

# Congenital syphilis notifications and rapid plasma reagin positivity among children <2 years-of-age in South Africa, 2023–2024

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## Summary

Congenital syphilis (CS) is a potentially life-threatening infection for foetuses and neonates. Pregnant women with syphilis infection can transfer it to their unborn babies, resulting in CS. Globally, CS remains the second leading cause of preventable neonatal mortality, and the World Health Organization has set targets for its elimination by 2030. South Africa monitors the progress towards elimination through the District Health Information System and the Notifiable Medical Conditions Surveillance System (NMCSS). This analysis aimed to determine trends in CS clinical notifications and rapid plasma reagin (RPR) positive results among children 2-years- of age in 2024 in comparison to 2023. CS line-list data were requested from the NMCSS platform at the National Institute for Communicable Diseases, a division of the National Health Laboratory Service. Data were cleaned and analysed using STATA® 18 (STATA Corporation, College Station, United States) and Microsoft Office Excel, 2023. Trends were described at national, provincial, district, and facility levels by calendar quarter and year. Median ages (in days) were calculated for children notified as CS cases (clinical notifications) and RPR-positive children. In 2024, there were 1 552 clinical notifications, and 4 243 RPR-positive results were recorded. The Western Cape (WC), KwaZulu-Natal (KZN), and Gauteng (GP) provinces accounted for 79% of clinical notifications during 2024. On the other hand, KZN, Eastern Cape, WC, and GP accounted for 81% of all RPR-positive children reported into the system. CS notifications were reported from 47 out of 52 districts in the country and 180 health facilities (mostly hospitals) out >4 000 facilities in the country. The median age among clinical notifications was three days (interquartile range [IQR]: 1-10) and two days (interquartile range [IQR]: 1-5) among children with RPR-positive results. The CS case rate declined slightly from 198/100 000 live births in 2023 to 190/100 000 live births in 2024, suggesting a decrease in CS transmission or poorer notification practices. Compared to 2023, the number of clinical notifications declined slightly in 2024 nationally, with a considerable decline in calendar quarter three. The provinces with higher proportions of clinical notifications and RPR-positive children may have better screening, case detection, testing, and case reporting. The declining clinical notifications may suggest low case transmission or that screening and case reporting are not done effectively. There is still a need to conduct regular training for healthcare providers on screening and reporting procedures.

## Introduction

Syphilis is a sexually transmitted infection caused by *Treponema pallidum*.<sup>1,2</sup> About 80% of untreated maternal syphilis infections can be transferred to the foetus as congenital syphilis (CS), a potentially life-threatening condition that can lead to complications such as prematurity and stillbirth.<sup>1</sup> In early pregnancy, maternal syphilis can cause miscarriages.<sup>3</sup>

CS is preventable through syphilis screening for pregnant women during their first antenatal care (ANC) visit and at subsequent visits until delivery and treatment of mothers who test positive.<sup>4</sup> Prevention of CS is cost-effective and involves the use of rapid point-of-care tests for syphilis, including the dual HIV/syphilis rapid test,



and timely treatment of maternal syphilis with benzathine penicillin injection, which reduces transmission in pregnancy.<sup>5</sup>

In 2022, the World Health Organization (WHO) estimated approximately 700 000 CS notifications worldwide and 390 000 adverse birth outcomes due to syphilis in pregnancy. About nine per cent of the adverse outcomes were attributed to women who had syphilis during pregnancy and were adequately treated with penicillin.<sup>5,6</sup> In 2023, CS contributed approximately 305 000 perinatal deaths globally and was the second leading cause of perinatal mortality worldwide.<sup>7,8</sup> In the same year, seven in 1 000 pregnant women had syphilis globally, which contributed to approximately 1.5 million CS notifications and 200 000 annual neonatal deaths globally.<sup>3,7</sup>

Syphilis is endemic in low- and middle-income countries, with a rising burden in high-income countries. Low- and middle-income countries had over 404 000 CS notifications in 2016, equivalent to a rate of 1 119 per 100 000 live births, with an average ANC syphilis screening coverage of only 47%.<sup>5</sup> The contributing factors to the highest burden of maternal syphilis include lower levels of screening among pregnant women at ANC visits, poor surveillance, and the unavailability of healthcare services.<sup>5</sup> The African region contributed 57% of the global burden of maternal syphilis in 2016, and this has resulted in CS notifications. It is surprising that CS is still not controlled while maternal screening is widely available and *T. pallidum* is highly susceptible to penicillin.<sup>9</sup>

