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Congenital syphilis annual surveillance report, South Africa 2023

Tendesayi Kufa[1,2], Ephordia Thabane[1], Dikeledi Leshaba[1], Matimba Makhubele[3], Adrian Puren[1,4]

[1]Centre for HIV and STIs, National Institute for Communicable Diseases, a division of the National Health Laboratory Service, Johannesburg, South Africa
[2]School of Public Health, University of the Witwatersrand, Johannesburg, South Africa
[3]Division of Public Health Surveillance and Response, National Institute for Communicable Diseases, a division of the National Health Laboratory Service, Johannesburg, South Africa
[4]Division of Virology, School of Pathology, University of the Witwatersrand, Johannesburg, South Africa

Summary

Congenital syphilis (CS) is earmarked for elimination globally. To monitor progress towards CS elimination, South Africa lists this condition within category two on the national Notifiable Medical Conditions (NMC) surveillance platform. Here, we describe trends in clinical CS notifications and laboratory alerts of rapid plasma reagin (RPR)-positive results for 2023. We requested data from the NMC line list and exported them into Stata 18.5 [Stata Corporation, College Station, United States] for analysis. We used descriptive statistics to illustrate trends in notifications received during 2023, nationally and by province and district. During 2023, there were 1 739 clinical notifications of CS and 5 160 alerts of RPR-positive results from children <2 years of age. At the provincial level, four provinces—Eastern Cape, Gauteng, KwaZulu-Natal, and Western Cape—accounted for 89.9% of all clinical notifications and 81.4% of RPR-positive results. There were clinical notifications from 165 facilities with a median of three notifications (IQR 1–9) per facility. There was a median of eleven notifications at the district level (IQR 4–47). We obtained RPR-positive results from children <2 years of age from 414 facilities representing all of South Africa's 52 districts. There was a median of two RPR-positive results per facility (IQR 1–10, range 1–265). The increase in notified cases may represent an increase in the burden of disease or improvements in notifications by healthcare providers. The higher proportions of clinical cases and RPR-positive results in some provinces suggest better detection and reporting of CS cases in these provinces. To improve CS case detection and reporting, there is a need for continuous training of healthcare providers on the clinical signs and symptoms of maternal and congenital syphilis and on the notification procedures.

Introduction

Congenital syphilis (CS) refers to the mother-to-child transmission of syphilis (MTCTs) during pregnancy or childbirth. It occurs when a woman infected with *Treponema pallidum*—the bacteria that causes syphilis—becomes pregnant or when a pregnant woman acquires the infection during the pregnancy, and the infection remains undetected, untreated, or inadequately treated.[1,2] In the absence of treatment, 50–90% of pregnant women with syphilis will transmit the infection to their unborn child, resulting in adverse pregnancy or birth outcomes such as stillbirths, preterm or low birthweight deliveries and associated complications, early neonatal deaths, and congenital infections.[1,2] Pregnant women living with HIV and co-infected with syphilis are more likely to transmit HIV to their unborn babies compared to pregnant women living with HIV but without syphilis.[3]

Screening and testing pregnant women for syphilis remains the cornerstone of the elimination of the MTCTs plan. This plan, launched by the World Health Organisation in 2007, requires that countries ensure that 95% of pregnant women attend antenatal care, ideally before 20 weeks, that 95% of those who attend antenatal care are screened and tested for syphilis, and that 95% of pregnant women who have syphilis are treated with benzathine penicillin.[4] Countries will be considered to have eliminated congenital syphilis when they have a case rate that is less than 50 cases/100 000 live births in the presence of a robust surveillance system.[4]

South Africa has provided antenatal screening for syphilis since the late 1990s. Current screening guidelines introduced in late 2023 recommend testing for syphilis at least four times during pregnancy—at booking before 20 weeks, at least twice in the third trimester, and at delivery—using an approved and quality-assured dual HIV/syphilis test with confirmatory rapid plasma reagin (RPR) testing.[5] Syphilis exposed children <2 years of age

that are either suspected of infection or showing symptoms are tested for syphilis using an RPR at the discretion of the attending clinician.[5]

