

## 9 Tuberculosis

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### Introduction

Tuberculosis (TB) remains a major health problem in South Africa. Although TB incidence has been declining in South Africa since 2009 and deaths due to TB have decreased in recent years, TB remains the number one cause of death in this country.<sup>a</sup> The Global TB Report 2015 estimated that in 2014 South Africa had the second-highest TB incidence rate in the world, with 834 cases per 100 000 population.<sup>b</sup>

In order to meet the Sustainable Development Goals (SDGs) and End TB Strategy targets, South Africa has adopted the 90:90:90 strategy for TB. This involves screening 90% of people in the key populations for TB; starting 90% of those diagnosed with TB on treatment; and ensuring that 90% of those started on treatment, successfully complete their treatment.<sup>c</sup> Key populations in South Africa that are particularly vulnerable to TB include: people living with HIV, people with diabetes, household contacts of people with TB, pregnant women and children under the age of five years, miners, former miners and people working and living near mines, healthcare workers, prison inmates and prison employees.<sup>d</sup>

Table 1 shows the End TB Strategy key indicators and targets for 2020 together with baseline values from 2014, thus highlighting the gap that needs to be addressed.<sup>e</sup>

**Table 1: Coverage levels for TB interventions using baseline and target scenarios**

|                                         | Intervention                                                                                                                                   | Baseline (2014) | 90-90-90 (2020) |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|
| 1. Screen for vulnerable populations TB | Proportion of high risk groups symptom screened for TB: intensified case finding in clinics and other health facilities                        | 20%             | 90%             |
|                                         | Proportion of high risk groups symptom screened for TB: active case finding in communities, schools, correctional facilities, workplaces, etc. | 5%              | 90%             |
|                                         | If no active TB and eligible for IPT, initiate on IPT                                                                                          | 5%              | 100%            |
| 2. Diagnose and treat TB                | Proportion of estimated TB cases diagnosed and initiated on treatment                                                                          | 57%             | 90%             |
|                                         | If HIV co-infection, appropriate treatment includes ART                                                                                        | 66%             | 100%            |
| 3. Successfully treat TB                | Proportion of drug sensitive TB cases treated successfully                                                                                     | 76%             | 90%             |
|                                         | RIF resistant TB, successful outcome                                                                                                           | 45%             | 70%             |

Source: South African National AIDS Council, 2016.<sup>e</sup>

In early 2015, a large-scale TB screening campaign was launched as the first step towards the End TB Strategy targets. In the first year, 70 425 inmates in correctional facilities were tested for TB using the GeneXpert test, and 252 843 people in six peri-mining communities were screened for TB.<sup>f</sup> Later in 2016, the second phase of the screening campaign will focus on the metros, which together account for about 40% of the TB burden. In 2017, the final stage will focus on the provinces with the highest TB burdens, namely the Eastern Cape (EC), Gauteng (GP), KwaZulu-Natal (KZN) and Western Cape (WC).<sup>g</sup>

In an attempt to assess the true burden of TB in South Africa, a national TB prevalence survey will commence in 2017. The survey will be concluded within two years and the first results, available by 2018, will help to inform the strategy of the national TB programme.

Multidrug-resistant tuberculosis (MDR-TB) (resistance to at least isoniazid and rifampicin, the most effective first-line TB drugs), is a critical threat to global TB control and is associated with high mortality in settings with HIV co-infection.<sup>b</sup> Treatment requires the use of second-line drugs, which are less potent and more toxic than first-line medications. Treatment for MDR-TB lasts up to two years, includes a daily intramuscular injection for the first 4–8 months of therapy,

a Statistics South Africa. Mortality and causes of death in South Africa, 2014: Findings from death notification. Pretoria: StatsSA; 2015.

b World Health Organization. Global tuberculosis report 2015. WHO/HTM/TB/2015.22. Geneva: WHO; 2015. Available from: [http://www.who.int/tb/publications/global\\_report/en/](http://www.who.int/tb/publications/global_report/en/). [6 August 2016].

c World Health Organization. The End TB Strategy. WHO/HTM/TB/2015.19. Geneva: WHO; 2015. Available from: [http://www.who.int/tb/End\\_TB\\_brochure.pdf?ua=1](http://www.who.int/tb/End_TB_brochure.pdf?ua=1) [6 August 2016].

d Stop TB Partnership. Global Plan to end TB 2016–2020. The paradigm Shift. Geneva: Stop TB Partnership; 2015. Available from: <http://www.stoptb.org/assets/documents/global/plan/plan2/Annexes.pdf> [6 August 2016].

e National Department of Health and South African National AIDS Council. South African HIV and TB Investment Case. Summary Report Phase 1; March 2016.

f South African National AIDS Council. Enhanced Progress Report: National Strategic Plan on HIV, STIs and TB (2012–2016). SANAC; March 2016.

g Deputy President Cyril Ramaphosa. World TB Day, 23 March 2016. Available from: <http://www.gov.za/speeches/deputy-president-cyril-ramaphosa-address-mark-world-tb-day-marapong-stadium-lephalale> [6 August 2016].

and is associated with severe side-effects.<sup>h</sup> Furthermore, treatment places a significant financial burden on the patient's family and the health system in general.

South Africa has a high burden of MDR-TB. Until 2008, like many countries in the world, South Africa adopted an inpatient model of care in which patients were hospitalised in a centralised specialised hospital for the initial six months of treatment to facilitate daily injections and allow close monitoring of adverse events and adherence. Following discharge, and for the remaining period of treatment (18 months or longer), patients were expected to complete treatment at their local healthcare facility and return to the centralised hospital for monthly outpatient visits; for some patients this entailed travelling up to 500 km to reach the hospital. However, by 2008 the escalating burden of drug-resistant tuberculosis (DR-TB), together with limited bed capacity, resulted in long waiting lists and high mortality while patients waited to access treatment, plus the occurrence of nosocomial transmission.<sup>i,j</sup> Furthermore, patients were discharged before the end of the injectable phase of treatment to facilities unfamiliar with DR-TB treatment, resulting in poor treatment outcomes and high default rates.<sup>k</sup>

To address the TB burden in South Africa, the National Department of Health (NDoH) introduced GeneXpert diagnostic machines across the country in 2011. These machines detect TB and rifampicin-resistant TB (RR-TB), which is considered a surrogate marker for MDR-TB, in less than two hours. Following this, guidelines for decentralised and de-institutionalised management of DR-TB were introduced,<sup>l</sup> and by 2015 the NDoH was promoting the provision of MDR-TB services in each district in the country. The last two *District Health Barometers* have reported the TB rifampicin resistance confirmed client rate by district. However, the MDR-TB treatment success rate is being reported for the first time this year.

Although the quality and completeness of the TB data have improved significantly over the last few years, the MDR-TB data are far from accurate or complete. Fifteen per cent of patient records had missing geographical data and could not be assigned to a district in 2015. These problems are due to a combination of data programming issues, the use of incorrect facility names and old geographical boundaries (prior to 2011), as well as incomplete and inaccurate data entry. Poor MDR-TB programme data was a major weakness highlighted in a World Health Organization (WHO)-led review at the end of 2015.<sup>m</sup> Accurate data are essential for the management and control of MDR-TB in South Africa. Given the infectious nature of this disease and the poor treatment success rate, every effort must be made at all levels of the healthcare system to improve the validity of the MDR-TB data. All the indicator values in this publication differ from the values in the 2015/16 Annual Report of the National Department of Health as the ETR.Net and EDRWeb data were cleaned after the analysis of the data was done by HST.

## 9.1 Incidence of TB (all types)

The TB incidence rate is the proportion of new TB cases in a population over a specific period of time. The incidence rate reported here is based on the number of diagnosed TB cases reported in the electronic TB register (ETR.Net) in 2015 per 100 000 population.

In South Africa, the TB incidence rate reached its peak in 2009 at 832 per 100 000, and declined thereafter, with an incidence rate of 520 per 100 000 population in 2015. However, South Africa still has one of the highest TB burdens in the world, and considerable effort will be necessary to achieve the Sustainable Development Goals.

Presently the Eastern Cape, KwaZulu-Natal and Western Cape have the highest incidence rates in the country, with reported rates of 692, 685 and 681 per 100 000, respectively (Figure 1). Table 2 shows the decline in TB incidence across the provinces; the most notable decline was in KwaZulu-Natal where the incidence decreased from 1 185 to 685 per 100 000 over the last 5 years.

h Wu S, Zhang Y, Sun F, Chen M, Zhou L, Wang N, et al. Adverse Events Associated With the Treatment of Multidrug-Resistant Tuberculosis: A Systematic Review and Meta-analysis. *Am J Ther*. 2016; 23(2):e521–30. doi: 10.1097/01.mjt.0000433951.09030.5a.

i Wallengren K, Scano F, Nunn P, Margot B, Buthelezi B, Williams B, et al. Resistance to TB drugs in KwaZulu-Natal: causes and prospects for control. Available from: <http://arxiv.org/abs/1107.1800> [Accessed 25 July 2015].

j Gandhi N, Moll A, Sturm A, Pawinski R, Govender T, Lalloo, et al. Extensively drug-resistant tuberculosis as a cause of death in patients co-infected with tuberculosis and HIV in a rural area of South Africa. *Lancet*. 2006; 368:1575–80.

k Brust J, Gandhi N, Carrara H, Osburn G, Padayatchi N. High treatment failure and default rates for patients with multidrug-resistant tuberculosis in KwaZulu-Natal, South Africa, 2000–2003. *Int J Tuberc Lung Dis*. 2010; 14:413–9.

l National Department of Health. Multi-drug resistant tuberculosis: A policy framework on decentralised and deinstitutionalised management for South Africa. Pretoria: NDoH; 2011.

m World Health Organization. Towards Universal Health Coverage: Report of the Evaluation of South Africa Drug Resistant TB programme and its implementation of the Policy Framework on Decentralised and Deinstitutionalised Management of Multidrug Resistant TB. Pretoria: WHO; 2016.

Figure 1: Incidence of TB (all types) by province, 2015

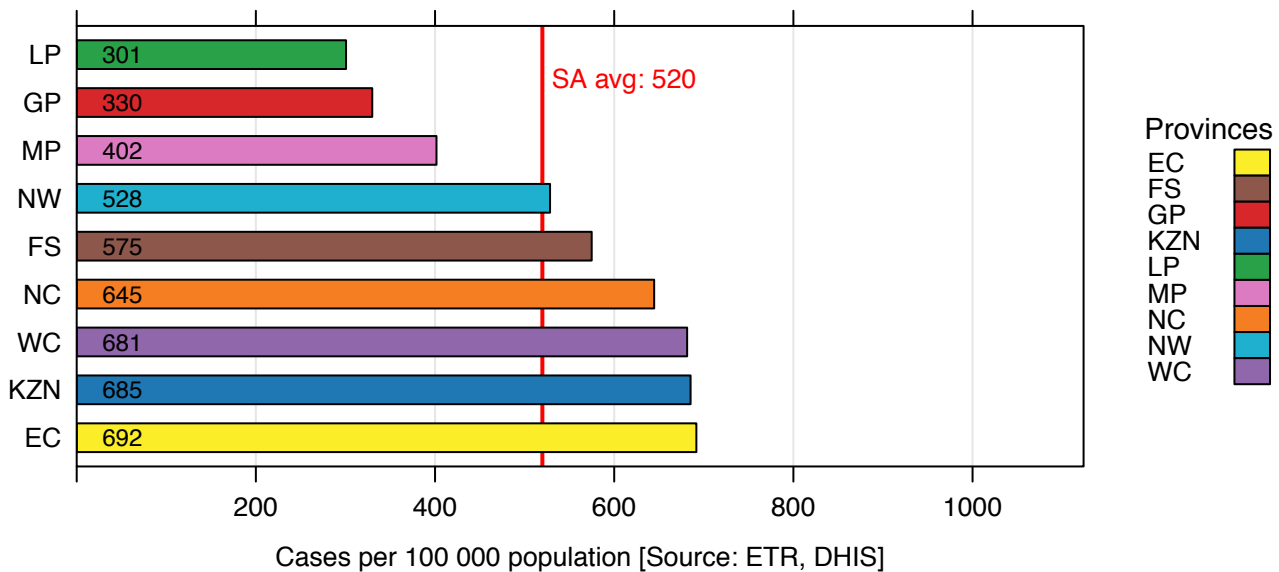


Table 2: Incidence of TB (all types) by province and nationally, 2006–2016 (cases per 100 000 population)

|     | 2006  | 2007  | 2008  | 2009    | 2010    | 2011    | 2012    | 2013  | 2014  | 2015  |
|-----|-------|-------|-------|---------|---------|---------|---------|-------|-------|-------|
| EC  | 720.5 | 806.6 | 962.7 | 953.4   | 922.3   | 913.7   | 862.7   | 823.1 | 785.0 | 691.7 |
| FS  | 819.6 | 844.1 | 889.5 | 859.7   | 837.2   | 841.5   | 760.6   | 720.9 | 631.7 | 574.8 |
| GP  | 462.3 | 174.1 | 489.5 | 517.1   | 113.6   | 454.1   | 418.2   | 403.3 | 378.2 | 329.9 |
| KZN | 591.7 | 880.7 | 928.1 | 1 215.5 | 1 161.8 | 1 185.2 | 1 060.4 | 952.5 | 813.7 | 685.2 |
| LP  | 284.1 | 329.1 | 397.2 | 433.5   | 419.8   | 410.6   | 371.8   | 383.3 | 334.1 | 300.7 |
| MP  | 22.7  | 227.3 | 637.1 | 745.0   | 715.5   | 613.6   | 512.7   | 477.1 | 461.5 | 401.6 |
| NC  | 778.2 | 859.2 | 935.5 | 932.5   | 892.2   | 893.8   | 758.1   | 798.0 | 764.3 | 644.6 |
| NW  | 791.6 | 766.5 | 815.0 | 903.8   | 894.4   | 816.6   | 705.0   | 658.1 | 630.7 | 528.4 |
| WC  | 958.8 | 938.3 | 948.1 | 930.1   | 909.5   | 827.4   | 776.5   | 742.9 | 709.9 | 681.4 |
| SA  | 577.7 | 608.2 | 752.8 | 831.8   | 718.4   | 762.3   | 689.3   | 648.9 | 592.7 | 519.8 |

