

5 Immunisation

5.1 Immunisation coverage under 1 year

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 1 year old who have received the following immunisations:^a

At birth: OPV (0), BCG

6 weeks: OPV (1), DTaP-IPV-Hib (1), Hep B (1)

10 weeks: OPV (2), DTaP-IPV-Hib (2), Hep B (2)

14 weeks: OPV (3), DTaP-IPV-Hib (3), Hep B (3)

9 months: Measles (1)

Data from the DHIS were used to calculate the annual immunisation coverage under 1 year by dividing the total number of children under 1 year that received all the above-mentioned immunisations by the total population of children under one year old. However, the indicator at present does not include vaccinations for the rotavirus and pneumococcal conjugate vaccines that were introduced in 2009. Note that all immunisation indicators are very sensitive to denominators (population estimates) or numerators that might be incorrect. 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 from other areas.

The immunisation coverage in the country for 2011/12 was 95.2%, which is similar to the level in 2009/10 (in 2010/11 there was a drop to 89.2% – possibly due to issues with the mass campaign and stock shortages of certain antigens). The coverage differs between the provinces, ranging from 73.9% in Mpumalanga to 114.6% in Gauteng in 2011/12. Coverage shows fluctuations over time, but seven out of the nine provinces (the exceptions were Mpumalanga and the Western Cape) had a higher coverage in 2011/12 than in 2007/08.

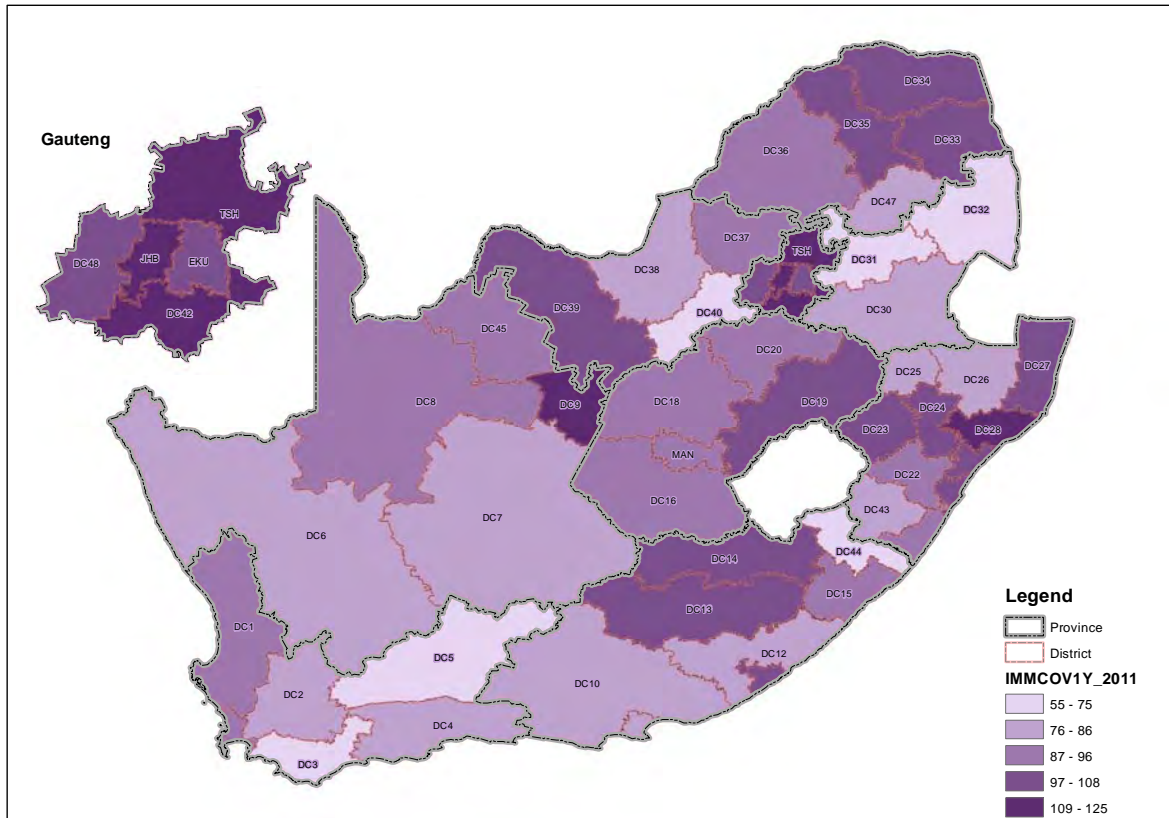
The wide variation in immunisation coverage among districts in 2011/12 can be seen in Map 1 and Figure 1, the latter reflecting a variation from a high of 125.0% in the City of Johannesburg (GP) to a low of 55.2% in Alfred Nzo (EC). Alfred Nzo has shown a decline in immunisation coverage from 80.1% in 2009/10 to 56.5% in 2010/11 and then stabilised (Figure 2). Although the majority of districts show a higher coverage in 2011/12 compared to 2007/08, two districts showed large drops in immunisation rates over the past 5 years, namely Ehlanzeni (MP) 29.5% and Central Karoo (WC) 25.0%.