In South Africa, CS is under surveillance to facilitate CS elimination.<sup>10</sup> The elimination target is 50 notifications per 100 000 live births as set by the WHO.<sup>5</sup> Since maternal serology is central to CS diagnosis, all pregnant women should be screened and, if positive, treated during pregnancy to prevent CS. Symptomatic syphilis-exposed babies and babies born to inadequately treated mothers should be assessed at birth for possible CS infection and treated accordingly.<sup>7</sup> Children <2 years-of-age who meet the CS case definition should be reported to the Notifiable Medical Conditions Surveillance System (NMCSS) at the National Institute for Communicable Diseases (NICD), a division of the National Health Laboratory Service (NHLS), as clinical notifications. CS is a category 2 NMC and requires reporting by the diagnosing healthcare professional within seven days of making the diagnosis.<sup>4</sup> Notifications are sent to the NMCSS using the Notifiable Medical Conditions Electronic Application (NMC app), the web-based platform, or a paper-based notification by completing a combined Case Notification Form (CNF) and Case Investigation Form (CIF). The combined form facilitates the collection of complete patient data needed for correct classification of the notifications and determination of gaps in the prevention cascade. Healthcare providers from the public and private sectors sometimes draw blood for rapid plasma reagin (RPR) testing from symptomatic babies and those born to inadequately treated or untreated mothers and send it to the laboratory for testing. After the NHLS laboratory completes the tests, the results are fed directly into the NMCSS as alerts through the NHLS Laboratory Information System (LIS). Only RPR data from the public healthcare sector are fed into the NHLS LIS, with 99.9% of the notifications being sent from the public sector. The CS clinical notifications represent a different surveillance stream from the RPR results. This surveillance system reflects notifications that meet the



surveillance case definition, while the RPR-positive results among children <2 years-of-age indicate infection due to potential exposure to maternal syphilis. Children who are RPR-positive and meet the case definition for CS (clinical notification) are considered clinical notifications and are counted as such.

The aim of this analysis was to determine the trends in the number of CS notifications notified and RPR-positive children captured in the CS NMC line list from calendar quarter one (Q1) to calendar quarter four (Q4) of 2024 and to compare the quarterly trends with those from 2023.

## Methods

This was a cross-sectional analysis of children who met the case definition for CS and were notified as CS cases (clinical notifications) from both public and private healthcare facilities, and RPR-positive children from the public sector reported through the NMCSS platform and included in the line list from calendar Q1 to calendar Q4 of 2024, compared with similar data from 2023. The line list of clinical notifications and RPR-positive children <2 years-of-age was extracted from the NMCSS for the period 01 January to 31 December 2024, and CS case data from Q1–4 of 2023 were provided for comparison with the 2024 findings. For cleaning and analysis, STATA® statistical software version 18 and Microsoft Excel were used. Descriptive statistics were used to determine the trends of clinical notifications and laboratory reports of RPR-positive results among children <2 years-of-age at national, province, district, and facility levels by calendar quarter. The median age in days among children notified as clinical notifications and those reported as RPR-positive was determined. The CS case rates were calculated by dividing the number of clinical notifications by the total number of live births and multiplying by 100 000. The total number of live births was obtained from the District Health Information System (DHIS) through the paediatric HIV surveillance dashboards. These were calculated at national and provincial levels by calendar quarter and year. The case definition for CS is given in Table 1.

**Table 1.** Congenital syphilis (CS) surveillance case definition for South Africa.<sup>11</sup>

| Disease epidemiology                                                                                                                                                                      | Who must notify                                                 | Case definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A condition affecting a child (&lt;2 years-of-age) whose mother had untreated or inadequately treated syphilis.</b>                                                                    | Healthcare practitioner (nurse or doctor making the diagnosis). | Any case meeting the following criteria is considered a case of CS:<br>[1] A live birth or fetal death at more than 20 weeks of gestation or >500 g (including stillbirth) born to a woman with positive syphilis serology <b>AND</b> without adequate syphilis treatment. Adequate maternal treatment is defined as at least one injection/dose of 2.4 million units of intramuscular benzathine benzylpenicillin at least 30 days prior to delivery.                                                                                   |
| <b>Early CS: may present at any time in infancy or early childhood (&lt;2 years-of-age).<br/>An infected infant may be asymptomatic at birth and develop signs 4–8 weeks after birth.</b> |                                                                 | <b>OR</b><br>[2] A live birth, stillbirth or child aged <2 years-of-age born to a woman with positive syphilis serology or with unknown serostatus, and with <b>laboratory evidence</b> of syphilis infection (regardless of the timing or adequacy of maternal treatment).<br><b>The following constitutes acceptable laboratory evidence:</b> <ul style="list-style-type: none"><li>• Demonstration by dark-field microscopy or fluorescent antibody detection of <i>Treponema pallidum</i> in the umbilical cord, placenta,</li></ul> |



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nasal discharge or skin lesion material or autopsy material of a neonate or stillborn infant;

- *Treponema pallidum* PCR positive on umbilical cord, placenta, nasal discharge or skin lesion material or autopsy material of a neonate or stillborn infant;
- Analysis of cerebrospinal fluid (CSF) is reactive for Venereal Disease Research Laboratory (VDRL) test, or elevated CSF cell count or protein;
- Infant with a reactive non-treponemal (RPR) serology titre fourfold or more than that of the mother;
- Infant with a reactive non-treponemal (RPR) serology titre fourfold more than that of the mother but that remains reactive  $\geq 6$  months after delivery;
- Infant with a reactive non-treponemal serology test (RPR or VDRL) of any titre **AND** any of the clinical signs listed below born to a mother with positive or unknown serology, independent of treatment; and
- Any stillborn infant with a reactive maternal test should be considered a CS case (i.e., a syphilitic stillbirth).

**AND/OR**

[3] A live birth, stillbirth or child aged <2 years born to a woman with positive syphilis serology or with unknown serostatus, and with radiographic clinical evidence of syphilis infection (regardless of the timing or adequacy of maternal treatment).

