INTRODUCTION AND OVERVIEW

Background

The 2023/24 *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. Data are drawn from the web-based District Health Information System (WebDHIS), Statistics South Africa (Stats SA) surveys, the National Treasury Basic Accounting System (BAS) and the Personnel Administration System (PERSAL). 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.

The DHB publication is available at http://www.hst.org.za. and the interactive online dashboard is accessible from http://www.dhb.hst.org.za

Methodology and data sources

Indicators used in the 2023/24 DHB

The indicators[1] in this DHB focus mainly on South Africa's progress towards achievement of the Sustainable Development Goals (SDGs) and universal health coverage (UHC).. The indicators in this publication are categorised according to the UHC index[2] (reproductive, maternal, newborn and child health, infectious diseases, non-communicable diseases, service capacity and access); 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 2023/24, and downloaded in July 2024.

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, 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.

1 A table with definitions, references and terms for each indicator used in this report is available in Appendix 1.
2 Hogan DR, Stevens GA, Hosseinpoor AR, Boerma T. Monitoring universal health coverage within the Sustainable Development Goals: development and baseline data for an index of essential health services. The Lancet Global Health. 2018;6(2):e152-e68.

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. 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 2023/24 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 2023/24 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[3] 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.

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

Indicator maps and ranking

Thematic mapping was conducted using R[4], employing various spatial data manipulation and visualisation packages.

The spatial dataset was prepared by importing a shapefile containing local municipal boundaries using the *sf* package, which allowed for the representation of districts and provinces within South Africa.[5,6] Indicator data was sourced from a Microsoft Excel file and processed using *dplyr*, where district identifiers were standardised to match those in the shapefile. A left join was performed to merge the indicator dataset with the spatial boundaries, ensuring that each district's geographic representation was linked to its respective indicator values.

Thematic maps were generated using a continuous colour scale from the *viridis* package, with the scale_fill_viridis_c function applied for its perceptually uniform gradient, which is colourblind-friendly and well-suited for continuous data visualisation.[7] The plasma colour scheme was used, assigning lighter, yellowish shades to high values and darker, purplish shades to low values to enhance interpretability. Districts without available data were outlined in red to highlight gaps, while those with data were outlined in grey. Provincial borders were delineated by aggregating district geometries and displaying them with black outlines for clear regional distinction (Figure 1).

For labelling, the *shadowtext* package was employed to improve text readability, with district names displayed in black text on a white halo for areas with data, while districts without data were labelled in red to further emphasize missing information.[8]

The final maps were exported in A4 landscape format using the ggsave function from *ggplot2*, ensuring high-resolution output suitable for reports and presentations.[9,10]

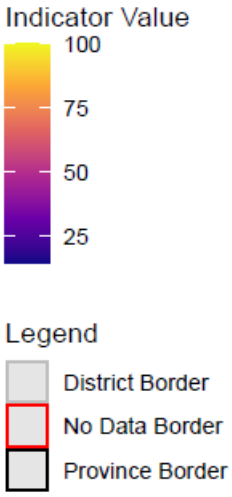

Figure 1 Indicator colour scheme and legend

4 R Core Team. R: A language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing; 2023. Available from: https://www.r-project.org/
5 Pebesma E. Simple features for R: standardized support for spatial vector data. R J. 2018;10(1):439–46.
6 Pebesma E. sf: Simple Features for R [Internet]. 2024 [cited 2024 Mar 4]. Available from: https://r-spatial.github.io/sf/
7 Garnier S. viridis: Colorblind-friendly color maps for R [Internet]. 2024 [cited 2024 Mar 4]. Available from: https://sjmgarnier.github.io/viridis/
8 Yu G. shadowtext: Shadow text grob and layer for ggplot2 [Internet]. 2024 [cited 2024 Mar 4]. Available from: https://cran.r-project.org/web/packages/shadowtext/
9 Wickham H. ggplot2: Elegant graphics for data analysis. 2nd ed. New York: Springer; 2016.
10 Wickham H, François R, Henry L, Müller K. dplyr: A grammar of data manipulation [Internet]. 2023 [cited 2024 Mar 4]. Available from: https://dplyr.tidyverse.org/

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 2023/24 or FY 2024. The TB data 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.

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.