Four of the six districts in Gauteng ranked in the top 10 (in 2010/11 this was all six) along with four districts in KwaZulu-Natal (in 2010/11 none of these were in the top 10), with one each from the Northern Cape and Limpopo. Uthukela, Umzinyathi, Uthungulu and Umkhanyakude (all KZN) showed large increases in immunisation rates over the past 5 years, although Umkhanyakude has not reached a top 10 place. Other districts that showed increases of 25% or more when comparing coverage between 2007/08 and 2011/12 included Sedibeng and West Rand (GP), Chris Hani and Joe Gqabi (EC), Thabo Mofutsanyane (FS) and Mopani (LP). Joe Gqabi (EC) and Uthukela (KZN) showed a large increase between 2010/11 and 2011/12.

Nationally the target of 90% coverage was reached, as well as by the majority of provinces and half of the districts.

^a OPV is Oral Polio vaccine, BCG is Bacille Calmette Guerin, DTaP-IPV/Hib Diphtheria, Tetanus, acellular Pertussis, Inactivated Polio Vaccine and *Haemophilus influenzae* type b combined, Hep B is Hepatitis B vaccine.

Map 1: Immunisation coverage under 1 year (annualised), 2011/12



Section A: Indicator Comparisons per programme by District

Figure 1: Immunisation coverage under 1 year (annualised), 2011/12

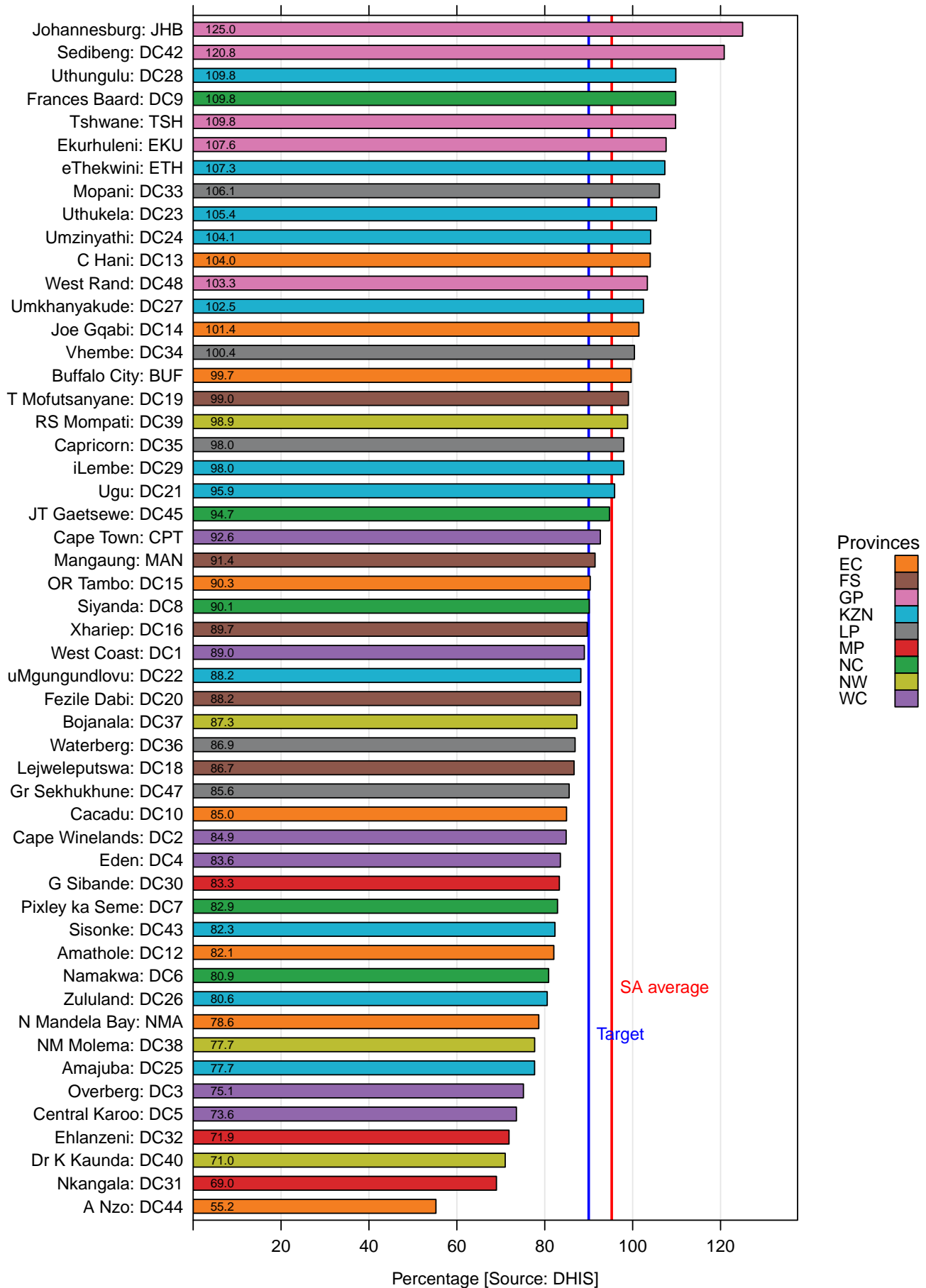
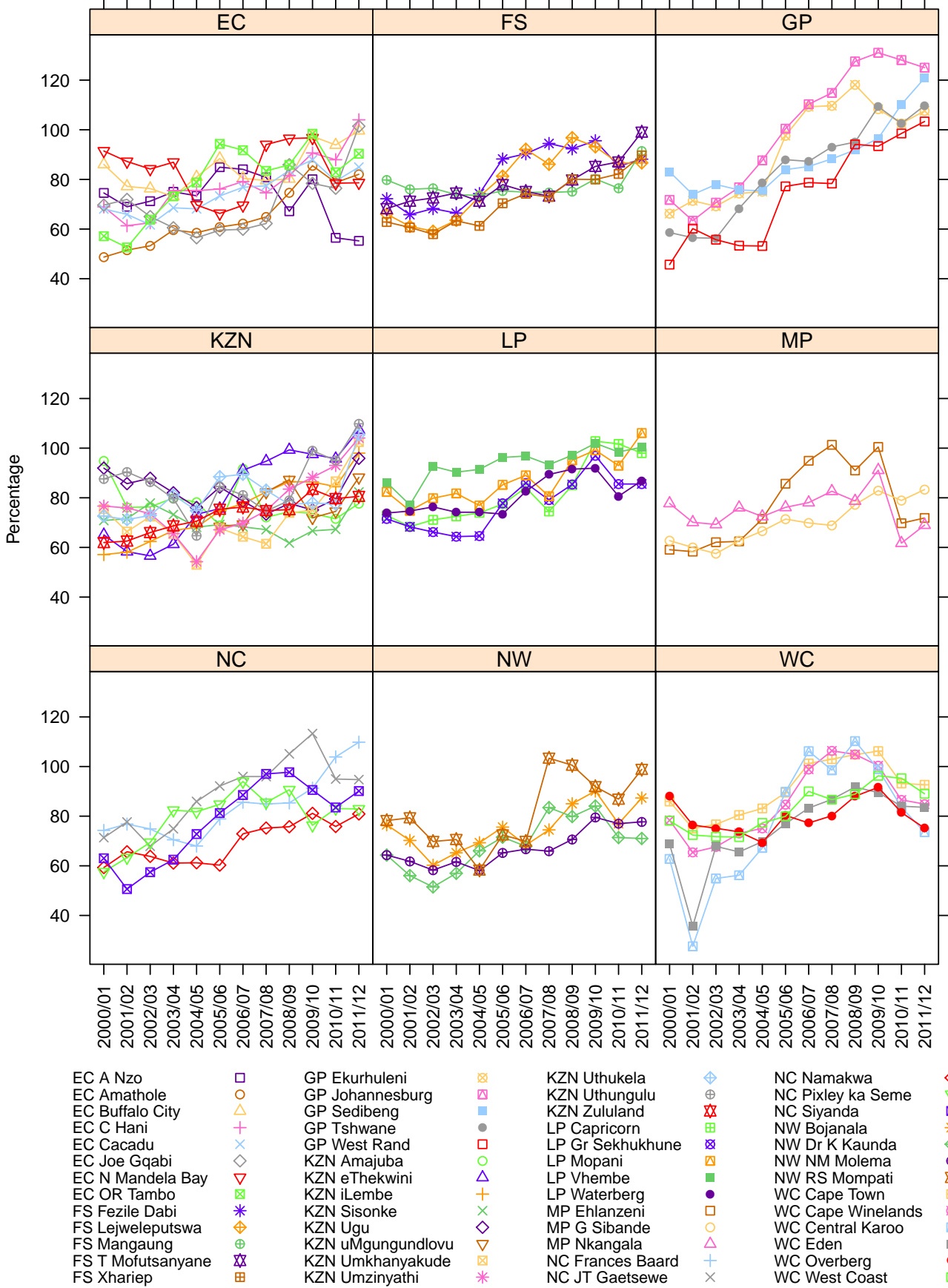


