6 Immunisation

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6.1 Immunisation coverage under 1 year

The immunisation coverage under 1 year is calculated by dividing the total number of children under 1 year who received all required immunisations by the total population of children under one year old.

Immunisation is one of the most effective health care interventions to prevent serious illnesses and death in young children. Immunisation has a significant impact on morbidity and mortality rates and plays a critical role in efforts to achieve Millennium Development Goal 4 to reduce child mortality rates by two thirds by 2015, compared to the 1990 baseline. The immunisation coverage under 1 year indicator is used to measure the effectiveness of the immunisation programme and is also a proxy indicator for the functioning of the health system.

Immunisation coverage under 1 year measures the percentage of children under one year old who have received the following immunisations:[a,b]

At birth:	OPV (0), BCG
6 weeks:	OPV (1), DTaP-IPV/ Hib (1), Hep B (1), RV (1), PCV (1)
10 weeks:	DTaP-IPV/ Hib (2), Hep B (2)
14 weeks:	DTaP-IPV/ Hib (3), Hep B (3), RV (2), PCV (2)
9 months:	Measles (1), PCV (3)

Data from the District Health Information Software (DHIS) were used to calculate this indicator. From 2013/14, the vaccinations for the rotavirus and pneumococcal conjugate vaccines that were introduced in 2009 have been included in the list of required immunisations for a child to be considered fully immunised before their first birthday. Immunisation coverage indicators are very sensitive to denominators (population estimates) or numerators that might be incorrect.

With respect to the population estimates, the old population time series has been replaced. This new time series – based on more recent information from Statistics South Africa (Stats SA) incorporating information from Census 2011 – gives an overall immunisation coverage that is more in line with other estimates (e.g. country surveys, World Health Organization – WHO[c]) and for recent years, the levels of most (but not all) districts are more realistic than was the case with the old population time series. The DHB denominators for immunisation coverage have been updated retrospectively. However, long-term trends for immunisation coverage have not been included here, as these might reflect issues with the population denominators rather than real changes in coverage. In general, rates over 100% may be due to data quality problems such as over-counting of children immunised or inclusion of campaign data, underestimation of the population denominator, or the immunisation of children born outside of the district catchment area.

The immunisation coverage in the country for 2013/14 was 84.4%. This was lower than the 94.0% for 2012/13 reported in the previous District Health Barometer[d] which was based on the old population time series, but slightly higher than the 80.1% in 2011/12 that was calculated using population data from the Census 2011. This is because the population under 1 year in Stats SA's time series estimates is about 3% lower than that reported by Census 2011. These lower estimates are expected to reflect the current situation more accurately. The National Department of Health (NDoH) target for this indicator is 90%.

The immunisation coverage differed between the provinces, ranging from 70.3% in Limpopo (LP), to 109.0% in Gauteng (GP).

The wide variation in immunisation coverage among districts in 2013/14 can be seen in Map 1 and Figure 2, the latter reflecting a variation from values above 100% for all Gauteng districts (West Rand 116.5%, Tshwane 111.2%, Ekurhuleni 108.6%, Johannesburg 107.5% and Sedibeng 104.0%) and eThekwini (KZN) with 104.7% to a low of 54.0% in Waterberg (LP). The largest improvements in immunisation coverage since 2010/11 were seen in uMgungundlovu (KZN) (a 24.6 percentage point increase) and Alfred Nzo (EC) (a 19.9 percentage point increase). Coverage declined in all LP districts other than Vhembe, to levels well below the target.

a National Department of Health. New EPI vaccine guidelines – Revised: October 2010. Pretoria: National Department of Health; 2010.

b OPV is oral polio vaccine, BCG is Bacille Calmette Guerin, DTaP-IPV/ Hib is diphtheria, tetanus, acellular pertussis, inactivated polio vaccine and *Haemophilus influenzae* type b combined, Hep B is hepatitis B vaccine, RV is rotavirus vaccine and PCV is pneumococcal conjugated vaccine. Retrieved from NIDS 2013 definitions.

c Immunization Summary: A statistical reference containing data through 2012. New York: UNICEF and WHO; 2013. Available from: http://www.childinfo.org/immunization.html

d Massyn N, Day C, Dombo M, Barron P, English R, Padarath A. District Health Barometer 2012/13. Durban: Health Systems Trust; 2013.

When looking specifically at the NHI districts (Figure 2), only three were above the national average – Tshwane (GP) (111.2%), uMgungundlovu (KZN) (96.3%) and Thabo Mofutsanyana (FS) (91.7%); Vhembe (LP) (85.7%) had a coverage similar to the average and the rest were below the average. OR Tambo (EC) had a value of only 58.0%. This was a large decrease compared with the 66.7% reported in 2011/12. uMzinyathi (KZN) also showed a large decrease (from 86.5% to 77.2%), while Tshwane (98.4%), uMgungundlovu (71.7%) and Dr Kenneth Kaunda (77.0%) all showed increases in 2011/12.

Stock-outs have been reported as the main obstacle for vaccination by a Health-e News Service investigation into vaccinations, for which weekly monitoring was conducted at five clinics in Gauteng, the Eastern Cape and Limpopo during February 2014.[e] During this time, there were stock-outs of polio, rotavirus, tetanus and hepatitis B vaccines. One clinic in Vhembe (LP) reported stock-outs of both polio and hepatitis B vaccines. Stock-outs lasted from one to four weeks. The same investigation also found that in Mpumalanga, there was a lack of trained health workers and also a lack of knowledge among mothers.[f] However, there are also numerous other factors that could have influenced the number of children vaccinated: service related factors (e.g. some facilities do immunisations only on stipulated days and not after hours); client-related factors (e.g. migration; non-adherence to return dates); and administrative factors (e.g. poor data quality; stock-out of Road-to-Health Cards).

