

# Introduction and Overview

## Background

The 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 System (DHIS), Statistics 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 health experts.

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 2012/13 DHB

The indicators<sup>a</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, several new indicators have been added. These are:

- OPD new client not referred rate
- Ratio ambulatory to inpatient days
- Child under 5 years diarrhoea with dehydration incidence
- Child under 5 years diarrhoea case fatality rate
- Child under 5 years pneumonia incidence
- Child under 5 years pneumonia case fatality rate
- Child under 5 years severe acute malnutrition incidence
- Child under 5 years severe acute malnutrition case fatality rate
- TB case finding (new pulmonary TB smear-positive)
- TB case finding index
- Incidence of TB – new pulmonary TB smear-positive
- Incidence of TB – all types
- TB successful treatment rate (all TB)
- Adult remaining on ART at end of the month – total
- Child under 15 years remaining on ART at end of the month – total

The TB indicators for defaulter and cure rates focus only on new smear-positive pulmonary TB cases. More detailed spreadsheets, including all the categories of case finding and treatment outcomes, are included on the CD.

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

- Usable beds per 1 000 uninsured population
- Utilisation rate – PHC
- Utilisation rate under 5 years – PHC
- Facility under-1 mortality rate

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

- Facility under-5 mortality rate
- Baby initiated on HAART under 18 months rate
- Mental health case load
- TB two-month smear conversion rate.

Burden of disease indicators could not be updated for this edition of the DHB as the 2010 data were not available from Stats SA in time for inclusion.

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 2012/13, received in June 2013. 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 2012/13). 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, ratio ambulatory to inpatient days, and expenditure per patient day equivalent.

## PMTCT indicators

Gaps in the completeness of the DHIS data affect national averages, interpretation, analysis and trends for the NIDS indicator Baby PCR test positive around 6 weeks rate. This indicator has been compared with another indicator, namely proportion of PCR tests HIV positive for infants under two months of age. Several sources of data have been assessed for the number of PCR tests: DHIS data, PMTCT surveys and data from the NHLS, which performs infant PCR testing for the public health service.

The NHLS indicator on the proportion 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. KwaZulu-Natal Province continues to have extremely high rates of missed diagnostic opportunities, with 9.8% of all PCR tests under 2 months not having a clear result in 2012/13.

For the NHLS indicator on early infant HIV diagnosis coverage, the methodology was adjusted this year to align with the monthly reports issued by the NHLS and applied retrospectively to all the data reported in this edition. 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.

## District health financing indicators

Provincial health expenditure from 2005/06 to 2012/13 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. Expenditure for areas recorded according to the old boundaries (such as DC12 prior to 2011) was split into the current DC12 and BUF according to the population share of those two districts.

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, 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, excluding 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 National Treasury to convert expenditure for all years to real 2012/13 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  $16\% \pm 1\%$ . 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.

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 2012/13 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 developed by the NDoH for 2001 to 2016 (based on the best available information from the Census 2001 and mid-year estimates) are used in this DHB. These are the same population estimates currently included in the DHIS. Population estimates from Census 2011 are dramatically different to this time series, particularly in some districts and for certain age categories such as infants under one year of age. Key health service delivery indicators such as immunisation coverage have therefore also been calculated using the Census 2011 figures to illustrate the impact of the variation in the denominator on performance.

## Deprivation index and socio-economic quintiles

The deprivation index is a measure of relative deprivation across districts within South Africa. As with any index, the deprivation index is a composite measure derived from a set of variables.<sup>b</sup>

Variables included in the analysis are considered to be indicators of material and social deprivation. The deprivation indices for this report were generated using Stats SA's GHS data and the 2007 Community Survey (CS).

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).

No new district-level data for the deprivation index have been collected since 2007, so the socio-economic quintiles from 2007 have been used for each of the years thereafter to enable ongoing analysis of equity according to socio-economic status.

Therefore, for this DHB, it has been assumed that there is no change in the SEQ over time and the same quintiles have been assumed since 2007, although this assumption becomes increasingly uncertain.

The old data are also available only by the 2006 to 2010 boundaries, and assumptions were made in order to approximate the SEQ for districts with changed boundaries, as described in the DHB 2011/12.

Work is underway to update the index and quintiles based on the Census 2011; however, this information was not available in time for inclusion in this DHB.

<sup>b</sup> The deprivation index used in the DHB is generated using principal components analysis which identifies the underlying process that has the most influence in determining the outcome of each variable included in the analysis. Each variable is weighted based on its linear association with the underlying process. The weighted variables are then used to construct the deprivation index.

