose of calculating an overall performance rank. Two approaches were used to rank districts according to the amount of progress made in performance over time, and to rank districts according to a 'frontier' of performance that then also considers efficiency (resources used to generate performance) and fairness (deprivation and context that challenge performance).

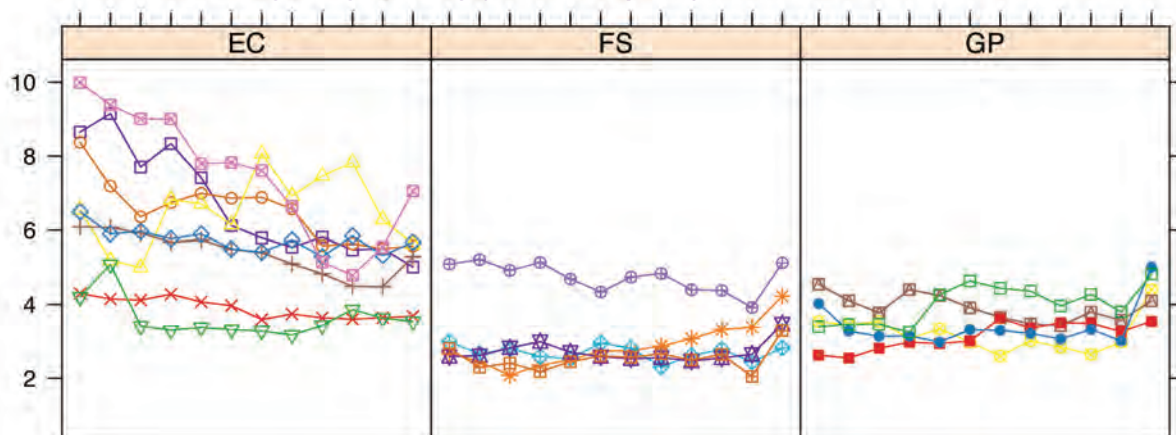
The methodology and results are reported in the chapter on ranking in this DHB.

ArcView was used for generating the thematic or choropleth maps of indicator values by district. All of the maps were created using 'natural breaks'<sup>9</sup> with five categories as the default. For all indicators, low indicator values are represented by light shades and high indicator values by darker shades, regardless of whether high values are 'best' or 'worst'. Thus, dark shades are not always best, and each indicator map should be interpreted in terms of the desired target range for that indicator.

## Trends

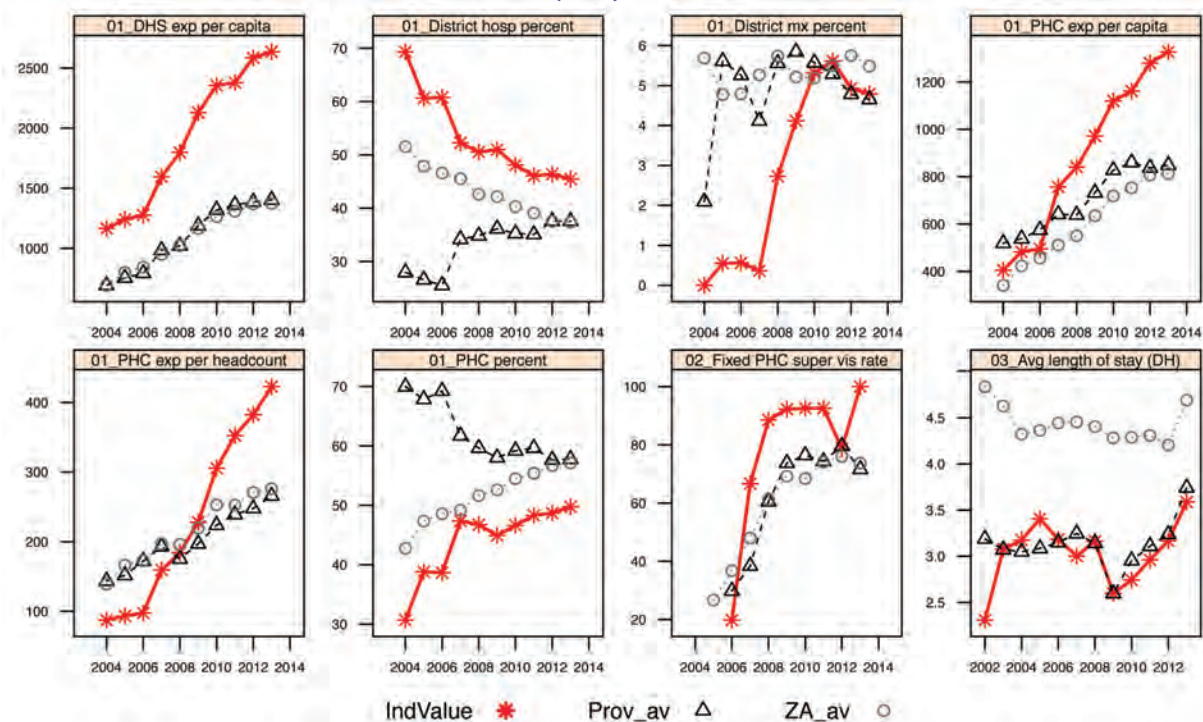
Annual trends of an indicator comparing districts and provinces are included in some chapters in Section A. Indicator comparisons by district help the reader to explore how an indicator varies over a number of years across districts and provinces. As the scale of the y axis is the same for all the graphs, one can easily notice differences. This also shows variation and change within the districts in a particular province over time.