One mechanism to assess the quality of the data is to compare the raw values of the data elements that should be more or less the same, namely those children fully immunised under 1 year, measles 1st dose and PCV 3rd dose. At a national level, the values for these three data elements are fairly similar and as expected, the number of children fully immunised is lower than the number who received individual antigens (Table 1). However, these aggregated national data conceal data quality issues and there are a large number of facilities with fully immunised numbers less than the measles 1st dose or PCV 3rd dose.

Table 1: Comparison of raw data for Immunised fully under 1 year new, Measles 1st dose under 1 year and PCV 3rd dose under 1 year

Element	2013/14
Immunised fully under 1 year new	910 332
Measles 1st dose under 1 year	939 770
PCV 3rd dose under 1 year	940 181

The correlation between district expenditure on vaccines per population under 1 and immunisation coverage under 1 can provide some insights. For example, it was found that the 5 GP districts are amongst the top 10 of districts with the highest vaccine expenditure (ranging from R1 453 to R1 621 per child under 1 year). Expenditure on vaccines is not available for all districts as some provinces do not distinguish vaccines from general medicines expenditure in the Basic Accounting System (information lacking for FS and LP provinces and incomplete for NW). Most provinces record spending 2-3% of their District Health Services expenditure on vaccines, although this is highest in Gauteng at 3.9%. For those districts with expenditure data, there is a broad correlation showing lower immunisation coverage where expenditure per population under 1 is low, suggesting that these districts may not be allocating sufficient resources to this priority programme (Figure 4).

In conclusion, the target of 90% coverage has only been reached by nine districts (of which three are NHI districts) and in Gauteng Province. In order to sufficiently protect children against these diseases (preventing resurgence of these diseases, e.g. measles outbreaks) the immunisation coverage should be further increased.[g] For the immunisation programme to serve its goals, it is important to achieve consistently high coverage for all vaccinations to prevent outbreaks. Towards this end, the NDoH conducted a national immunisation campaign in 2013 which included giving polio drops to children aged up to 59 months and measles vaccines to children aged from nine to 59 months.[h]

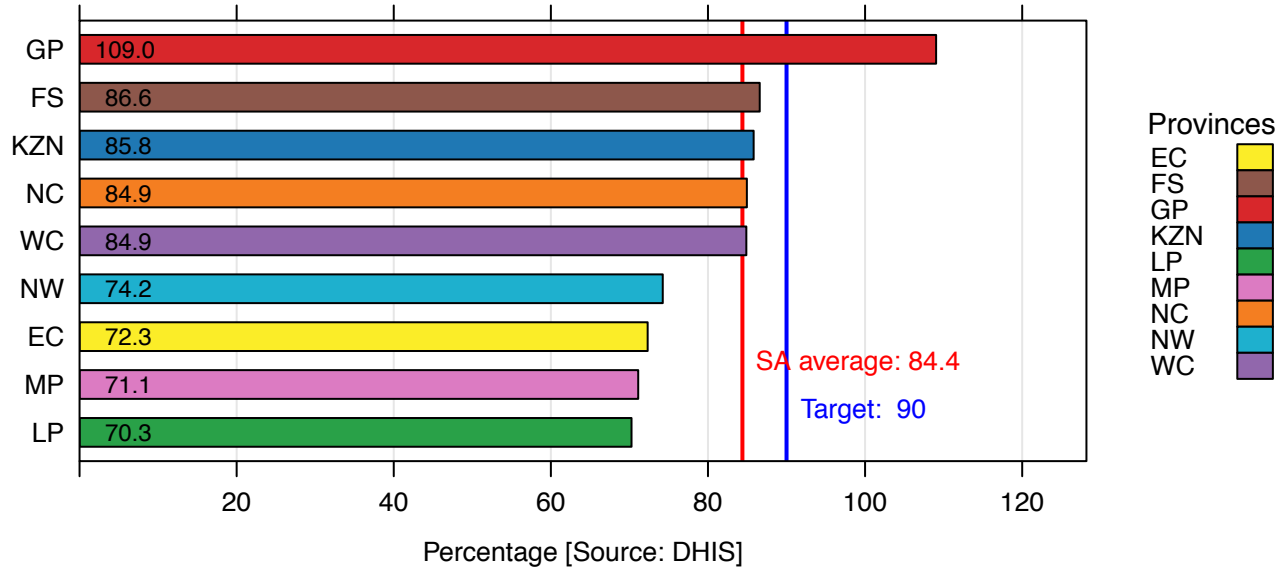
e Shots in the dark? Vaccinations in South Africa. http://www.health-e.org.za/2014/03/10/shots-dark-vaccines-south-africa/ [accessed 21 July 2014].

f Stock-outs, low awareness stymie immunisations. http://www.health-e.org.za/2014/03/11/stock-outs-low-awareness-stymie-immunisations-2/ [accessed 21 July 2014].

g Shibeshi ME, Masresha BG, Smit SB, Biellik RJ, Nicholson JL, Muitherero C, Shivute N, Walker O, Reggis K, Goodson JL. Measles resurgence in southern Africa: challenges to measles elimination. Vaccine. 2014 Apr 1;32(16):1798-807.

h National polio and measles immunisation campaign 2013. http://www.services.gov.za/services/content/news/immunisation_campaign/en_ZA Accessed 22 July 2014.