## 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.

- Using the DHIS data for Buffalo City (BUF) and Amathole (DC12) for 2008/09 to 2011/12 (which appears relatively consistent and complete), the proportion of maternal deaths in each local municipality was calculated and used to split the NCCEMD data for the old Amathole (same code of DC12) into the new districts, BUF and DC12 (new boundaries).
- All maternal deaths in Motheo (DC17) were allocated to Mangaung (MAN). Looking at the DHIS data per local municipality for 2008/09 to 2011/12, it appears that a small number of deaths would have occurred in Mantsopa LM (FS196, previously FS173) but no adjustment was made due to the relatively small proportion.
- All maternal deaths in Metsweding (DC46) were added to Tshwane MM (TSH).
- Approximately 15 deaths in OR Tambo DM (DC15) (Mbizana LM and Ntabankulu LM, old EC151, EC152 — now EC443 and EC444) would probably move from DC15 to Alfred Nzo DM (DC44) with the change in boundaries. The Western Cape data on maternal deaths are not in the DHIS due to an issue with linking the correct data element names. Data were obtained from Sinjani<sup>c</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 (CI) 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>d</sup>

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 report.

## 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 2012/13 or FY 2013. 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 derive from 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.

<sup>c</sup> Sinjani is the equivalent of the DHIS used only in the Western Cape Province.

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

## 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 and expenditure, 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.

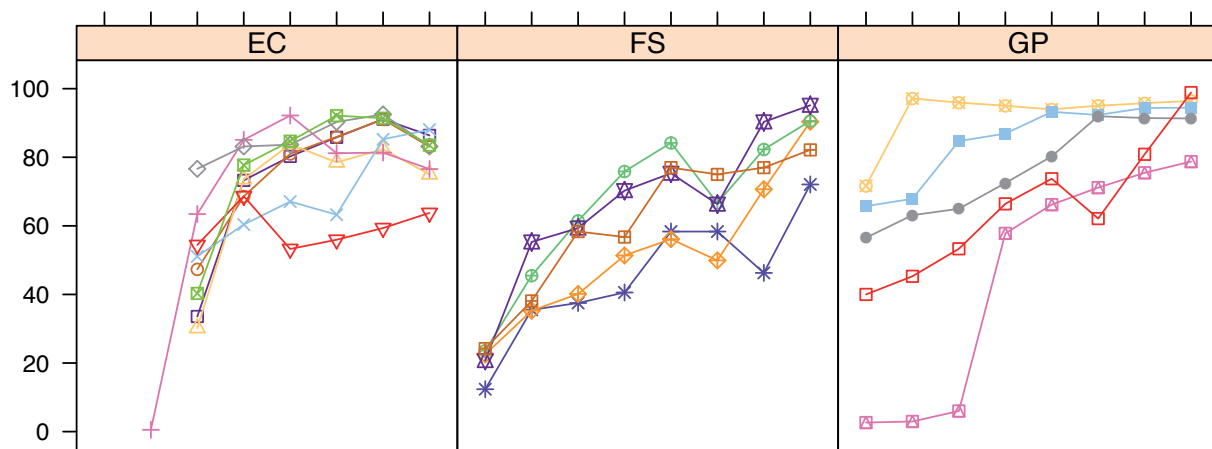
In the DHB data file, the indicator ranks for all districts are coloured from green to orange to red. It must be noted that this is only a crude indication of performance and is based on the position of a district *relative* to the other 51 districts and not to a target or fixed standard. Therefore, 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.

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>e</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, as depicted below.