Figure 2: Annual trends: Immunisation coverage under 1 year (annualised)



5.2 Measles 1st dose under 1 year coverage

The measles vaccine 1st dose is given to children at nine months as this is the earliest age at which a vaccinated child will develop a reasonable immune response. Vaccine efficacy for measles is around 85%, therefore a second dose is given at 18 months. Measles immunisation coverage is reported in the light of the large-scale outbreak of measles that South Africa suffered in 2009/10.

Data from the DHIS were used to calculate the annual measles 1st dose under 1 year coverage by dividing the total number of children under 1 year that have received this vaccination by the total population of children under 1 year old. The measles immunisation coverage indicator is also sensitive to errors in the denominator or numerator.

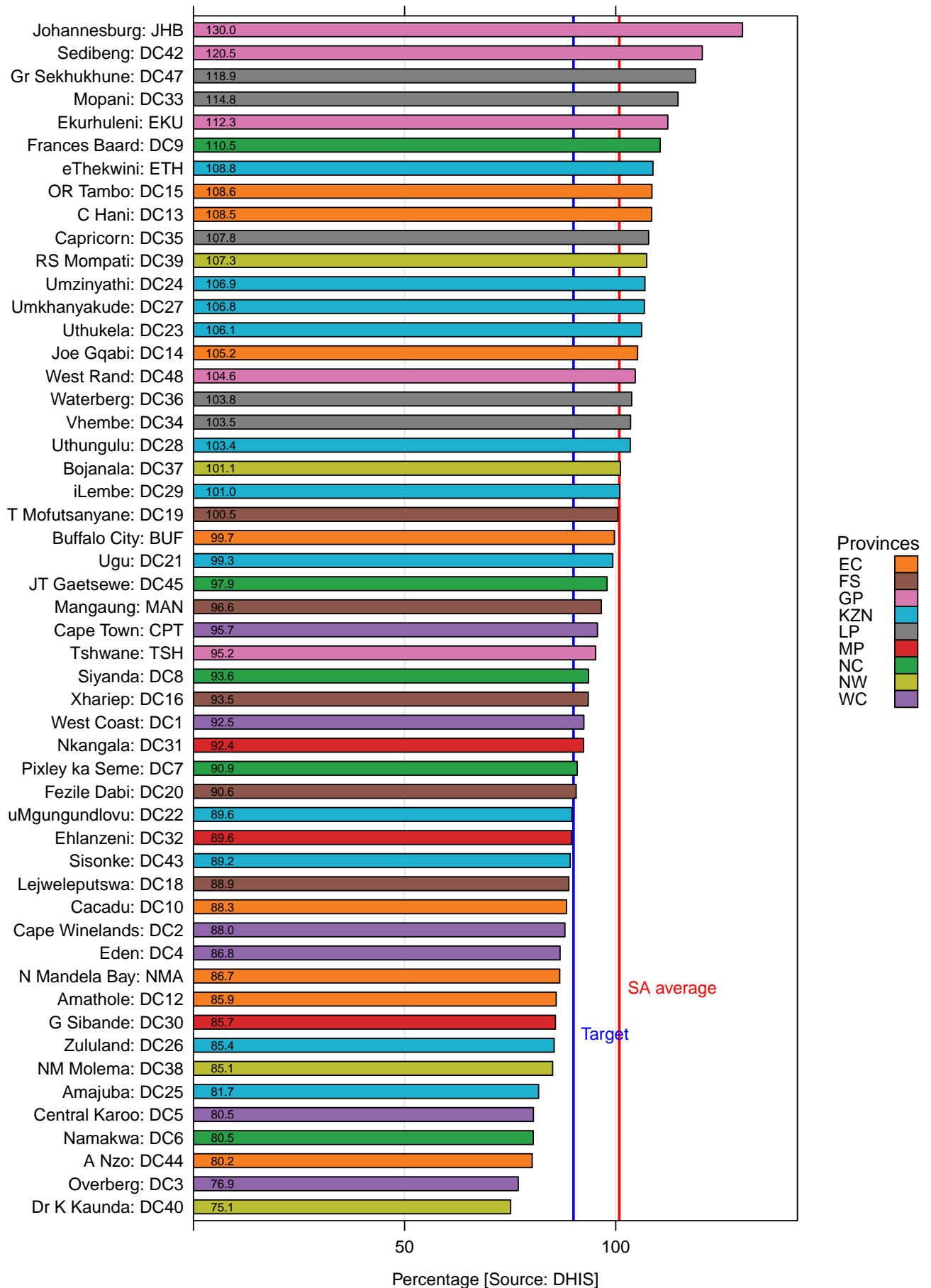
The average measles 1st dose under 1 year coverage in the country for 2011/12 was 100.9% and has been increasing steadily (with a drop in 2010/11) since 2007/08 (from 87.5%). The coverage differs between the provinces, although almost all (except Mpumalanga at 89.4 %) reflect a coverage of more than 90%, with Gauteng being the highest at 113.9%^b in 2011/12. Coverage shows fluctuations over time, but eight out of the nine provinces (except Western Cape) had a higher coverage in 2011/12 compared to 2007/08.

The measles 1st dose coverage varied between districts in 2011/12 (Figure 3), ranging from 75.1% in Dr K Kaunda (NW) to 130.0% in the City of Johannesburg (GP). The majority of districts showed a higher coverage in 2011/12 compared to 2007/08. The following districts showed an increase of more than 25% over four years when comparing 2007/08 with 2011/12: Chris Hani and Joe Gqabi (EC); Thabo Mofutsanyane (FS); Sedibeng and West Rand (GP); Umkhanyakude and Uthungulu (KZN); Mopani, Capricorn and Greater Sekhukhune (LP). Uthukela (KZN) showed an increase of 26.7% from 2010/11 to 2011/12.

The WHO target of 90% coverage was reached nationally, as well as by most provinces and almost two-thirds of districts.

^b This may be related to denominator under-estimation. Under-estimation of the denominator refers to the fact that the population estimate for the geographic area is lower than reality. This refers to the resident population size and is different from transient crossing of people into a province to access services.

Figure 3: Measles 1st dose under 1 year coverage (annualised), 2011/12



5.3 Measles 1st to 2nd dose drop-out rate

The measles 2nd dose is given at 18 months. Over the past five years the 2nd dose coverage has been considerably lower than that of the 1st dose. The national coverage for the 1st dose in 2011/12 was 100.9%, but only 85.4% for the 2nd dose. For the second dose the coverage ranged from 63.2% in Dr K Kaunda (NW) to 102.2% in Greater Sekhukhune (LP).