**Acceptable radiological evidence refers to:**

- Long-bone radiographs suggestive of CS (e.g., osteochondritis, diaphyseal osteomyelitis, periostitis);

**AND/OR**

[4] A live birth, stillbirth or child aged <2 years-of-age born to a woman with positive syphilis serology or with unknown serostatus, and with clinical evidence of syphilis infection (regardless of the timing or adequacy of maternal treatment).

**Acceptable clinical evidence:**

- In settings where a non-treponemal (RPR) titre is not available, an infant born to a mother with reactive or unknown serology, independent of treatment, and whose six-month examination demonstrates any of the early clinical signs listed below;
  - Early clinical signs that may be present in an infant with CS include non-immune hydrops, hepatosplenomegaly, rhinitis (snuffles), and skin rash, pseudoparalysis of an extremity or failure to thrive or achieve developmental milestones; and
  - An older infant or child may develop additional signs or symptoms such as frontal bossing, notched and pegged teeth (Hutchinson teeth), clouding of the cornea, blindness, bone pain, decreased hearing or deafness, joint swelling, sabre shins, and scarring of the skin around the mouth, genitals and anus.
-



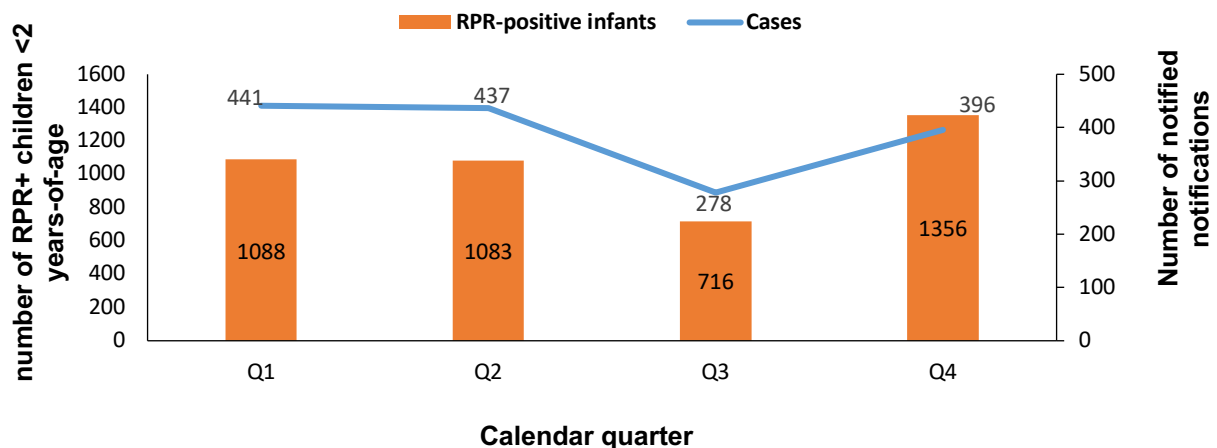
### Definition of Terms:

- **Clinical notifications** were defined as paper-based and electronic reports of children <2 years-of-age who met the case definition for CS, received from health facilities through the NMCSS, containing patients' clinical information with or without a laboratory-confirmed RPR result.
- **RPR-positive infant** is an infant with a positive RPR result received into the NMCSS through the NHLS LIS.

## Results

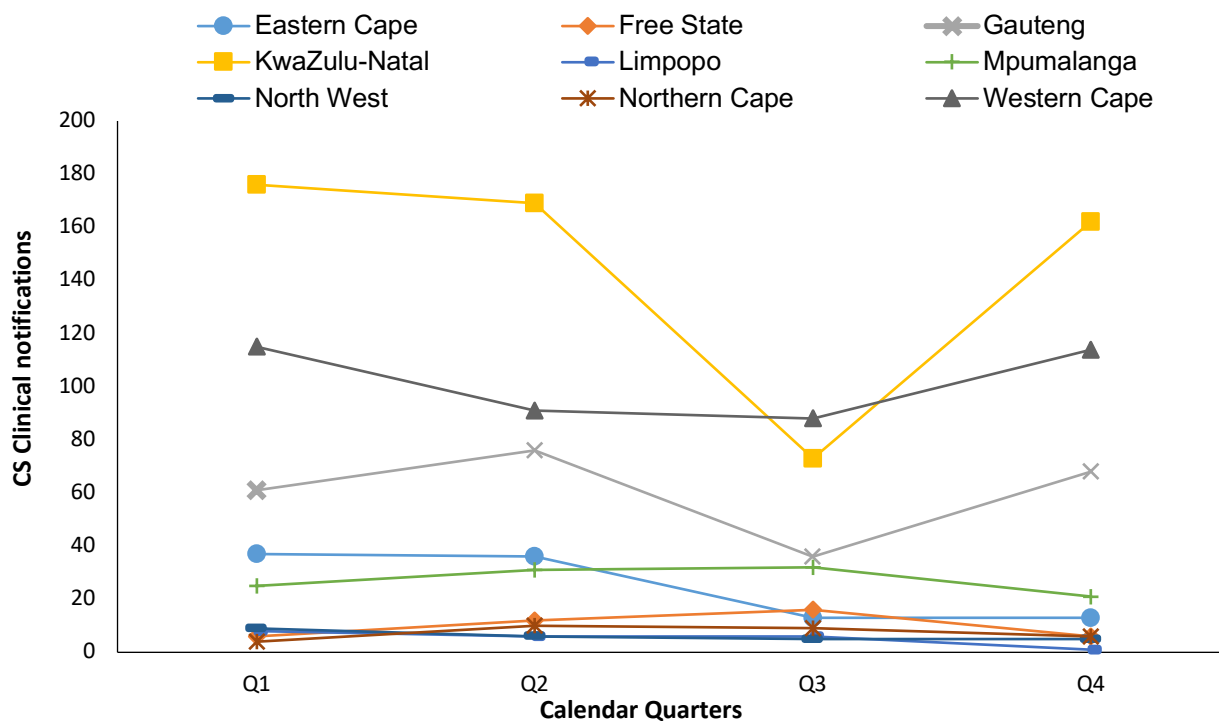
During the period 01 January to 31 December 2024, i.e., calendar Q1 to calendar Q4 of 2024, there were 4 754 children with RPR-positive results and 1 552 clinical notifications among children <2 years-of-age. The majority, 59% (911/1 552), of the clinical notifications were reported electronically. Of the clinical notifications reported, the median age at diagnosis was three days (IQR: 1–10 days). The median age in days for the RPR-positive children was two days (IQR: 1–5 days).