Figure 1: Immunisation coverage under 1 year by province, 2013/14



Map 1: Immunisation coverage under 1 year by district, 2013/14

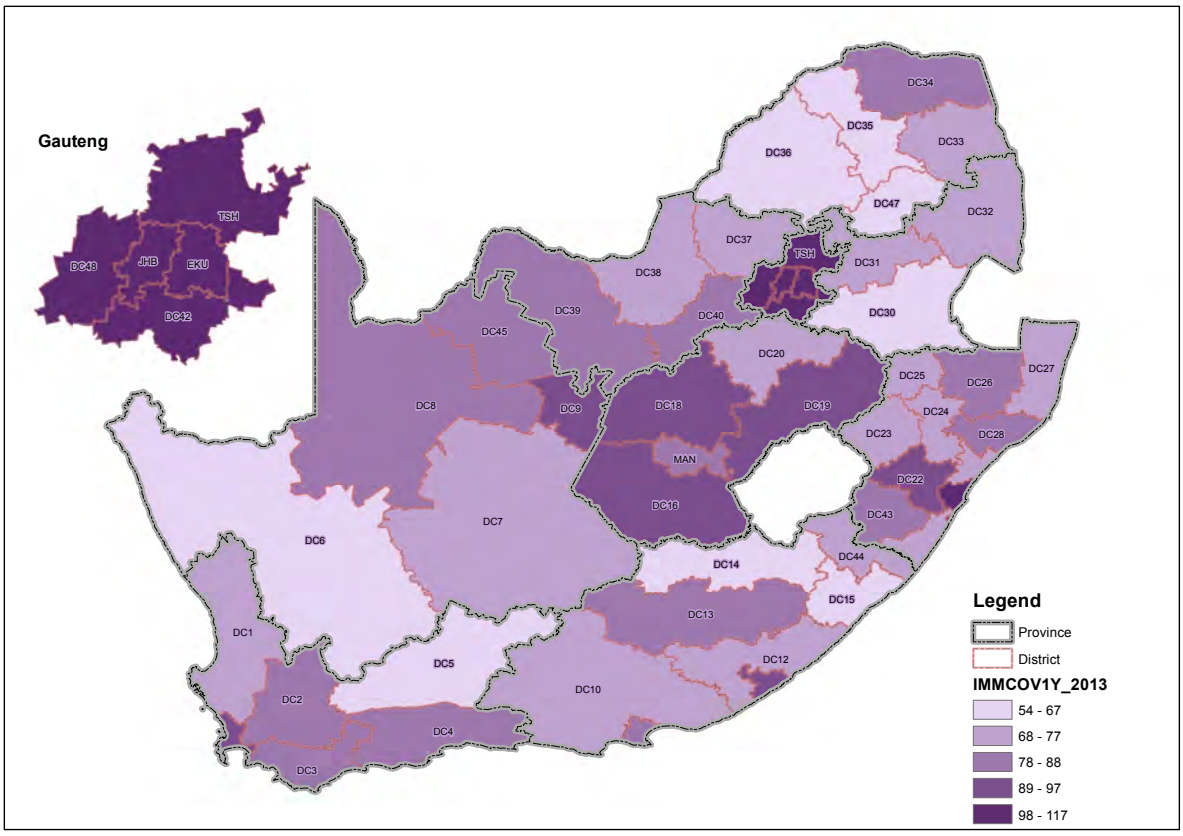


Figure 2: Immunisation coverage under 1 year by district, 2013/14

