

# Introduction

## Background

The 2018/19 *District Health Barometer (DHB)* provides an overview of the delivery of selected healthcare services in the public health sector across the provinces, districts and local municipalities/sub-districts of South Africa. The *DHB* has been an annual publication since 2005. The main focus of the 2018/19 publication is the Sustainable Development Goals (SDGs)<sup>a</sup> and the Universal Health Coverage (UHC)<sup>b</sup> index. Data are drawn from the electronic District Health Information Software (WebDHIS), the Ideal Clinic Realisation and Maintenance system, Statistics South Africa (Stats SA) surveys, the National Treasury Basic Accounting System (BAS), the Personnel Administration (PERSAL) system, the TIER.Net for Tuberculosis (TB) and antiretroviral (ART) data, the Electronic Drug-resistant Tuberculosis Register (EDRWeb), the National Income Dynamics Study (NiDS), and other National Department of Health (NDoH) information systems. The publication seeks to highlight inequities in health outcomes, health-resource allocation and health delivery, and to track the efficiency of health processes, across all provinces and districts.

Compilation of the *DHB* is guided by a technical working group made up of managers from the NDoH, the Health Information Systems Programme (HISP), and the Health Systems Trust (HST). The *DHB* is again divided into two separate but complementary publications, namely the *DHB: District Health Profiles*, and the *DHB*. The district chapter format in the *District Health Profiles* is aligned with the District Health Plan (DHP) template of the NDoH for the period 2020/21 - 2022/23. The district chapters in the *DHB* only contain trend graphs of the indicators included in Section A: Indicator Comparisons per programme of this publication.

## Methodology and data sources

### Indicators used in the 2018/19 DHB

The indicators<sup>c</sup> in this *DHB* have been approved by the NDoH. The chosen indicators are those linked to measuring the NDoH's Annual Performance Plan (APP), the provincial APPs and the DHPs of the districts, as well as progress on the SDGs and UHC. All the indicators in this publication are categorised according to the UHC index; where applicable, the indicator names are also replicated from the National Indicator Data Set.

Indicators based on health facility data were updated from WebDHIS for the financial years up to 2018/19, ending in March each year. The data were received in July 2019.

### Population data

Indicators requiring population denominators were assigned mid-year population estimates for the relevant year, as available at the time of calculation. The district population estimates (five-year age groups) used were developed by Stats SA for 2002 - 2021 (based on the best available information from Census 2016 and other sources of demographic information). These are the same population estimates currently included in the WebDHIS.

### Uninsured population estimates

The uninsured population time series was based on medical scheme coverage modelled estimates developed by Daniel Shapiro of Insight Actuaries and Consultants, together with the population time series estimates currently in the DHIS for all years. Overall, from year 1 to year 2 the coverage level remained remarkably static, at around 16% ± 1%. Therefore, for the purposes of this analysis, it was considered adequate to apply a single-year estimate of medical scheme coverage to the whole population time series, since the variation in coverage between districts is more relevant than changes in coverage over time.

a Work of the Statistical Commission pertaining to the 2030 Agenda for Sustainable Development. Available from: [https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework\\_A.RES.71.313%20Annex.pdf](https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework_A.RES.71.313%20Annex.pdf).

b World Health Organization. Available from: [https://www.who.int/healthsystems/universal\\_health\\_coverage/en/](https://www.who.int/healthsystems/universal_health_coverage/en/).

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

The number of covered and uncovered lives was estimated using Insight's small area model. The model used different sets of survey data to estimate the population and the number of medical scheme beneficiaries for small areas in the South African Census. The small-area estimates were then aggregated to municipalities according to the current municipal demarcations.

Small area populations were estimated by rescaling Census 2011 person data to the total population; this was done by local municipality as per the 2016 Community Survey<sup>d</sup> and by metro as per the 2018 General Household Survey.<sup>e</sup>

The number of medical scheme beneficiaries was estimated using a predictive model. Household information from the 2018 General Household Survey was used to model the number of medical scheme beneficiaries in a household, based on predictors also available in the Census data. Separate models were built for the probability of a household having coverage, and for the number of individuals covered if that household had coverage. The predictors included gender of the household head, age of the household head, province, metro, income category, and number of household members. The models were then applied to Census data to predict the number of medical scheme members in households for each small area. Household information was taken from Descriptive Community Profile data of the Census and scaled using the 2016 Community Survey and the 2018 General Household Survey total populations. The predicted number of medical scheme beneficiaries was scaled to the number of medical scheme beneficiaries by metro from the 2018 General Household Survey, and to the number of medical scheme beneficiaries by province in the Council for Medical Schemes Annual Report.

### **District health expenditure indicators**

Provincial health expenditure up to 2018/19 was extracted from the National Treasury Basic accounting system (BAS). Expenditure allocated to specific health facilities (listed hierarchically according to 'responsibility level') was coded to the latest DHIS facility information. All other expenditure that could not be clearly allocated to a specific district (such as, for example, provincial-level expenditure) was allocated to each district proportionate to the population share of the area involved.