Both the number of clinical notifications and children with RPR-positive results declined slightly from Q1 to quarter two (Q2) of 2024, then declined considerably during quarter three (Q3), likely because of the disruption to laboratory testing services as a consequence of the NHLS cybersecurity incident, and then increased in Q4 of 2024 (Figure 1).



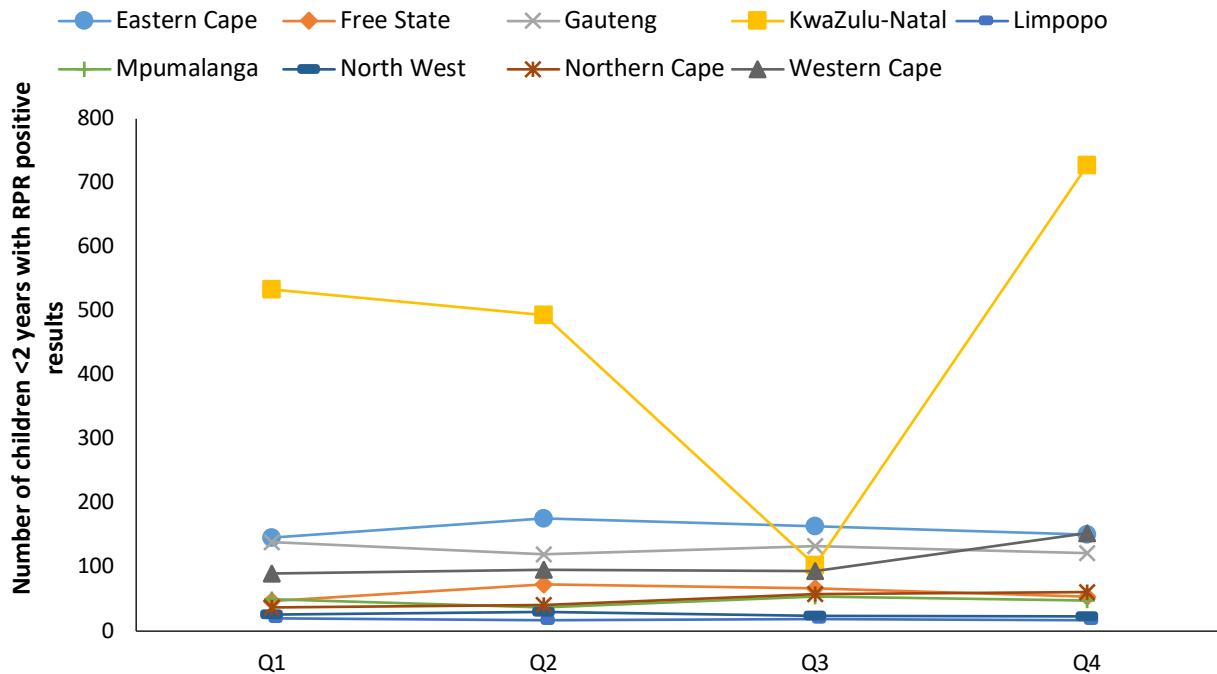
**Figure 1.** Distribution of congenital syphilis (CS) notifications and laboratory alerts of rapid plasma reagin (RPR)-positive results by calendar quarter, South Africa, 2024, N=5 795.

The Free State (FS) and Mpumalanga (MP) provinces showed an increase in the number of clinical notifications during Q3 and a decline during Q4, although the overall number of notifications was low relative to other provinces, while the KwaZulu-Natal (KZN), Gauteng (GP), and Western Cape (WC) provinces showed an increase in the number of notifications during Q4 (Figure 2).



**Figure 2.** Congenital syphilis (CS) clinical notifications by province and calendar quarter, South Africa, 2024, N=1 552.

The KZN, GP, Eastern Cape (EC), and WC provinces accounted for 81% of children <2 years-of-age with RPR-positive results reported into the system, compared with 86% of clinical notifications. Limpopo (LP), MP, and North West (NW) had lower numbers that were steady, while the Northern Cape (NC) province showed a steady increase in the quarterly number of children with RPR-positive results. In the EC province, the number of RPR-positive children <2 years-of-age peaked during Q2, followed by a decline in Q4. The KZN province had the highest number of RPR-positive children, and these numbers declined slightly between Q1 and Q2, followed by a considerable decline during Q3 and a substantial increase in Q4 of 2024. Similar to KZN, the number of RPR-positive children in the WC increased steadily, then declined slightly in Q3, and peaked in Q4 (Figure 3).