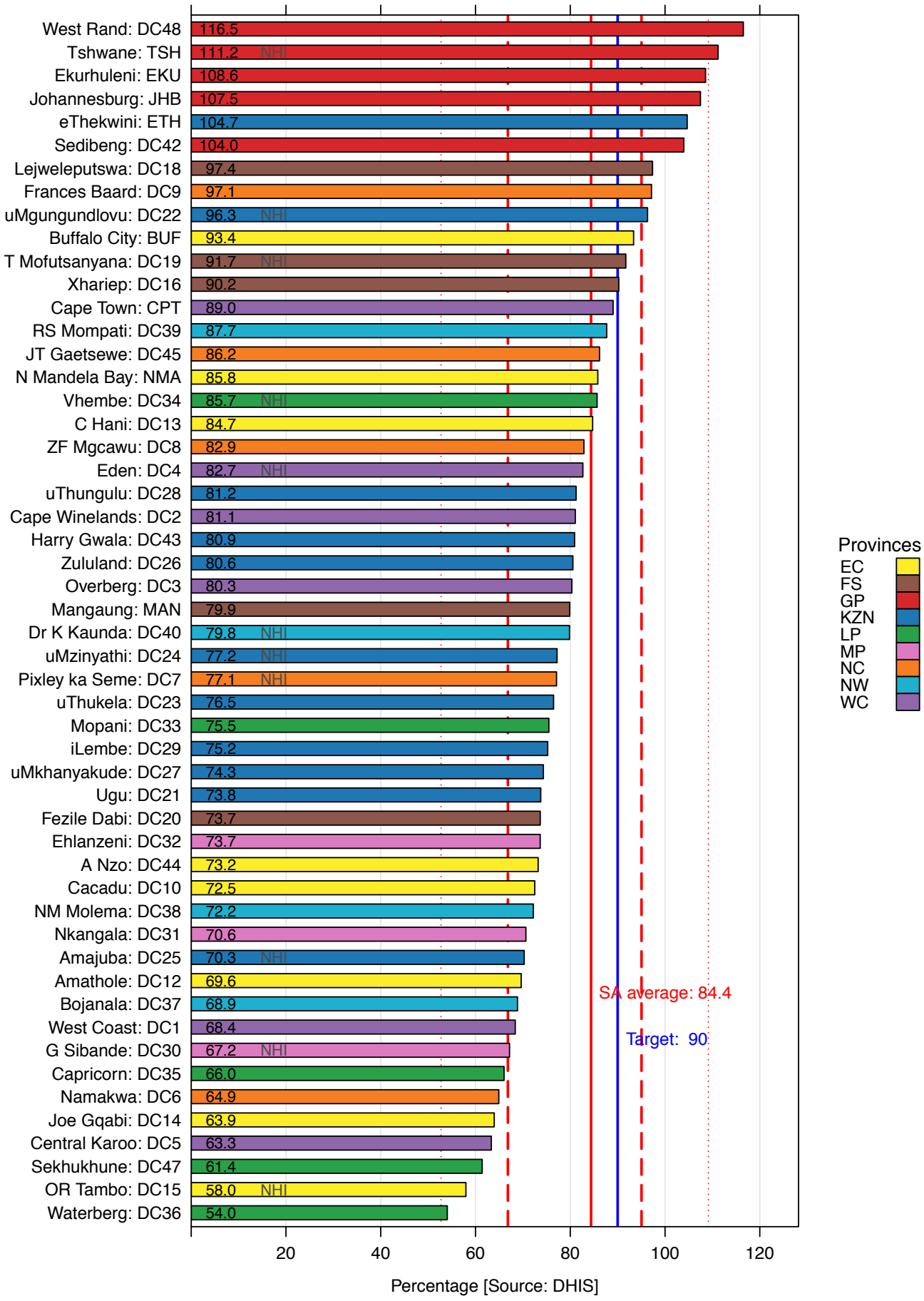


Figure 3: Annual trends: Immunisation coverage under 1 year

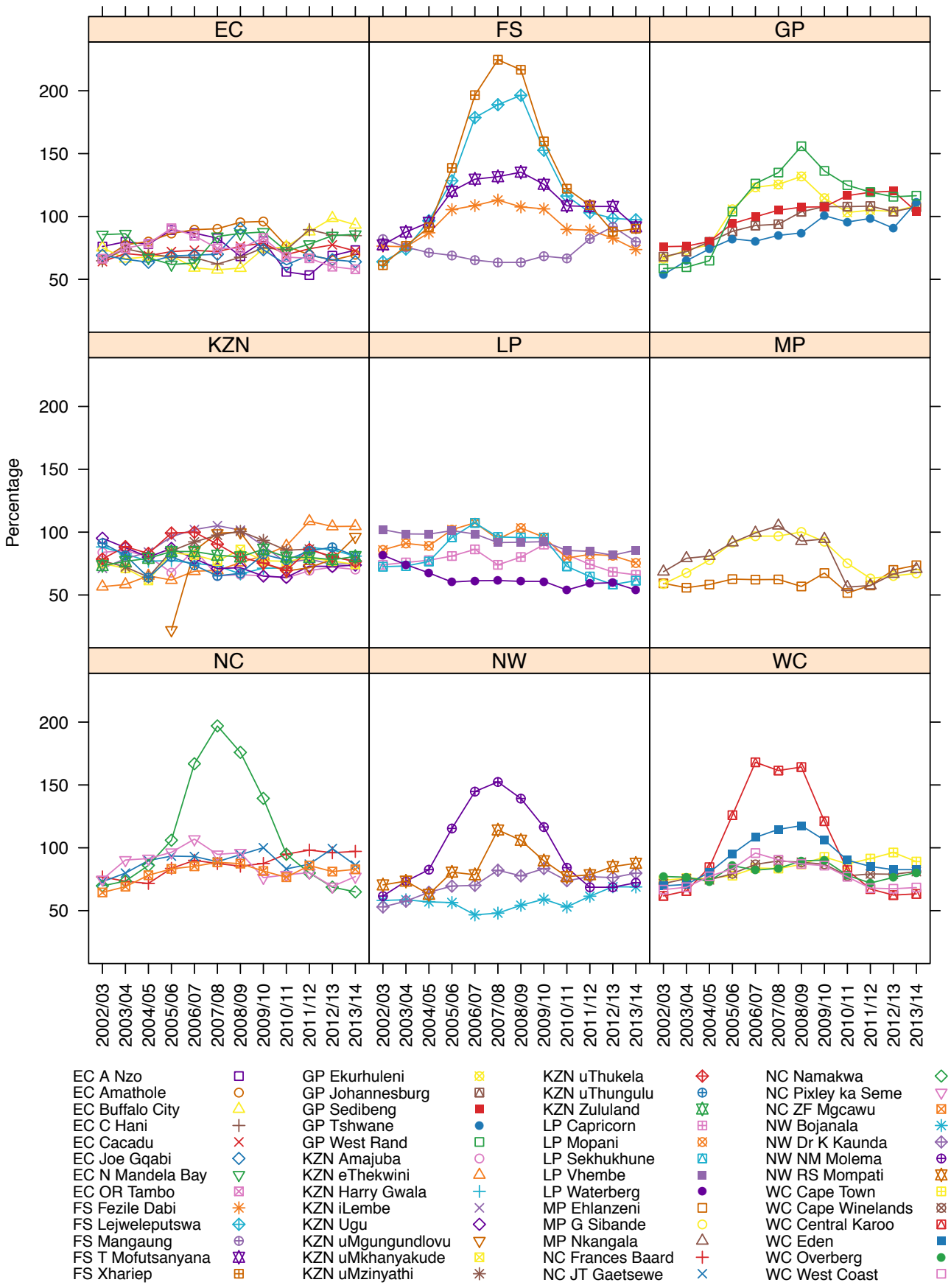


Figure 4: Scatterplot of vaccine expenditure per population under 1 year and immunisation coverage under 1 year, 2013/14

