Introduction and overview

Background

The 2019/20 *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. As for the 2018/19 publication, the main focus for the 2019/20 edition is on the Sustainable Development Goals (SDGs) and Universal Health Coverage (UHC) index. Data are drawn from the 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 System (PERSAL), the Three Integrated Electronic Registers (TIER.Net) for tuberculosis (TB) and antiretroviral therapy (ART) data, the Electronic Drug-resistant Tuberculosis Register (EDRWeb), the National Income Dynamics Study (NiDS) and other National Department of Health information systems. The publication seeks to highlight inequities in health outcomes and 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 a technical work group made up of eight Public Health specialists and Health Systems Trust (HST). The district chapters in the *DHB* contain trend graphs of the indicators included in Section A: Indicator Comparisons per programme, as well as additional indicators aligned with the District Health Plan template of the National Department of Health. The district chapters also include the burden of disease (BOD) profiles for 2012–2017. The BOD profiles cover the percentage of deaths by broad cause; deaths are classified into four groups, namely: (i) injuries; (ii) non-communicable diseases; (iii) HIV and TB; and (iv) communicable diseases together with maternal, perinatal and nutritional conditions. Data are presented by gender and age group as well as the 10 leading single causes of death within each age group and by gender.

The *DHB* is available at http://www.hst.org.za.

Methodology and data sources

Indicators used in the 2019/20 DHB

The indicators[a] in this *DHB* focus mainly on South Africa's progress towards achievement of the SDGs and UHC. 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 ending March, up to 2019/20, and downloaded in July 2020.

Population data

Indicators requiring population denominators (human resources for health and financial indicators) 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) developed by Stats SA for 2000–2030, available August 2020, are used. Population-denominated indicators from WebDHIS used the time series loaded in that system at the time of extraction.

Uninsured population estimates

The uninsured population time series was based on district-level modelled estimates of medical scheme coverage developed by Daniel Shapiro of Insight Actuaries and Consultants, together with the population time series estimates. Overall, medical scheme coverage has 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 whole population time series, since the variation in coverage between districts is more relevant than are changes in coverage over time.

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

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

Small areas population was estimated by rescaling Census 2011 person data to the total population by local municipalities as per the 2016 Community Survey, and the total population by metros as per the 2018 General Household Survey.

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 Census data. Separate models were built for the probability of a household having coverage and for the number of individuals covered, given that a household has 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 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 2019/20 was extracted from the National Treasury BAS. Expenditure allocated to specific health facilities (under the 'Responsibility level' hierarchy) 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 in proportion to the population share of the areas 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 Primary Health Care (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 on local government expenditure on PHC 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 the Consumer Price Index (CPI) (Stats SA) were used to convert expenditure for all years to real 2019/20 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[b] 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 World Health Organization (WHO) is care-seeking behaviour for children with suspected pneumonia, expressed in percentage terms. This measure is amenable for inclusion in survey instruments, which ask caregivers about illnesses their children might have had in the previous two weeks. The South African Demographic and Health Survey[c] (SADHS) 2016 reported on the percentage of children with symptoms of acute respiratory infection for whom advice or treatment was sought; however, the numbers are so small that only a single national figure is 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 5 years is defined as the pneumonia deaths in children under 5 years as a proportion of pneumonia separations under 5 years in health facilities. It therefore only measures those deaths that occur in children who have been 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 (Pneumonia case survival under 5 years rate) was calculated, as per WHO guidance, by applying the following formula and expressed as a coverage on the scale 0–100:

index = (max CFR – CFR) / (max CFR – min CFR) x 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.

b Statistics South Africa. General Household Survey. Pretoria: Statistics South Africa; 2015.

c National Department of Health. South Africa Demographic and Health Survey 2016. Key Indicators Report. Pretoria: NDoH; 2016.

Tuberculosis indicators

Tuberculosis (TB) indicators for the most recent year based on the TIER.Net and EDRWeb were provided by the National Department of Health (NDoH).

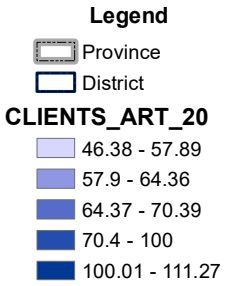
Diabetes prevalence and treatment coverage

In order to generate local estimates of diabetes prevalence, a machine learning model was trained with SADHS 2016 data to predict individual probabilities of being diabetic from demographic (age, gender, race) and bio-behavioural (body mass index, waist circumference, current smoking) characteristics, 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 population proportion of treated and diabetes prevalence. A smooth variation over time of both prevalence of diabetes and treatment coverage within each district was assumed, and final yearly estimates and projections for the years for which data were not available were generated by fitting a series of generalised linear models.