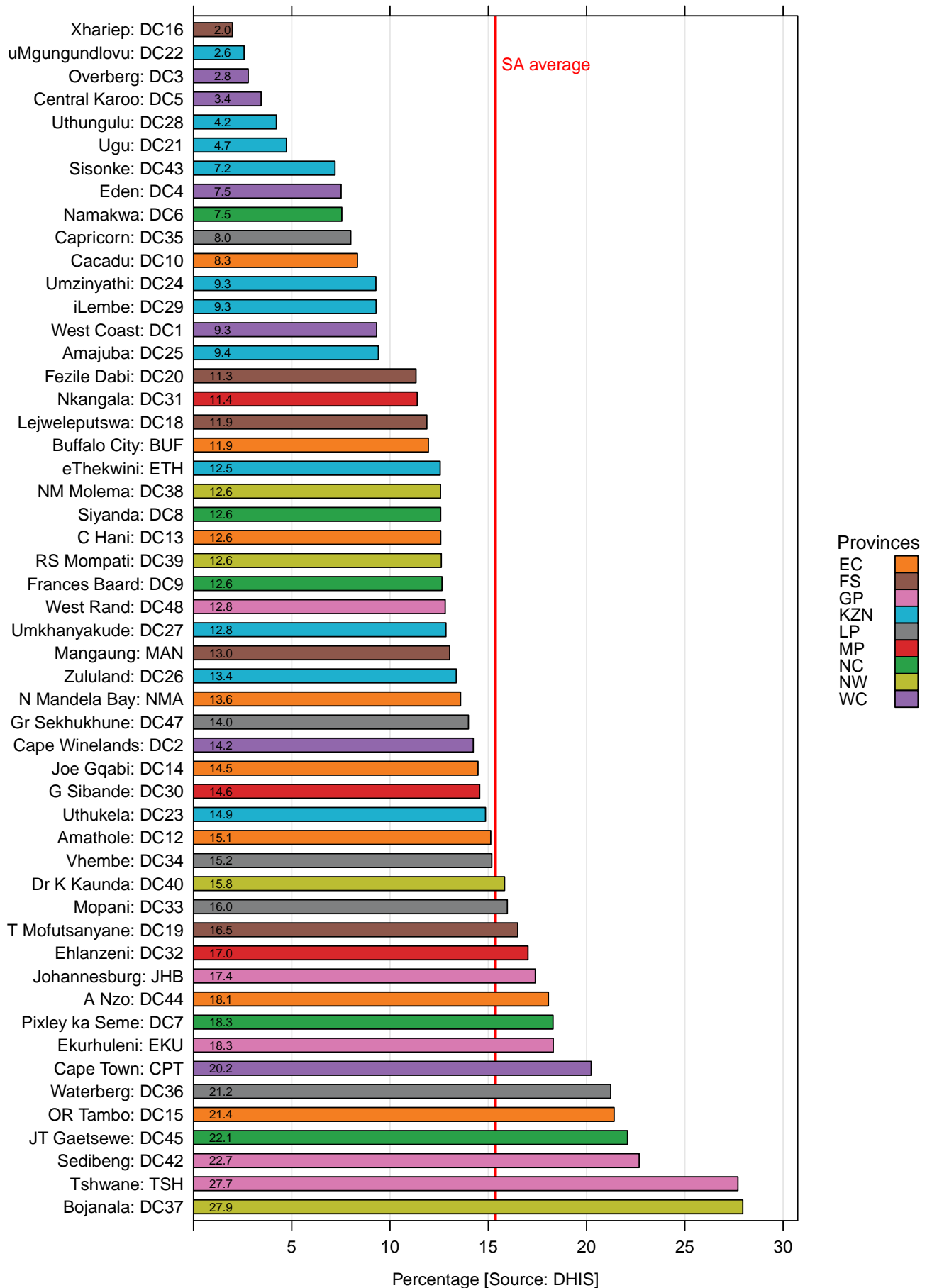
The measles 1st to 2nd dose drop-out rate measures the percentage of children who dropped out between the first and the second dose of the measles vaccine. The advantage of this indicator is that both the numerator and the denominator are available from the routine DHIS health data and are thus not subject to the inherent complications associated with a population-based denominator, as with the other immunisation coverage indicators.

The national drop-out rate for 2011/12 was 15.4%. Since 2007/08 the drop-out rate decreased from 19.5% to 8.9% in 2009/10, after which it increased again to the current level. It is difficult to determine whether this is due to poor data quality or variable service delivery. From a provincial perspective, the drop-out rate ranges from 10.0% in KwaZulu-Natal to 19.9% in Gauteng.

At the district level, the range is even larger – from a low 2.0% in Xhariep (FS) to a high 27.9% in Bojanala (NW) (Figure 4). However, three-quarters of the districts have a lower drop-out rate in 2011/12 than in 2007/08, although only slightly more than half have a lower rate in 2011/12 compared to the previous year.

Although no target has been set for this indicator, it is important to achieve a consistently high coverage (for both the 1st and 2nd dose) to prevent outbreaks.