To monitor progress towards elimination of MTCTs, South Africa has included CS as a category two condition on the national Notifiable Medical Conditions (NMC) surveillance platform coordinated by the National Institute for Communicable Diseases (NICD), a division of the National Health Laboratory Service (NHLS), since 2017.[6] All healthcare workers—in public and private laboratories—are required to report or notify cases through paper-based or electronic forms within seven days of making a diagnosis. In addition to the NMC platform, CS surveillance is complemented by monitoring RPR-positive results from children <2 years of age who are tested in NHLS laboratories (NMC alerts). July 2023 saw the introduction of a combined case notification form (CNF) and case investigation form (CIF), allowing healthcare providers to notify cases and provide the information required for the correct classification of cases at the same time.[7] The combined CNF/CIF is available on the web version of the NMC electronic application and in a paper-based version. The mobile version of the NMC app does not include the fields on infant and maternal information needed to classify and verify cases.

Here, we describe trends in clinical CS notifications and laboratory alerts of RPR-positive results during 2023.

Methods

On 26 July 2024 we extracted data on notified cases and RPR-positive results from children <2 years of age (CS alerts) for the period 1 January 2023 to 31 December 2023. We extracted this data from the NICD's NMC platform. Table 1 gives the surveillance case definition for CS.[8] Results of RPR testing from children <2 years of age and tested at public sector NHLS laboratories are automatically fed from the laboratory information system (TrakCare) into the NMC data mart. Data were extracted in the form of a line list and exported into Stata® 18.5 [Stata Corporation, College Station, United States] for analysis. Following data cleaning and recoding of variables, we used descriptive statistics—counts, frequencies, and percentages—to describe quarterly trends in clinical notifications and laboratory alerts of RPR-positive results at the national, provincial, and district levels. Infants/children who met the criteria for both a clinical case and an RPR-positive result (CS alert) were considered clinical cases. Some children <2 years of age are initially identified as a laboratory alert, following which a notification form providing additional clinical details is completed. These children are identified by the presence of notifier details leading to a CS laboratory alert. CS rates are defined as the number of clinical CS cases notified during the surveillance period divided by the number of live births during the same period, expressed as a count per 100 000 live births. Case rates for the surveillance period were calculated overall and by province. We obtained the number of live births in 2023 from the District Health Information System (DHIS) through paediatric HIV surveillance dashboards.

We did not obtain written informed consent for data collection from patients. This is because CS is a reportable condition under the National Health Act 61 of 2003, South Africa.[9] Providers are required to notify cases within seven days of making a diagnosis. Data collected during notification are kept private and confidential via password-controlled access, with only NMC staff and relevant healthcare providers (with Health Professions Council of South Africa (HPCSA) or South African Nursing Council (SANC) registration numbers) having access to the line list.

Table 1. Congenital syphilis surveillance case definition[8], South Africa.

Disease epidemiology	Who must notify	Case definition
A condition affecting an infant or child (< 2 years) whose mother had untreated or inadequately treated syphilis. **Early Congenital Syphilis**: may present anytime in infancy or early childhood (< 2 years). An infected infant may be asymptomatic at birth and develop signs 4-8 weeks after birth.	Healthcare practitioner *(nurse or doctor receiving the laboratory result)*	Any case meeting the following criteria will be considered a case of congenital syphilis: [1] A live birth or foetal death at more than 20 weeks of gestation or >500 g (including stillbirth) born to a woman with positive syphilis serology **AND** 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. **OR** [2] A live birth, stillbirth, or child aged <2 years born to a woman with positive syphilis serology or with unknown serostatus and with **laboratory evidence** of syphilis infection (regardless of the timing or adequacy of maternal treatment). *The following constitutes acceptable laboratory evidence:* • Demonstration by dark-field microscopy or fluorescent antibody detection of *Treponema pallidum* in the umbilical cord, placenta, 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) being reactive to 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 ≥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 • Any stillborn infant with a reactive maternal test should be considered a congenital syphilis 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 congenital syphilis (e.g., osteochondritis, diaphyseal osteomyelitis, periostitis); **AND/OR** [4] A live birth, stillbirth, or child aged <2 years 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 6-month examination demonstrates any of the early clinical signs listed below: • Early clinical signs that may be present in an infant with congenital syphilis include non-immune hydrops, hepatosplenomegaly, rhinitis (snuffles), and skin rash, pseudoparalysis of an extremity, or failure to thrive or achieve developmental milestones. • 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.