Indicator maps and ranking

ArcMap 10.6 was used to generate the thematic or choropleth maps of indicator values by district and local municipality/sub-district. Most of the maps were created using 'natural breaks',[d] 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



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.

Data display

Financial year and calendar year

Indicators from the DHIS and the BAS financial system cover the 12 months from April to March, which is the financial year of the NDoH. Indicators for financial years are annotated as 2019/20 or FY 2020. The TB data from TIER.Net and EDRWeb cover a calendar year. Data from the Stats SA surveys correspond with the period of the survey. Human resource 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.

d 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.

Indicator ranking – is first always best?

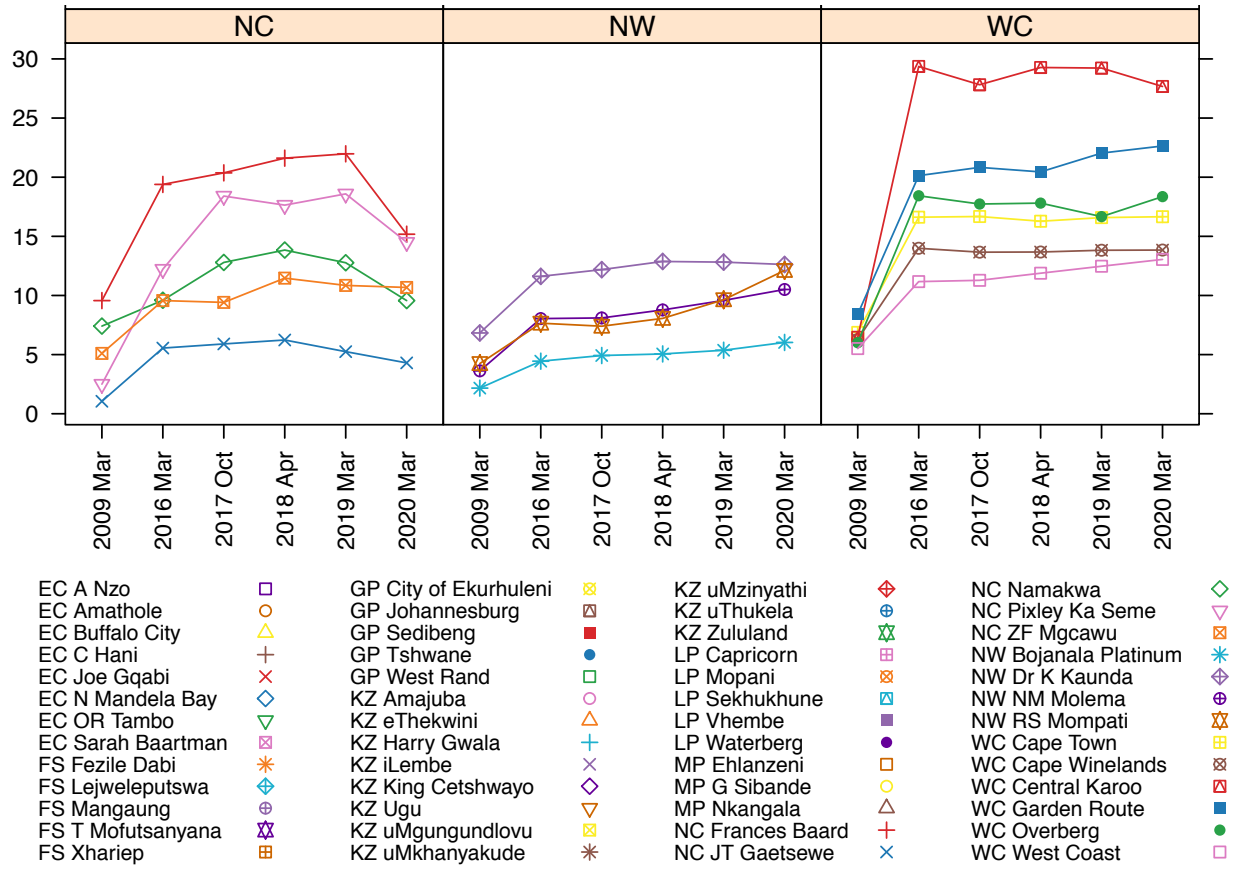
The districts are ranked from 1 to 52 (for the various indicators in the league table graphs where number 1 represents the best performance and number 52 the worst performance). However, with some indicators such as the expenditure indicators, an indicator in the number 1 position does not mean best 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 merely 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. move 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 over a number of years across districts and provinces



In section B of the report, composite graphs show annual trends for all districts for the majority of indicators included in Section A: Indicator Comparisons per programme of the *DHB* as well as additional indicators aligned to the District Health Plan template of the NDoH. The district indicator value is shown together with the relevant provincial averages and ZA national averages (Figure 3).

Figure 3: Example of annual indicator trends for districts