JHGD
Journal of Human Growth and Development
www. jhgd.com.br

ORIGINAL ARTICLE

Data quality of the epidemiological surveillance system for congenital syphilis

Karen Kaline dos Santos Teixeira[a], Thaisa Góis Farias de Moura Santos Lima[a], Jailton Carlos de Paivaa, Marquiony Marques dos Santos[a], Ricardo Alexsandro de Medeiros Valentim[a], André Gustavo Gadelha Mavignier de Noronha[b], Arthur Alexandrino[b], Ricardo Andrade Bezerra[b], Isabelle Ribeiro Barbosa Mirabal[b]

Open acess

[a]Universidade Federal do Rio Grande do Norte. Laboratório de Inovação Tecnológica em Saúde. Natal, Rio Grande do Norte-RN, Brasil;

[b]Universidade Federal do Rio Grande do Norte. Programa de Pós-Graduação em Saúde Coletiva. Natal, Rio Grande do Norte-RN, Brasil.

Corresponding author
rab.andradebezerra@gmail.com

Manuscript received: january 2025
Manuscript accepted: march 2025
Version of record online: august 2025

ORCID Authors
ORCID: 0000-0002-7469-2930; karenksteixeira@gmail.com;
ORCID: 0000-0001-8276-4124; thaisa.lima@lais.huol.ufrn.br;
ORCID: 0000-0001-8276-4124; jailton.paiva@lais.huol.ufrn.br;
ORCID: 0000-0001-5812-4004; marquiony.santos@lais.huol.ufrn.br.
ORCID: 0000-0002-9216-8593; ricardo.valentim@lais.huol.ufrn.br
ORCID: 0009-0007-2887-4964; andre.noronha@lais.huol.ufrn.br
ORCID: 0000-0001-5817-4335; alexandrinoarthurdm@gmail.com
ORCID: 0000-0002-7687-6901; rab.andradebezerra@gmail.com
ORCID: 0000-0002-1385-2849; isabelleribeiro68@gmail.com

Abstract

Introduction: cases of congenital syphilis have been increasing in Brazil, and the quality of data recorded in the surveillance system may impact the information used in primary care.

Objective: To evaluate the quality of data in the epidemiological surveillance system for congenital syphilis from 2017 to 2021.

Methods: evaluation study using descriptive statistics and Spearman's correlation test, analyzing records of congenital syphilis in the Notifiable Diseases Information System, in order to evaluate completeness, consistency and timeliness of data entry (2017–2021), as well as its linkage with the Mortality Information System, in order to evaluate representativeness.

Results: a total of 1,575 cases were reported during the study period. Completeness ranged from 92.5% to 96.2%, while consistency ranged between 80.4% and 97.3%. The time between diagnosis and notification was delayed (median of 3 to 4 days), while data entry was timelier (median of 3 to 8 days). The representativeness of this system was classified as moderate, with a correlation of 0.65 ($p \leq 0.001$) between the records of deaths in the analyzed systems. Nevertheless, consistency between the reported deaths and the completion of the date of occurrence was considered very poor.

Conclusion: the surveillance system for congenital syphilis was considered complete and consistent in most of the evaluated points, agile in entering cases, late in detecting them and moderately representative, indicating the need for improvement; however, it is important for the implementation of surveillance actions.

Keywords: Syphilis, Congenital; Epidemiology; Evaluation Study; Information Systems; Epidemiological Monitoring.

Suggested citation: Teixeira KKS, Santos Lima TGFM, Paiva JC, Santos MM, Valentim RAM, Noronha AGGM, Alexandrino A, Bezerra RA, Mirabal IRB. Data quality of the epidemiological surveillance system for congenital syphilis. *J Hum Growth Dev. 2025; 35(2):210-220.* DOI: http://doi.org/10.36311/jhgd.v35.17295

Authors summary

Why was this study done?
The importance of guaranteeing the quality, timeliness and representativeness of the data is highlighted, based on the evaluation of the epidemiological surveillance system for congenital syphilis in Natal, Rio Grande do Norte, from 2017 to 2021. Congenital syphilis continues to require a detailed analysis of prenatal information and the working conditions of health professionals, in order to reduce its vertical transmission. This study focused on the quality of the data on congenital syphilis in Natal aims to evaluate the quality of data, timeliness and representativeness of the epidemiological surveillance system for congenital syphilis in Natal.

What did the researchers do and find?
This study evaluated the quality of data from the surveillance system for congenital syphilis in Natal (2017-2021), analyzing completeness, consistency, speed of data recording and representativeness. Data from the Notifiable Diseases Information System (SINAN) and the Mortality Information System (SIM) were used, applying descriptive statistics and Spearman's correlation. A total of 1,575 cases were recorded, predominantly mothers aged between 20 and 39 and brown. Data completeness was high (>95%) for essential variables. Nonetheless, case detection was late (median 3 to 4 days), while data entry was faster (median 3 to 8 days). The representativeness of this system was moderate (correlation of 0.65; $p \leq 0.001$) among the analyzed death records.

What do these findings mean?
Continuous evaluation of the quality and timeliness of the data on congenital syphilis is essential to guide public policies and health strategies that are effective in reducing vertical transmission. In addition to strengthening epidemiological surveillance, detailed analysis of these data provides valuable information for improving prenatal care and clinical management, with a view to mitigating the impacts of this condition on maternal and child health in the region.