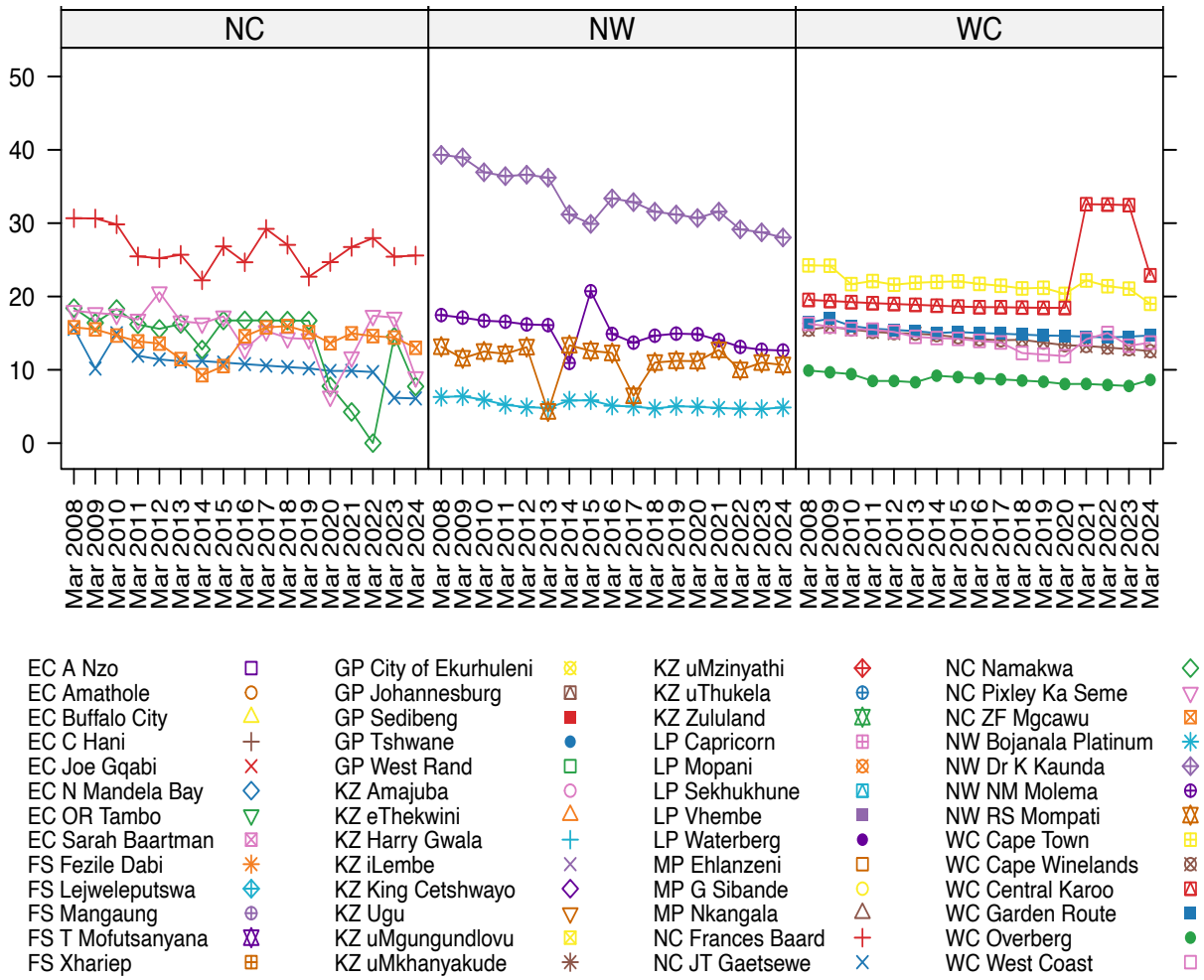

Figure 2 Example of annual indicator trends over a number of years across districts and provinces

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. The district indicator value is shown together with the relevant provincial averages and ZA national averages (Figure 3).

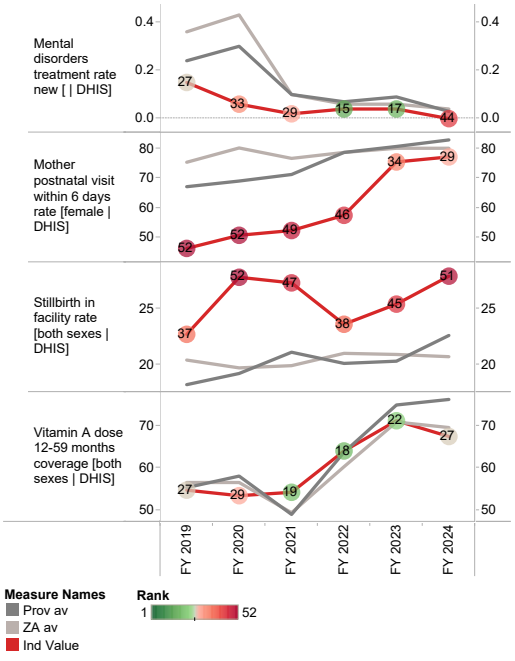

Figure 3 Example of annual indicator trends for districts