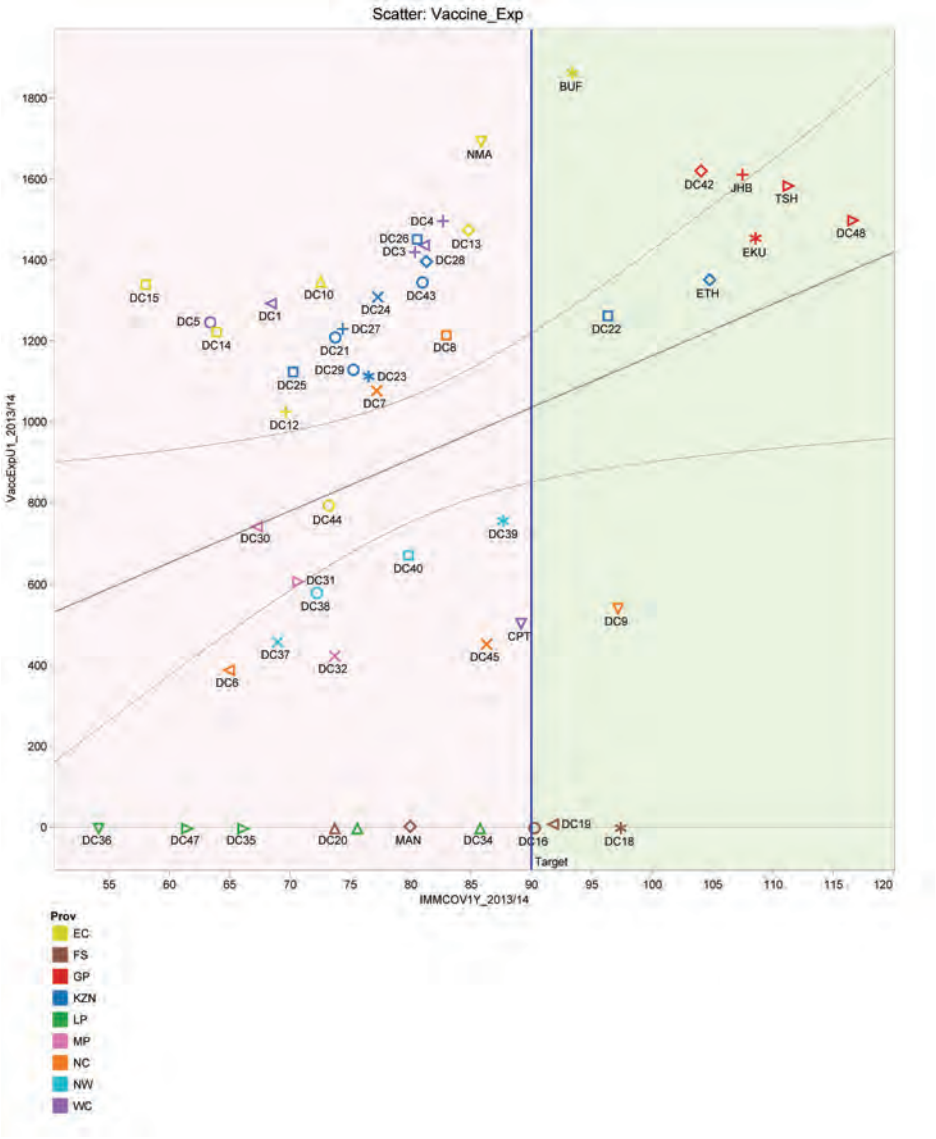
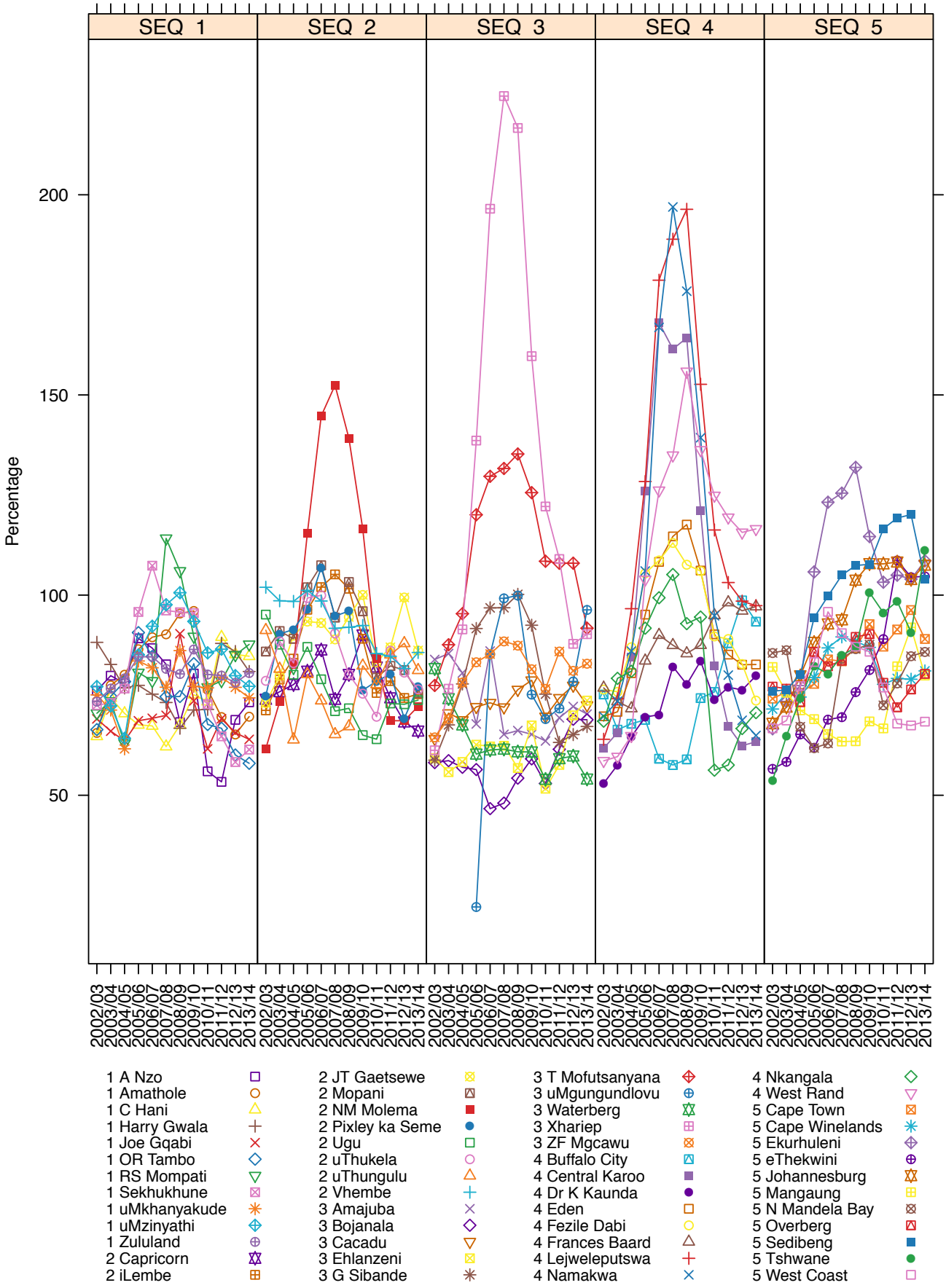