Highlights
There were significant improvements in the documentation of tests and treatments over the period, reflecting greater efficiency in the epidemiological surveillance system. The comparison with the Mortality Information System (SIM) showed a moderate correlation in the records of deaths from congenital syphilis, reinforcing the representativeness of the data in epidemiological monitoring.

INTRODUCTION

The World Health Organization (WHO) points out that about 930,000 pregnant women acquire syphilis in the world every year. Of these pregnancies, approximately 38% progress to unfavorable birth outcomes, including 143,000 stillbirths, 102,000 infants with congenital syphilis (CS), 62,000 neonatal deaths, 44,000 premature or low birth weight infants[1]. Estimates from the Pan American Health Organization (PAHO) pointed to 22,800 cases of CS in Latin America and the Caribbean in 2015, which indicates a rate of 1.7 cases per 1,000 live births.

In Brazil, until 2018, there was a significant increase in the rates of children with CS and a beginning of a decrease in incidence rates from 2019 onwards. In 2020, the country had a CS detection rate of 7.7 cases per 1,000 live births and a CS mortality coefficient of 6.5 per 100,000 live births. Some of the factors that may be related to these results are the increased coverage and availability of rapid tests, unprotected sex and the resistance of primary care professionals to administer penicillin[2], weakening access to treatment.

In 2020, most of the CS records came from the Southeast region (44.5%), followed by the Northeast of Brazil (28.2%), accounting for 72.7% of the total records in Brazil. Regarding deaths from congenital syphilis in children under one year of age, the North region had the highest mortality rate, resulting in approximately 10.2 cases per 100,000 live births, followed by the Southeast (7.3%) and Mid-West (6.2%)[3].

The increase in CS cases should not be evaluated considering only social and economic indicators, but should use data such as the quality of information passed on in prenatal care to pregnant women and partners. Another important factor is the working conditions that provide appropriate tools for satisfactory prenatal care, providing the necessary conditions for the correct registration of cases and the clinical management of syphilis in pregnant women, preventing vertical transmission[4,5].

The epidemiological scenario is an elementary instrument for surveillance, as it configures a triggering tool in the "information-decision-action" process. Health information not only describes epidemiological scenarios, but also evaluates services, directs implementations, conducts, evaluates and monitors health care models, as well as disease control. For this purpose, it is essential to have technical knowledge and professionals qualified to program, conduct and monitor the processes related to the collection, notification, processing, evaluation, presentation and dissemination of data, in addition to the production of information[6].

The list that determines the harms and diseases of compulsory notification, determined by law, has been the main source of data and information for epidemiological surveillance, ensuring the mandatory registration, periodicity and dissemination of information. The constant qualification of the epidemiological surveillance system, supported by parameters of utility, timeliness of registration and quality, portrays substantial tools for the programming, monitoring, operationalization and analysis of health actions, promoting their improvements and pointing out activities that lead to more knowledge regarding the diseases as a solution[7].

In order to improve the system and bring reliable, complete and consistent information, every database must be regularly evaluated, thus serving as a subsidy in decision-making by health managers. The more qualified the database, the greater its capacity to support the construction of effective public policies[4].

Continuous updating followed by the qualification of the database of the Notifiable Diseases Information System (SINAN, as per its Portuguese acronym) is essential for monitoring the epidemiological scenarios of the diseases and conditions contained in the system. Data with irregularities, from incomplete records or with frequently ignored variables, inconsistencies between

fields and duplication of records, among other setbacks verified at the municipal, state or federal levels, indicate the need for an analysis of the quality of the collected information[8].

The current study aimed to evaluate the quality of data from the epidemiological surveillance system for congenital syphilis in Natal, Rio Grande do Norte State, Brazil, from 2017 to 2021, according to the Updated Guidelines for Evaluating Public Health Surveillance Systems, belonging to the Centers for Diseases Control and Prevention[9].

METHODS

Study design

This is an evaluative study with secondary data regarding the notifications of cases of congenital syphilis in the municipality of Natal.

Study location and period

The municipality of Natal, capital of Rio Grande do Norte (RN), is located in the Northeast region of Brazil. According to the Brazilian Institute of Geography and Statistics (2019), the city occupies a territorial area of 167.4 km², divided into 36 neighborhoods, distributed in 5 health districts, all included in the study. It has a demographic density of 4,805.24 inhabitants/km² and a population estimate of 884,122 inhabitants in 2019. Data collection took place from January 1, 2017 to December 31, 2021.

Study population and eligibility criteria

All cases of congenital syphilis registered in the Notifiable Diseases Information System (SINAN) and all deaths, miscarriages and stillbirths due to congenital syphilis in the municipality of Natal were included. In order to identify fetal and infant deaths recorded in the Mortality Information System (SIM, as per its Portuguese acronym), records that had congenital syphilis as the underlying or associated cause were selected (codes in the range A50 to A50.9 of the 10th Revision of the International Statistical Classification of Diseases and Related Health Problems of the International Health Code (ICD-10)[10]. The extraction and compilation of data for the study took place from March to June 2022.

In order to evaluate the syphilis system, the Updated Guidelines for Evaluating Public Health Surveillance Systems, belonging to the Centers for Diseases Control and Prevention, is a document produced to promote the best use of the resources offered by public health systems, through the design of the evaluation of databases, ensuring that diseases and health conditions are monitored efficiently and effectively[9].