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 District Health Services expenditure includes all sub-programmes under Programme 2: District Health Services, except sub-programme 2.8 (Coroner services).

Additional data sources used include:

- ◆ Data from the National Treasury on local government expenditure on PHC. Net expenditure was used, i.e. expenditure less revenue (which includes transfers from provinces to local government).
- ◆ Factors for inflation adjustments based on Consumer Price Index (CPI) (Stats SA) were used to convert expenditure for all years to real 2018/19 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.
- ◆ Uninsured population estimates, derived from modelled estimates of medical scheme coverage and the DHIS population time series.

Per capita expenditure indicators use public sector expenditure divided by the uninsured population. However, the General Household Survey<sup>f</sup> and other sources indicate that the uninsured population makes significant use of private sector services, and the insured population also makes some use of public sector services. As such, it is acknowledged that there is a wide range of uncertainty surrounding the true size of the population that is dependent on public sector services, which affects the accuracy of the per capita expenditure indicators.

### **Smoothed pneumonia case fatality rate and corresponding rescaled index indicator**

The UHC indicator reported by the WHO is 'care-seeking behaviour for children with suspected pneumonia', expressed in percentage terms. This measure can be included in survey instruments used by caregivers about illnesses that children might have had in the previous two weeks. The 2016 South Africa Demographic and Health Survey (SADHS) reported on the percentage of children with symptoms of acute respiratory infection for whom advice or treatment was sought; however, the numbers were so small that only a single national figure was provided. An alternative, which can be obtained from DHIS data, is an index based on the pneumonia case fatality rate (CFR) in children under 5 years of age. The pneumonia CFR under

d Statistics South Africa. Community Survey 2016. Available from: [http://www.statssa.gov.za/?page\\_id=6283](http://www.statssa.gov.za/?page_id=6283).

e Statistics South Africa. General Household Survey, 2018. Available from: <http://www.statssa.gov.za/?p=12180>.

f Statistics South Africa. General Household Survey. Pretoria: Stats SA; 2015.

5 years is defined as the number of pneumonia deaths in children under 5 years as a proportion of pneumonia separations under 5 years in health facilities. It therefore only measures deaths in children admitted to a health facility.

District-level time series for pneumonia CFR under 5 years were computed by smoothing DHIS yearly data using a generalised additive model with thin-plate splines, after removal of extreme outliers. A rescaled indicator (expressed as a coverage on the scale 0-100) was calculated, as per WHO guidance, by applying the following formula:  $\text{index} = (\text{max CFR} - \text{min CFR}) / (\text{max risk} - \text{min risk}) \times 100$ , where CFR is the smoothed estimate describe above, and max CFR and min CFR are the maximum and minimum values of CFR observed across districts, respectively.

## TB indicators

TB indicators were provided by the NDoH for the most recent year, based on the TIER.Net and EDRWeb.

## Diabetes prevalence and treatment coverage

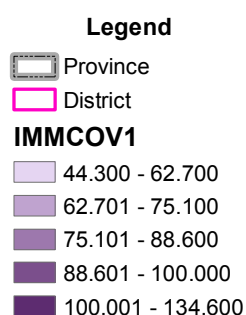
In order to generate local estimates of diabetes prevalence, a machine-learning model was trained with SADHS 2016 data to predict individual probability of being diabetic using demographic information (age, gender, race), bio-behavioural characteristics (body mass index, waist circumference, current smoking), self-reported previous diagnosis, and use of medication. The model was then applied to data from each NiDS 'wave' to estimate the prevalence at sub-national level by averaging the predicted probabilities of being diabetic for the individuals in each district and adjusting for the imperfect sensitivity and specificity of the predictive model. The sampling design of the survey was taken into account in the procedure. The proportion of patients with diabetes receiving treatment was directly estimated from self-reported data, and treatment coverage was calculated as the ratio between the proportion of the population on treatment, and diabetes prevalence. A smooth variation over time was assumed for both diabetes prevalence and treatment coverage within each district, and final yearly estimates were generated by fitting a series of generalised linear models.

## Data display

### Indicator maps and ranking

ArcMap 10.6 was used to generate the thematic or choropleth maps of indicator values by district and sub-district. Most of the maps were created using 'natural breaks',<sup>9</sup> with five categories as the default. In some cases the distribution was heavily skewed at the local municipality level and manual breaks were chosen to better illustrate areas of public health importance. 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'. Therefore, dark shades are not always best, and each indicator map should be interpreted in terms of the desired target range for that indicator.

**Figure 1: Example of natural breaks in choropleth maps of indicator values by district and sub-district**



## Averages

All averages (provincial and national) are *weighted averages*, based on the total numerator and denominator for all the sub-areas included, and are, therefore, 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.