Results

During 2023, there were 1 739 clinical notifications of CS and 5 160 alerts of RPR-positive results from children <2 years of age. The number of clinical notifications was equivalent to a case rate of 198 cases per 100 000 live births. Over this period, there was a steady increase in the number of clinical notifications received (Figure 1). The number of laboratory alerts of RPR-positive results decreased by 30% in the last two quarters of 2023.

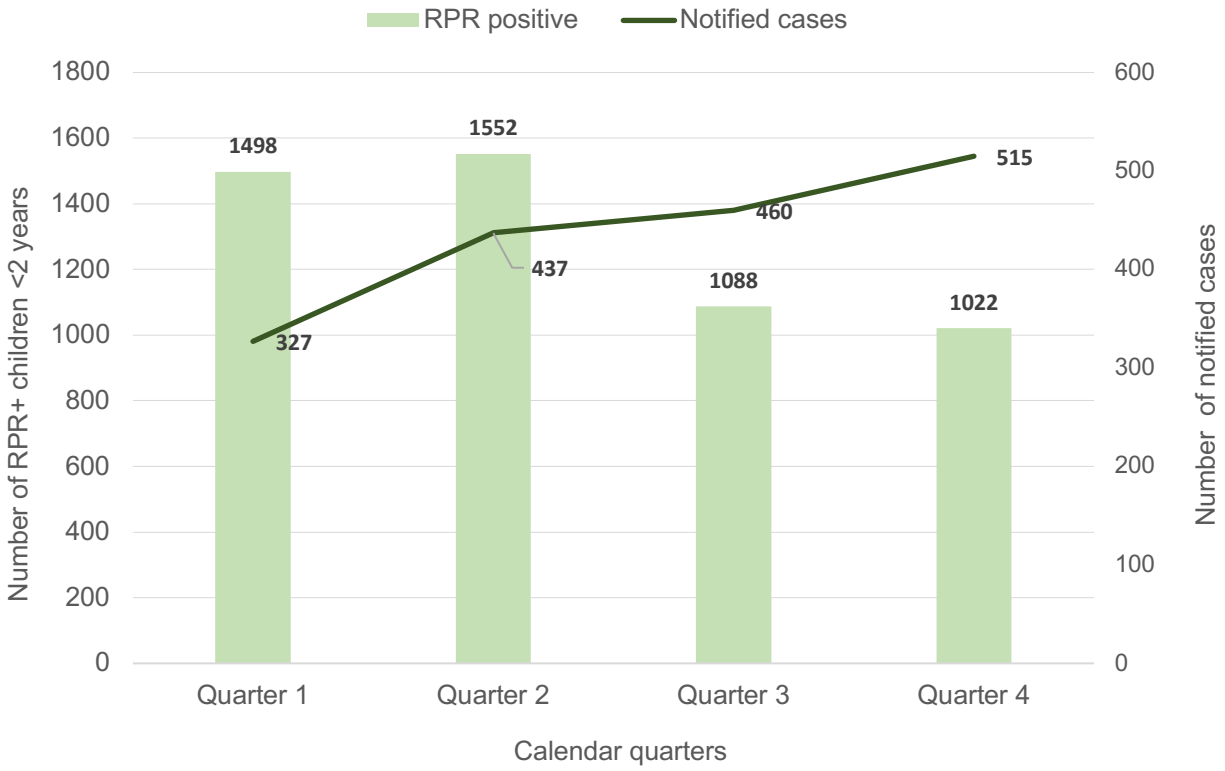

Figure 1. Trends in congenital syphilis clinical notifications and rapid plasma reagin (RPR) positive specimens by calendar quarter, South Africa, January–December 2023.