Data collection

In order to study the completeness of the data, the following variables were selected: neighborhood, mother's education, prenatal care during this pregnancy, diagnosis period of maternal syphilis, non-treponemal test at delivery/curettage, mother's treatment regimen, partner(s) treated concurrently with the pregnant woman, non-treponemal test – peripheral blood, treponemal test (after 18 months), non-treponemal test – cerebrospinal fluid, changes in cerebrospinal fluid, radiological diagnosis of the child, treatment regimen of the child and progression of the case. Variables that were not filled in, filled in with "unknown" or with invalid values, were considered incomplete.

Data analysis

The completeness values were categorized based on the parameters of a study that evaluated the completeness of the data from the Notifiable Diseases Information System (SINAN) on congenital syphilis[4]. The parameters were adapted by defining them as: very poor (< 50%), poor (50 - 69.9%), regular (70 - 89.9%), good (90 - 94.9%) and excellent (≥ 95%).

Regarding the consistency of the data, the following variables were studied: (1) death from congenital syphilis, death from other causes, miscarriage or stillbirth – cases that had these progressions without the presence of information on the date of occurrence were checked; (2) non-treponemal reactive test of the mother at delivery/curettage and the field of the titration filled in; (3) non-treponemal test of the reactive child and the field of the titration filled in; (4) non-treponemal reactive test (cerebrospinal fluid) and the field of the titration filled in; (5) symptomatic clinical diagnosis – the presence of signs and symptoms was verified; (6) the criterion for defining a case of congenital syphilis was met in accordance with the Clinical Protocol and Therapeutic Guidelines (PCDT, as per its Portuguese acronym)[11]. The adopted parameters were the same as those used for the completeness evaluation.

The speed of data recording was calculated using the time interval, in days, between the date of diagnosis and the date of notification of the case, and (II) between the date of notification and the date of entering the form into SINAN. An agile system for syphilis is considered when (I) 90% of the cases are notified within seven days from the beginning of the diagnosis and when (II) the data are entered into the SINAN within 30 days after the notification of the case[9,12]. In order to evaluate the degree of representativeness of the system, the records of deaths, miscarriages and stillbirths in SINAN were compared with mortality data from the Mortality Information System (SIM) using the Spearman's correlation test. According to this comparison, it was possible to evaluate representativeness according to the occurrence of the description of events in multiple data sources.

Legal and ethical aspects of research

The study uses a secondary database from public information banks, so its ethical and legal aspects are already covered, and no evaluation by an ethics and research committee is necessary for this work.

RESULTS

Between 2017 and 2021, 1,575 cases of congenital syphilis were reported in the municipality of Natal. In all the years evaluated, the predominant age group of the mother was from 20 to 39 years old and the race was brown. The mothers' education profile is incomplete Elementary School and the period of maternal diagnosis reveals that most of them were diagnosed during prenatal care (table 1).

Table 1: Characterization of cases of congenital syphilis in the Natal Notification Information System, Rio Grande do Norte, 2017 to 2021 (n = 1,575)

Variables	Year of notification									
	2017		2018		2019		2020		2021	
	n	%	n	%	n	%	n	%	n	%
Mother's age group										
0-9 years	00	0.00	00	0.00	00	0.00	00	0.00	00	0.00
10-19 years	68	23.86	74	24.83	74	20.56	45	15.31	64	18.93
20-39 years	202	70.88	212	71.14	264	73.33	234	79.59	257	76.04
40-59 years	07	2.46	06	2.01	05	1.39	11	3.74	10	2.96
> 60 years	00	0.00	00	0.00	00	0.00	00	0.00	00	0.00
Ignored	08	2.81	06	2.01	17	4.72	04	1.36	07	2.07
Mother's race/skin color										
White	52	18.25	69	23.15	93	25.83	74	25.17	69	20.41
Black	13	4.56	16	5.37	11	3.06	16	5.44	19	5.62
Yellow	01	0.35	01	0.34	00	0.00	00	0.00	00	0.00
Brown	186	65.26	202	67.79	233	64.72	189	64.29	221	65.38
Indigenous	00	0.00	00	0.00	01	0.28	00	0.00	00	0.00
Ignored	33	11.58	10	3.36	22	6.01	15	5.10	29	8.58
Education										
Illiterate	01	0.35	02	0.67	04	1.11	00	00	03	0.89
1st to 4th grade of incomplete Elementary School	20	7.02	17	5.70	18	5.00	11	3.74	04	1.18
4th grade of incomplete Elementary School	08	2.81	08	2.68	11	3.06	11	3.74	08	2.37
5th to 8th grade of incomplete Elementary School	111	38.95	118	39.60	138	38.33	114	38.78	130	38.46
Complete Elementary School	12	4.21	24	8.05	14	3.89	23	7.82	32	9.47
Incomplete High School	39	13.68	51	17.11	56	15.56	44	14.97	53	15.68
Complete High School	34	11.93	46	15.44	63	17.50	52	17.69	51	18.09
Incomplete Higher Education	03	1.05	02	0.67	06	1.67	05	1.70	04	1.18
Complete Higher Education	00	0.00	01	0.34	04	1.11	00	0.00	05	1.48
Ignored	57	20.00	29	9.73	46	12.77	34	11.56	48	14.20
Diagnosis of maternal syphilis										
During prenatal care	160	56.14	165	55.37	252	70.00	198	67.35	203	60.95
At the time of delivery/ curettage	109	38.25	121	40.60	96	26.67	82	27.89	113	33.43
After delivery	07	2.46	09	3.02	06	1.67	08	2.72	14	4.14
Not performed	00	0.00	00	0.00	02	0.56	02	0.68	02	0.59
Ignored	09	3.16	03	1.01	04	1.11	04	1.36	03	0.89

Source: Prepared by the authors, 2024.