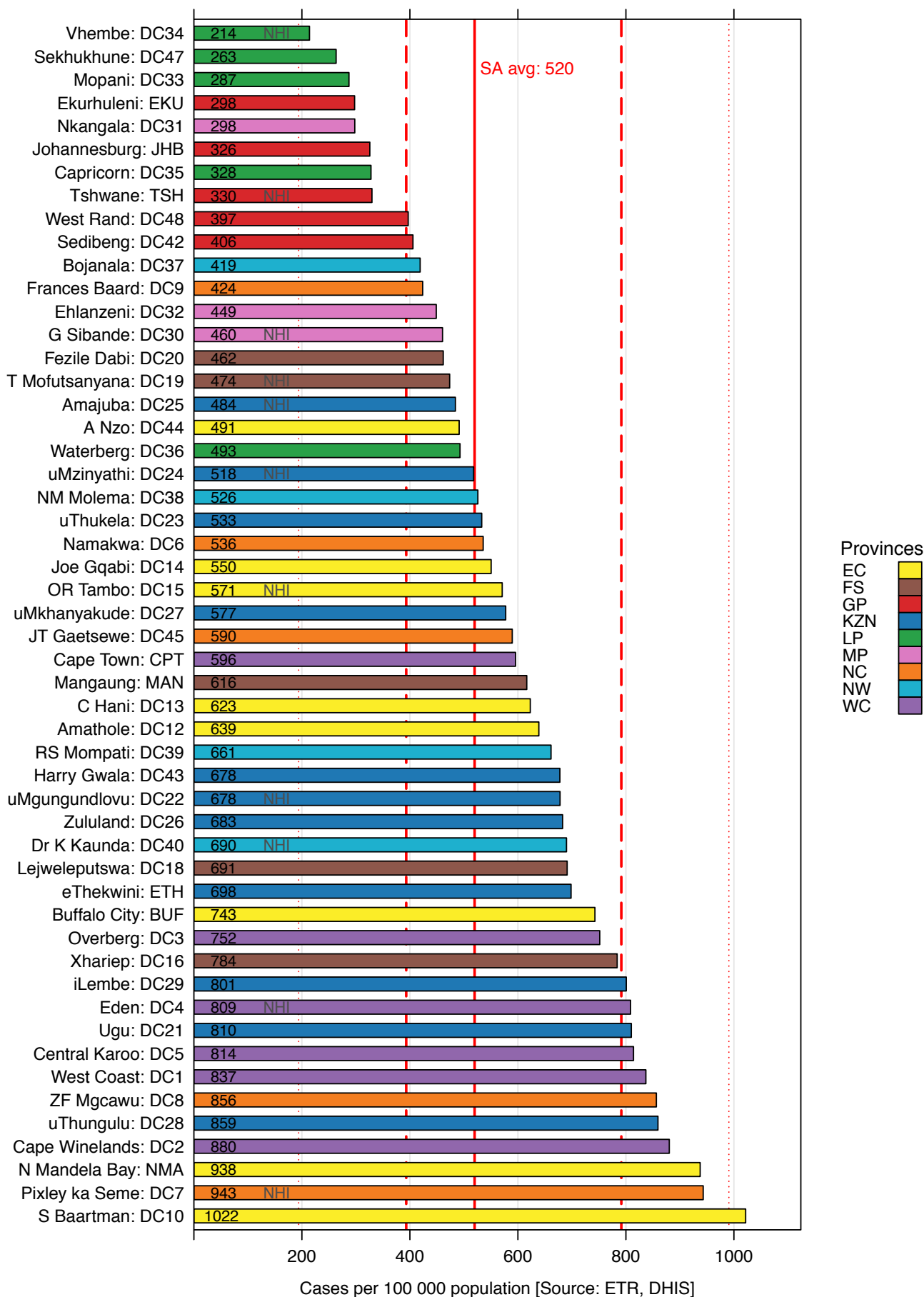
Source: ETR.Net

As can be seen in Figure 2 and Map 1, the districts with the highest TB incidence rates were S Bantam (EC) with 1 022 cases per 100 000, Pixley ka Seme (Northern Cape (NC)) with 943 cases per 100 000, and N Mandela Bay (EC) with 938 new cases per 100 000 population. All three districts have remained at approximately the same incidence rate for the last four years. The lowest incidence occurred in three districts in Limpopo Province (LP), namely Vhembe (214 per 100 000), Sekhukhune (263 per 100 000) and Mopani (287 per 100 000). Although the TB incidence rate declined or at least stabilised in most districts, one district reported a slight increase in incidence between 2014 and 2015, namely West Coast (WC), from 825.7 to 837.0 per 100 000. Five districts reported a sharp decline in incidence rate from 2014 to 2015. Xhariep (Free State (FS)) reported a decline from 978.7 to 783.8 per 100 000, Ugu (KZN) from 996.3 to 810.0, eThekweni (KZN) from 871.3 to 698.4, OR Tambo (EC) from 775.8 to 570.9, and Frances Baard (NC) from 635.8 to 423.6 per 100 000 population.

The three districts with the highest TB burden in 2015 were eThekweni (KZN) with 24 588 cases, Cape Town (WC) with 23 815 cases, and Johannesburg (GP) with 15 912 cases. These districts will need to make a concerted effort to decrease their high TB burden.

Incidence across National Health Insurance (NHI) districts varied widely, from 214 per 100 000 in Vhembe (LP) to 943 per 100 000 in Pixley ka Seme (NC) (Figure 3). From 2014 to 2015, TB incidence decreased in all 11 NHI districts.

Figure 2: Incidence of TB (all types) by district, 2015



Map 1: Incidence of TB (all types) by district, 2015 (cases per 100 000 population)

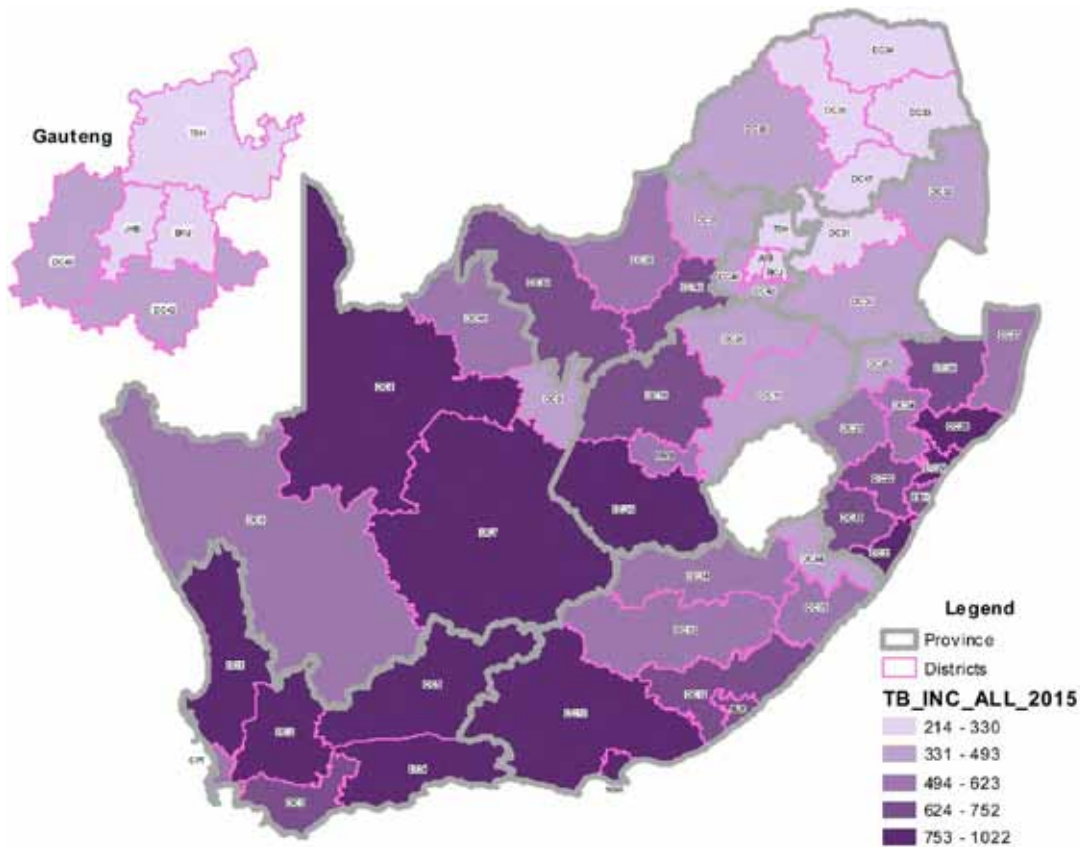
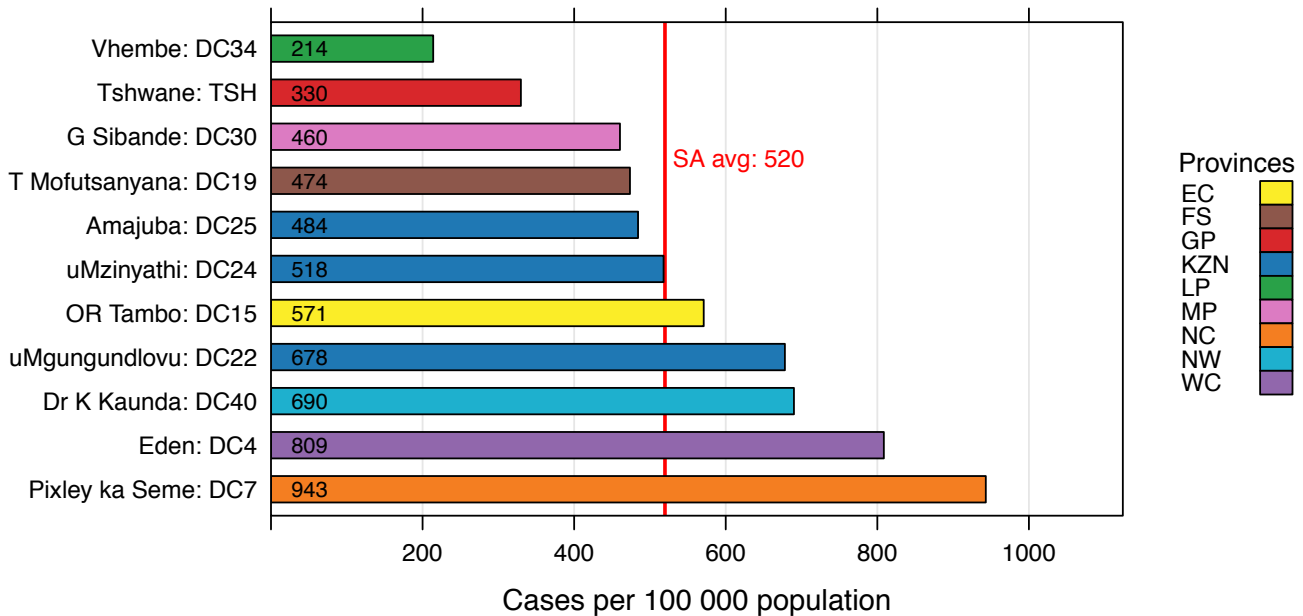


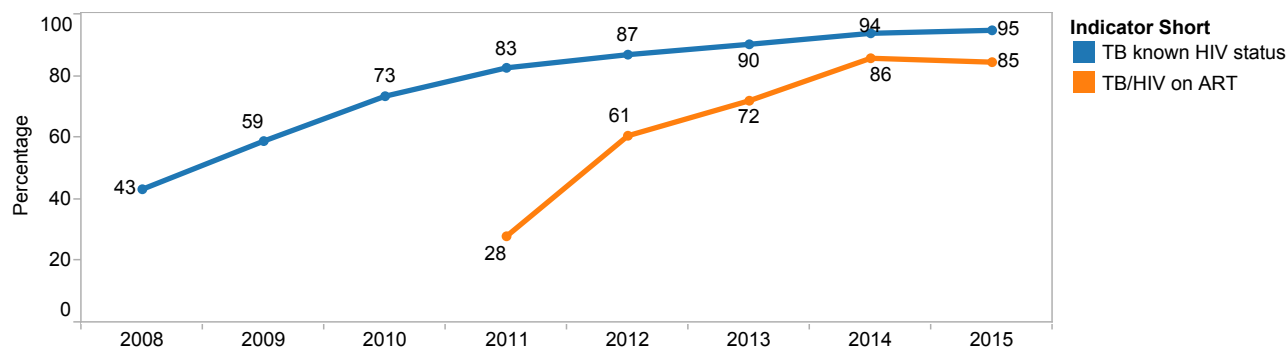
Figure 3: Incidence of TB (all types) by National Health Insurance district, 2015



## TB and HIV co-infection

The relationship between TB and HIV is well documented, and HIV is a key driver of the TB epidemic.<sup>n</sup> As disconnected and inadequate services contribute to poor treatment outcomes in patients co-infected with TB and HIV,<sup>o</sup> it is encouraging to see that the proportion of TB patients who know their HIV status increased considerably from 43.3% in 2008 to 94.8% in 2015 (Figure 4). Similarly, it is very encouraging to note that the number of co-infected patients on antiretroviral therapy (ART) increased from 28.0% in 2011 to 84.5% in 2015.

**Figure 4: Percentage of TB patients with known HIV status and percentage of TB-HIV co-infected patients on ART, 2008–2015**



### a) Proportion of TB patients with known HIV status

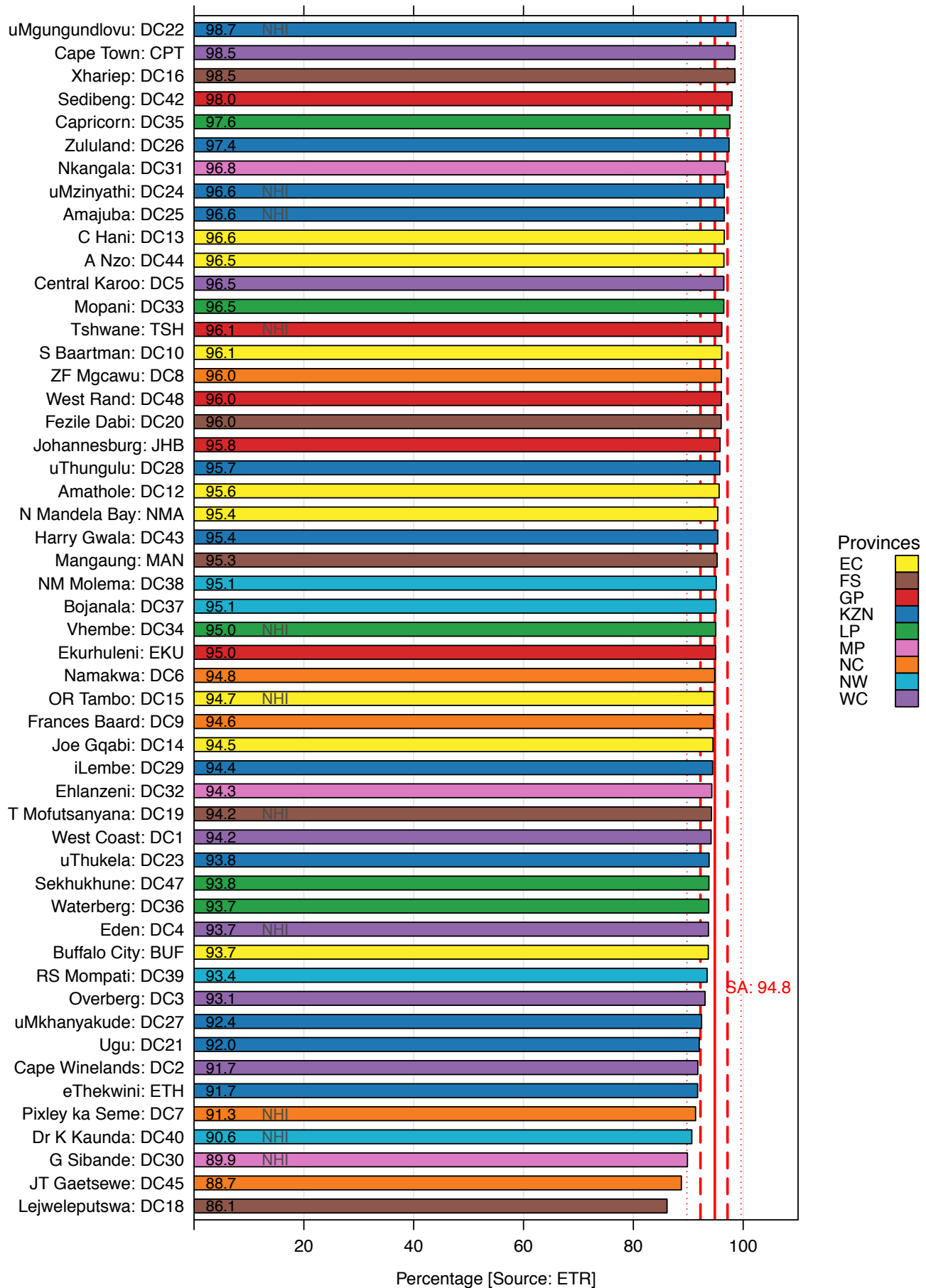
In 2015, 94.8% of TB patients across the country knew their HIV status. All nine provinces performed well; the Western Cape had the highest proportion of patients with known status (96.1%), while the Free State had the lowest proportion (93.0%).