<sup>g</sup> This is the default classification method in ArcMap, 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.

## Financial year and calendar year

Indicators from the DHIS and the BAS cover the 12 months from April to March, which is the financial year of the NDoH. Indicators for financial years are annotated as 2018/19 or FY 2019. The TB data from TIER.Net and EDRWeb cover a calendar year. Data from the Stats SA surveys correspond with the period of a survey. Human resources (HR) data are cross-sectional (for a specific month in a year). 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?

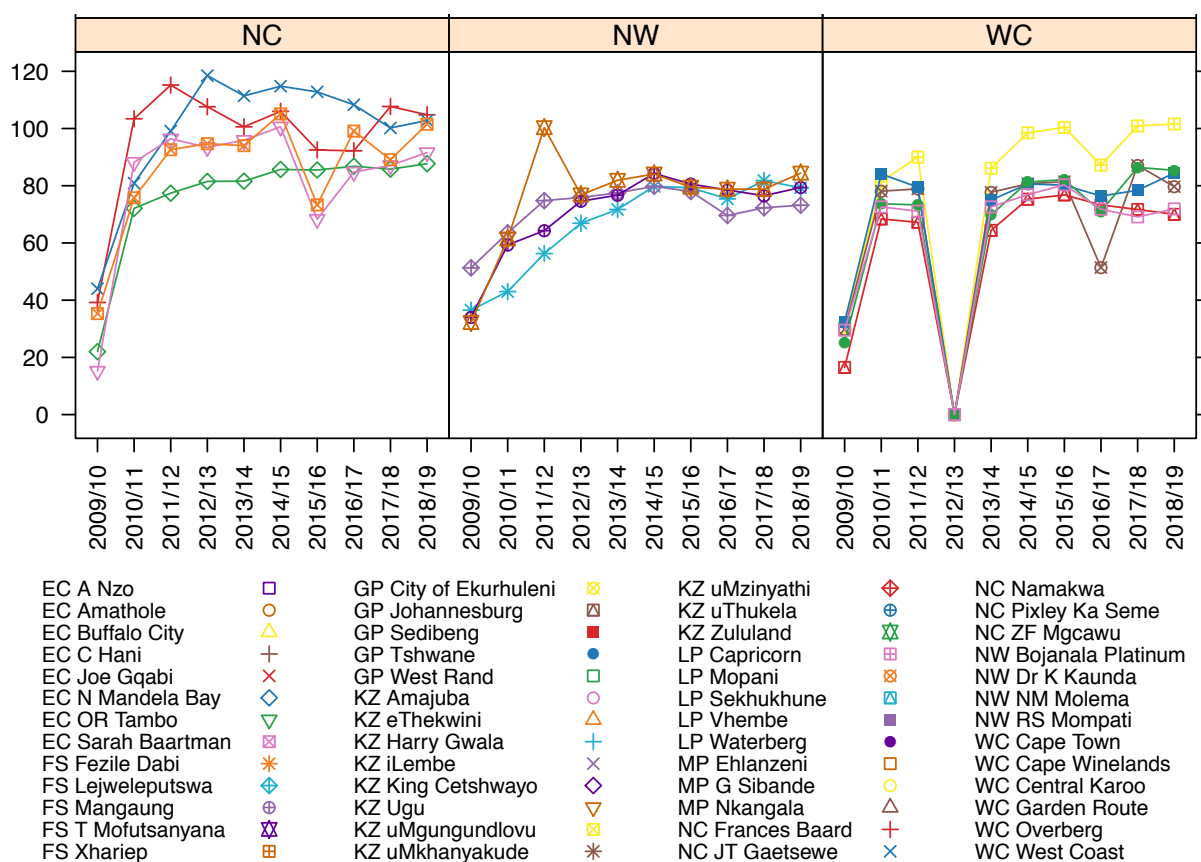
The districts are ranked from 1 to 52 (for the various indicators in the league table graphs, where number 1 represents the best performance and number 52 the worst performance). However, with some indicators, such the expenditure indicators, an indicator in the number 1 position does not mean best performance; 'best' is usually in the middle range close to the South African average. For these indicators, 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) or descending (high values are best, for example immunisation coverage).

In the *DHB* data file, the indicator ranks for all districts are coloured from green 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 based on 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 towards red) if other districts have improved to a greater extent.

## Trends

Annual indicator trends (district and provincial) are included in some chapters in Section A: Indicator Comparisons per programme (Figure 2). 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 notice differences easily. Annual trends also reveal variation and change within the districts in a particular province over time.

**Figure 2: Example of annual indicator trends across districts and provinces, 2008/09 - 2018/19**



In section B of the report, composite graphs show annual trends for all districts for all the indicators included in Section A: Indicator Comparisons per programme of the *DHB*. The district indicator value is shown together with the relevant provincial averages and South African national averages (Figure 3).

**Figure 3: Example of annual indicator trends for districts**