In Natal, 63.1% (65) of the health facilities are decentralized to the Notifiable Diseases Information System (SINAN), that is, they have autonomy to collect, monitor and close cases in their establishments, while the other 36.9% (38) depend on the health district to consolidate the information in the epidemiological surveillance system for congenital syphilis.

The variables: non-treponemal test reactive of the mother at delivery/curettage, reactive non-treponemal test of the child (peripheral blood), reactive treponemal test (cerebrospinal fluid) and their respective fields of titrations filled in, were considered consistent, with a percentage above 95% in the period. The clinical variable and the presence of described signs and symptoms were considered excellent in the period from 2017 to 2020; in 2021, it showed a good category. On the other hand, the variables "death from congenital syphilis", "death from other causes", "miscarriage or stillbirth" with the field "date" filled in was consistent only in 2017; in the other analyzed years, it showed a result classified as very poor. Regarding the case definition, the variable was regular in relation to the used categorization (table 2).

Table 2: Percentage of consistency of the variables selected in the Notifiable Diseases Information System, Natal, Rio Grande do Norte, 2017 to 2021. (n = 1,575)

Variables	Consistency (%)									
	2017		2018		2019		2020		2021	
	n = 285	%	n = 298	%	n = 360	%	n = 294	%	n = 338	%
Definition of a case of congenital syphilis treated	251/285	88.07	261/298	87.58	289/360	80.27	244/294	82.99	261/338	77.21
Reactive non-treponemal test of the mother at delivery/curettage – Title	266/266	100.00	276/276	100.00	335/335	100.00	276/276	100.00	306/306	100.00
Reactive non-treponemal test of the child (peripheral blood) – Title	219/219	100.00	250/250	100.00	313/314	99.68	262/262	100.00	283/283	100.00
Reactive non-treponemal test (cerebrospinal fluid) – Title	03/03	100.00	00/00	100.00	00/00	100.00	01/01	100.00	02/02	100.00
Symptomatic clinical diagnosis – Presence of signs and symptoms	45/47	95.74	22/23	95.65	28/29	96.55	27/27	100.00	18/19	94.73
Case progression: death from congenital syphilis, death from other causes, miscarriage or stillbirth – Date of death	02/02	100	00/13	0.00	02/11	6.06	02/08	25.00	05/15	33.33

Source: Prepared by the authors, 2024.

Completeness was high in all years for the following fields: neighborhood, prenatal care during pregnancy, diagnosis period of maternal syphilis, non-treponemal test at delivery/curettage and case progression (>95%), and discharge from the period from 2017 to 2020 from the fields of non-treponemal test – child's peripheral blood, treponemal test (after 18 months), and child's treatment regimen. The treatment regimen was classified as good in 2017 and 2018, but showed improvement, providing excellent completeness. The fields of non-treponemal (cerebrospinal fluid) tests and radiological diagnosis of the child were mostly classified as good. For the variables "education", "partner(s) treated concurrently with the pregnant woman" and "changes in cerebrospinal fluid", completeness was regular (table 3).

Table 3: Completeness of the selected variables on congenital syphilis in the Notifiable Diseases Information System, Natal, Rio Grande do Norte, 2017 to 2021. (n = 1,575)

Variables	Completude									
	2017		2018		2019		2020		2021	
	n = 285	%	n = 298	%	n = 360	%	n = 294	%	n = 338	%
Mother's details										
Neighborhood	284	99.65	298	100.00	359	99.72	292	99.32	337	99.70
Education	230	80.70	269	90.27	311	86.39	263	89.46	286	84.62
Performed prenatal care during this pregnancy	278	97.54	288	96.64	352	97.78	287	97.62	327	96.75
Diagnosis period of maternal syphilis	277	97.19	295	98.99	357	99.17	292	99.32	336	99.41
Non-treponemal test at delivery/ curettage	280	98.25	293	98.32	354	98.33	289	98.30	335	99.11
Treponemal test at delivery/ curettage	235	82.46	250	83.89	336	93.33	282	95.92	330	97.63
Treatment regimen	268	94.04	279	93.62	352	97.78	287	97.62	330	97.63
Partner(s) treated concurrently with pregnant woman	220	77.19	262	87.92	341	94.72	277	94.22	291	86.09
Child's data										
Non-treponemal test – Peripheral Blood	275	96.49	294	98.66	354	98.33	293	99.66	318	94.08
Treponemal test (after 18 months)	280	98.25	293	98.32	354	98.33	280	95.24	320	94.67
Non-treponemal test - cerebrospinal fluid	269	94.39	269	90.27	326	90.56	276	93.88	294	86.98
Changes in cerebrospinal fluid	256	89.92	258	86.58	321	89.17	274	93.20	289	85.50
Radiological diagnosis of the child: altered examination of the long bones	246	86.32	261	87.58	329	91.39	279	94.90	310	91.72
Treatment regimen	277	97.19	294	98.66	357	99.17	291	98.98	320	94.67
Case progression	282	98.95	298	100	360	100	281	95.58	337	99.70

Source: Prepared by the authors, 2024.