Ninety-five per cent of TB patients knew their HIV status in 28 districts (Figure 5). Lejweleputswa (FS) had the lowest proportion of patients with known HIV status (86.1%). In the NHI districts, the proportion of patients with known HIV status varied from a low of 89.9% in G Sibande (Mpumalanga (MP)) to a high of 98.7% in uMgungundlovu (KZN).

<sup>n</sup> Corbett E, Watt C, Walker N, Maher D, Williams BG, Raviglione MC, et al. The growing burden of tuberculosis: global trends and interactions with the HIV epidemic. *Arch Intern Med.* 2003; 163:1009–21.

<sup>o</sup> Shah N, Wright A, Bai G, Barrera L, Boulahbal F, Martin-Casabona N, et al. Worldwide emergence of extensively drug-resistant tuberculosis. *Emerg Infect Dis.* 2007; 13:380–7.

Figure 5: Percentage of TB cases with known status by district, 2015

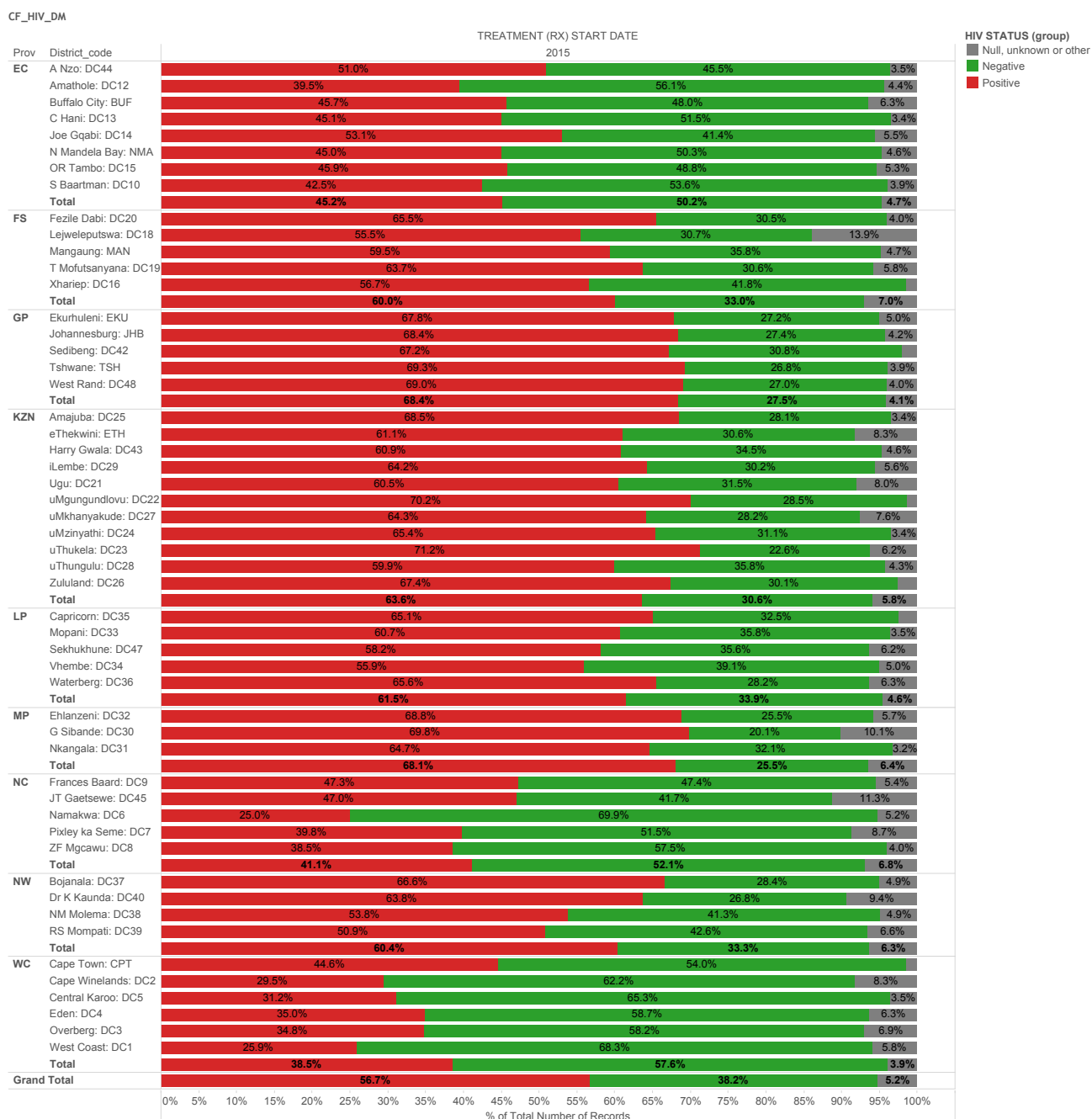




**b) Proportion of TB patients co-infected with HIV**

In 2015, the average TB/HIV co-infection rate across South Africa was 56.7%. Tuberculosis patients in Gauteng, Mpumalanga and KwaZulu-Natal had the highest co-infection rates at 68.4%, 68.1% and 63.6%, respectively. The Eastern Cape, Northern Cape and Western Cape had far lower rates of HIV co-infection at 45.2%, 41.1% and 38.5%, respectively. Across the districts, TB/HIV co-infection rates varied from a high of 71.2% in uThukela (KZN) to a low of 25.0% in Namakwa (NC). HIV co-infection rates in the NHI districts ranged from a low of 35.0% in Eden (WC) to a high of 70.2% in uMgungundlovu (KZN) (Figure 6).

**Figure 6: TB/HIV co-infection rate across districts, 2015**



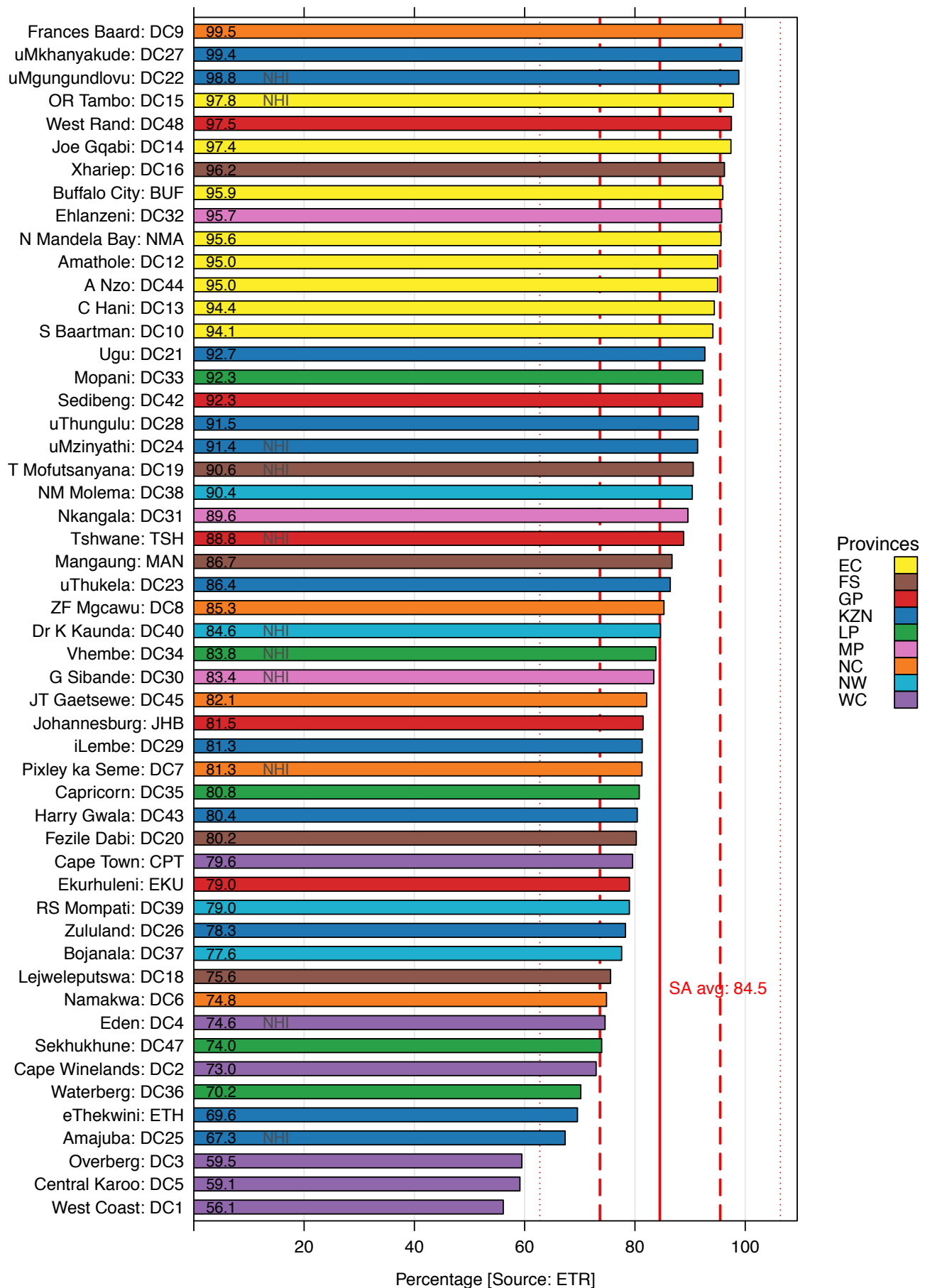
**c) Proportion of co-infected patients on ART**

Figure 7 shows the percentage of TB-HIV co-infected patients started on ART. The increase in proportion is very encouraging, from 28.0% in 2011 to 84.5% in 2015. If these improvements continue we will likely reach the End TB target of 100% by 2020.

Among the provinces, the Eastern Cape had the highest proportion of co-infected patients on ART (95.7%), while the Western Cape had the lowest proportion (75.7%). There was wide variation across districts, with the West Coast (WC) having the lowest proportion of HIV-positive TB patients on ART (56.1%), and Frances Baard (NC) the highest proportion (99.5%). Nine of the 11 NHI districts had more than 80% of HIV co-infected TB patients on ART.



Figure 7: Percentage of TB patients on ART by district, 2015



## 9.2 TB successful treatment rate (all TB)

This indicator measures the proportion of all TB patients (smear-positive, smear-negative and extra-pulmonary) who were cured or who completed treatment.<sup>p</sup> The national treatment success rate has been improving steadily, from 68.8% in 2007 to 77.2% in 2014. Table 3 shows the number and proportion of successfully treated patients between 2012 and 2014. It is encouraging that the treatment success rate has remained constant; however, as the number of TB patients decline, the country must intensify its efforts to treat all TB patients successfully to reach the End TB Strategy target of 90% by 2020.

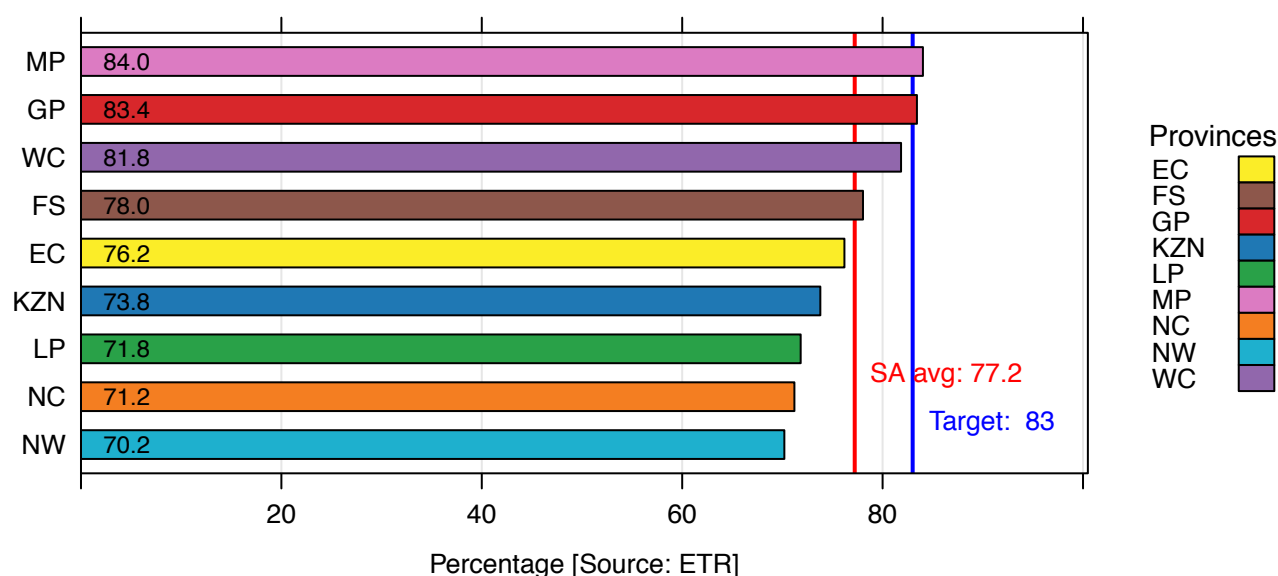
**Table 3: National TB treatment success rate, 2012–2014**

| Year | Number of TB patients started on TB treatment | Number of patients successfully treated | Treatment success rate (%) |
|------|-----------------------------------------------|-----------------------------------------|----------------------------|
| 2012 | 354 270                                       | 269 624                                 | 76.1                       |
| 2013 | 339 379                                       | 264 455                                 | 77.9                       |
| 2014 | 325 498                                       | 251 344                                 | 77.2                       |

Source: ETR.Net

Limpopo, Mpumalanga and North West (NW) provinces saw a marked increase in treatment success rate from 2013 to 2014. Mpumalanga increased its success rate from 76.1% in 2013 to 84.0% in 2014, and reported the highest treatment success rate for all nine provinces. Limpopo and North West also increased their success rates from 2013 to 2014, from 57.6% to 71.8% and from 65.8% to 70.2%, respectively (Figure 8). The Western Cape, Eastern Cape, Northern Cape, Gauteng and Free State maintained their treatment success rates from 2013. However, KwaZulu-Natal reported a significant decline in treatment success from 81.8% in 2013 to 73.8% in 2014. It appears that the reason for the drop in KwaZulu-Natal's treatment success was the proportion of patients not evaluated, namely more than 12% of patients in five districts in 2014 (Figure 9). eThekweni had the highest not-evaluated rate among all the districts (18.5%).

