

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 available annually since 2005 and draws data from the District Health Information System (DHIS), StatsSA, 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). It seeks to highlight inequities in health outcomes, health resource allocation and delivery, as well as track the efficiency of health processes across provinces and districts in the country.

An advisory committee made up of managers from the National Department of Health (NDoH), as well as health experts and stakeholders from the academic, private and research arenas, guides the DHB.

This edition is longer and more extensive than previous editions. 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/dhb> and on CD from the Health Systems Trust.

Methodology and Data Sources

Indicators used in this DHB

The indicators^a in this DHB have been approved by the NDoH. The chosen indicators are the ones linked to measuring the Millennium Development Goals, the NDoH's Annual Performance Plan, the District Health Plan of the health districts and those that measure some important aspect of the burden of disease.

This year several new indicators have been added. These are:

- Usable beds per 1 000 uninsured population
- Utilisation rate under 5 years – PHC
- Vitamin A coverage 12 to 59 months
- Early neonatal death rate
- Facility under-1 mortality rate
- Facility under-5 mortality rate
- Measles 1st to 2nd drop-out rate
- Pneumococcal vaccine 3rd dose
- Couple year protection rate
- Cervical cancer screening coverage
- Antenatal visits before 20 weeks rate
- HIV prevalence among antenatal clients tested (survey)
- Antenatal client initiated on HAART rate
- Baby initiated on HAART under 18 months rate
- Mental health case load.

The TB indicators for smear conversion, defaulter and cure rates only focus on new smear-positive pulmonary TB cases. More detailed spreadsheets from the NDoH, 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:

- Diabetes mellitus detection rate
- Proportion of expenditure by main item
- Severe malnutrition under 5 years incidence
- Perinatal mortality rate in facility
- Facility crude death rate.

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

The indicators are categorised according to programmes and no longer according to indicator types (input, process, output, outcome and impact). Most of the indicators in this report, excluding the socio-economic, financial and some 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 2011/12, received in June 2012. 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 2011/12). 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 and expenditure per patient day equivalent. The chronic disease indicators (hypertension detection rate and mental health case load) were limited to PHC facility data only.

PMTCT indicators

Gaps in the completeness of the DHIS data affect national averages, interpretation, analysis and trends for some of the National Indicator Data Set (NIDS) indicators such as Baby Polymerase Chain Reaction (PCR) test around 6 weeks uptake rate and PCR test positive around 6 weeks rate. These two indicators have been compared with two other indicators, namely early infant HIV diagnosis coverage and 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 survey and data from the National Health Laboratory Service (NHLS), which performs infant PCR testing for the public health service. For the NHLS indicator on early infant HIV diagnosis coverage, the estimated number of HIV-exposed infants in need of PCR testing (denominator) was estimated from the live births in facility recorded in DHIS multiplied by the average antenatal HIV prevalence. It should be noted that there are some substantial differences in the number of live births at district level reported in the DHIS as compared to Statistics South Africa (StatsSA) and there will, therefore, be differences in coverage estimates reported in this DHB and the monthly reports issued by NHLS (which are based on StatsSA live births multiplied by HIV prevalence for the denominator).

The NHLS data on PCR tests are still reported according to the old district boundaries. Therefore, we obtained the facility-level data and aligned the records to the new boundaries by matching the facilities to DHIS or using other geographic information available. The location of some facilities was uncertain after this process and it is noted that there may be some small errors in the assignment of PCR tests between districts as a result, but this does not affect the overall national total.

For the NHLS indicator on the proportion of PCR tests HIV positive for infants under two months of age, this has been calculated as the proportion of ALL tests in infants under two months that are POSITIVE. The other result categories (with reference to FY 2012 results) are:

- EQUIVOCAL – 0.05%
- INDETERMINATE – 1.05%
- LOW POSITIVE – 0.04%
- REJECTED – 0.24%
- NEGATIVE – 96.01%
- POSITIVE – 2.6%.