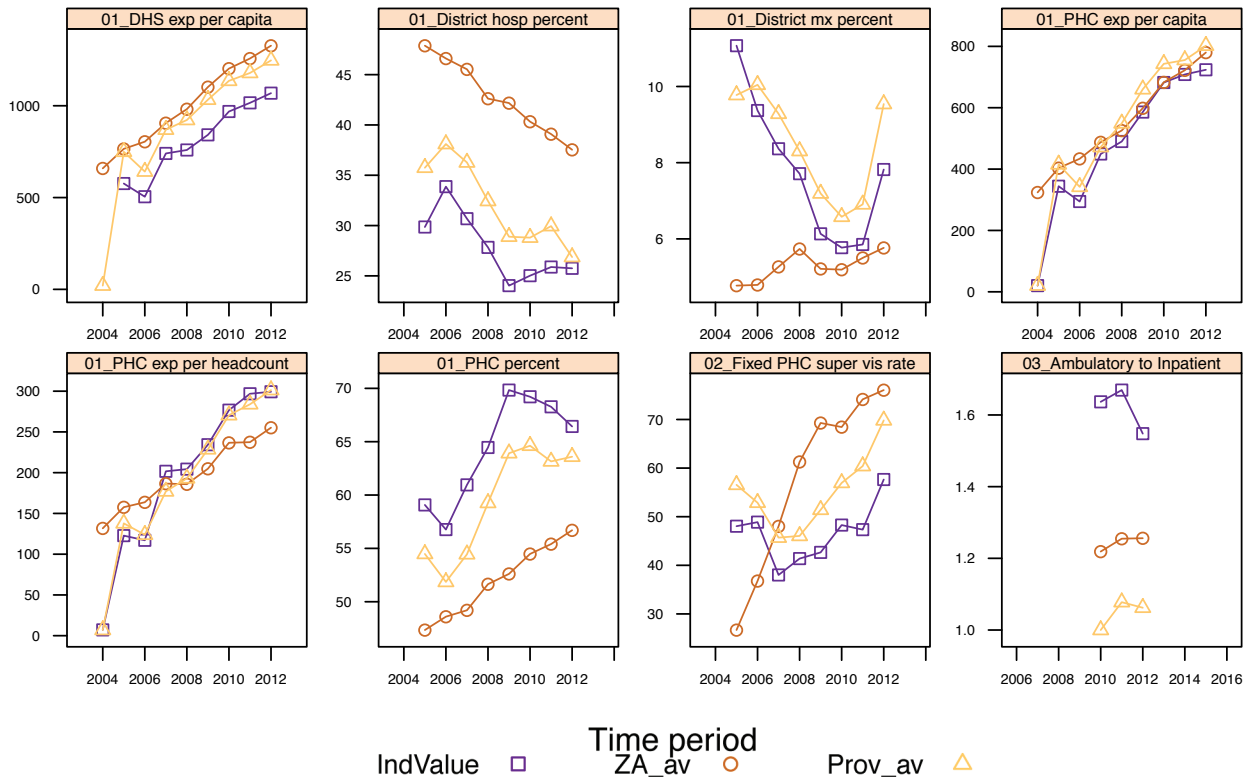
### Annual trends: PHC supervisor visit rate (fixed clinic/CHC/CDC)



<sup>e</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.

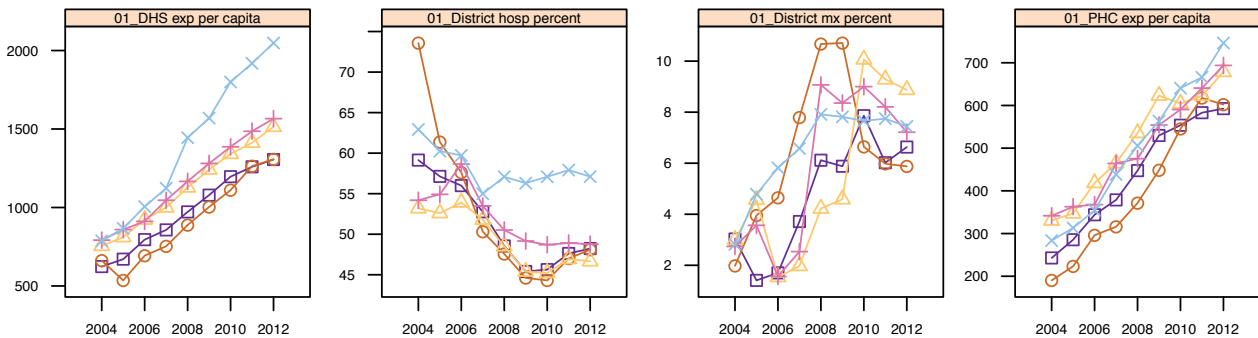
In section B of the report, there are composite graphs showing annual trends for all districts for all the indicators included in the DHB. The district indicator value (IndValue) is shown together with the relevant provincial (Prov\_av) and national averages (ZA\_av) (see legend below).

**Annual indicators for district: Bojanala: DC37**



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

**Annual indicators for districts in Limpopo (LP)**



The CD also includes many other graphs showing annual and monthly trends by indicator, by province and by individual district. The monthly graphs have been created with R statistics software and also have a loess regression line to help discern the trends.