Notified cases refer to clinical notifications received through the Notifiable Medical Conditions platform; RPR-positive results from children confirmed to be <2 years of age at specimen collection, tested at NHLS laboratories, and obtained from the NMC platform. These represent children screened for syphilis because either they were exposed (maternal history of RPR+) or syphilis is clinically suspected.

At the provincial level during 2023, clinical notifications were highest in the KwaZulu-Natal, Gauteng, Western Cape, and Eastern Cape provinces. These four provinces accounted for 89.9% of all clinical notifications, with KwaZulu-Natal Province alone accounting for 46% of clinical notifications. Clinical notifications increased throughout the year in Mpumalanga Province, albeit from a very low base, i.e., from seven in Quarter 1 to 32 in Quarter 4 (Figure 2). The number of CS clinical notifications was equivalent to case rates of 14 per 100 000 live births in Limpopo Province to 418 per 100 000 live births in Western Cape Province (Table 2).

The numbers of RPR-positive results from children <2 years of age were also highest in the KwaZulu-Natal, Gauteng, Western Cape and Eastern Cape provinces, contributing 81.1% of all RPR-positive results captured in the system. In the Eastern Cape, Gauteng, and Western Cape provinces, the number of RPR-positive results decreased by 41–-53% in Quarters 3 and 4 compared to Quarter 2 (Figure 3).

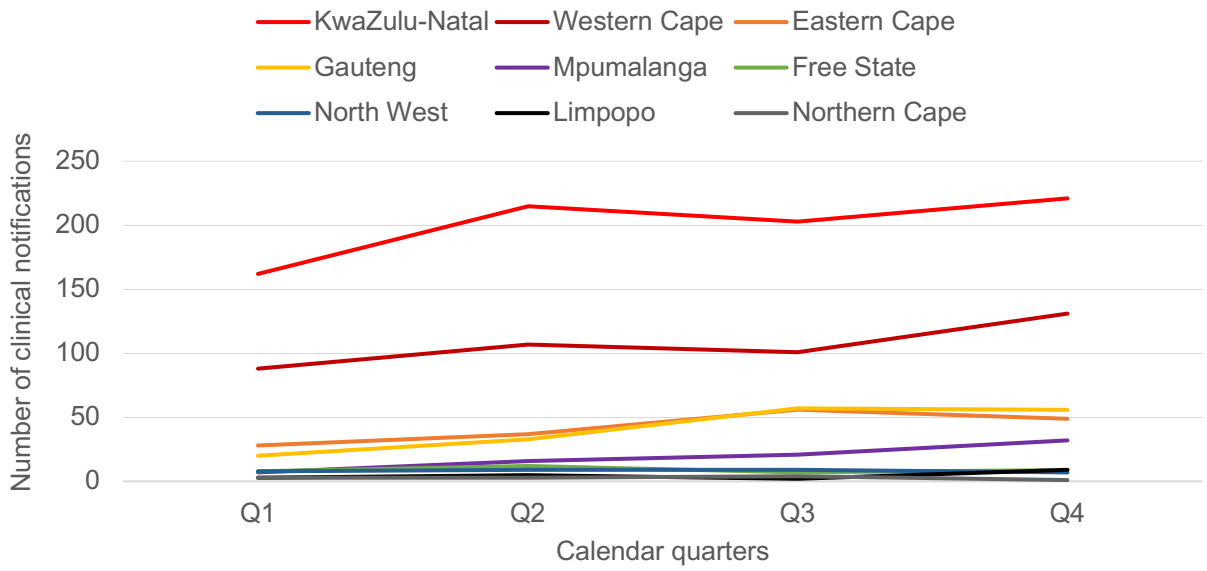

Figure 2. Trends in congenital syphilis clinical notifications by quarter and province, South Africa 2023, N=1 739.