If the percentage positive was calculated using only the POSITIVE and NEGATIVE results this would make virtually no difference at national level. However, it should be noted that in KwaZulu-Natal districts particularly there are between 2.6-4.1% of test results which are INDETERMINATE in FY 2012 and, if these were excluded, the positivity would be slightly lower – about 0.1 percentage points lower in most cases. Note that in its own reports NHLS considers only the POSITIVE and NEGATIVE in calculating the percentage positive.

District health financing indicators

Data on provincial health expenditure from 2005/06 to 2011/12 was extracted from the National Treasury Basic Accounting System (BAS) database. All expenditure data were re-coded to the latest DHIS facility information and aligned to the new (2011) demarcation boundaries. Where possible, expenditure was allocated to individual health facilities and was, therefore, easy to re-align to new boundaries. However, for general area expenditure it was sometimes more difficult to allocate the expenditure accurately. All expenditure that could not be clearly allocated to a specific district was split to each district according 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 Buffalo City according to the population share of those two districts.

Provincial expenditure was coded according to the programmes and sub-programmes published by National Treasury. Expenditure from sub-programmes 2.1-2.7 (district management, 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. This is different to how the indicator was reported in previous DHBs, where non-hospital PHC included only sub-programmes 2.1-2.5). Total DHS expenditure includes all sub-programmes under Programme 2: District Health Services, excluding sub-programme 2.8 (Coroner services). These changes have been made to better align the DHB indicators with the District Health Expenditure Reviews.

Additional data sources used include:

- Data on local government expenditure on primary health care from National Treasury. Net expenditure was used, i.e. expenditure less income which includes transfers from provinces to local government.
- Factors for inflation adjustments based on Consumer Price Index (CPIX) were obtained from National Treasury to convert expenditure for all years to real 2011/12 prices.
- Medical scheme coverage from the StatsSA General Household Surveys (GHS) was used to calculate the uninsured population. The GHS is the only source of district-level estimates of medical schemes coverage, but these were available only for 2005-2007 and there were some anomalies in the data in that period. Over time, reliable extrapolation of coverage at the 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%. Thus, for the purpose of this analysis, it was considered adequate to apply a single year estimate of medical schemes 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 where the overall rate in GHS is comparable with CMS and historical trends. This estimate uses the pooled 2005-2007 district-level estimates, adjusted according to the change in provincial coverage between the two periods (for example, where Gauteng (GP) and Western Cape (WC) were clearly under-reported in 2005-2007). 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.

For the purposes of these calculations of per capita expenditure we have divided public sector expenditure 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. Thus 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.

The figures have all been adjusted to take the effect of inflation into account and are presented in real 2011/12 prices. This means that increases in expenditure over time reflect greater availability of resources rather than just 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 2001–2016 (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.

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.^b

Variables included in the analysis are considered to be indicators of material and social deprivation. The deprivation indices for this report were generated using StatsSA's 2006 GHS data and the 2007 Community Survey (CS) data and have been calculated in such a way that the indices are directly comparable to the deprivation indices generated from the 2005 GHS data. This, therefore, provides three years of deprivation trend data.

To simplify interpretation the deprivation index was normalised such that the district that is least deprived has a deprivation index of 1. Districts with higher values are relatively more deprived than districts with lower values. The score itself does not have any intrinsic meaning, but the relative scores show which districts are more deprived than others and can be

^b 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.

used to rank districts. Each district was thus 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).

Unfortunately, no new district level data for the deprivation index has been collected since 2007, thus 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. With the release of detailed data from Census 2011, it will be possible to update the index in the future.

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 over time this assumption becomes increasingly uncertain.

The old data are also available only by the 2006-2010 boundaries and so the following assumptions have been made in order to approximate the SEQ for districts that have changed boundaries:

- EC125 was SEQ 3, so BUF was assigned to SEQ 3. The remainder of DC12 (the new Amathole) was assigned to SEQ 2 as 4/6 of the remaining sub-districts are SEQ 2
- DC15 and DC44 – all sub-districts except EC157 are SEQ 1, therefore both districts remain SEQ 1
- FS172 was in SEQ 4 and previously DC17 (Motheo) was on the borderline of SEQ 3 and 4 so MAN has been placed in SEQ 4
- DC16 – now has ¾ of sub-districts in SEQ 4 so have changed to SEQ 4
- DC19 still has most sub-districts in SEQ 3 so left in SEQ 3
- TSH – only GT462 is in SEQ 3, other sub-districts are SEQ 4, so left in SEQ 4.