Figure 5: Immunisation coverage under 1 year by SEQ



6.2 DTaP-IPV/ Hib 3 – Measles 1st dose drop-out rate

The DTaP-IPV/ Hib 3rd dose is given at 14 weeks, while the Measles 1st dose is given at nine months. The DTaP-IPV/ Hib 3 – Measles 1st dose drop-out rate measures the percentage of children who dropped out between the 14-week vaccination and the nine-months dose. The indicator takes the number of children who received the third DTaP-IPV/ Hib vaccination minus the number who received the first dose of measles vaccination, and divides this by the number of children who received the third DTaP-IPV/ Hib vaccination. The advantage of this indicator is that both the numerator and the denominator are available from the routine DHIS health data and are thus not subject to the inherent complications associated with a population-based denominator, as with the immunisation coverage under 1 year indicator.

The national drop-out rate for 2013/14 was 6.3%. The drop-out rate is influenced by the quality of service delivery, patient behaviour and data quality. As such, at national level, it appears that children were being lost during the course of the immunisation schedule. As can be seen from the provincial and district values, some of the drop-out rates were negative, meaning that there were more children receiving a measles vaccination at nine months compared to those receiving the DTaP-IPV/ Hib at 14 weeks. This might be due to poor quality of the data.

At the provincial level, the drop-out rate ranged from -1.9% in WC (Figure 6) to 18.6% in LP. At the district level, the range was even larger, from a low of -11.9% in Overberg (WC) to a high of 24.6% in Sekhukhune (LP) (Figure 7). The five Limpopo districts were all among the eight districts with the highest drop-out rates. With respect to the NHI pilot districts, only three were above the national average: Amajuba (KZN) (8.9%), Vhembe (LP) (10.1%) and Gert Sibande (MP) (13.6%).

The target set by the NDoH for this indicator is less than 10%. Based on the current data, this target has been reached nationally, and provincially except for Limpopo and all but six districts.