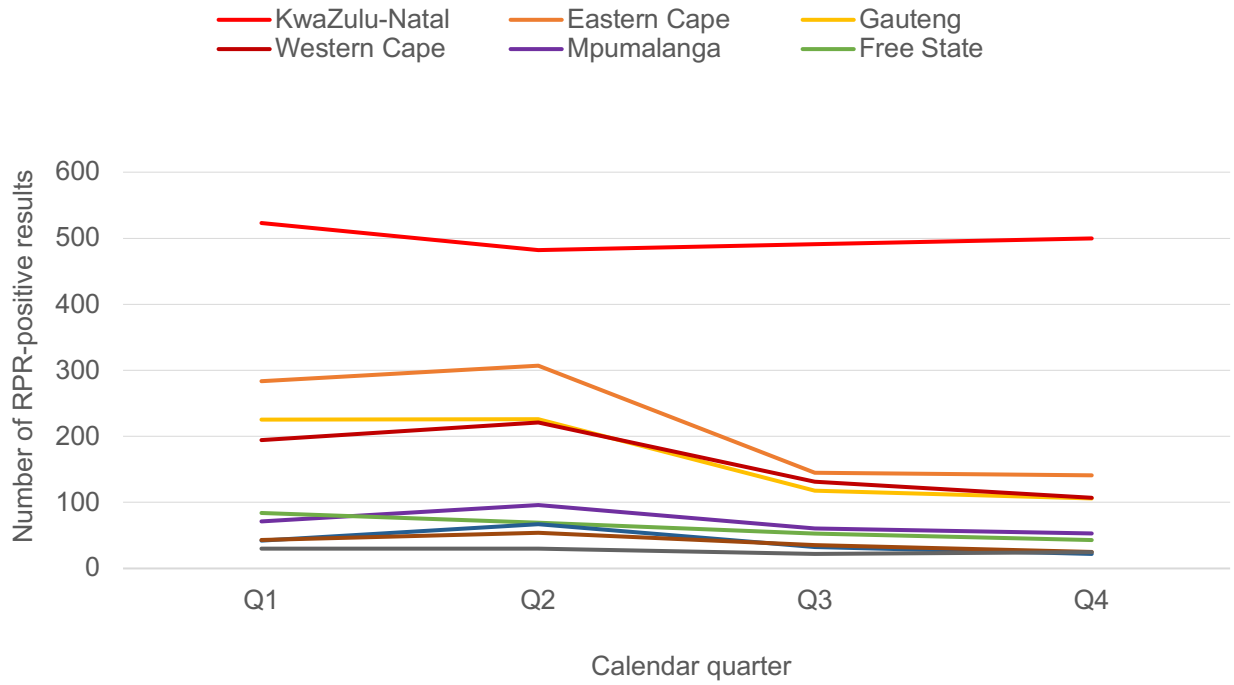

Figure 3. Trends in rapid plasma reagin (RPR) positive results by quarter and province, South Africa 2023, N=5 160.

Table 2. Congenital syphilis clinical notifications, live births, and case rate/100 000 population by province, South Africa 2023.

Province	Clinical notifications	Live births* (2023)	Case rate / 100 000 live births
Western Cape	427	90 487	472
KwaZulu-Natal	801	191 728	418
Eastern Cape	170	91 856	185
Mpumalanga	76	72 642	105
Free State	36	42 379	85
Gauteng	166	201 609	82
North West	33	50 935	65
Northern Cape	11	22 358	49
Limpopo	19	112 978	17
South Africa	**1 739**	**876 972**	**198**

*Obtained from District Health Information System (DHIS)

There were clinical notifications from 165 district facilities with a median of three notifications (IQR 1–9, range of 1–120) per facility. At the district level, there was a median of 11 notifications (IQR 4–47, range of 1–313) per district (Table 3). There were RPR-positive results from children <2 years from 414 facilities representing all of South Africa's 52 districts. There was a median of two RPR-positive results per facility (IQR 1–10, range 1–265) and 54 RPR-positive results per district (IQR 26–97, range 1–963).

Table 3. Congenital syphilis clinical notifications by calendar quarter (Q), district, and province, South Africa 2023.