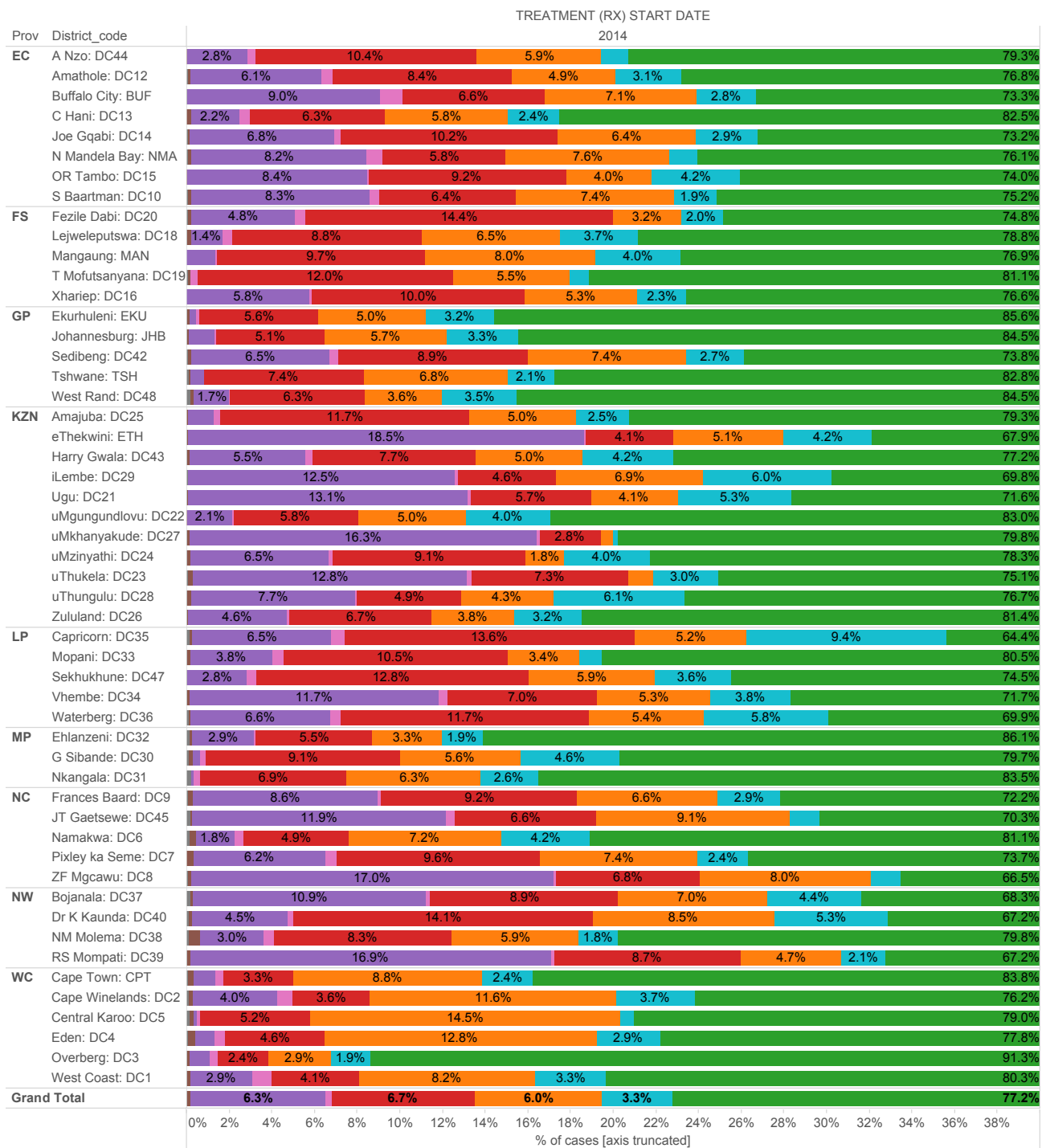
**Figure 8: TB treatment success rate by province, 2014**



<sup>p</sup> National Department of Health. National Tuberculosis Management Guidelines 2014. Pretoria: NDoH; 2014.

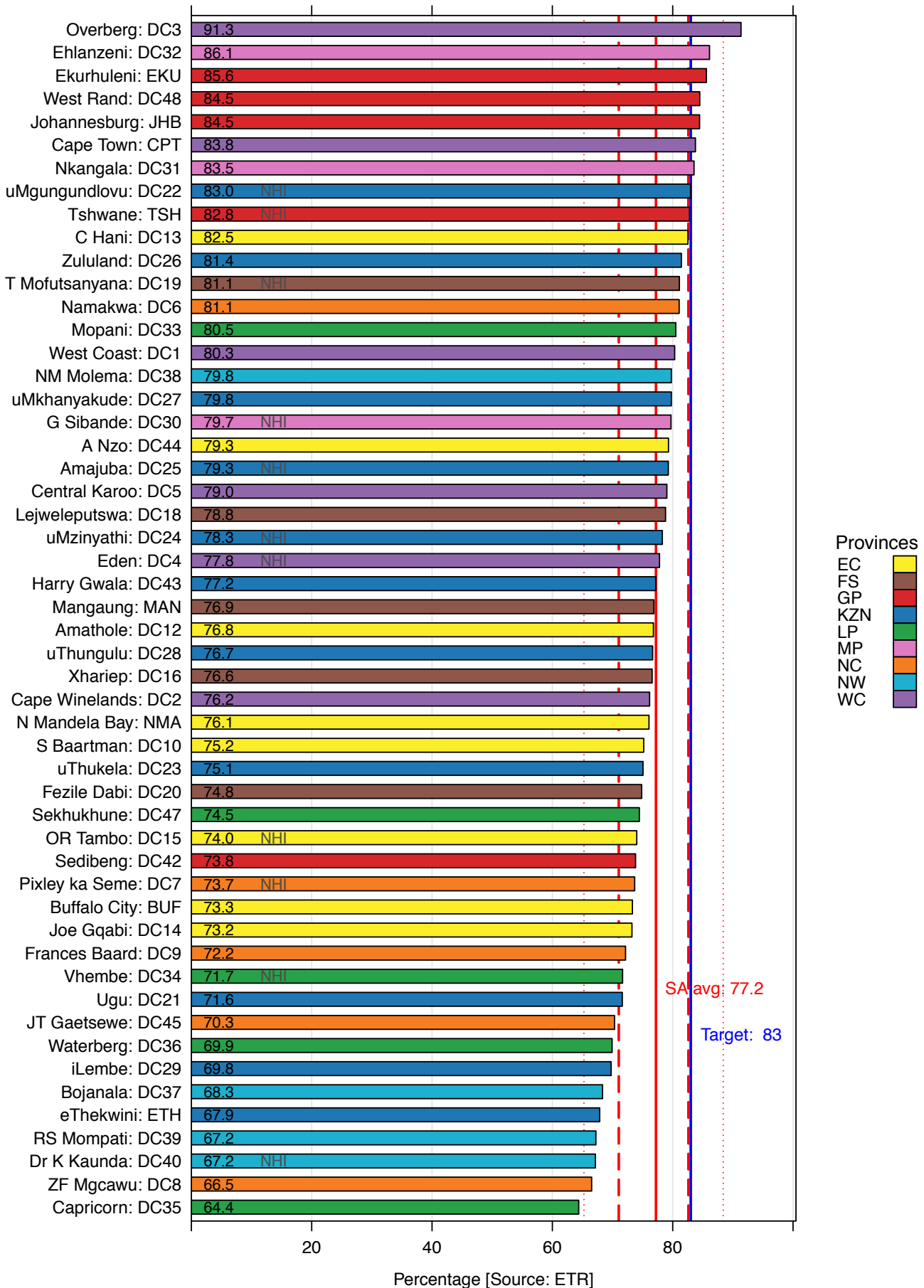
Section A: Tuberculosis

Figure 9: Treatment outcomes for all TB patients by district, 2014



At district level, Overberg (WC) had the highest treatment success rate of 91.3%, exceeding the End TB Strategy target of 90%. The lowest success rate (64.4%) was in Capricorn (LP), but this is a marked improvement on the lowest success rate of 46.7% reported by Vhembe (LP) in 2013. Low success rates were also reported by ZF Mgcawu (NC) 66.5%, and RS Mompoti and Dr K Kaunda (NW), both at 67.2% (Figure 10). High death rates in Capricorn (LP) (13.6%) and Dr K Kaunda (NW) (14.1%) and a high number of cases not evaluated in ZF Mgcawu (17.0%) are possible causes of these poor treatment success rates (Figure 9). It is of concern that eThekweni (KZN) had the highest number of TB cases in South Africa but one of the lowest treatment success rates (67.9%).

Figure 10: TB treatment success rate by district, 2014



Treatment success rates in the NHI districts ranged from 67.2% in Dr K Kaunda (NW) to 83.0% in uMgungundlovu (KZN) (Figure 11). Vhembe (LP) recorded a remarkable increase from 46.7% in 2013 to 71.7% in 2014 by decreasing the proportion of not-evaluated cases from 35.8% to 11.7% (Figure 9). While eight of the 11 NHI districts increased their treatment success rate, three districts reported a decline from 2013 to 2014, namely Eden (WC) from 79.1% to 77.8%, OR Tambo (EC) from 76.2% to 74.0%, and uMzinyathi (KZN) from 82.9% to 78.3%.

Figure 11: TB treatment success rate by National Health Insurance district, 2014

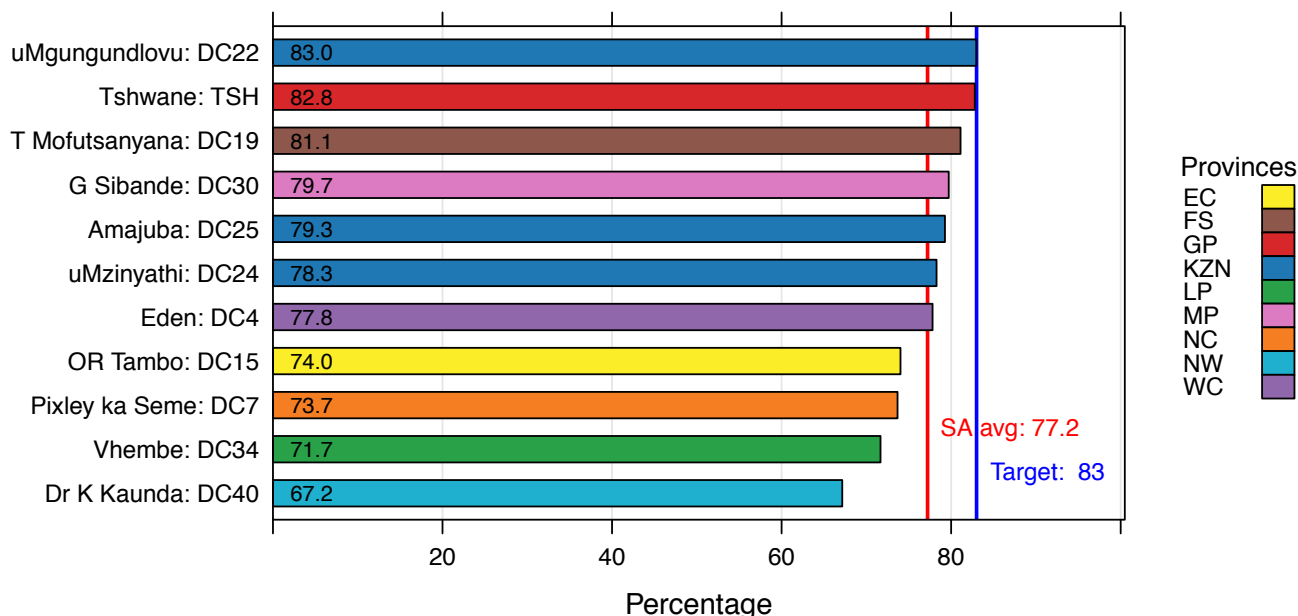
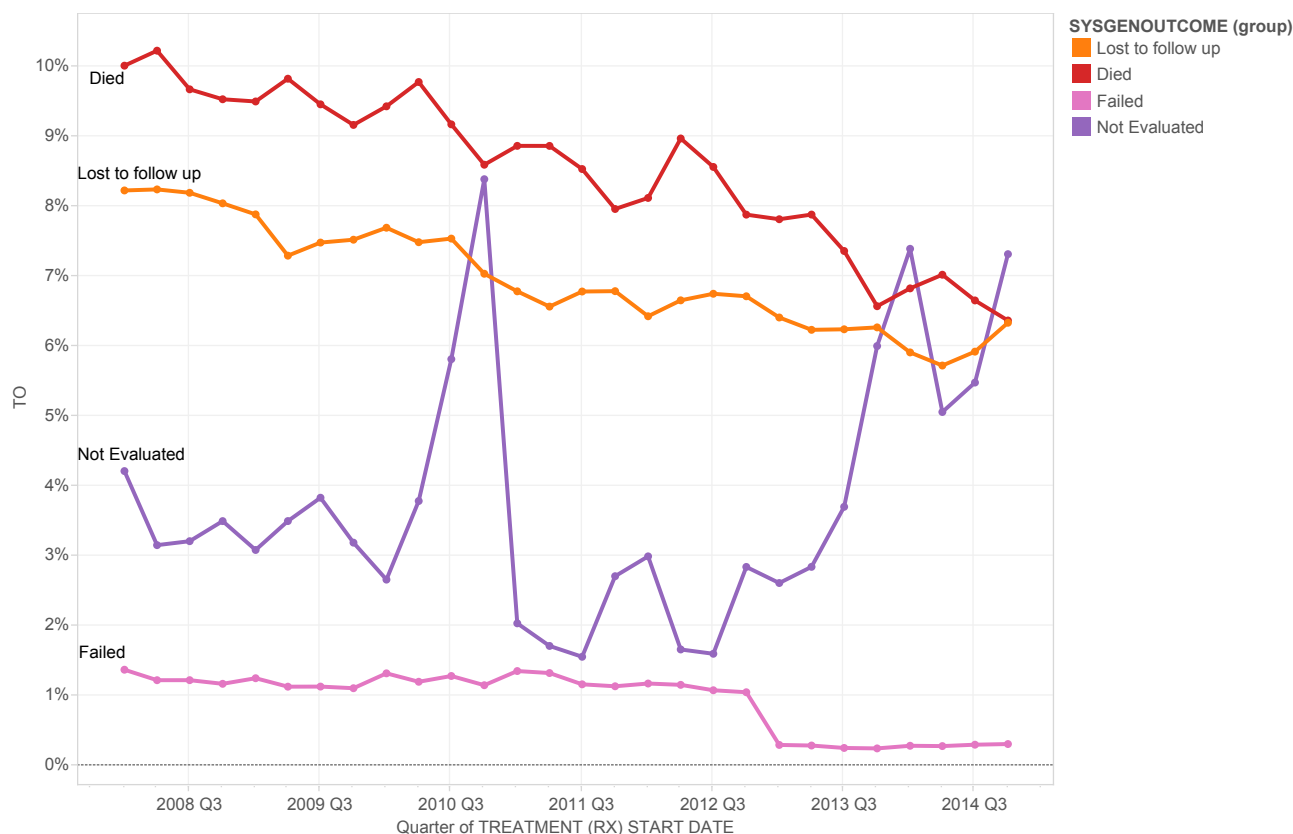


Figure 12 shows the trends for treatment outcomes from 2008 to 2014. While the proportion of patients who died or who failed treatment has been decreasing steadily, the proportion of cases loss to follow up has not declined, and the proportion of cases not evaluated has increased significantly over the last two years. It is not clear whether the inclusion of patients previously classified as 'Transferred out' has contributed to the increase in patients not evaluated, or whether there are other reasons for this increase. However, to improve TB programme performance, the proportion of patients not evaluated and loss to follow up must be reduced, and efforts should be made by every facility to find out and report treatment outcomes for all patients.