Figure 6: DTaP-IPV/ Hib 3 – Measles 1st dose drop-out rate by province, 2013/14

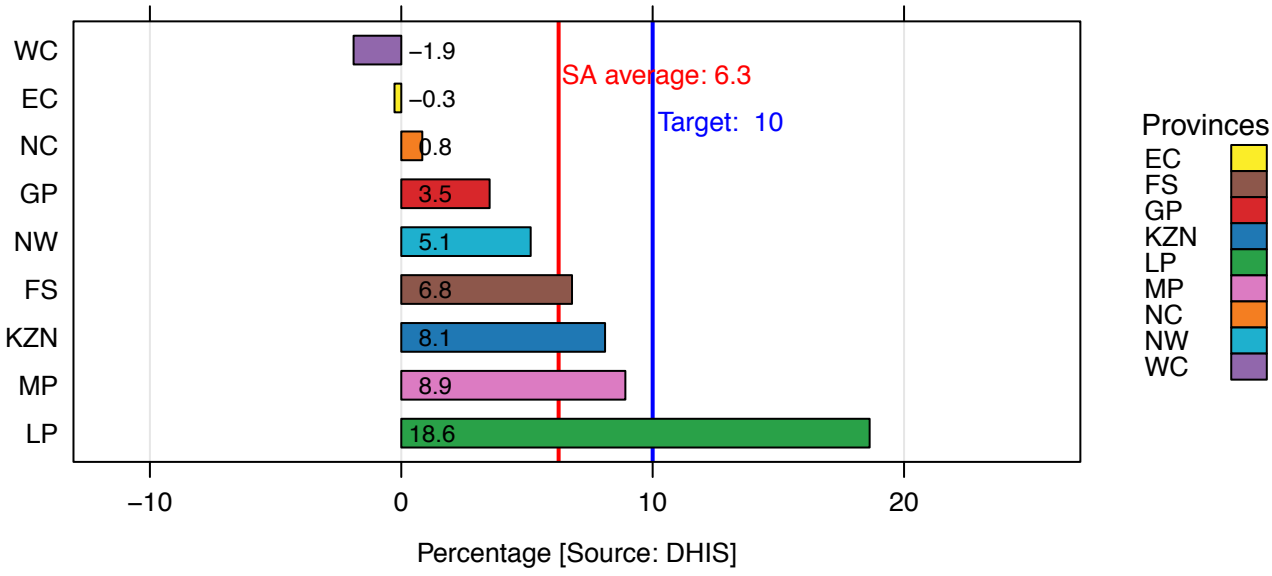
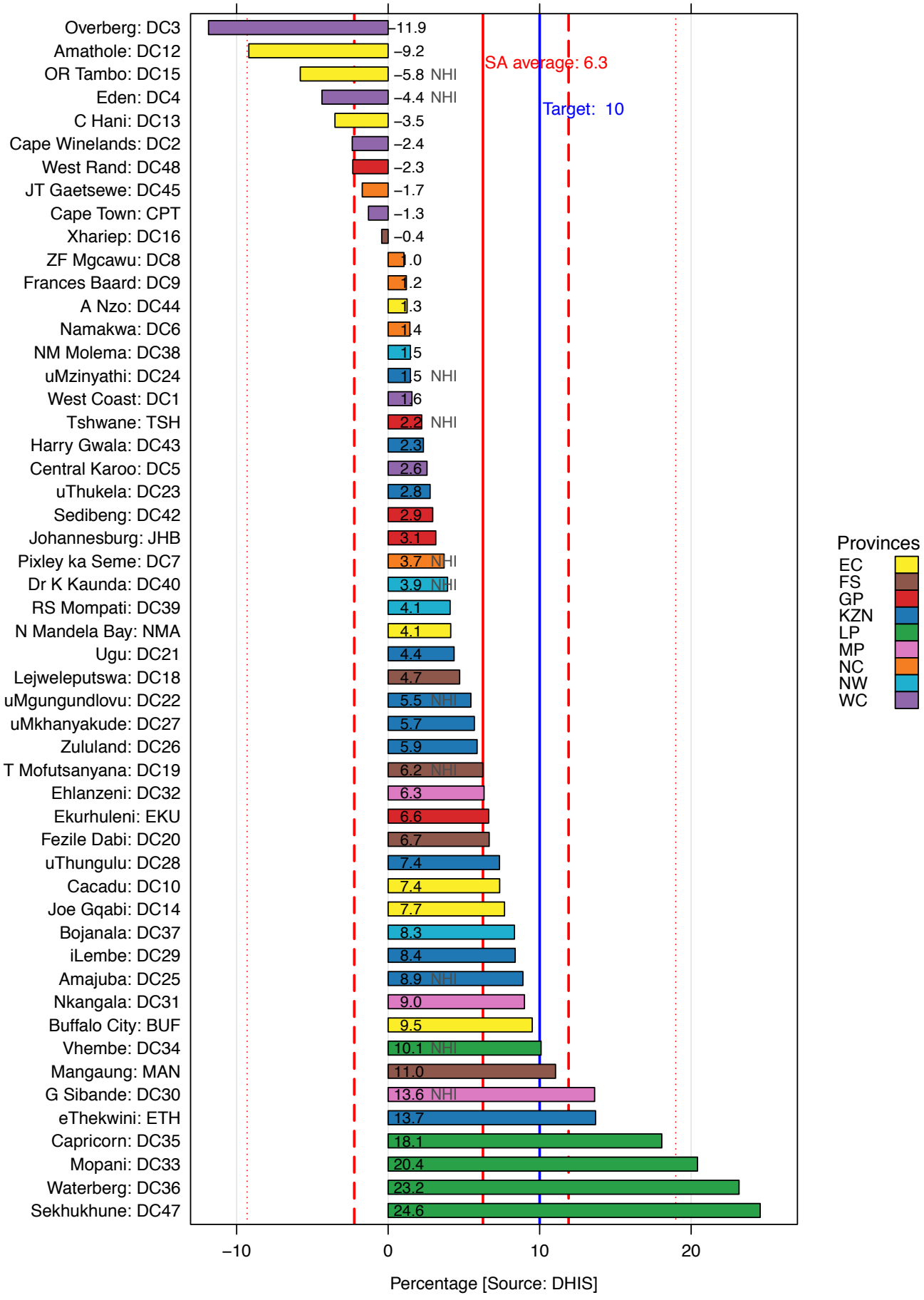