Figure 4: Measles 1st to 2nd drop-out rate, 2011/12



5.4 Rotavirus 2nd dose coverage

Rotavirus (RV) is an important cause of severe gastroenteritis in children under 5 years worldwide.¹ Infections caused by the highly contagious RV occur seasonally in South Africa, usually during the winter months from late March to August. The human RV vaccine has been found to significantly reduce the incidence of severe RV gastroenteritis and hospitalisation due to diarrhoea among South African infants during the first year of life.² The vaccine has been offered routinely in the South African public health sector since August 2009. The first dose is given at six weeks and the second dose at 14 weeks. Data from the RV sentinel surveillance programme at the National Institute for Communicable Diseases show reductions in the total number of patients testing RV-positive, namely 426 in 2009, 241 in 2010 and 148 in 2011.³

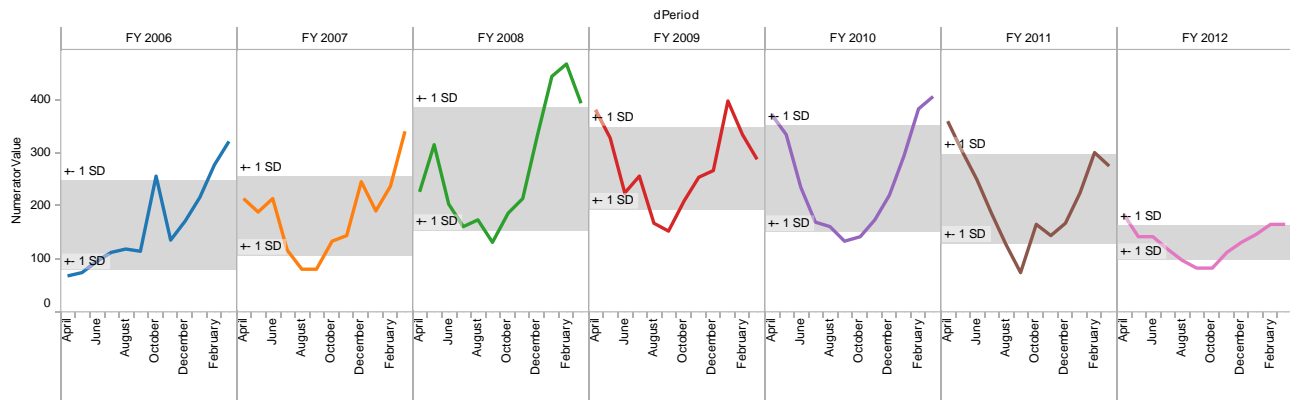
Data from the DHIS were used to calculate the annual RV 2nd dose under 1 year coverage by dividing the total number of children under 1 year that have received this vaccination by the total population of children under 1 year old. As with other immunisation coverage indicators, this indicator is also sensitive to errors in the denominator or numerator.

Significant increases in RV immunisation coverage have occurred since the vaccine was introduced in 2009. The national average for RV 2nd dose coverage was 34.7% in 2009/10, 72.3% in 2010/11 and rose to 98.2% in 2011/12. The coverage differs between the provinces, although almost all (except Eastern Cape at 77.6%) reflect a coverage of more than 90%, with Gauteng being the highest at 111.8%^c in 2011/12. All provinces have shown a large increase in coverage over the past three years.

Marked variation exists in RV 2nd dose coverage among districts in 2011/12 (Figure 6), ranging from 58.1% in Alfred Nzo (EC) to 130.5% in the City of Johannesburg (GP). But all districts have shown a significant increase over the past three years.

It is positive to see that within three years of introducing the vaccine, the target of 90% coverage has been reached nationally, as well as by six of the nine provinces and almost two-thirds of districts. There has been a marked decrease in the national diarrhoeal incidence in children under 5 years since 2008/09. All districts, with the exception of Johannesburg (GP) have reflected a decrease in diarrhoeal incidence since 2008/09. This decline may be associated with several other factors including improved water quality management and reductions in HIV infection. The number of deaths due to diarrhoea (recorded in the DHIS) showed an even more dramatic decline over three years from 3 245 deaths in 2008/09 compared to 1 550 deaths in 2011/12.