### Annual trends: Average length of stay (district hospitals)



In Section B of the report, there are composite graphs showing annual trends for all districts for all the indicators included in the DHB. The district indicator value (IndValue) is shown together with the relevant provincial (Prov\_av) and national averages (ZA\_av) (see legend below).

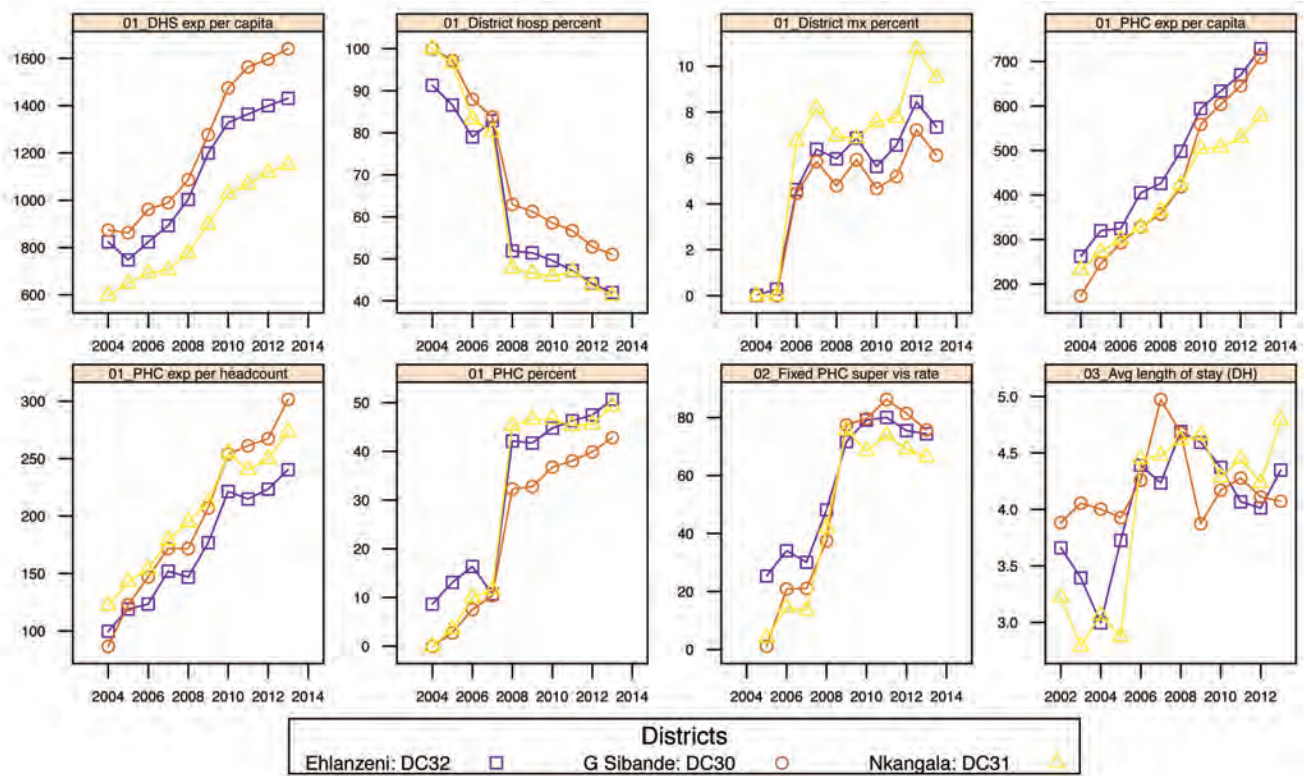
### Annual indicators for district: Central Karoo (DC5)



<sup>9</sup> This is the default classification method in ArcView, using the Jenks Optimisation algorithm to group values within a class, resulting in classes of similar values separated by breakpoints. This method works well with data that are not evenly distributed and not heavily skewed towards one end of the distribution.

There are also composite graphs showing annual trends for all districts within each province.

### Annual indicators for districts in Mpumalanga (MP)



## District profiles

New graphs have been developed this year to provide a snapshot of each district's performance in the most recent year relative to the other districts.

The district value – for the most recent available year for each indicator – is shown (with the rank position) on a standardised scale which indicates how many standard deviations the value is above or below the average of all 52 districts. The symbol shape (triangle, circle, inverted triangle) shows how each indicator has been ranked and these are coloured according to the district's rank per indicator (green = best, red = worst). The table and the borders of the shaded range indicate the minimum and maximum district values. The target value (where available) is indicated by the blue stars.

### District profile: Gert Sibande (DC30), SEQ 3