Maternal deaths

In the case of the number of maternal deaths from confidential enquiries, the data were reported according to the old boundaries and so the following assumptions were made to enable alignment with the new boundaries for the DHB:

- Using the DHIS data for Buffalo City (BUF) and Amathole (DC12) for 2008/09-2011/12 (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 2008/09-2011/12 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 for FY 2012 were obtained from Sinjani^c and imported into DHIS.

HIV prevalence among antenatal clients tested (survey)

The ANC survey results for 2001-2010 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.^d

The national prevalence rates were taken from the ANC Survey reports, since these are calculated using weights for the number of women 15-49 years in each province and these weights were not available to us.

Due to the relatively small sample sizes, the prevalence rates do fluctuate somewhat in some districts year-on-year and, therefore, the data were pooled to provide a more stable time series, combining 2001-2004, 2005-2007 and 2008-2010. All of these results were large enough to use the normal approximation to the binomial distribution for the CI calculations. For the grouped estimates a straight average of the national prevalence estimates for the relevant years was used.

^c Sinjani is the equivalent of the DHIS used only in the Western Cape province.

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

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.

Substantial boundary changes came into effect with the municipal elections in May 2011, including the incorporation of all district-managed areas (DMAs) into districts, the creation of two new metros (Buffalo City in the Eastern Cape and Mangaung in the Free State) and the incorporation of Metsweding into Tshwane in Gauteng, among others.

Averages

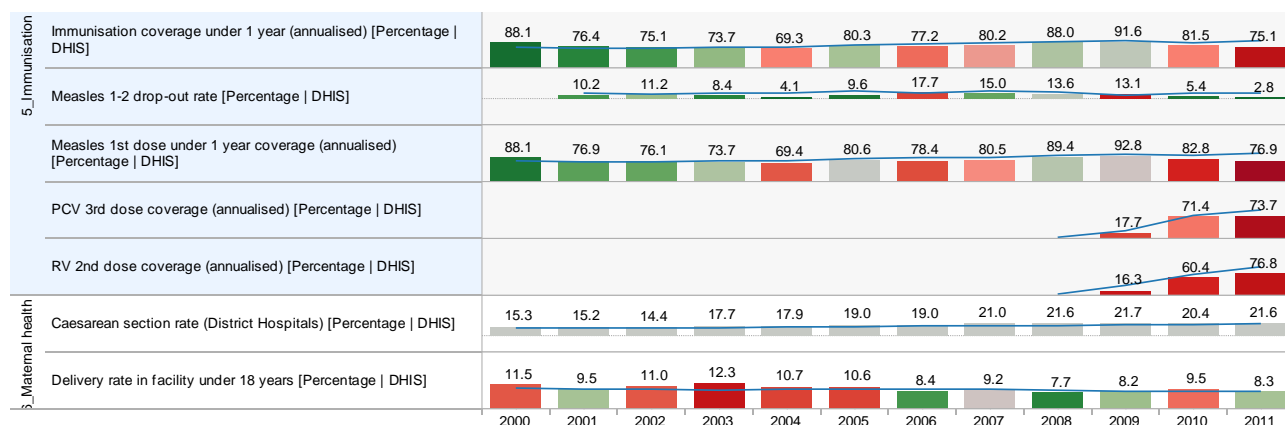
It is important to note that all averages (provincial and national) are weighted averages, based on the total numerator and denominator for all the sub-areas included, and are thus not averages of the district indicator values. Therefore, these averages may appear 'skewed' for any indicator in any province 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 Basic Accounting System (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 2011/12 or FY 2012. Other sources such as the TB data from ETR.net, antenatal HIV survey, water quality and cause of death data cover a calendar year. Data from StatsSA surveys are for the period of the census or survey.