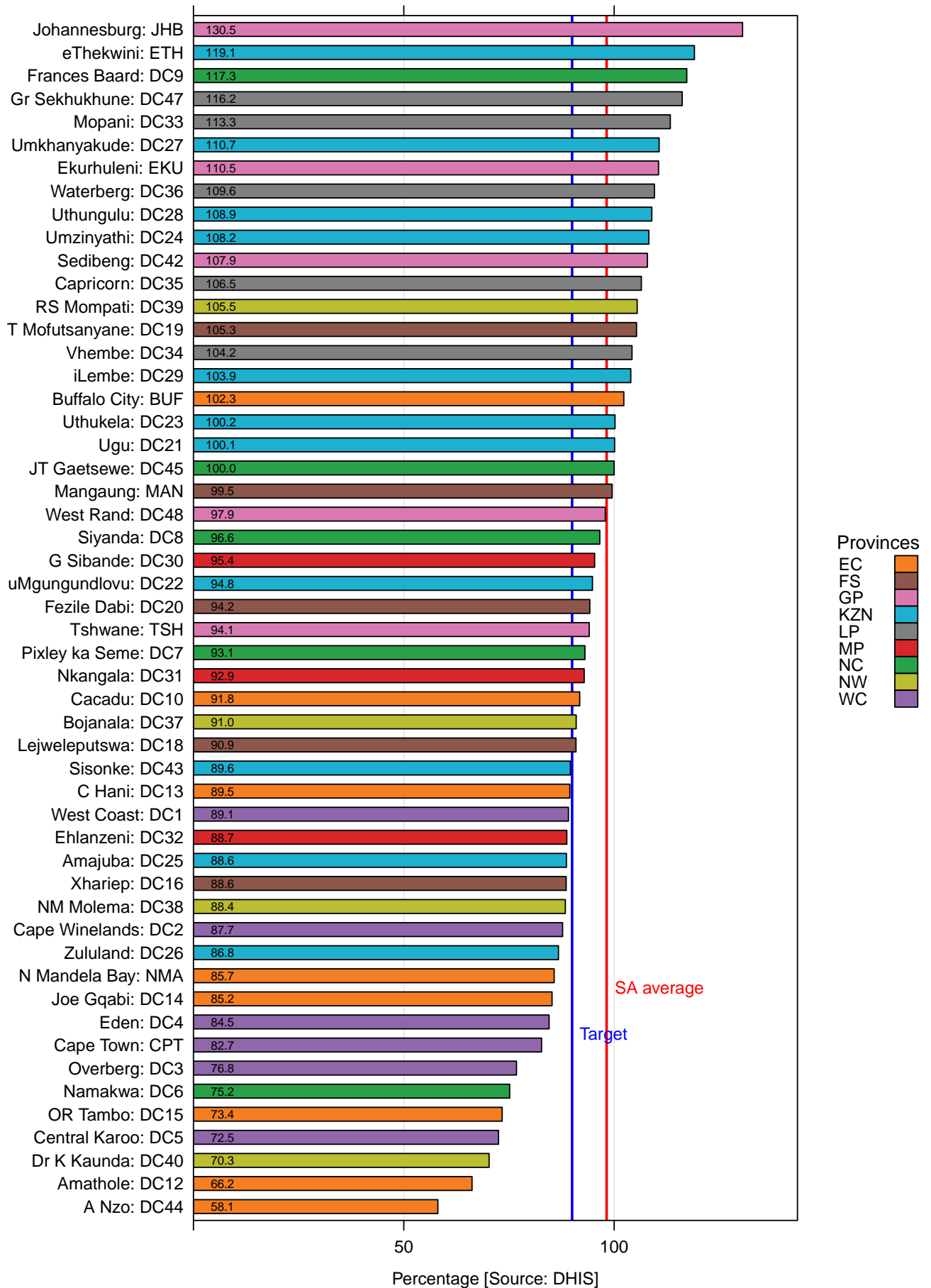
Figure 5: Monthly trends in the number of deaths due to diarrhoea, country, 2005/06-2011/12



The trend of sum of NumeratorValue for dPeriod Month broken down by dPeriod Year. Colour shows details about dPeriod Year. The data is filtered on OrgUnitType and IndicatorShort. The OrgUnitType filter keeps multiple members. The IndicatorShort filter keeps Death diarr dehyd <5. The view is filtered on dPeriod Year, which excludes FY 2001, FY 2002, FY 2003, FY 2004 and FY 2005.

^c This may be related to denominator under-estimation. Under-estimation of the denominator refers to the fact that the population estimate for the geographic area is lower than reality. This refers to the resident population size and is different from transient crossing of people into a province to access services.

Figure 6: RV 2nd dose coverage (annualised), 2011/12



5.5 Pneumococcal vaccine 3rd dose coverage

Streptococcus pneumoniae is recognised as the leading bacterial cause of pneumonia in children.⁴ The burden of pneumococcal disease in South Africa is further aggravated by the HIV epidemic. Additionally, the pathogen has been the most important cause of meningitis in South African children since the introduction of *Haemophilus influenzae* type b conjugate vaccine.

Following the introduction of PCV in 2009 in South Africa, preliminary data indicates a reduction in pneumococcal disease burden, which is in keeping with the impact of the vaccine seen in other countries. PCV not only protects those who are vaccinated but it also provides herd immunity and protects people who are at high risk of invasive pneumococcal disease, such as HIV-positive adults and the elderly who are at high risk of invasive pneumococcal disease. The 1st vaccination is given at 6 weeks, the 2nd at 14 weeks and the 3rd at 9 months.

Data from the DHIS were used to calculate the annual PCV 3rd dose under 1 year coverage by dividing the total number of children under one year that have received this vaccination by the total population of children under 1 year old. As with other immunisation coverage indicators, this indicator is also sensitive to errors in the denominator or numerator.

