



Congenital syphilis in the city of Rio de Janeiro, 2016-2020: epidemiological profile and completeness of records

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ABSTRACT

Introduction: Congenital syphilis remains an important national health issue, especially in Rio de Janeiro, which presents numbers above the country's rate for this offense. This disease is a marker for the assessment of the quality of care delivered to mothers and children since it can be avoided through early diagnosis and treatment during pregnancy. **Objective:** This cross-sectional study described the epidemiological profile of congenital syphilis cases in the city of Rio de Janeiro, in 2016-2020, according to maternal sociodemographic data, prenatal care, and cases' evolution. Furthermore, incidence rates for these factors and the fetal and infant mortality rates were calculated. The completeness of the records was also assessed. **Methods:** We included all notified cases of congenital syphilis in the city during 2016-2020 using SINAN records. SINASC and SIM were also used as databases for the incidence rates and the mortality rates calculation. **Results:** During this period, the city of Rio de Janeiro exhibited high rates of this disease, with 18,6 cases/1000 live births in 2020 and more than 90% cases of early congenital syphilis. The highest rates were related to social vulnerability – black and teenage women with low levels of education and no access to prenatal care. It is important to highlight the low level of completeness for some variables and the divergence found between the mortality data from SIM and SINAN, both factors that jeopardize adequate knowledge of the disease. **Conclusion:** Therefore, despite some advances, a lot must be done to achieve control of congenital syphilis in the city of Rio de Janeiro.

Keywords: Congenital syphilis, Health information systems, Social inequality, Pre-natal care, Mortality rate.

INTRODUCTION

Syphilis is a disease caused by *Treponema pallidum* that has two forms: acquired - mainly sexually transmitted - and congenital - vertically transmitted. Congenital syphilis is a preventable condition, which has an important impact on child morbidity and mortality, especially in the first years of life, being related to sequelae and perinatal death (fetal and early neonatal deaths)^{1,2}.

Some risk factors associated with congenital syphilis are inadequate or absent prenatal care, absent or incomplete treatment scheme during prenatal care, shortage of benzathine penicillin (the only medication capable of crossing the transplacental barrier), and non/treatment of sexual partnerships²⁻⁴. Among the obstacles faced during prenatal care, late beginning, loss of follow-up due to address

change, difficulty in syphilis diagnosis during pregnancy, and lack of guidance regarding this illness and condom use should be highlighted³⁻⁵. Thus, seeking to prevent congenital infection, routine prenatal screening for syphilis was instituted, indicated in the first appointment, in the 3rd trimester, and on admission to the maternity ward³.

In this context, congenital syphilis rates act as an important marker for prenatal care quality and maternal and child health monitoring - sentinel event, since it can be avoided with effective health measures, such as early diagnosis and pregnant women's treatment⁵. Within this perspective, compulsory notification of this disease was instituted throughout the national territory, for better monitoring of cases, through epidemiological surveillance and the database of the National System for Notifiable Diseases (SINAN)².

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In the last ten years, Brazil has faced an increase in syphilis rates, with 115,371 cases of acquired syphilis reported in 2020 (detection rate of 54.5 cases/100,000 inhabitants); 61,441 cases in pregnant women (detection rate of 21.6/1,000 live births); 22,065 cases of congenital infection (incidence rate of 7.7/1,000 live births)². From 2010 to 2020, there was an increase in infant mortality rate due to syphilis, from 3.5 to 6.4 deaths per 100,000 live births². In 2020, a decrease in syphilis cases could be seen throughout the country; however, these findings may be related to problems in transferring data between municipal, state, and federal databases, as well as a reduction in demand by health services and an underreporting of cases on SINAN, due to the local mobilization of health professionals, caused by the COVID-19 pandemic².

In this scenario, the state of Rio de Janeiro and its capital stood out in 2020, with high detection rates of syphilis in pregnant women and congenital syphilis, respectively, 55.1 and 74.6 cases/1,000 live births, higher than national rates, respectively, 21.5 and 18.4 cases/1,000 live births. The state also had the highest mortality rate for congenital syphilis in children under one-year-old, 21.5/1,000 live births².

In the city of Rio de Janeiro, the state capital, the neighborhoods with the highest rates of CS from 2011 to 2014 formed a kind of "congenital syphilis corridor" with a layout like that of Avenida Brasil (or BR 101); additionally, there was an association with less access to prenatal care, low education level and black skin color⁷. During the 2011-2014 period, the estimated rate was 17.3/1000 live births. Between 2013 and 2017, the penicillin shortage affected the regions with the worst development rates in the city and had repercussions on the differences between neighborhoods^{8,9}. The CS rate in the city was 19.6/1000 live births; however, there were neighborhoods without registered cases and others at the level between 64 and 105 cases/1000 live births, again related to the worst living conditions^{8,9}.

This study aimed to describe the sociodemographic profile, quality of prenatal care, and evolution of cases of congenital syphilis in the city of Rio de Janeiro from 2016 to 2020; and to calculate the incidence (total and according to sociodemographic variables) and mortality rates (fetal and infant), also analyze the completeness of the data in the SINAN form.

We expected to update congenital syphilis epidemiology at the municipal level and, thus, analyze maternal and child health care, enabling health actions aimed at the most susceptible population.

METHODS

Descriptive cross-sectional study of congenital syphilis (CS) cases reported in residents of Rio de Janeiro between 2016 and 2020. The city is in the Southeast Region and occupies an area of 1,200.329 km², with an estimated population, in the year 2021, of 6,775,561 people and a Municipal Human Development Index, in the year 2010, of 0.799^{10,11}.