In the district profiles in section B, the main year of data has been used for the axis labels in order to simplify the presentation of long-term trends across multiple indicators, some of which are by calendar year and others by financial year. In these graphs, the year 2011 would represent data for 2011/12 for those indicators reported by financial year, since nine of the 12 months of the data are in 2011. Readers should be aware of which actual time period is covered by checking the indicator chapter or the DHB data file.



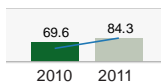
Indicator ranking – is first always best?

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.

In the district profiles, the value for each indicator for each year is ranked and colour coded from green (best) to grey (average) to red (worst) for those indicators that can be ranked.



Similarly, 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 it 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. This is illustrated by the example of rotavirus 1st dose coverage where the ranking for a particular district got worse, even though the coverage increased; in 2009 the district coverage was higher than the national average (blue line) whereas in 2010 the coverage had fallen slightly below the national average.

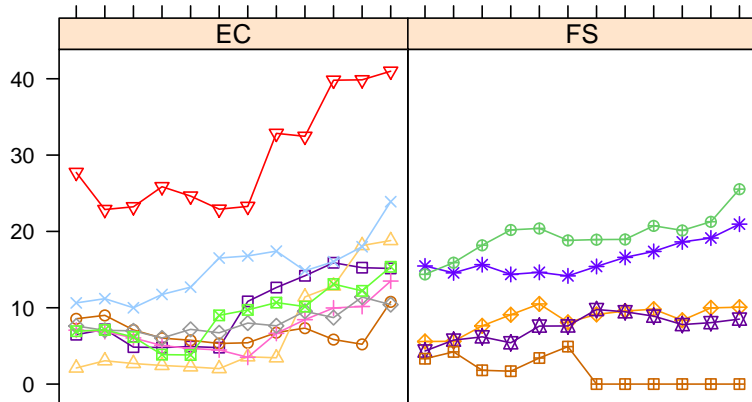


ArcView was used for generating the thematic or choropleth maps of indicator values by district. All of the maps were created using 'natural breaks'^e with five categories as the default. For all indicators, low indicator values are represented by light shades and high indicator values by darker shades, 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

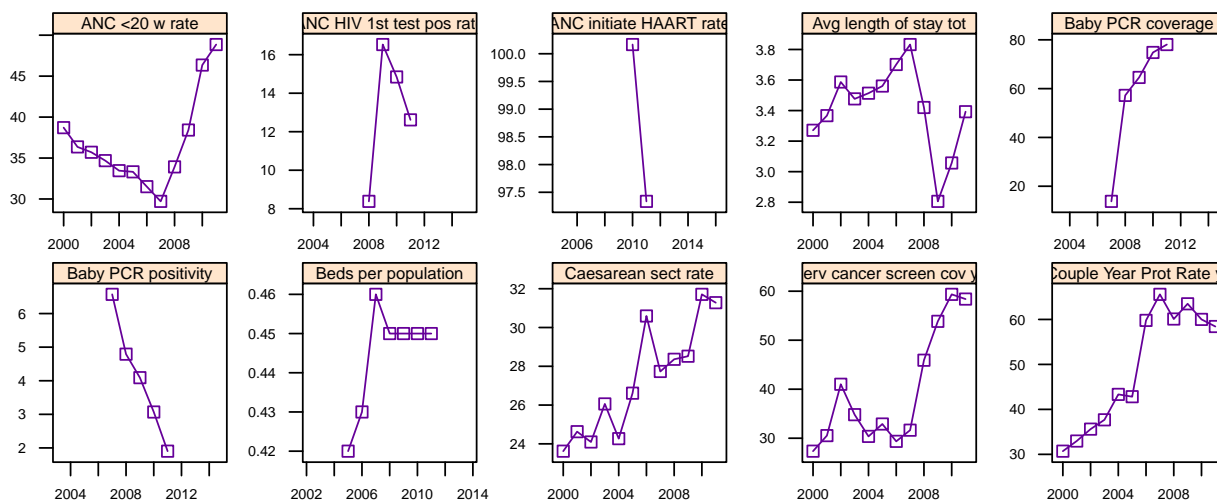
Annual trends of an indicator comparing districts and provinces are included in some chapters in section A. Indicator comparisons by district help the reader explore how an indicator varies over a number of years across districts and provinces. As the scale of the y axis is the same for all the graphs,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