**Figure 3.** Children with rapid plasma reagin (RPR)-positive results by calendar quarter and province, South Africa, 2024, N=4 243.

### Case rates

Overall, CS case rates decreased from 198/100 000 live births in 2023 to 190/100 000 live births in 2024 nationally. There was variation in the provincial case rates when comparing Q1–Q4 of 2023 to Q1–Q4 of 2024 rates nationally; Q1 and Q2 of 2024 were higher than Q1 and Q2 of 2023. The case rates for the WC, GP, NC, and KZN provinces were consistently higher than the national average across the different calendar quarters of 2023 and 2024. GP had fluctuating case rates, which remained high at 113/100 000 live births in Q3 of 2023, increased to 153/100 000 live births in Q2 of 2024, declined to 73/100 000 live births in Q3 of 2024, and increased again to 149/100 000 live births during Q4 of 2024. MP case numbers increased from Q3 of 2023 to Q4 of 2024. FS had fluctuating case rates, while NW and LP had lower case rates in both years (Table 2).



**Table 2.** Congenital syphilis (CS) case rates by calendar quarter and province, South Africa, 2023 and 2024.

| Year | Province      | Q1                     |                  |            | Q2                     |                  |            | Q3                     |                  |            | Q4                     |                  |            |
|------|---------------|------------------------|------------------|------------|------------------------|------------------|------------|------------------------|------------------|------------|------------------------|------------------|------------|
|      |               | Clinical notifications | DHIS Live births | Case rate* | Clinical notifications | DHIS Live births | Case rate* | Clinical notifications | DHIS Live births | Case rate* | Clinical notifications | DHIS Live births | Case rate* |
| 2023 | Eastern Cape  | 28                     | 23 865           | 117        | 37                     | 23 584           | 157        | 56                     | 23 275           | 241        | 49                     | 21 132           | 232        |
|      | Free State    | 8                      | 10 954           | 73         | 12                     | 10 938           | 110        | 7                      | 10 871           | 64         | 9                      | 9 616            | 94         |
|      | Gauteng       | 20                     | 50 763           | 39         | 33                     | 52 563           | 63         | 57                     | 50 444           | 113        | 56                     | 47 839           | 117        |
|      | KwaZulu-Natal | 162                    | 51 887           | 312        | 215                    | 50 302           | 427        | 203                    | 47 631           | 426        | 221                    | 41 908           | 527        |
|      | Limpopo       | 3                      | 29 685           | 10         | 5                      | 29 161           | 17         | 2                      | 28 595           | 7          | 9                      | 25 537           | 35         |
|      | Mpumalanga    | 7                      | 18 914           | 37         | 16                     | 18 742           | 85         | 21                     | 18 077           | 116        | 32                     | 16 909           | 189        |
|      | North West    | 3                      | 13 157           | 23         | 3                      | 13 097           | 23         | 4                      | 12 944           | 31         | 1                      | 11 737           | 9          |
|      | Northern Cape | 8                      | 5 888            | 136        | 9                      | 5 716            | 157        | 9                      | 5 543            | 162        | 7                      | 5 211            | 134        |
|      | Western Cape  | 88                     | 22 927           | 384        | 107                    | 23 037           | 464        | 101                    | 22 477           | 449        | 132                    | 22 046           | 599        |
|      | <b>Total</b>  | <b>327</b>             | <b>228 040</b>   | <b>143</b> | <b>437</b>             | <b>227 140</b>   | <b>192</b> | <b>460</b>             | <b>219 857</b>   | <b>209</b> | <b>516</b>             | <b>201 935</b>   | <b>256</b> |
| 2024 | Eastern Cape  | 37                     | 21 146           | 175        | 36                     | 21 856           | 165        | 13                     | 20 849           | 62         | 13                     | 19 044           | 68         |
|      | Free State    | 6                      | 9 109            | 66         | 12                     | 9 673            | 124        | 16                     | 9 372            | 171        | 6                      | 9 026            | 66         |
|      | Gauteng       | 61                     | 48 487           | 126        | 76                     | 49 832           | 153        | 36                     | 49 013           | 73         | 68                     | 45 734           | 149        |
|      | KwaZulu-Natal | 176                    | 44 939           | 392        | 169                    | 46 699           | 362        | 73                     | 4 4204           | 165        | 162                    | 39 926           | 406        |
|      | Limpopo       | 8                      | 27 221           | 29         | 6                      | 27 773           | 22         | 6                      | 25 969           | 23         | 1                      | 23 251           | 4          |
|      | Mpumalanga    | 25                     | 17 022           | 147        | 31                     | 17 517           | 177        | 32                     | 17 142           | 187        | 21                     | 15 259           | 138        |
|      | North West    | 9                      | 11 747           | 77         | 6                      | 11 876           | 51         | 5                      | 11 230           | 45         | 5                      | 10 545           | 47         |
|      | Northern Cape | 4                      | 5 317            | 75         | 10                     | 5 440            | 184        | 9                      | 5 132            | 175        | 6                      | 4 631            | 130        |
|      | Western Cape  | 115                    | 21 847           | 526        | 91                     | 23 128           | 393        | 88                     | 22 907           | 384        | 114                    | 22 536           | 506        |
|      | <b>Total</b>  | <b>441</b>             | <b>206 835</b>   | <b>213</b> | <b>437</b>             | <b>213 794</b>   | <b>204</b> | <b>278</b>             | <b>205 818</b>   | <b>135</b> | <b>396</b>             | <b>189 952</b>   | <b>208</b> |

\*Number of clinical notifications/District Health Information System (DHIS)live births x 100 000.