Figure 12: National trends for TB treatment outcomes, 2008–2014



### 9.3 TB death rate (all TB)

Tuberculosis remained the leading cause of death in South Africa in 2014, with 8.4% of deaths nationally attributed to TB.<sup>9</sup> However, the proportion of deaths due to TB has decreased significantly since 2007, when it peaked at 12.8%. At provincial level, TB was the leading cause of death in six of the nine provinces in 2014. The highest proportion of deaths due to TB was recorded in KwaZulu-Natal (11.2%), followed by Mpumalanga (9.8%) (Table 4).

Table 4: TB as cause of natural death by province, 2011–2014

| Year | SA   |      | WC   |     | EC   |      | NC   |     | FS   |      | KZN  |      | NW   |      | GP   |     | MP   |      | LP   |     |
|------|------|------|------|-----|------|------|------|-----|------|------|------|------|------|------|------|-----|------|------|------|-----|
|      | Rank | %    | Rank | %   | Rank | %    | Rank | %   | Rank | %    | Rank | %    | Rank | %    | Rank | %   | Rank | %    | Rank | %   |
| 2014 | 1    | 8.4  | 4    | 5.6 | 1    | 9.0  | 2    | 7.4 | 1    | 8.4  | 1    | 11.2 | 1    | 8.9  | 1    | 6.7 | 1    | 9.8  | 2    | 7.4 |
| 2013 | 1    | 8.8  | 4    | 5.7 | 1    | 9.8  | 2    | 7.7 | 1    | 8.5  | 1    | 11.9 | 1    | 8.7  | 1    | 7.3 | 1    | 10.6 | 2    | 7.7 |
| 2012 | 1    | 9.9  | 2    | 6.4 | 1    | 10.8 | 1    | 8.8 | 1    | 9.3  | 1    | 13.3 | 1    | 10.4 | 1    | 7.7 | 1    | 12.0 | 2    | 8.5 |
| 2011 | 1    | 10.7 | 1    | 7.1 | 1    | 11.4 | 1    | 8.5 | 2    | 9.6  | 1    | 14.4 | 1    | 11.3 | 1    | 8.4 | 1    | 13.4 | 2    | 9.1 |
| 2010 | 1    | 11.6 | 1    | 7.8 | 1    | 12.7 | 1    | 9.2 | 2    | 11.1 | 1    | 15.7 | 1    | 12.3 | 1    | 8.8 | 1    | 13.4 | 1    | 8.4 |

Source: StatsSA.<sup>a</sup>

The TB death rate measures the proportion of TB patients who died while on treatment.<sup>p</sup> Factors that increase the risk of death for TB patients in South Africa are advanced age, HIV co-infection, a prior history of TB, and the presence of both pulmonary and extra-pulmonary TB. In TB patients with HIV, the risk of death decreases if patients are on ART and if they have a higher CD4 cell count.<sup>f</sup>

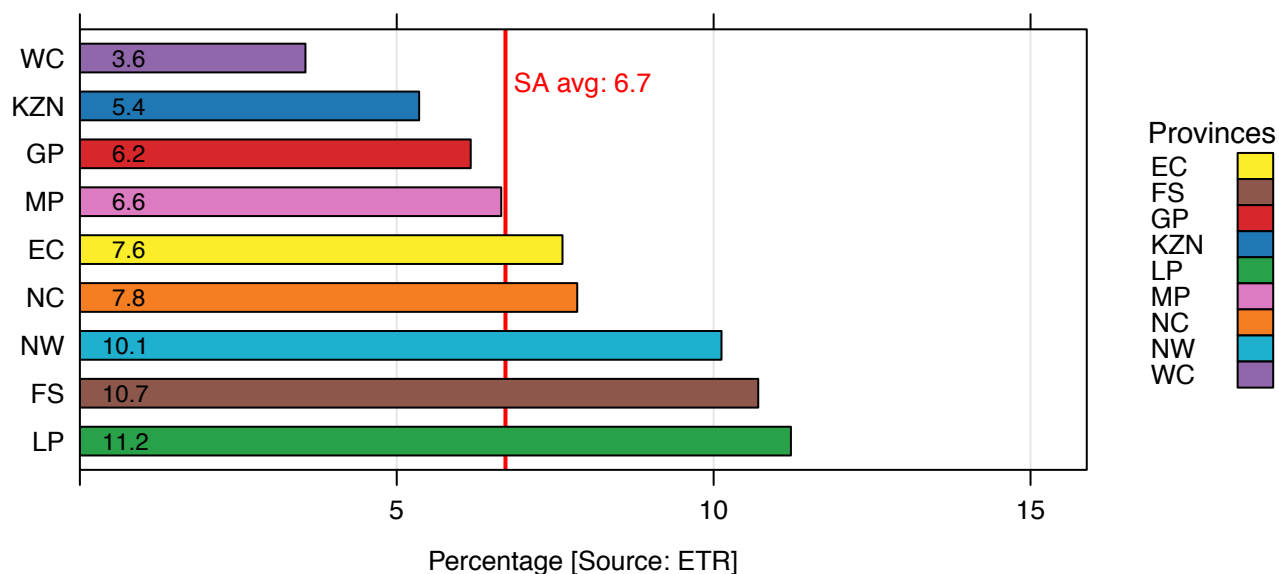
In 2014, a national average death rate of 6.7% was reported for TB patients on treatment. This was an improvement from 7.4% in 2013. There was wide variation in death rate between provinces, with a high of 11.2% in Limpopo and a low of 3.6% in the Western Cape. Limpopo’s death rate increased slightly, while death rates decreased in the other eight provinces (Figure 13).

q Statistics South Africa. Mortality and causes of death in South Africa, 2014: Findings from death notification. Pretoria: StatsSA; 2015.

r Pepper DJ, Schomaker M, Wilkinson RJ, de Azevedo V, Maartens G. Independent predictors of tuberculosis mortality in a high HIV prevalence setting: a retrospective cohort study. *AIDS Res Ther.* 2015; 12:35.



Figure 13: TB death rate by province, 2014



At district level, the highest TB death rate was recorded in Fezile Dabi (FS) (14.4%) and the lowest in Overberg (WC) (2.4%) (Figure 14). uMkhanyakude (KZN) and C Hani (EC) saw the largest decline in death rate compared with 2013, from 6.9% to 2.8% and from 10.7% to 6.3%, respectively. uThungulu (KZN) and Pixley ka Seme (NC) had the biggest increase compared with 2013, from 3.1% to 4.9% and from 8.0% to 9.6%, respectively.

Nine of the 11 NHI districts reported a death rate higher than the national average of 6.7%. Furthermore, five of the 11 NHI districts reported an increase in death rate compared with 2013, namely Vhembe (LP), Tshwane (GP), G Sibande (MP), Pixley ka Seme (NC) and Amajuba (KZN) (Figure 15).

Figure 14: TB death rate by district, 2014

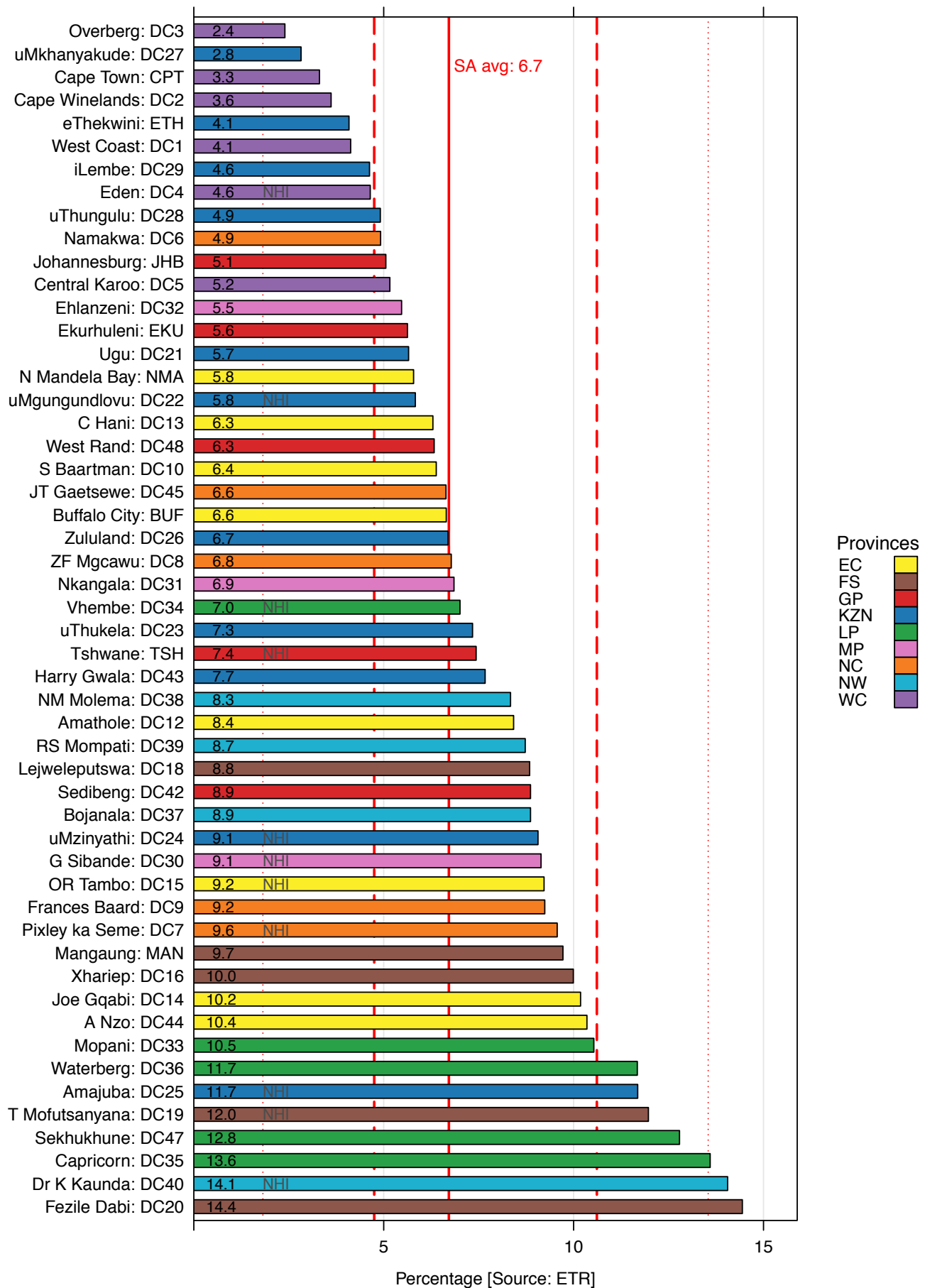
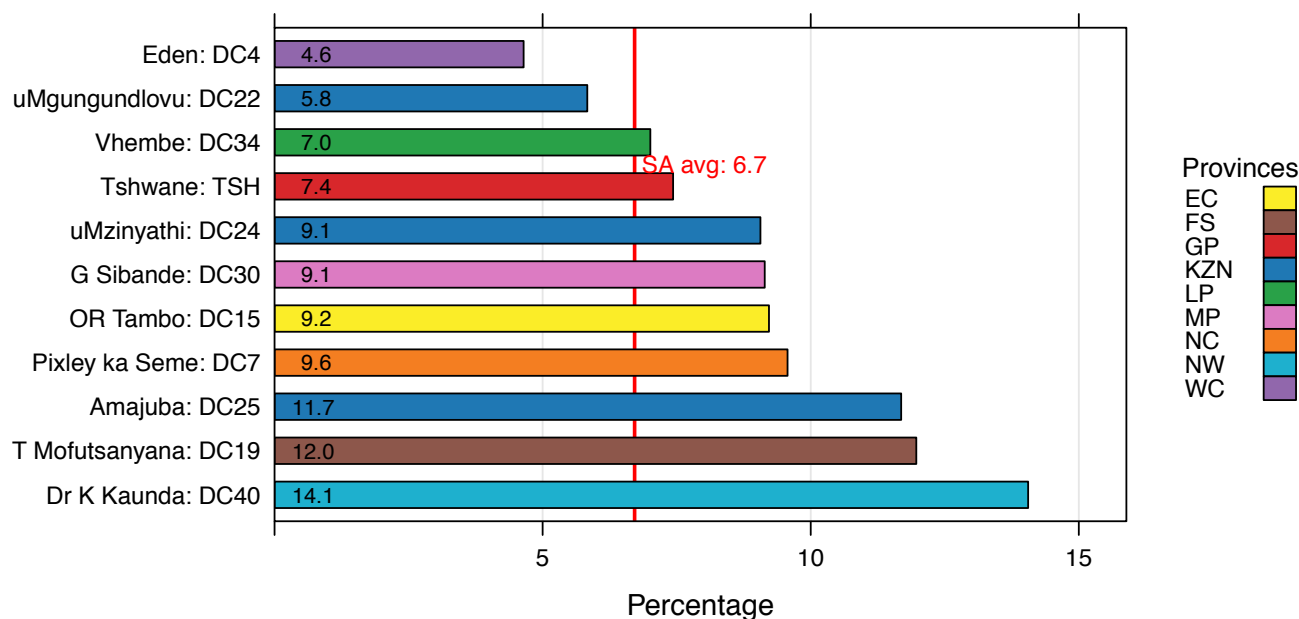


Figure 15: TB death rate by National Health Insurance district, 2014



However, it must be noted that due to the high proportion of cases not evaluated in 2014, the death rate for several districts may be higher than shown in Figures 13 and 14. In eThekweni (KZN), iLembe (KZN), Ugu (KZN), uMkhanyakude (KZN), uThukela (KZN), Vhembe (LP), JT Gaetsewe (NC), ZF Mgcau (NC), Bojanala (NW) and RS Mompoti (NW), more than 10% of cases were not evaluated, which may have impacted negatively on the death rates in these districts (Figure 9).

#### 9.4 TB cure rate (new pulmonary smear-positive)

This indicator measures the proportion of new smear-positive patients who have bacteriological proof of cure and who are smear-negative in the last month of treatment and on at least one other occasion.<sup>P</sup> As smear-positive TB cases are infectious and responsible for much TB transmission, it is encouraging to see that the proportion of smear-positive TB cases has decreased over the last four years (Table 5).