Annual trends: Caesarean section rate (District Hospitals)



In section B of the report there are composite graphs showing annual trends for all districts for most of the indicators included in the DHB.

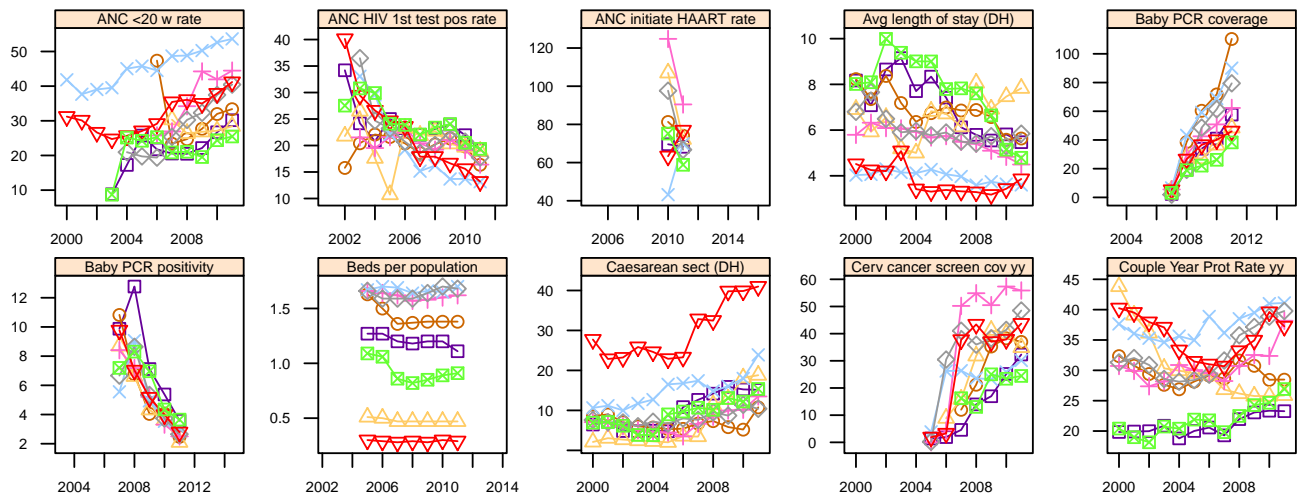
Annual indicators for district: Cape Town: CPT



^e 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.

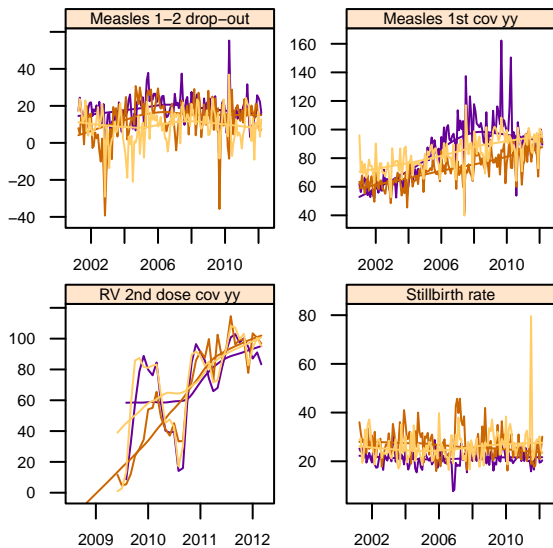
There are also composite graphs showing annual trends for all districts within each province.

Annual indicators for districts in Eastern Cape (EC)



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.

Monthly trends for all districts per province



District monthly trends