### **Comparison of clinical notifications by district, 2023-2024, South Africa**

The number of clinical notifications gradually increased from 327 during Q1 of 2023 and reached a peak of 513 in Q4 of the same year nationally. In 2024, there was an overall decline in the number of CS notifications, with a total of 441 during Q1 and a decline to 396 by the end of Q4, 2024.

In the EC, OR Tambo district had the highest number (n=119) of clinical notifications, the majority (n=97) of which were reported in 2023. Joe Gqabi had the lowest number of clinical notifications, i.e., one CS case in each year. Mangaung Metro in the FS province recorded the highest (n=58) number of clinical notifications between Q1 2003 and Q4 2024. In GP, the City of Johannesburg had the highest number (n=161) of clinical notifications that increased from 53 in 2023 to 108 by the end of 2024. The KZN province notified the highest number (n=1 381) of clinical notifications in 2023 and 2024; however, the number of clinical notifications declined across the districts in 2024. eThekweni Metro had the highest (n=543) number of total CS notifications in 2023–2024, which decreased from 313 in 2023 to 230 by the end of 2024. Umzinyathi district notified fewer than three CS notifications in both years. In MP, clinical notifications increased from 63 in 2023 to 78 in 2024, with the highest notifications reported from Gert Sibande District. In the NW province, Dr Kenneth Kaunda District notified the highest number (n=16) for both years. Clinical notifications in LP did not show a specific trend, but the majority (n=22) of the notifications were reported from Capricorn District. The ZF Mgcawu District of the NC notified the highest number of clinical notifications (n=23) in the province, with only five notifications in 2024. In the WC province, there was a decline in the number of CS notifications from 2023 to 2024, and the majority (n=336) of the notifications were reported from the City of Cape Town Metro (Table 3).

**Table 3.** Congenital syphilis (CS) clinical notifications in patients <2 years-of-age by calendar quarter, district, and province, South Africa, Q1 2023 – Q4 2024.

| <i>Province and District</i> | <i>2023</i> |           |           |           | <i>2024</i> |           |           |           |              |
|------------------------------|-------------|-----------|-----------|-----------|-------------|-----------|-----------|-----------|--------------|
|                              | <i>Q1</i>   | <i>Q2</i> | <i>Q3</i> | <i>Q4</i> | <i>Q1</i>   | <i>Q2</i> | <i>Q3</i> | <i>Q4</i> | <i>Total</i> |
| <b>Eastern Cape</b>          |             |           |           |           |             |           |           |           |              |
| Alfred Nzo                   | 0           | 13        | 10        | 7         | 10          | 2         | 0         | 0         | 42           |
| Amathole                     | 0           | 1         | 4         | 5         | 4           | 2         | 2         | 0         | 18           |
| Buffalo City Metro           | 4           | 3         | 2         | 2         | 8           | 7         | 4         | 5         | 35           |
| Chris Hani                   | 0           | 0         | 1         | 3         | 0           | 3         | 2         | 2         | 11           |
| Joe Gqabi                    | 0           | 0         | 1         | 0         | 1           | 0         | 0         | 0         | 2            |
| Nelson Mandela Bay Metro     | 0           | 6         | 8         | 2         | 11          | 5         | 0         | 2         | 34           |
| OR Tambo                     | 24          | 14        | 29        | 30        | 2           | 15        | 3         | 2         | 119          |
| Sarah Baartman               | 0           | 0         | 1         | 0         | 1           | 2         | 2         | 2         | 8            |
| <b>Free State</b>            |             |           |           |           |             |           |           |           |              |
| Fezile Dabi                  | 0           | 0         | 1         | 2         | 2           | 2         | 6         | 2         | 15           |
| Lejweleputswa                | 0           | 0         | 1         | 0         | 0           | 0         | 0         | 0         | 1            |
| Mangaung Metro               | 7           | 12        | 5         | 7         | 4           | 10        | 9         | 4         | 58           |
| Thabo Mofutsanyana           | 1           | 0         | 0         | 0         | 0           | 0         | 0         | 0         | 1            |
| Xhariep                      | 0           | 0         | 0         | 0         | 0           | 0         | 1         | 0         | 1            |
| <b>Gauteng</b>               |             |           |           |           |             |           |           |           |              |
| City of Johannesburg Metro   | 2           | 8         | 18        | 25        | 21          | 35        | 17        | 35        | 161          |
| City of Tshwane Metro        | 5           | 6         | 12        | 5         | 7           | 16        | 4         | 4         | 59           |
| Ekurhuleni Metro             | 7           | 10        | 17        | 16        | 12          | 17        | 13        | 16        | 108          |
| Sedibeng                     | 2           | 6         | 5         | 4         | 2           | 0         | 1         | 4         | 24           |
| West Rand                    | 4           | 3         | 5         | 6         | 19          | 8         | 1         | 9         | 55           |
| <b>KwaZulu-Natal</b>         |             |           |           |           |             |           |           |           |              |
| Amajuba                      | 13          | 15        | 15        | 21        | 20          | 20        | 6         | 9         | 119          |
| eThekweni Metro              | 57          | 85        | 80        | 91        | 76          | 61        | 18        | 75        | 543          |
| Harry Gwala                  | 2           | 4         | 4         | 5         | 5           | 15        | 2         | 4         | 41           |
| iLembe                       | 30          | 21        | 28        | 35        | 16          | 24        | 8         | 10        | 172          |
| King Cetshwayo               | 6           | 14        | 9         | 12        | 8           | 4         | 10        | 17        | 80           |
| Ugu                          | 16          | 14        | 10        | 4         | 5           | 3         | 8         | 8         | 68           |
| uMgungundlovu                | 32          | 47        | 52        | 48        | 41          | 39        | 13        | 35        | 307          |
| uMkhanyakude                 | 6           | 7         | 1         | 1         | 0           | 0         | 4         | 0         | 19           |