Figure 7: DTaP-IPV/ Hib 3 – Measles 1st dose drop-out rate by district, 2013/14



Map 2: DTaP-IPV/ Hib 3 – Measles 1st dose drop-out rate by district, 2013/14

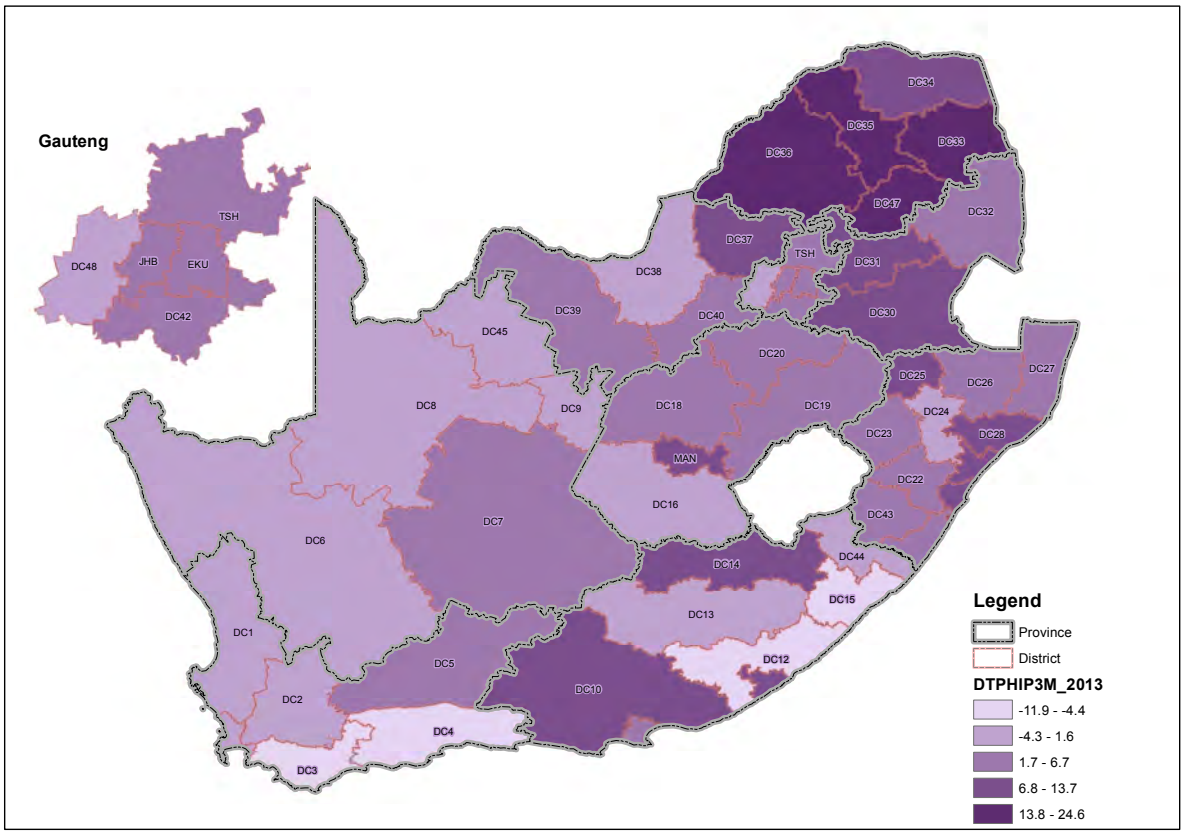


Figure 8: Annual trends: DTaP-IPV/ Hib 3 – Measles 1st dose drop-out rate

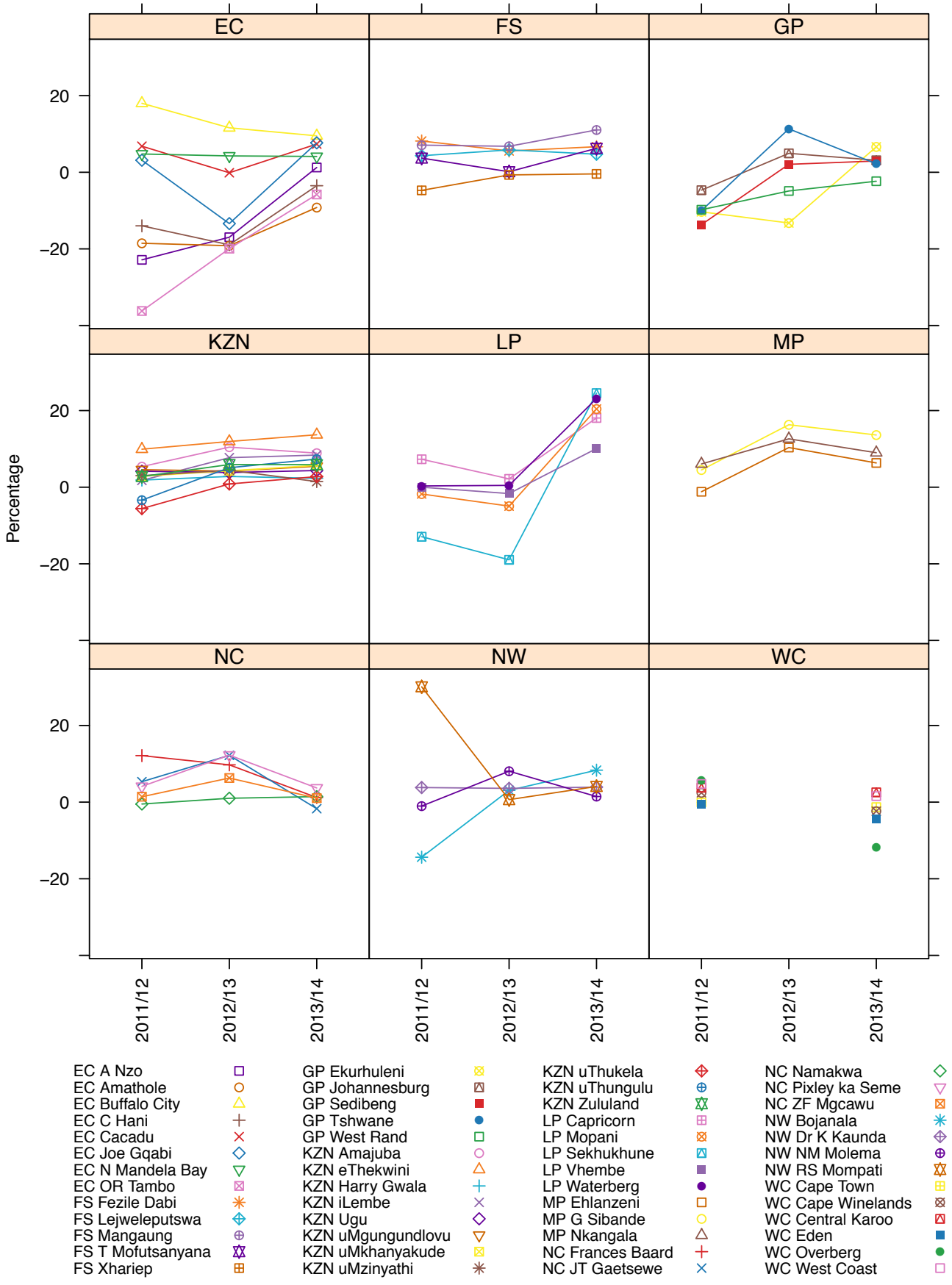


Figure 9: DTaP-IPV/ Hib 3 – Measles 1st dose drop-out rate by SEQ