*District	# of facilities	Q1	Q2	Q3	Q4	Total
EC Alfred Nzo	4	0	13	10	7	30
EC Amathole	2	0	1	4	5	10
EC Buffalo City Metro	3	4	3	2	2	11
EC Chris Hani	2	0	0	1	3	4
EC Joe Gqabi	1	0	0	1	0	1
EC Nelson Mandela Bay Metro	2	0	6	8	2	16
EC OR Tambo	5	24	14	29	30	97
EC Sarah Baartman	1	0	0	1	0	1
FS Fezile Dabi	1	0	0	1	2	3
FS Lejweleputswa	1	0	0	1	0	1
FS Mangaung Metro	3	7	12	5	7	31
FS Thabo Mofutsanyana	1	1	0	0	0	1
FS Xhariep	0	0	0	0	0	0
GP City of Johannesburg Metro	7	2	8	18	25	53
GP City of Tshwane Metro	6	5	6	12	5	28
GP Ekurhuleni Metro	4	7	10	17	16	50
GP Sedibeng	2	2	6	5	4	17
GP West Rand	2	4	3	5	6	18
KZN Amajuba	1	13	15	15	21	64
KZN eThekwini Metro	15	57	85	80	91	313
KZN Harry Gwala	5	2	4	4	5	15
KZN iLembe	2	30	21	28	35	114
KZN King Cetshwayo	2	6	14	9	12	41
KZN Ugu	6	16	14	10	4	44
KZN uMgungundlovu	4	32	47	52	48	179
KZN uMkhanyakude	3	6	7	1	1	15
KZN Umzinyathi	1	0	2	0	0	2
KZN uThukela	1	0	4	2	4	10
KZN Zululand	1	0	2	2	0	4
LP Capricorn	2	2	4	1	2	9
LP Greater Sekhukhune	3	1	1	1	2	5
LP Mopani	0	0	0	0	0	0
LP Vhembe	0	0	0	0	0	0
LP Waterberg	3	0	0	0	5	5
MP Ehlanzeni	5	3	4	1	3	11
MP Gert Sibande	3	4	11	20	28	63
MP Nkangala	1	0	1	0	1	2
NC Frances Baard	1	1	2	1	1	5
NC John Taolo Gaetsewe	0	0	0	0	0	0
NC Namakwa	2	1	2	0	1	4
NC Pixley Ka Seme	1	2	0	3	1	6
NC ZF Mgcawu	5	4	5	5	4	18
NW Bojanala Platinum	2	0	0	1	1	2
NW Dr Kenneth Kaunda	2	3	1	1	0	5
NW Dr Ruth Segomotsi Mompati	1	0	1	0	0	1
NW Ngaka Modiri Molema	1	0	1	2	0	3
WC Cape Winelands	7	21	16	26	29	92
WC City of Cape Town Metro	15	39	57	38	48	182
WC Central Karoo	0	0	0	0	0	0
WC Garden Route (Eden)	9	5	7	21	26	59
WC Overberg	2	3	0	2	2	7
WC West Coast	12	20	27	14	26	87
Total	**165**	**327**	**437**	**460**	**515**	**1 739**

*EC = Eastern Cape Province; FS = Free State Province; GP = Gauteng Province; KZN = KwaZulu-Natal Province; LP = Limpopo Province; MP = Mpumalanga Province, NC = Northern Cape Province; NW = North West Province; WC = Western Cape Province

Discussion

The national CS case rate for 2023 was estimated at 198 cases/100 000 live births against an elimination target of 50/100 000 live births. There was an increase in clinical cases notified in each successive quarter during 2023. The four provinces with the most notifications accounted for 90% of all clinical notifications. All but five districts in the country sent notifications. There was a decline in the number of laboratory alerts of RPR-positive children <2 years of age from the third quarter at the national level.

The increase in the number of notified CS cases may represent an increase in the burden of disease or improvements in notifications by providers. The increased cases in the face of similar or declining numbers of RPR-positive children detected suggest that the increased clinical notifications observed are likely due to improved notifications. The decrease in the number of RPR-positive children <2 years of age likely reflects a decrease in i) the number of children <2 years suspected of congenital syphilis or exposed to syphilis or ii) an increase in the number of children <2 years initially identified through an RPR-positive laboratory alert who were evaluated and notified as cases. The number of children initially identified through an RPR-positive laboratory alert was 43% of all children <2 years of age notified in 2023. Since 2017, when the NICD started monitoring the numbers of RPR-positive children <2 years of age, incidence has increased quarterly.[10,11] Data analysis from 2024 will therefore be required to confirm the persistence of this declining trend.