|                           |            |            |            |            |            |            |            |            |              |
|---------------------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|
| Umzinyathi                | 0          | 2          | 0          | 0          | 3          | 1          | 0          | 1          | 7            |
| uThukela                  | 0          | 4          | 2          | 4          | 2          | 2          | 3          | 1          | 18           |
| Zululand                  | 0          | 2          | 2          | 0          | 0          | 0          | 1          | 2          | 7            |
| <b>Limpopo</b>            |            |            |            |            |            |            |            |            |              |
| Capricorn                 | 2          | 4          | 1          | 2          | 4          | 4          | 5          | 0          | 22           |
| Sekhukhune                | 1          | 1          | 1          | 2          | 1          | 0          | 0          | 0          | 6            |
| Vhembe                    | 0          | 0          | 0          | 0          | 2          | 0          | 0          | 0          | 2            |
| Waterberg                 | 0          | 0          | 0          | 5          | 1          | 2          | 1          | 1          | 10           |
| <b>Mpumalanga</b>         |            |            |            |            |            |            |            |            |              |
| Ehlanzeni                 | 3          | 4          | 1          | 3          | 5          | 9          | 5          | 5          | 35           |
| Gert Sibande              | 4          | 11         | 20         | 28         | 19         | 21         | 24         | 14         | 141          |
| Nkangala                  | 0          | 1          | 0          | 1          | 1          | 1          | 3          | 2          | 9            |
| <b>North West</b>         |            |            |            |            |            |            |            |            |              |
| Bojanala Platinum         | 0          | 0          | 1          | 1          | 3          | 2          | 1          | 0          | 8            |
| Dr Kenneth Kaunda         | 3          | 1          | 1          | 0          | 3          | 3          | 1          | 4          | 16           |
| Dr Ruth Segomotsi Mompati | 0          | 1          | 0          | 0          | 0          | 0          | 0          | 0          | 1            |
| Ngaka Modiri Molema       | 0          | 1          | 2          | 0          | 3          | 1          | 3          | 1          | 11           |
| <b>Northern Cape</b>      |            |            |            |            |            |            |            |            |              |
| Frances Baard             | 1          | 2          | 1          | 1          | 1          | 4          | 1          | 4          | 15           |
| John Taolo Gaetsewe       | 0          | 0          | 0          | 0          | 1          | 0          | 0          | 1          | 1            |
| Namakwa                   | 1          | 2          | 0          | 1          | 0          | 0          | 1          | 0          | 5            |
| Pixley Ka Seme            | 2          | 0          | 3          | 1          | 2          | 6          | 2          | 1          | 17           |
| ZF Mgcawu                 | 4          | 5          | 5          | 4          | 0          | 0          | 5          | 0          | 23           |
| <b>Western Cape</b>       |            |            |            |            |            |            |            |            |              |
| Cape Winelands            | 21         | 16         | 26         | 29         | 28         | 21         | 24         | 33         | 198          |
| City of Cape Town Metro   | 39         | 57         | 38         | 48         | 44         | 28         | 45         | 37         | 336          |
| Garden Route (Eden)       | 5          | 7          | 21         | 26         | 11         | 18         | 7          | 17         | 112          |
| Overberg                  | 3          | 0          | 2          | 2          | 4          | 4          | 0          | 1          | 16           |
| West Coast                | 20         | 27         | 14         | 26         | 28         | 20         | 12         | 26         | 173          |
| <b>Total</b>              | <b>327</b> | <b>437</b> | <b>460</b> | <b>515</b> | <b>441</b> | <b>437</b> | <b>278</b> | <b>396</b> | <b>3 291</b> |

The table contains data from 47 out of 52 districts in South Africa.