The system was considered late in the detection of cases, as the mean numbers of days between the day of diagnosis and the date of notification were 20.16 in 2017, 11.31 in 2018, 11.14 in 2019, 12.86 in 2020 and 47.00 in 2021, with a median of four in 2017 and three in the other years. It is observed that there has been an improvement in the delay between the date of notification and the date of entry over the years, where the mean number of days between the date of notification and the date of entry has reduced considerably in the time series (Table 4), with means of 30.59 in 2017, 14.13 in 2018, 6.58 in 2019, 7.86 in 2020 and 8.00 in 2021. The median was eight in 2017, four in 2018 and three in the following years.

The representativeness of deaths from congenital syphilis, miscarriages and stillbirths in SINAN was evident when comparing them with the number of deaths recorded in the Mortality Information System, which showed a moderate correlation (r = 0.65) (table 5).

Table 4: Summary-measures of the interval (in days) between the date of diagnosis, notification and entry of cases of congenital syphilis in the Notifiable Diseases Information System, Natal, Rio Grande do Norte, 2017 to 2021. (n = 1,575)

Summary-measures	Year of notification				
	2017	2018	2019	2020	2021
Interval (in days) between diagnosis and notification					
Mean	20.16	11.31	11.14	12.86	47.00
Standard deviation	51.96	41.09	29.76	70.66	173.70
Minimum	00	00	00	00	00
Maximum	540	400	311	1027	1386
Median	04	03	03	03	03
Percentile 25	02	02	01	01	01
Percentile 75	16	06	06	05	06
Interval (in days) between notification and entry					
Mean	30.59	14.13	6.58	7.86	8.00
Standard deviation	80.02	46.82	13.47	11.09	14.90
Minimum	00	00	00	00	00
Maximum	379	592	178	75	177
Median	08	04	03	03	03
Percentile 25	02	01	01	00	00
Percentile 75	22	10	07	13	11

Source: Prepared by the authors, 2024.

Table 5: Number of deaths with mention of congenital syphilis in the Mortality Information System (SIM) and in the Notifiable Diseases Information System (SINAN), Natal, Rio Grande do Norte, 2017 to 2021

Month	2017		2018		2019		2020		2021		Sperman's Correlation
	SIM	SINAN	SIM	SINAN	SIM	SINAN	SIM	SINAN	SIM	SINAN	
Jan	00	00	01	02	01	01	02	01	00	00	
Feb	00	00	02	04	00	00	01	01	01	01	
Mar	01	01	00	00	01	01	00	00	03	02	
Apr	00	00	00	02	02	02	00	00	01	01	
May	00	00	00	00	00	00	00	00	01	01	
Jun	01	01	00	00	00	00	00	01	00	00	rho = 0,650
Jul	00	00	01	02	01	01	01	00	00	00	p value ≤ 0,001
Aug	00	00	00	00	01	03	00	01	01	01	
Sep	00	00	02	00	01	01	00	01	02	02	
Oct	00	00	02	03	01	01	01	00	00	01	
Nov	00	00	00	00	00	00	02	03	00	02	
Dec	00	00	00	00	01	01	00	00	00	04	

Source: Prepared by the authors, 2024.

DISCUSSION

Overall completeness ranged from 92.5% to 96.2% and consistency ranged from 80.4% to 97.3%. The system was considered late for the interval between diagnosis and notification, with a mean of 11.14 to 47 days, and agile in entries, with a mean of 8 to 30.59 days. It was considered moderately representative due to its correlation with the number of deaths obtained in SINAN and SIM.

Among the various factors that may be related to the decrease in the number of cases and the incidence rate of Congenital Syphilis (CS), one can cite the advance in the improvement of notifications, caused by the decentralization of SINAN in the main health facilities in the municipality over the years, increasing the consistency of data and reducing the number of duplicate records, increased coverage and supply of rapid tests and the need to perform the non-treponemal test at the time of delivery[13,14].

The issue reinforces the need for health services, especially Primary Health Care (PHC), to carry out the early detection of pregnant women, as well as the offer of syphilis screening tests at an opportune time, enabling

pregnant women to receive information and guidance for the prevention of syphilis and the treatment of the infection in a timely manner in their unit[15].

Considered a notifiable disease since 1986[16], CS has as its registration system the Notifiable Diseases Information System (SINAN), which, despite its performance weaknesses, operationalization of notifications in relation to the periodicity of updating, timeliness, data insertion and setbacks in relation to data processing, is still the main system used to evaluate the behavior of the disease and whether the information collected in this system is consistent and timely[16].

The profile of mothers of children with congenital syphilis in the municipality corroborates the national scenario. Mothers aged between 20 and 39 years, brown, with a low level of education, most of whom had prenatal care, were diagnosed during prenatal care, but had inadequate treatment[15,17]. The surveillance system for congenital syphilis showed good quality of completeness, timeliness in the entries and can be considered moderately representative.