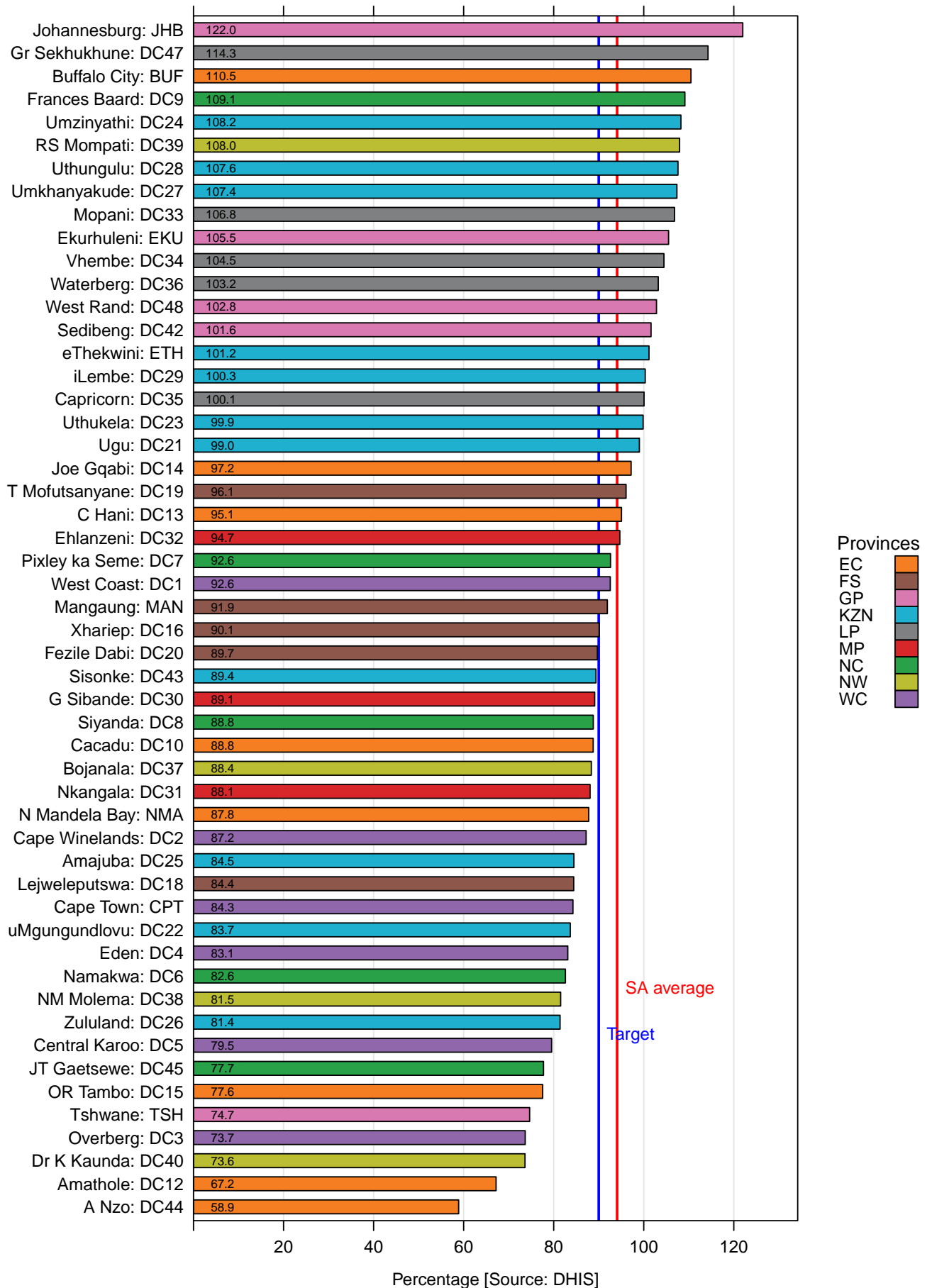
Similarly to the RV 2nd dose coverage, significant increases in PCV immunisation coverage have been achieved since the vaccine was introduced in 2009. The national average for PCV 3rd dose coverage was 23.3% in 2009/10, jumped to 72.8% in 2010/11 and rose further to 94.1% in 2011/12. The coverage differs between the provinces, ranging from 80.9% in Eastern Cape to 105.6%^d in Limpopo in 2011/12. All provinces showed a large increase over the past three years.

There is variation in PCV 3rd dose coverage among districts in 2011/12 (Figure 7), ranging from 58.9% in Alfred Nzo (EC) to 122.0% in the City of Johannesburg (GP). All districts showed a significant increase over the past three years.

The national target of 90% coverage has been reached, although only five provinces have reached this target and just over half of the districts. Pneumonia incidence in children under 5 years started decreasing in 2009/10 (from 97.4 per 1 000 to 80.3 per 1 000 in 2011/12) and most districts show a decrease in the incidence since 2009/10.

^d This may be related to denominator under-estimation. Under-estimation of the denominator refers to the fact that the population estimate for the geographic area is lower than reality. This refers to the resident population size and is different from transient crossing of people into a province to access services.

Figure 7: PCV 3rd dose coverage (annualised), 2011/12



References

- 1 Tate JE, Burton AH, Boschi-Pinto C, Steele AD, Duque J, Parashar UD; WHO-coordinated Global Rotavirus Surveillance Network. 2008 estimate of worldwide rotavirus-associated mortality in children younger than 5 years before the introduction of universal rotavirus vaccination programmes: a systematic review and meta-analysis. *Lancet Infect Dis.* 2012;12(2):136-41.
- 2 Madhi SA, Cunliff NA, Steele D, Witte D, Kirsten M, Louw C, et al. Effect of Human Rotavirus Vaccine on Severe Diarrhea in African Infants. *N Engl J Med.* 2010;362:289-298.
- 3 National Institute for Communicable Diseases. Rotavirus Surveillance. http://www.nicd.ac.za/?page=rotavirus_surveillance&id=90 [Accessed 9 September 2012].
- 4 Madhi SA. Introduction of the pneumococcal conjugate vaccine into the South African public immunisation programme: dawn of a new era? *South Afr J Epidemiol Infect.* 2008;23(4): 5-9.