The increase in the number of healthcare facilities notifying cases suggests a general improvement in notifications with more healthcare providers notifying cases. During the period 2017 to 2020, 116 facilities in 40 districts sent notifications, while this 2023 report includes cases from 165 facilities in 47 districts.[9,10]

South Africa has recently introduced interventions to reduce the occurrence of CS. In 2018, in the face of shortages of benzathine penicillin, the drug of choice for syphilis infection, the country prioritised pregnant women for benzathine penicillin treatment while other patients were treated with doxycycline.[12] In 2023, the country introduced dual HIV/syphilis testing for women who are not known to be HIV positive, together with more frequent testing—at least six times during pregnancy.[5] With better availability of benzathine penicillin and the re-introduction of its use for all cases of syphilis, the expectation is that more women with syphilis will be identified and treated, thereby averting CS. The impact of these interventions will only be fully realised in 2024.

Limitations of this analysis include under-reporting of cases by some facilities and lack of verification of notified cases. The Eastern Cape, Gauteng, KwaZulu-Natal, and Western Cape Provinces notified almost 90% of clinical CS cases. These four provinces accounted for 81% of RPR-positive results in 2023, 73% of maternal syphilis cases identified in the 2022 antenatal care HIV prevalence survey, and 66% of registered live births in 2022, with similar trends previously reported.[13,14] This higher proportion of clinical cases and RPR-positive results, when compared to maternal syphilis cases or births, suggests better detection and notification of CS cases in those provinces compared to the other provinces. July 2023 saw the introduction of a combined case notification form/case investigation form (CNF/CIF) to enhance the submission of clinical information required to verify if notified cases met the surveillance case definition. In an analysis of data collected from January 2020 to June 2022, when healthcare workers provided clinical information separately from the CNF, only one-third of the cases had a CNF matched to a CIF.[13] We will analyse the combined CNF/CIF data to verify if notified cases meet the case definition for CS and report the findings separately.

Conclusion

South Africa notified 1 739 clinical congenital syphilis cases in 2023, with the Eastern Cape, Gauteng, KwaZulu-Natal, and Western Cape Provinces accounting for 90% of cases. This represented a case rate of 198 cases/100 000 live births against a global elimination target of 50 cases per 100 000. Although there was an increase in notifications over the year, there is likely under-reporting of cases in some facilities and districts.

Recommendations

- To improve case detection, treatment and reporting, there is a need to train and re-train healthcare providers at primary care facilities, district, regional and tertiary hospitals on the clinical signs and symptoms of maternal and congenital syphilis, and on the notification procedures.
- To estimate the completeness of reporting or notifications, the NICD, in collaboration with the national and provincial departments of health, needs to conduct a facility-based evaluation or assessment at selected hospitals to identify congenital syphilis cases in a given period and match identified cases to the NMC line list. Findings of this assessment would be useful to estimate the extent of under-reporting and the nature of the selection bias introduced by under-reporting.
- To assess gaps and challenges faced by the country with respect to the elimination of CS, analysis of patient data to determine clinical characteristics that are over-represented among cases is a prerequisite. Identifying such characteristics will help the National Department of Health to design targeted interventions to maximise prevention, detection, and treatment of maternal and congenital syphilis.

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Ethical considerations

Because CS is notifiable, written informed consent to submit patient information and details of diagnosis are not obtained from the mothers or caregivers. Instead, notification of a case is done as standard-of-care after mothers or caregivers are informed. Ethical clearance for this surveillance activity was provided by the University of the Witwatersrand Human Subjects Research Council ethics committee as part of essential communicable diseases surveillance and outbreak response activities [M160167]. Data on notified cases was extracted from the NMC data mart through the NMC portal. The data were de-identified prior to analysis and sharing.

Conflict of interest

The authors have no conflict of interest to declare.

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