Table 5: National TB smear-positive rate, 2012–2015

| Year | Number of smear-positive TB patients | Total number of all TB patients | Smear-positive rate (%) |
|------|--------------------------------------|---------------------------------|-------------------------|
| 2012 | 122 425                              | 360 308                         | 33.9                    |
| 2013 | 115 080                              | 343 780                         | 33.5                    |
| 2014 | 91 331                               | 318 309                         | 28.7                    |
| 2015 | 73 363                               | 282 945                         | 25.9                    |

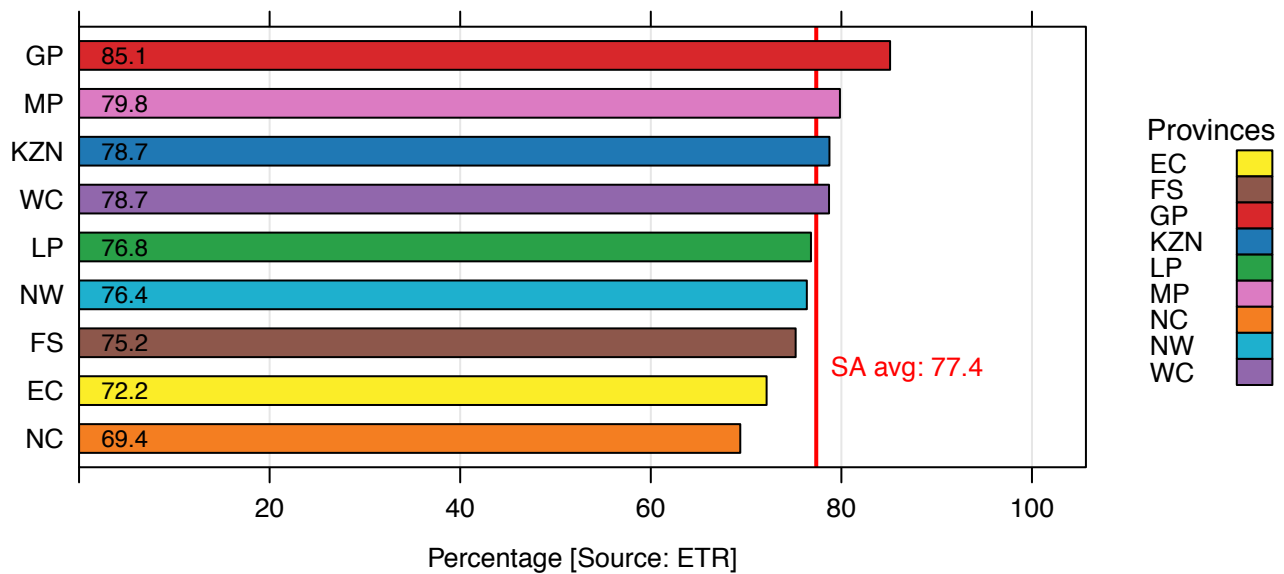
The average cure rate for the country was 77.4%. The cure rate for new smear-positive patients continued to increase from 75.8% in 2012, to 76.8% in 2013, and to 77.4% in 2014 (Table 6).

Table 6: National TB cure rate (new smear-positive), 2012–2014

| Year | Number of new smear-positive patients cured | Total number of new smear-positive patients | Cure rate for new smear-positive TB (%) |
|------|---------------------------------------------|---------------------------------------------|-----------------------------------------|
| 2012 | 92 685                                      | 122 302                                     | 75.8                                    |
| 2013 | 89 368                                      | 116 349                                     | 76.8                                    |
| 2014 | 74 737                                      | 96 607                                      | 77.4                                    |

At provincial level the cure rate varied from 69.4% in the Northern Cape to 85.1% in Gauteng (Figure 16). Contrary to previous years when the cure rate increased steadily in KwaZulu-Natal, the province reported a decline from 82.8% in 2013 to 78.7% in 2014. As mentioned earlier, KwaZulu-Natal had a large number of not-evaluated cases in 2014, which could partly explain this decline. North West and the Eastern Cape reported a remarkable increase in their cure rates. In North West, the cure rate increased from 66.0% in 2012 to 76.4% in 2014, and in the Eastern Cape it increased from 65.8% in 2012 to 72.2% in 2014.

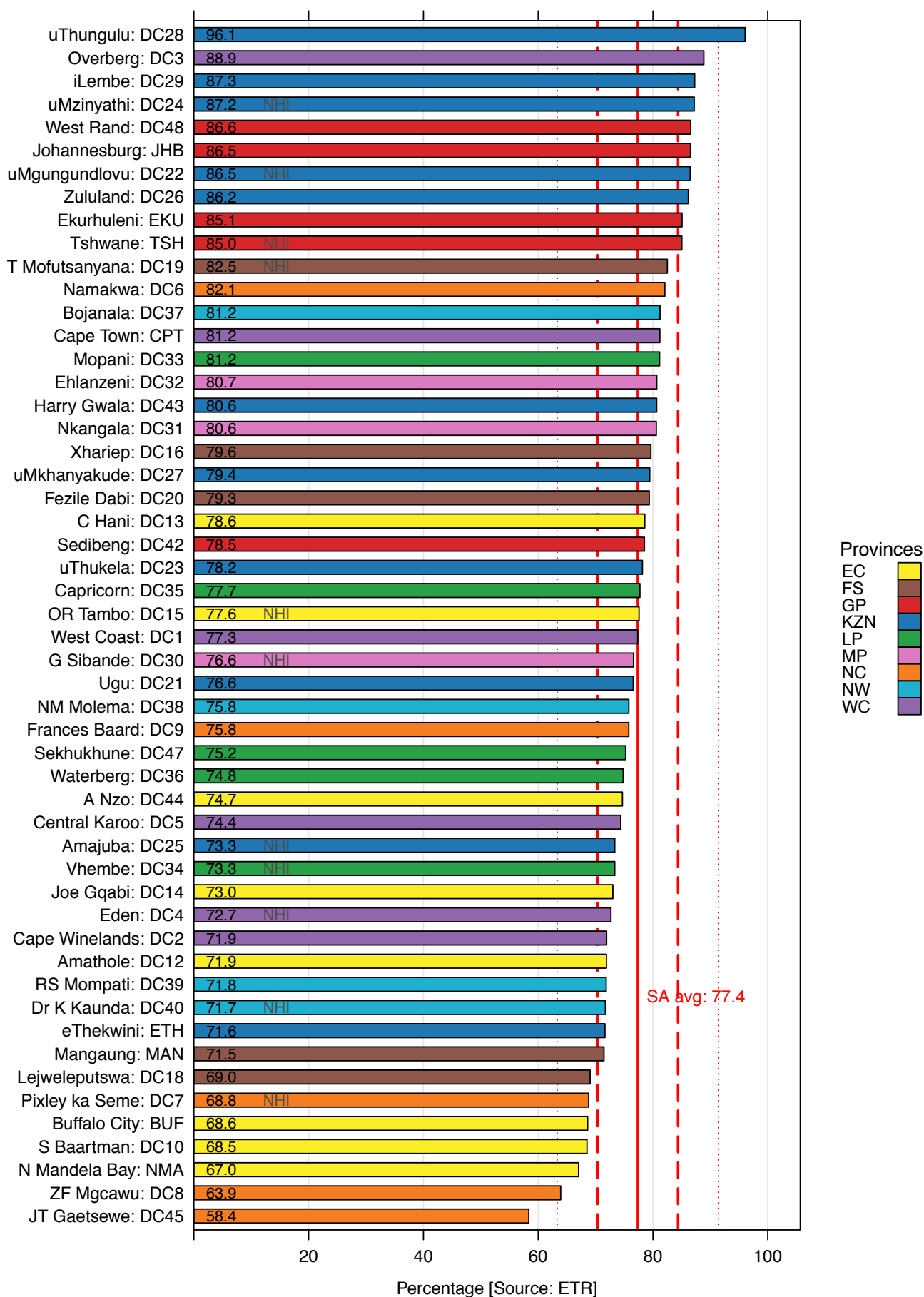
Figure 16: TB cure rate (new smear-positive) by province, 2014



At district level, there was wide variation in the cure rate for smear-positive TB, from a high of 96.1% in uThungulu (KZN) to a low of 58.4% in JT Gaetsewe (NC) (Figure 17). Three districts in Limpopo and one district in North West made the most significant improvement. In Limpopo, the cure rate increased in Vhembe from 47.9% in 2013 to 73.3% in 2014; in Sekhukhune from 58.8% to 75.2%; and in Waterberg from 64.9% to 74.8%. This improvement was achieved by reducing the number of patients not evaluated. The cure rate in Dr K Kaunda (NW) improved from 61.6% to 71.7%. Three districts reported a decline in cure rate of more than 7 percentage points, namely S Baartman (EC), eThekweni (KZN) and Eden (WC). Both S Baartman and eThekweni struggled with a high proportion of cases not-evaluated, while Eden had a high proportion of loss-to-follow-up cases (Figure 18).

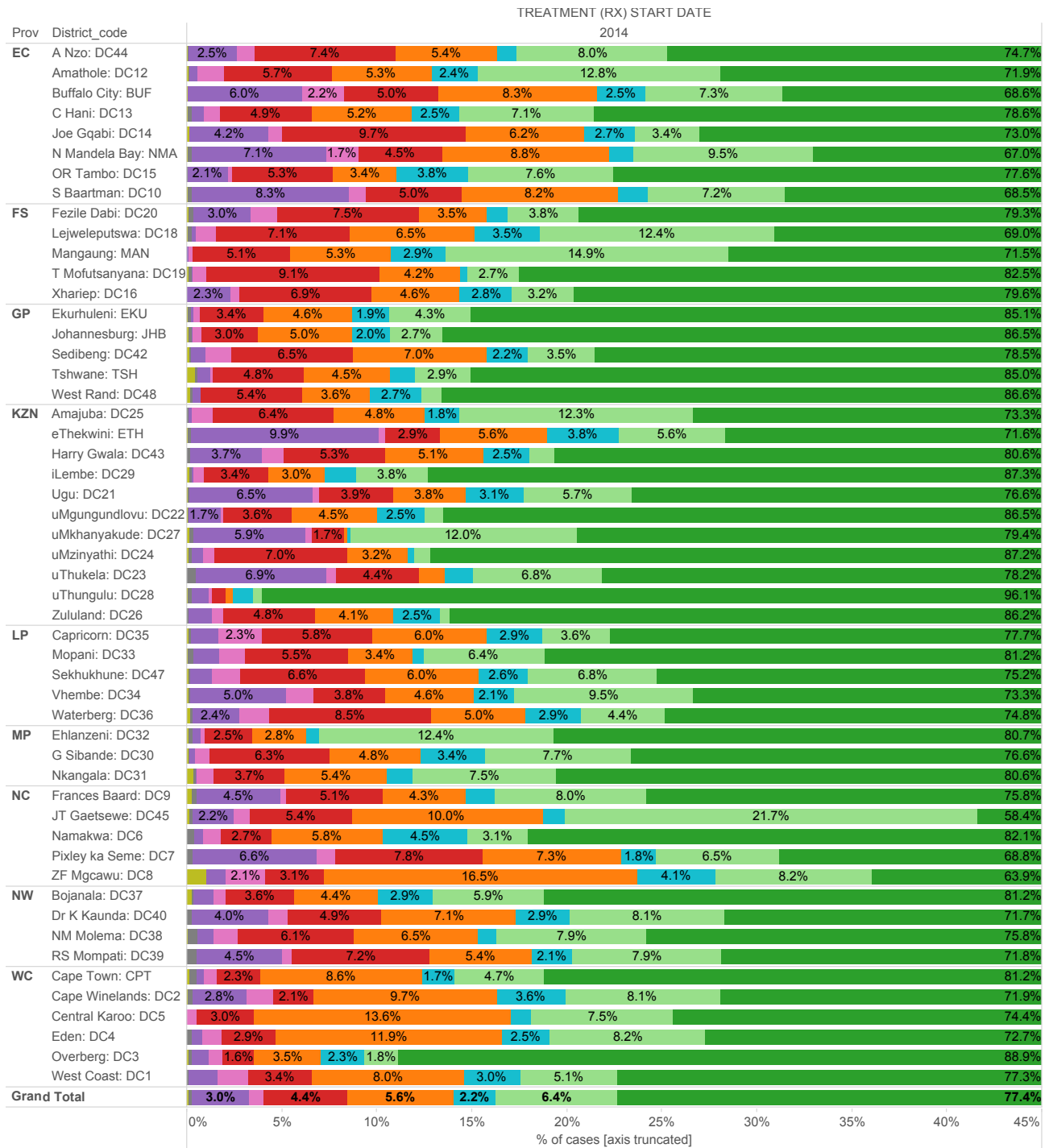
Five of the 11 NHI districts recorded a cure rate higher than the average of 77.4% in 2014. Seven NHI districts improved their cure rates, while two reported a slight decline of less than 3 percentage points. However, Pixley ka Seme (NC) reported a decrease from 73.2% to 68.8% and Eden (WC) reported a decrease from 79.8% to 72.7%. Eden has been on a downward trend since 2012 when it had the highest cure rate among NHI districts at 83.5%.

Figure 17: TB cure rate (new smear-positive) by district, 2014



Section A: Tuberculosis

Figure 18: Treatment outcomes in new pulmonary smear-positive patients, 2014



SYSTEM GEN OUTCOME

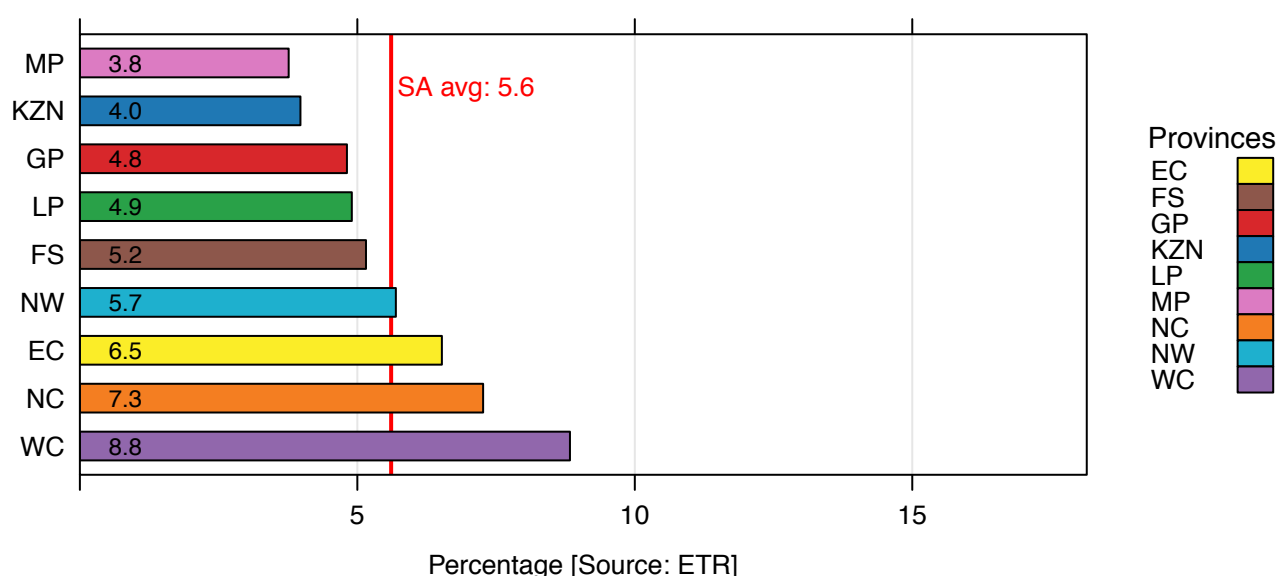
- Cured
- Completed
- Transferred Out
- Lost to follow up
- Died
- Failed
- Not Evaluated
- MDR Case
- RIF Resistance

## 9.5 TB loss to follow up rate (new pulmonary smear-positive)

The TB loss to follow up rate measures the proportion of new pulmonary smear-positive TB patients who interrupted treatment for two consecutive months or more.<sup>p</sup> This indicator does not include initial default, i.e. patients who were diagnosed with TB but who did not start treatment. Several studies have recorded a high rate of initial default in South Africa and have recommended that initial default be addressed to improve TB control.<sup>s,t</sup> Non-adherence or default from TB treatment can lead to death, drug resistance and continued transmission of TB in the community.<sup>u</sup>

The national loss to follow up rate was 5.6% in 2014, a marginal improvement from 5.8% in 2013. At provincial level, the loss to follow up rate decreased in six of the nine provinces, with the most notable improvements being in Mpumalanga (from 5.4% in 2013 to 3.8% in 2014), North West (from 7.1% in 2013 to 5.7% in 2014) and in the Eastern Cape (from 7.7% in 2013 to 6.5% in 2014). Limpopo, Free State and the Western Cape saw an increase in loss to follow up rate. While the rates in Limpopo and the Free State were still below the national target of 6%, the loss to follow up rate in the Western Cape was the highest in the country at 8.8% (Figure 19).