Data quality reflects the completeness, agility in recording and consistency (validity) of data recorded by a Public Health surveillance system[18]. The variables "neighborhood", "prenatal care during this pregnancy", "diagnosis period of maternal syphilis", "non-treponemal test at delivery/curettage" and "case progression" had completeness classified as excellent in all periods. In turn, the variables "mother's treatment regimen", "non-treponemal test – peripheral blood", "treponemal test after 18 months" and "child's treatment regimen" had excellent completeness in most years.

When compared to other regions of Brazil, the municipality of Natal has a higher quality of completeness. The high quality of the evaluated data refers to the relationship between efficiency in filling in the data and improvement of the work routine, decentralization of notifying units and continuing education. This can generate a greater awareness of the importance of data completeness[16]. Another important resource is the "Syphilis No!" project in the territory since 2018, where it was seen that both the completeness and consistency between the number of cases of pregnant syphilis (PS) and congenital syphilis (CS) were balanced, unlike previous years, where the number of CS cases was higher than that of GS.

In São Gonçalo, metropolitan region II of Rio de Janeiro, as an example, a study carried out to evaluate congenital syphilis defined most of the evaluated fields as excellent; however, variables such as maternal education, occupation, quantitative VDRL in the child, quantitative VDRL in cerebrospinal fluid and alterations in the X-ray of long bones did not obtain satisfactory results[17]. Porto Alegre-RS showed results similar to those of São Gonçalo[19].

Regarding the consistency of the data, SINAN in Natal was regular. Studies on the surveillance system in Natal pointed out underreporting of the field "date of death" and notifications in disagreement with the case definition criteria of the Ministry of Health, as the main reported inconsistencies. Such factors may occur because the system is local and not online, making it difficult to feedback the data, when qualification is necessary.

The inconsistencies observed in the date of death of the notifications showed the same national pattern in other diseases, such as AIDS in adults and children, which may be a limiting factor in their use in the evaluation of the time interval between notification and the date of death[20]. Another relevant point may be the choice of professionals to diagnose the case to be treated in maternity hospitals, with fear that the patient will not return to primary care to continue treatment, registering cases that do not comply with the definition of a CS case.

Regarding the variables "clinical diagnosis" and "the presence of described signs and symptoms", they were considered excellent in the period from 2017 to 2020; in 2021, it showed a good category. The downgrading of the category at this point may also be related to professionals who choose to diagnose even without presenting the case description established by the Brazilian protocol, considering the guarantee of treatment, especially when evaluating the impacts and direction of clinical management that the Covid-19 pandemic caused, anticipating treatment and recommending the least possible displacement to contain the expansion of the virus.

Regarding the evaluation of the consistency of the other criteria, the excellent results can be attributed to the agility in obtaining laboratory results, quality of the clinical examination and good completion of the forms, verified by the good completeness of the fields.

The surveillance system for syphilis was considered timely in entering and late in detecting cases. According to the Department of Health Surveillance of the municipality, this fact is due to the lack of sufficient human resources to identify these diagnoses and notify them in the official SINAN file, to later be entered into the system, a routine already optimized by the typists of the municipal health network. With regard to opportunity, a study carried out in Iran identified that this transfer of data, referring to another problem, was carried out within 19 days. This was due to the greater integration of systems and improvement of places and working conditions[12], a limiting factor in the country because SINAN is a local system that does not allow integration between other health systems.

The representativeness of deaths, miscarriages and stillbirths from congenital syphilis in SINAN was evidenced when compared with the number of deaths registered in the Mortality Information System (SIM), which showed a moderate correlation ($r = 0.65$). This data indicates that in relation to SIM, SINAN offers similar data, showing similar scenarios when evaluated together. Although there are some bottlenecks, such as the lack of feedback in SINAN and delays in typing death certificates, it was possible to consider the system representative in the municipality of Natal.

In turn, in Recife-PE, studies on congenital syphilis point to an unfavorable scenario of underreporting in SINAN. About 80.9% of the local SIM records were not identified in SINAN[21]. From this perspective, even if the underreporting of the data in these systems has not been evaluated, they can be evaluated as representative[12].

Nevertheless, this study has limitations. The first is the low number of evaluations of the epidemiological surveillance system for syphilis in other regions of the country, making it difficult to compare our results with other realities, thus limiting the discussion to a few regions of Brazil, making it necessary to compare the results of other diseases. The second limiting factor is that the evaluation does not foresee the difficulties inherent to the development of the routine by the team, only the weaknesses of the system, being an important element to broadly evaluate not only the system, but also the surveillance process, through the users. Although this first limitation has been addressed, the production of the current study can also be considered fundamental to identify the fragility of the system in a global way, giving the opportunity for future studies to deepen this theme.

CONCLUSION

The surveillance system for congenital syphilis in the city of Natal was considered complete, consistent and moderately representative, bringing the importance of a surveillance system that allows the production of an epidemiological scenario, the referral of interventional and strategic actions, as well as the production of new public health policies.

As improvements to the surveillance system, it is essential that the Notifiable Diseases Information System (SINAN)[21] be updated to an online version, in addition to creating configurations that allow systematic and periodic evaluations, as well as qualified monitoring of the case with additional information to the used form. Another relevant factor is the need to implement the vertical transmission committee of syphilis in the municipality of Natal, in order to further improve the analysis of the profiles and the opportunity for intervention and improvement in work processes.