## Discussion

From January to December 2024, 1 552 clinical notifications and 4 243 RPR-positive results were recorded among children aged <2 years. The WC, KZN, and GP provinces had the highest number of CS notifications, contributing 79% (1 229/1 552) of the total clinical notifications. The highest number of RPR-positive results was reported from the KZN, GP, and EC provinces. These findings were consistent with the 2020 and 2023 results. These provinces have high population sizes and have contributed approximately 1 394/1 739 (80%) of the total notifications, suggesting that there are effective surveillance systems with better notification practices compared to the provinces that reported fewer notifications. The rest of the provinces reported low numbers of CS notifications, and this may be due to fewer babies being diagnosed with CS. Notifications were received from 47 out of 52 districts and 180 out of 4 122 facilities in South Africa. Although the number of clinical notifications declined slightly in 2024 compared with 2023, the national case rate remained well above the WHO elimination target of 50 notifications per 100 000 live births. Of the 47 districts that had clinical notifications, the highest number of notifications were from the large metros such as the City of Johannesburg, eThekweni, and the City of Cape Town Metro. These districts are likely better resourced to conduct screening, testing for, and treatment of maternal syphilis and to diagnose CS, despite consistently showing the highest burden of CS in the country since 2017.<sup>12</sup>

The decrease in the number of CS notifications in 2024 may suggest a decreasing burden of CS nationally or may be due to sub-optimal screening and diagnosis of CS or decreased case notification by healthcare providers. Notification methods also play a role in the number of case notifications received. Electronic application notifications are quicker and facilitate timely case notification compared to paper-based methods that may cause delays. Study findings in 2021 showed that 57% of CS notifications were sent through a paper-based system.<sup>13</sup> However, in this study, clinical notifications were mainly reported electronically. The decrease in the number of RPR-positive children <2 years-of-age in 2024 suggests that there were fewer children and babies exposed to maternal syphilis, leading to fewer RPR-positive laboratory results compared with the 2023 results; alternately, early screening and management of pregnant mothers with syphilis may have prevented CS vertical transmission.

The decline in CS notifications could also have been due to fewer vertical transmissions of syphilis infection following the introduction and implementation of the 2023 Vertical Transmission Prevention (VTP) guidelines. Compared to previous guidelines, the 2023 guidelines recommend more frequent maternal syphilis screening – at booking and at 20, 26, 30, and 34 weeks, and at delivery.<sup>4</sup> Healthcare providers may have also improved electronic notification of CS after training on surveillance and the use of the NMC app for notification of CS in 2023.<sup>12</sup> In addition, the cyberattack experienced by the NHLS during Q3 of 2024 impacted sample testing and disrupted many testing laboratories; therefore, it may have contributed to a reduction in confirmatory RPR tests sent to the laboratories for testing and decreased diagnosis and CS notifications by healthcare providers.



Given these reasons, the country may have under-reported CS cases, leading to an underestimation of the true burden. Factors such as screening and testing access during pregnancy and access to diagnostic facilities may also contribute to underestimating the CS burden.<sup>5</sup>

The high case rates suggest an ongoing occurrence of CS, an underlying burden of CS in the EC, GP, KZN, and WC provinces, or better notification of CS notifications by healthcare providers.<sup>12</sup> In 2024, Q3 and Q4 case rates were lower than the same quarters of 2023, reflecting the impact of the NHLS cyberattack in 2024.

Countries have different ANC facilities with different syphilis case definitions, and some countries may lack resources, leading to fewer events of screening, testing, and treating. South Africa does not rely on testing to diagnose CS – clinical symptoms and history of exposure are enough to warrant treatment.<sup>4</sup> Maternal syphilis is treatable with timely penicillin injection.<sup>5,6</sup>

The limitations of this analysis include the variation in screening methods due to poor uptake of the updated CS guidelines, under-reporting of CS notifications by health facilities, and incomplete data due to incomplete CIFs and CNF when using the paper-based method. This method of notification can lead to delayed or missed notification if data capturing is delayed, while the electronic notification method sends notifications to the NMCSS in real time.

## Conclusion

CS remains a public health issue of importance, and, without proper management, it may cause life-threatening complications, including death among children. Nationally, the number of reported CS notifications declined, but the case rate in 2024 remained high at 190/100 000 live births. Control measures need to be put in place to ensure effective surveillance and management of CS. To reach the goal of CS elimination, ongoing training of healthcare providers on syphilis surveillance and health education among pregnant mothers and partners needs to be prioritised to promote adequate partner treatment. Healthcare providers need to promote and encourage early ANC booking to facilitate early syphilis screening and treatment.

## Recommendations

- The NICD NMC co-ordinators in the provinces should continue training healthcare providers on testing, treating, and notifying of CS.
- Healthcare providers need to maintain a high index of suspicion for syphilis at every ANC visit and need to encourage pregnant mothers to bring their partner for treatment.
- The NICD co-ordinators need to encourage healthcare providers to provide in-service training to enhance knowledge about syphilis management and promote capacity building for newly employed staff members as well.



- Regular community engagement campaigns that provide health education on syphilis and how to prevent and treat it should be conducted.
- Further research should be conducted by the NICD team, in collaboration with healthcare providers in the health facilities, to study the factors associated with the recurrence of syphilis post-treatment so that new prevention strategies can be implemented and incorporated into the VTP guidelines.

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## Ethical considerations

Ethical clearance was provided by the University of the Witwatersrand Human Subjects Research Council ethics committee as part of the communicable disease surveillance and outbreak response (M160167). The dataset was provided by the NMC, and personal identities were removed to maintain patient confidentiality. The patients' mother or caregivers are normally informed of the nature of this condition upon consultation. They are aware that it is an NMC.

## Conflict of interest

The authors have no conflict of interest to declare.



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