Figure 19: TB loss to follow up rate (new smear-positive) by province, 2014



At district level, 36 of South Africa's 52 districts achieved the national target and had a loss to follow up rate of 6% or less. uMkhanyakude (KZN) reported a loss to follow up rate of 0.1%, followed by uThungulu (KZN) with 0.4%, and uThukela (KZN) with 1.3% (Figure 20). The highest loss to follow up rate was recorded in ZF Mgcawu (NC) at 16.5%, Central Karoo (WC) at 13.6% and Eden (WC) at 11.9%. These same three districts also reported a significant increase in loss to follow up rate from 2013: ZF Mgcawu (NC) increased from 11.1% to 16.5%, Central Karoo (WC) from 10.2% to 13.6%, and Eden (WC) from 8.6% to 11.9%.

However, it must be noted that while certain districts such as uThukela, uMkhanyakude, Ugu and eThekweni in KwaZulu-Natal had low loss to follow up rates, they also had high rates of cases not-evaluated, which may 'hide' loss to follow up cases (Figure 18).

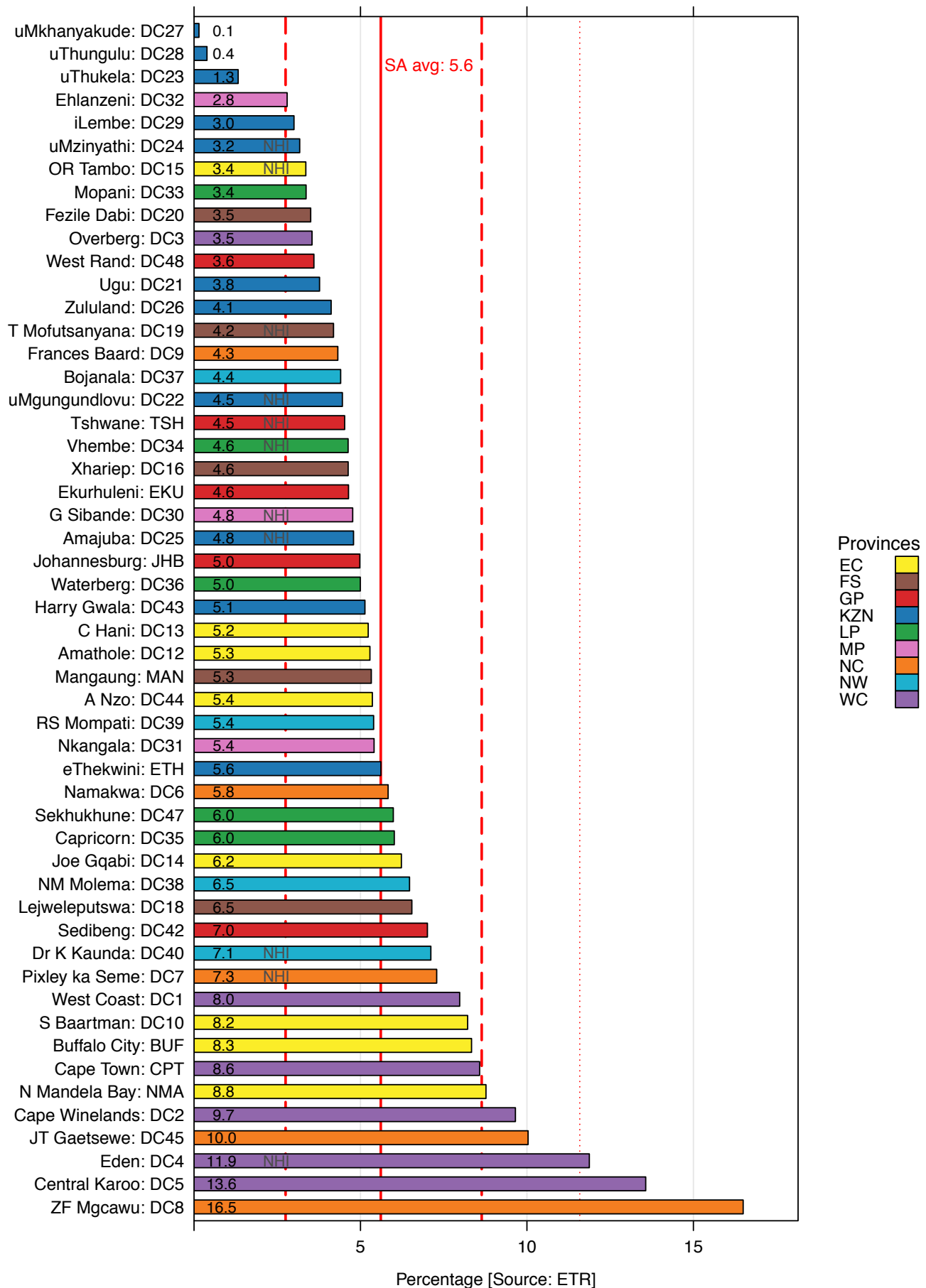
s Claassens MM, du Toit E, Dunbar R, Lombard C, Enarson DA, Beyers N, et al. Tuberculosis patients in primary care do not start treatment. What role do health system delays play? *Int J Tuberc Lung Dis.* 2013; 17(5):603–7.

t Cele LP, Knight S, Webb E, Tint K, Dlungwane T. High level of initial default among smear positive pulmonary tuberculosis in eThekweni health district, KwaZulu-Natal. *Southern African Journal of Infectious Diseases.* 2016; 31(2):41–3.

u Marx FM, Dunbar R, Enarson DA, Beyers N. The rate of sputum smear-positive tuberculosis after treatment default in a high-burden setting: a retrospective cohort study. *PLoS One.* 2012; 7(9):e45724.

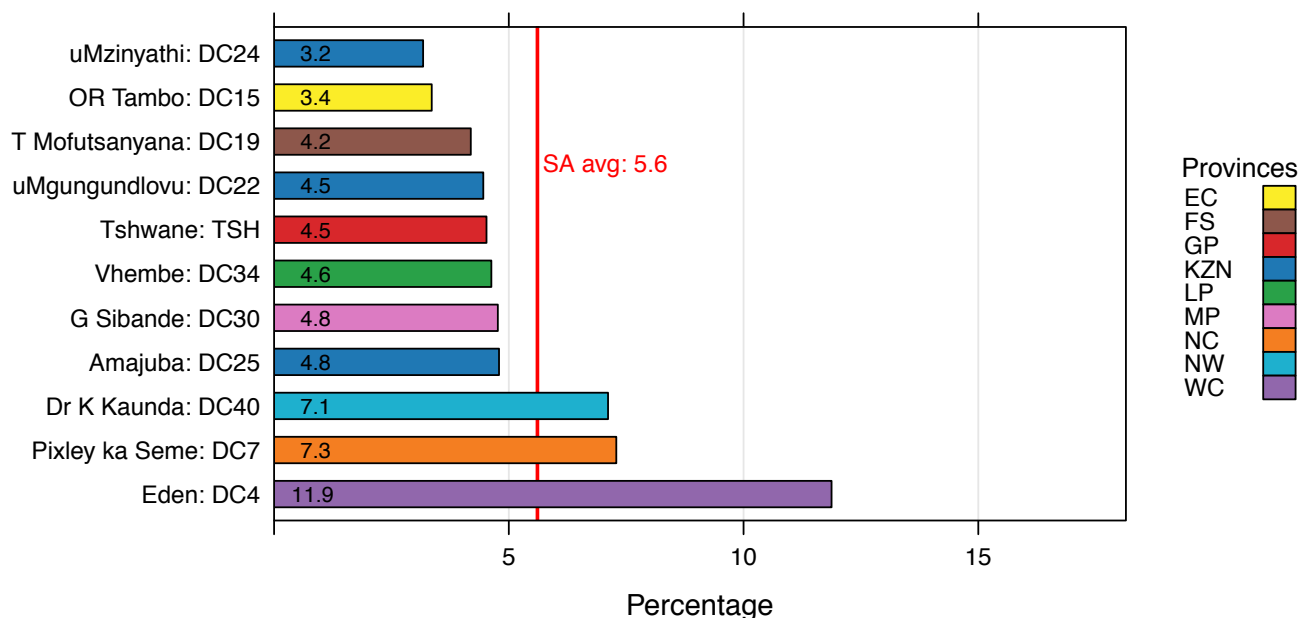


Figure 20: TB loss to follow up rate (new smear-positive) by district, 2014



Eight of the 11 NHI districts had a loss to follow up rate well below 6%, ranging from 3.2% in uMzinyathi (KZN) to 4.8% in Amajuba (KZN). Three NHI districts struggled with high loss to follow up rates, namely Dr K Kaunda (NW) (7.1%), Pixley ka Seme (NC) (7.3%), and Eden (WC) (11.9%). However, Eden is of the greatest concern as the loss to follow up rate doubled from 5.1% in 2010 to 11.9% in 2014 (Figure 21).

**Figure 21: TB loss to follow up rate (new smear-positive) by National Health Insurance district, 2014**



## 9.6 TB rifampicin resistance confirmed client rate

This indicator measures the proportion of TB suspects detected to have rifampicin resistance. The indicator is being reported for the second time in the *District Health Barometer*.

In 2015, 6.1% of the GeneXpert TB-positive tests conducted nationally were reported as rifampicin resistant. Map 2 and Figure 22 show the proportion of TB cases identified using the GeneXpert diagnostic tool that were detected to have rifampicin resistance by district. Both the map and figure show that KwaZulu-Natal remains the MDR-TB hotspot in the country, with seven of the 11 districts in the province reporting proportions of rifampicin resistance above the national average. uMkhanyakude, Zululand and iLembe (all KZN) had the highest rifampicin resistance rates of 12.4%, 9.5% and 9.3% respectively. Similar to KwaZulu-Natal at 8.3%, Mpumalanga reported that 8.6% of the TB cases identified in the province were rifampicin resistant. However, rates varied across the country, and in contrast to KwaZulu-Natal and Mpumalanga, resistance rates below 4% were reported in three Western Cape districts (Central Karoo, Eden and Overberg) and in Frances Baard (NC).

Variation in rifampicin resistance rates across the NHI districts was similar to the variation in provincial rates. National Health Insurance districts in KwaZulu-Natal and Mpumalanga reported high rates of rifampicin resistance. Amajuba and uMzinyathi (both KZN) reported rates of 8.3%, and G Sibande (MP) reported a rate of 8.2%. In contrast, Eden, the Western Cape NHI district, reported the lowest rifampicin resistance rate (3.6%).