In this context, it is possible to highlight the need for evaluations, such as these for health services, so that surveillance continues to improve, thus being able to incorporate into its routine more and more robust tools with great impact on the quality of the service provided not only to the municipality, but also to the surrounding municipalities. The importance of the research is emphasized not only for the municipality, but for dissemination in the scientific community, so that new system evaluations can be made, which can show the potential of epidemiological surveillance.

Authors' contributions

All the authors contributed to the writing of the paper.

Funding

All the analyzed data came from already available databases.

Conflict of interest

The authors declare that there are no conflicts of interest.

REFERENCES

1. ETMI PLUS. Marco para la eliminación de la transmisión maternoinfantil del VIH, la sífilis, la hepatitis y la enfermedad de Chagas. PAHO. 2017. [Internet]. [cited 2025 Apr 2]. Available from: https://www.paho.org/es/documentos/etmi-plus-marco-para-eliminacion-transmision-maternoinfantil-vih-sifilis-hepatitis
2. de Souza TA, Teixeira KK, Santana RL, Penha CB, Medeiros A de A, de Lima KC, et al. Intra-urban differentials of congenital and acquired syphilis and syphilis in pregnant women in an urban area in northeastern Brazil. Trans R Soc Trop Med Hyg [Internet]. 2021 Sep 3;115(9):1010–8. Available from: https://pubmed.ncbi.nlm.nih.gov/33547898/
3. BRASIL. Boletim Epidemiológico. Biblioteca Virtual em Saúde. Secretaria de Vigilância em Saúde. Ministério da Saúde. 2021. Número Especial. 2021. ISSN: 2358-9450. Disponível em: https://www.gov.br/aids/pt-br/central-de-conteudo/boletins-epidemiologicos/2021/sifilis/boletim_sifilis_2021_internet.pdf/view. Acesso em: 20 jun. 2022.
4. Köchert AL. Completitude de informações sobre sífilis adquirida no Sistema de Informação de Agravos de Notificação (SINAN): análise dos casos registrados entre 2013 e 2017. 2021 [cited 2025 Apr 2]; Available from: https://lume.ufrgs.br/handle/10183/238795
5. Conceição HN da, Câmara JT, Pereira BM. Análise epidemiológica e espacial dos casos de sífilis gestacional e congênita. Saúde em Debate [Internet]. 2019 Oct;43(123):1145–58. Available from: https://www.scielo.br/j/sdeb/a/V5sfBFJ843smX8y8n99Zy6r/
6. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Vigilância Epidemiológica. Guia de vigilância epidemiológica / Ministério da Saúde, Secretaria de Vigilância em Saúde, Departamento de Vigilância Epidemiológica. – 6. ed. – Brasília: Ministério da Saúde, 2005. ISBN 978-65-5993-506-2. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/guia_vigilancia_saude_6edrev_v1.pdf
7. Lara JM, Donalisio MR, Von Zuben A, Angerami R, Francisco PMSB. Avaliação do sistema de vigilância epidemiológica da leptospirose em Campinas, São Paulo, 2007 a 2014. Cad Saude Colet [Internet]. 2021 Oct;29(2):201–8. Available from: https://www.scielo.br/j/cadsc/a/w7vzBMSYrR98cwhdV6Hj8xx/

8. Rocha MS, Bartholomay P, Cavalcante MV, Medeiros FC de, Codenotti SB, Pelissari DM, et al. Sistema de Informação de Agravos de Notificação (Sinan): principais características da notificação e da análise de dados relacionada à tuberculose. Epidemiol Serv Saude [Internet]. 2020 Mar;29(1). Available from: https://pubmed.ncbi.nlm.nih.gov/32074197/
9. German RR, Lee LM, Horan JM, Milstein RL, Pertowski CA, Waller MN, et al. Updated guidelines for evaluating public health surveillance systems: recommendations from the Guidelines Working Group. MMWR Recomm Rep [Internet]. 2001 Jul 27;50(RR-13):1–35; quiz CE1–7. Available from: https://pubmed.ncbi.nlm.nih.gov/18634202/
10. Korenromp EL, Rowley J, Alonso M, Mello MB, Wijesooriya NS, Mahiané SG, et al. Global burden of maternal and congenital syphilis and associated adverse birth outcomes-Estimates for 2016 and progress since 2012. PLoS One [Internet]. 2019 Feb 27;14(2):e0211720. Available from: https://pubmed.ncbi.nlm.nih.gov/30811406/
11. Domingues CSB, Lannoy LH de, Saraceni V, Cunha ARC da, Pereira GFM. Brazilian Protocol for Sexually Transmitted Infections 2020: epidemiological surveillance. Rev Soc Bras Med Trop [Internet]. 2021 May 17;54(suppl 1):e2020549. Available from: https://www.scielo.br/j/rsbmt/a/yKr4qzvZWvkMMCLPrF7V3kD/
12. Nascimento CA do, Teixeira KK, Tavares A de M, Souza AMG de, De Souza TA, Aiquoc KM, et al. Qualidade dos dados, oportunidade e representatividade do sistema de vigilância epidemiológica da dengue em Natal, Rio Grande do Norte, 2012-2017. Rev Ciênc em Saúde [Internet]. 2020 Sep 14;10(3):92–100. Available from: https://www.portalrcs.hcitajuba.org.br/index.php/rcsfmit_zero/article/view/966
13. Soares MAS, Aquino R. Completeness and characterization of gestational syphilis and congenital syphilis records in Bahia, Brazil, 2007-2017. Epidemiol Serv Saude [Internet]. 2021;30(4):e20201148. Available from: https://pubmed.ncbi.nlm.nih.gov/34816889/
14. Jorge MO e., Barbosa CCH. Análise descritiva da situação da Sífilis Congênita no Distrito Federal no ano de 2011 a 2021. Rev Eletrônica Acervo Saúde [Internet]. 2022 Apr 8;15(4):e9961. Available from: https://acervomais.com.br/index.php/saude/article/view/9961
15. Nunes PS, Guimarães RA, Rosado LEP, Marinho TA, Aquino ÉC de, Turchi MD. Temporal trend and spatial distribution of syphilis in pregnancy and congenital syphilis in Goiás, Brazil, 2007-2017: an ecological study. Epidemiol Serv Saude [Internet]. 2021 Jan 22;30(1):e2019371. Available from: https://pubmed.ncbi.nlm.nih.gov/33503212/
16. Sífilis Congênita e Sífilis na Gestação. Informes Técnicos Institucionais. Serviço de Vigilância Epidemiológica; Coordenação do Programa Estadual DST/Aids-SP; Coordenadoria de Controle de Doenças CCD; Secretaria de Estado da Saúde SES-SP. Revista de Saúde Pública, v. 42, n. 4, p. 768–72, 2008. Available from: https://www.scielo.br/j/rsp/a/CRPrBF5GP7sg5vYHTwJd8ts/?lang=pt
17. Morais LS. Sífilis congênita no município de São Gonçalo: Evolução temporal 2007-2018. MORAIS, Lidiane Santos de Sífilis congênita no município de São Gonçalo: evolução temporal [Internet]. 2021;2007:2018. Available from: https://app.uff.br/riuff/handle/1/22987
18. Barbosa JR, Barrado JC dos S, Zara AL de SA, Siqueira JB. Avaliação da qualidade dos dados, valor preditivo positivo, oportunidade e representatividade do sistema de vigilância epidemiológica da dengue no Brasil, 2005 a 2009. Epidemiol Serv Saude [Internet]. 2015 Mar;24(1):49–58. Available from: https://www.scielo.br/j/ress/a/THPJVR4sCpvYTWhJC5rrX3k/
19. Teixeira LO, Belarmino V, Gonçalves CV, Mendoza-Sassi RA. Temporal trend and spatial distribution of congenital syphilis in the state of Rio Grande do Sul between 2001 and 2012. Cien Saude Colet [Internet]. 2018 Aug;23(8):2587–97. Available from: https://www.scielo.br/j/csc/a/Pjk7yrJVjwkxjHjSGQkhFXt/abstract/?lang=en
20. Glatt R. Análise da qualidade da base de dados de AIDS do sistema de informação de agravos de notificação (SINAN). 2005 [cited 2025 Apr 2];295–295. Available from: http://thesis.icict.fiocruz.br/lildbi/docsonline/pdf/glattrm.pdf
21. Belo MM de A, Oliveira CM de, Barros SC de, Maia LT de S, Bonfim CV do. Estimated underreporting of congenital syphilis deaths in Recife, Pernambuco, Brazil, 2010-2016: linkage between the mortality information system and the notifiable health conditions information system. Epidemiol Serv Saude [Internet]. 2021 Aug 25 [cited 2025 Apr 2];30(3):e2020501. Available from: http://scielo.iec.gov.br/scielo.php?script=sci_abstract&pid=S1679-49742021000300315&lng=en&nrm=iso&tlng=en

Resumo

Introdução: os casos de sífilis congênita vêm crescendo no Brasil, e a qualidade dos dados registrados no sistema de vigilância pode impactar as informações utilizadas na atenção básica.

Objetivo: avaliar a qualidade dos dados do sistema de vigilância epidemiológica da sífilis congênita, no período de 2017 a 2021.

Método: estudo avaliativo com estatísticas descritivas e teste de correlação de Spearman, analisando registros de sífilis congênita no Sistema de Informação de Agravos de Notificação para avaliar completude, consistência, agilidade no registro dos dados (2017-2021) e seu cruzamento com o Sistema de Informação de Mortalidade para avaliar a representatividade.

Resultado: no período analisado, 1.575 casos foram notificados. A completude variou entre 92,5% e 96,2%, e a consistência entre 80,4% e 97,3%. O tempo entre diagnóstico e notificação foi tardio (mediana de 3 a 4 dias), enquanto a digitação dos casos foi mais ágil (mediana de 3 a 8 dias). A representatividade do sistema foi moderada, com correlação de 0,65 ($p \leq 0,001$) entre os registros de óbito dos sistemas analisados. Entretanto, a consistência entre os óbitos registrados e o preenchimento da data de ocorrência foi considerada muito ruim.

Conclusão: o sistema de vigilância de sífilis congênita foi considerado completo e consistente na maior parte dos pontos avaliados, ágil na digitação dos casos, tardio na detecção e moderadamente representativo, indicando a necessidade de melhoria, entretanto configurando-se importante para o encaminhamento de ações de vigilância.

Palavras-chave: sífilis congênita, epidemiologia, estudo de avaliação, sistemas de informação, monitoramento epidemiológico.