Map 2: TB rifampicin resistance confirmed client rate by district, 2015

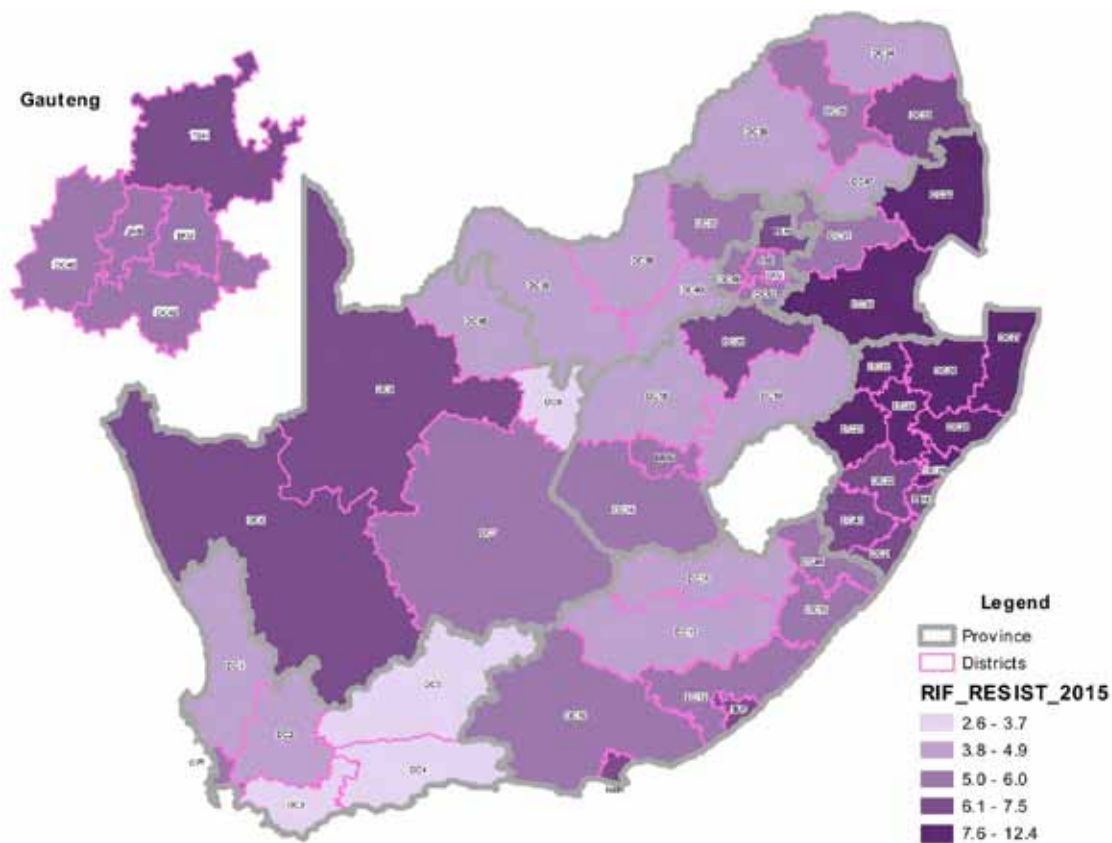
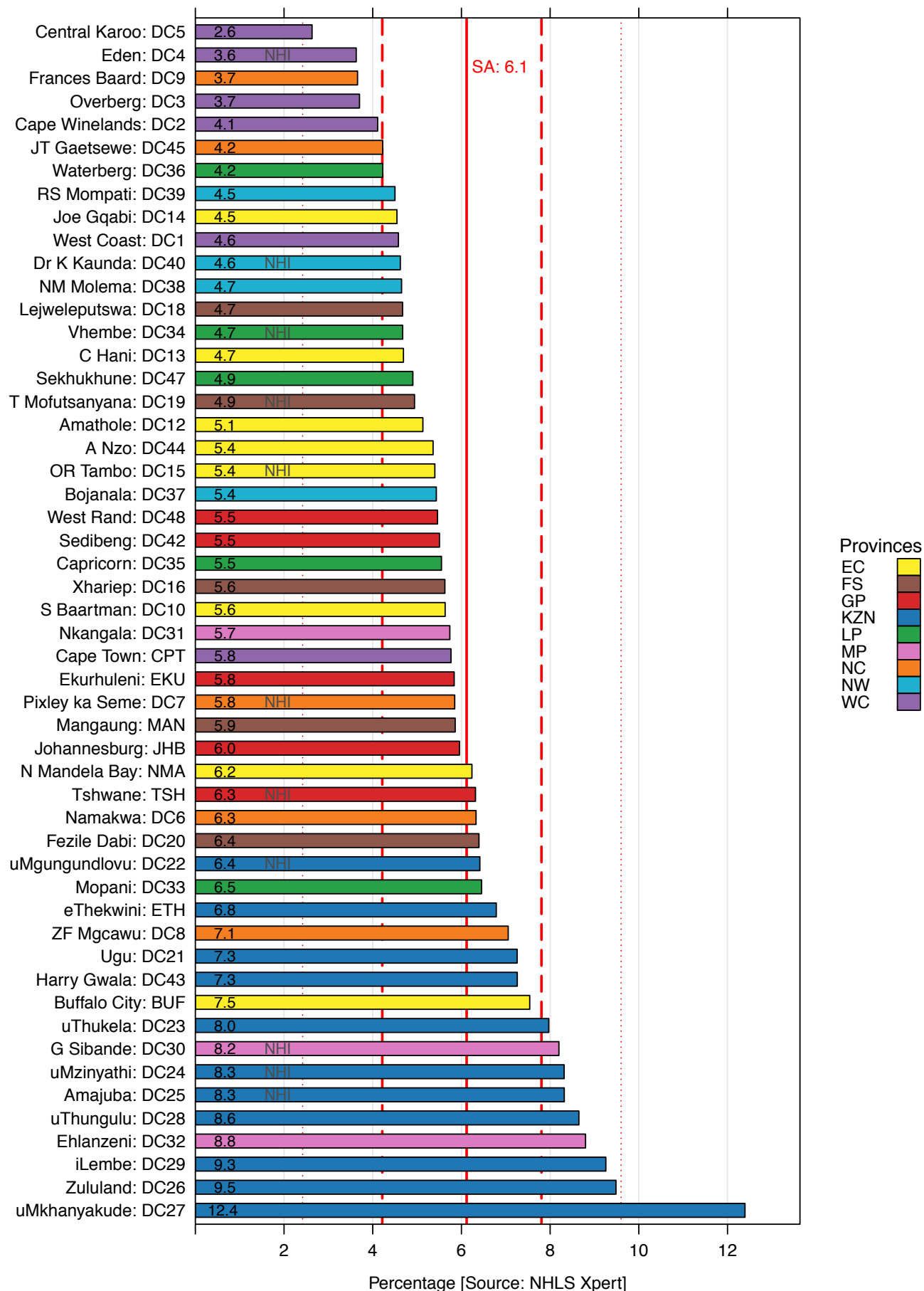


Figure 22: TB rifampicin resistance confirmed client rate by district, 2015

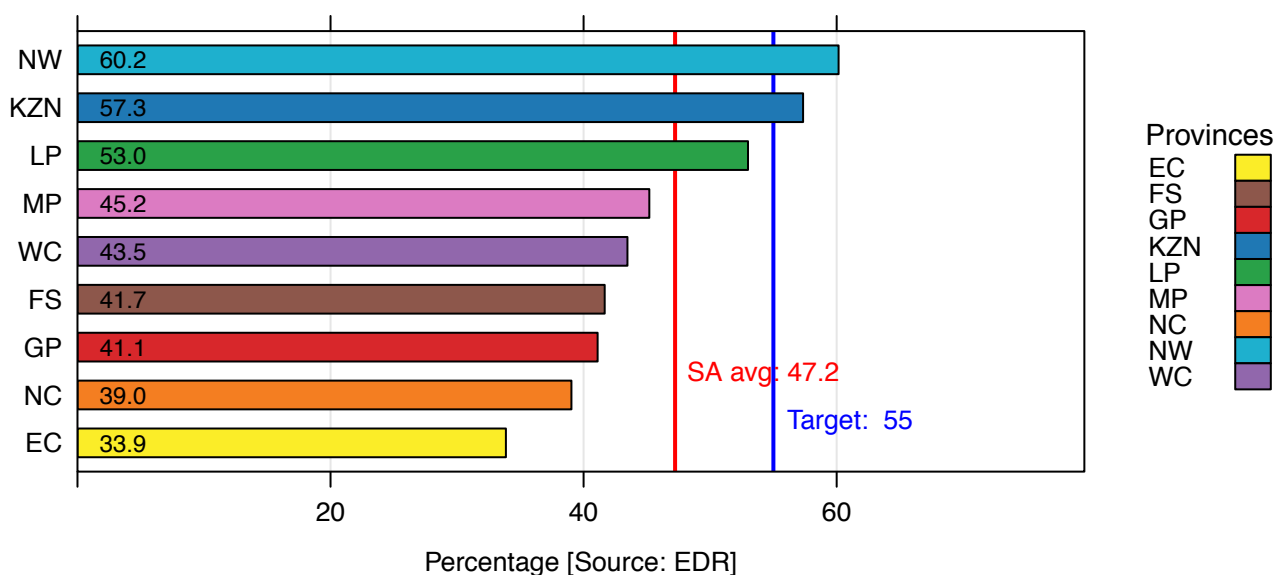


## 9.7 MDR-TB treatment success rate

MDR-TB treatment success rate is defined as the proportion of patients who started second-line treatment who were either cured or who completed treatment.<sup>v</sup> The treatment success rate target in the National Strategic Plan on HIV, STIs and TB 2012–2016<sup>f</sup> was 55%. However, in order to meet the Sustainable Development Goals, the End TB Strategy set a revised target of 75% for 2030, a target that has been endorsed by the National Department of Health.

In 2013, the average MDR-TB treatment success rate for the country was 47.2%. Although this is much lower than the treatment success rate for drug-susceptible ('routine') TB, the treatment success rates for MDR-TB are much lower than for TB. The MDR-TB success rate varied across the provinces, from 60.2% in the North West to 33.9% in the Eastern Cape. The success rate across the districts varied from a low of 26.5% in Ekurhuleni (GP) to a high of 72.3% in Mopani (LP). The success rate reported for Mopani is surprising, as at the time all MDR-TB patients in the province were treated in one hospital, and the other Limpopo districts were reporting far lower rates of successful treatment. Furthermore, with the treatment regimen available at the time, successful treatment outcome rates are seldom over 65%.<sup>w</sup> However, it is encouraging that treatment success of almost 65% was reported in three districts, namely uMzinyathi in KwaZulu-Natal (64.7%) and two North West districts, namely NM Molema (64.4%) and Bojanala (63.8%) (Figure 23).

**Figure 23: MDR-TB treatment success rate by province, 2013**

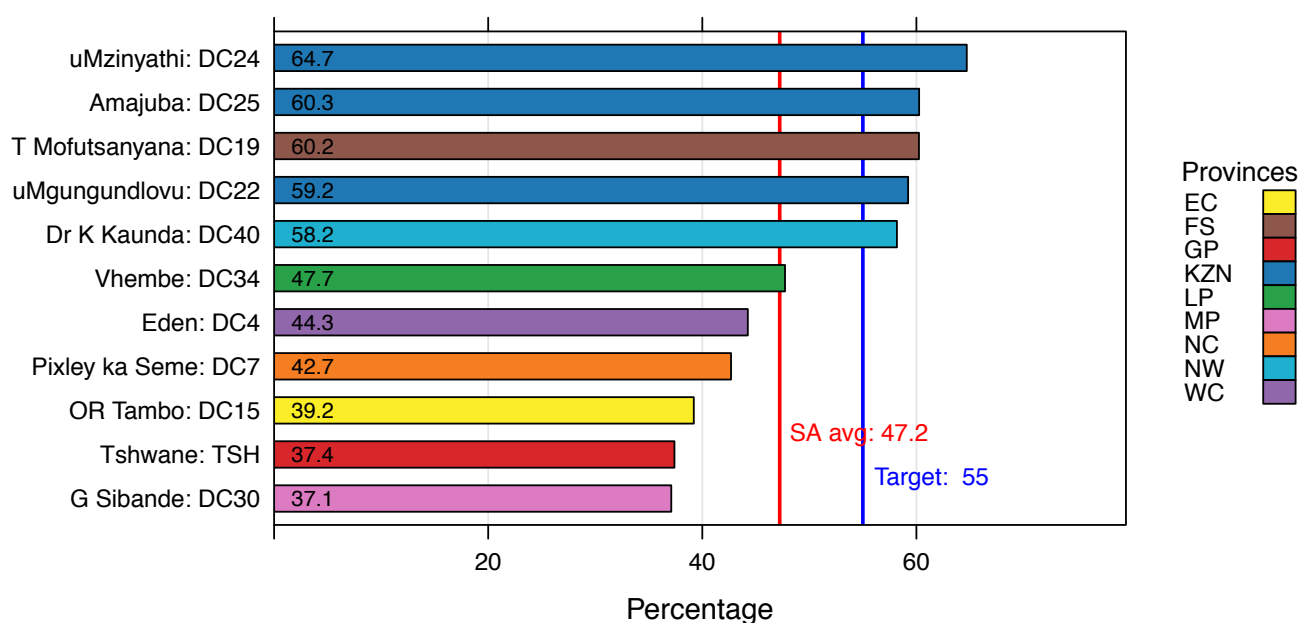


The treatment success rate for MDR-TB also varied across the NHI districts. Three NHI districts had treatment success rates over 60%, namely uMzinyathi (64.7%) and Amajuba (60.3%) (both KZN) and T Mofutsanyana (60.2%) (FS). Three NHI districts had treatment success rates below 40%, namely OR Tambo (EC), Tshwane (GP) and G Sibande (MP) (Figure 24).

<sup>v</sup> World Health Organization. Definitions and reporting framework for TB – 2013 revision. Geneva: WHO; 2013.

<sup>w</sup> Orenstein E, Basu S, Shah S, Andrews JR, Friedland GH, Moll AP, et al. Treatment outcomes among patients with multidrug-resistant tuberculosis: systematic review and meta-analysis. *Lancet Infect Dis.* 2009; 9:153–61.

Figure 24: MDR-TB treatment success rate by National Health Insurance district, 2013



### Summary of TB indicators across the NHI districts

Table 7 shows the performance of the NHI districts with regard to the TB indicators. T Mofutsanyana (FS) was the best-performing district on the TB programme (indicated by the most green blocks), followed by uMzinyathi (KZN). In contrast, Pixley ka Seme (NC) and Dr K Kaunda (NW) performed worst on the TB programme (indicated by the most red and orange blocks).

Table 7: Summary of TB indicators across the National Health Insurance districts, 2013–2015

| Average of Rank |                           |      | District      |                   |           |                 |                |                     |                      |              |                     |                  |              |
|-----------------|---------------------------|------|---------------|-------------------|-----------|-----------------|----------------|---------------------|----------------------|--------------|---------------------|------------------|--------------|
| Category        | Indicator Short           | Year | Amajuba: DC25 | Dr K Kaunda: DC40 | Eden: DC4 | G Sibande: DC30 | OR Tambo: DC15 | Pixley ka Seme: DC7 | T Mofutsanyana: DC19 | Tshwane: TSH | uMgungundlovu: DC22 | uMzinyathi: DC24 | Vhembe: DC34 |
| 09_TB_CF        | TB inc all TB             | 2015 | 17            | 36                | 43        | 14              | 25             | 51                  | 17                   | 8            | 34                  | 20               | 1            |
|                 | RIF resistance rate       | 2015 | 47            | 11                | 2         | 45              | 20             | 30                  | 17                   | 34           | 37                  | 46               | 14           |
| 09_TB_TO        | TB cure rate new sm+      | 2014 | 36            | 43                | 39        | 28              | 26             | 47                  | 11                   | 10           | 7                   | 4                | 37           |
|                 | TB success all TB         | 2014 | 20            | 50                | 24        | 18              | 36             | 38                  | 12                   | 9            | 8                   | 23               | 42           |
|                 | TB deaths all TB          | 2014 | 47            | 51                | 8         | 37              | 38             | 40                  | 48                   | 28           | 17                  | 36               | 26           |
|                 | New pulmonary TB LTF rate | 2014 | 23            | 41                | 50        | 22              | 7              | 42                  | 14                   | 18           | 17                  | 6                | 19           |
|                 | TB success MDR            | 2013 | 7             | 13                | 31        | 42              | 36             | 32                  | 8                    | 40           | 10                  | 2                | 26           |

Key:

■ Performing well compared to other districts

■ Average performance

■ Poor performance, improvement needed

Source: ETR.Net and EDRWeb

### Key findings

- ◆ Slow improvement in the TB cure rate, death rate, and defaulter rate are encouraging, but to reach the End TB Strategy and SDG targets for 2030, additional efforts and focus will be required.
- ◆ While TB treatment outcomes are improving in most districts, the proportion of patients not evaluated remains high. As this category can 'hide' patients loss to follow-up, efforts must be made to decrease the proportion of patients not evaluated.
- ◆ Three districts did not show improved TB programme performance, namely ZF Mgcawu (NC), Capricorn (LP) and Dr K Kaunda (NW). These districts need to prioritise improved TB programme performance by increasing treatment success and reducing the number of defaulters.
- ◆ The increase in number of TB patients with known HIV status and the proportion of co-infected patients on ART have been an encouraging improvement in the past few years.

### Recommendations

- ◆ The MDR-TB treatment success rate has been reported in this year's District Health Barometer for the first time. It is hoped that the national treatment success rate of 47.2% will improve with the introduction of new drugs and a shortened treatment regimen.
- ◆ Considerable efforts by all TB programme staff and frontline healthcare workers will be needed to capitalise on these new developments and improve the treatment success of MDR-TB patients.
- ◆ Improving the accuracy and validity of MDR-TB data and using these data for clinical and programmatic management will be an essential component in improving MDR-TB programme performance.