All CS case records - abortions, live births, and stillbirths - in SINAN database (Information System for Notifiable Diseases) were included, except those considered discarded as final classification. To calculate incidence rates, the denominator - number of live births - came from the Information System on Live Births (SINASC). The Mortality Information System (SIM) was also used to assess infant and fetal deaths caused by CS in city residents.

Data are available on the Municipal Health Secretariat of Rio de Janeiro site (Municipal TABNET). For CS, the link was <http://tabnet.rio.rj.gov.br/cgi-bin/dh?sinan/definicoes/sifcong2007.def>; for live births (http://tabnet.rio.rj.gov.br/cgi-bin/dh?sinasc/definicoes/sinasc_apos2005.def); and for infant deaths (http://tabnet.rio.rj.gov.br/cgi-bin/dh?sim/definicoes/sim_apos2005.def).

Data extracted included the mother's race/skin color (white, black, yellow, brown, and indigenous); education level (less than 4 years, 4-7 years, 8-11 years, and 12 years and more); age (10-19 years old, 20-34 years old and 35 years old and over); prenatal care support (yes or no); syphilis treatment (adequate/inappropriate/not performed); partnership treatment (yes or no), the moment of diagnosis (during prenatal care, at delivery/curettage, after delivery or not performed). Data from CS cases included classification (recent, late, stillbirth or abortion due to syphilis); outcome (alive, death due to CS or to another cause, abortion, and stillbirth), number of infant deaths due to CS; the number of total and CS fetal deaths.

For the description of congenital syphilis cases, relative frequencies, according to maternal sociodemographic profile (age, years of schooling,

race/skin color), prenatal care support (yes or no, the moment of diagnosis, and treatment of partnership), and outcome and classification, for each year, from 2016 to 2020, were calculated.

Incidence rates were calculated by dividing the number of new cases of syphilis (numerator) by the number of live births (denominator), according to each variable (maternal sociodemographic and prenatal data) and their quotient multiplied by 1,000, for each year within the studied period.

Data completeness was described according to the Romero and Cunha score¹², which classifies the quality of completeness according to the percentage of ignored/blank, in excellent (less than 5%), good (5% to 10%), fair (10% to 20%), poor (20% to 50%), and very poor (50% or more). Each variable was analyzed annually within the studied period.

Relative frequencies, incidence rates, and percentages of completeness were calculated using the Microsoft Excel program, which was also used to organize the data.

This work is part of the research project "Study of the health indicators of women and children in the health regions of the State of Rio de Janeiro", approved by the Research Ethics Committee of the Municipal Health Secretariat of Rio de Janeiro - SMS/RJ (Certificate of Presentation of Ethical Assessment - 29721320.0.3003.5279), according to report 4.692.836, of May 5, 2021.

RESULTS

From 2016 to 2020, 6551 congenital syphilis cases (CS) were reported in inhabitants of Rio de Janeiro City, of which 6082 were classified as recent CS, 20 as late CS, 274 as abortions, and 175 as

stillbirths. The annual average was 1310 cases. During this period, there was a decrease in incidence until 2020, when it reached a peak value of 18.6 cases/1000 live births.

Sociodemographic profile and prenatal care support of mothers of CS cases

The percentage of mothers aged 10-19 years stands out, representing about 20-30% of cases, while women aged 35 years and over constitute less than 10% of cases. There is a predominance of brown-colored women, followed by black and white, and those with 4-11 years of schooling. A high percentage of missing data can be seen for education level and race/color.

Most women had prenatal care and were diagnosed during prenatal care, but this percentage decreased over the period and reached just over half in 2019 and 2020. Between 42 and 73% of women had inadequate treatment, and 16 to 30% were untreated. Regarding the partner, the percentage of missing was high, as well as the number of untreated cases.

Classification and outcome of cases and age group at diagnosis of CS

Most CS cases occurred in live births, as early congenital syphilis, with a low percentage of fetal death or miscarriage, and were diagnosed during the neonatal period, predominantly in the first six days of life. Deaths due to CS occurred in less than 1% of cases, and the percentage of cases diagnosed in the early neonatal period suffered a slight reduction over the years of the study.

Table 1

Absolute number of cases, live births, and congenital syphilis (CS) rates (per 1,000 LB), Rio de Janeiro city, RJ, 2016-2020

Outcome	Year				
	2016	2017	2018	2019	2020
CS cases	1470	1415	1173	1135	1358
Live births	83057	84471	82485	76576	72816
CS incidence rates	17,70	16,75	14,22	14,82	18,65

Source: SINAN - <http://tabnet.rio.rj.gov.br/cgi-bin/dh?sinan/definicoes/sifcong2007.def> and SINASC - http://tabnet.rio.rj.gov.br/cgi-bin/dh?sinasc/definicoes/sinasc_apos2005.def

Table 2

Percent distribution of sociodemographic characteristics and prenatal care support, CS cases, Rio de Janeiro city, RJ, 2016-2020

Variables	Year				
	2016	2017	2018	2019	2020
Maternal age					
10-19 years	26.12	30.04	23.36	21.94	21.50
20-34 years	65.65	62.83	61.98	62.11	66.42
35 years and more	6.80	5.23	8.01	7.49	7.44
Missing	1.43	1.91	6.65	8.46	4.64
Maternal educational level					
< 4 years	2.72	1.70	1.62	1.15	1.47
4-7 years	23.40	17.60	16.79	13.48	13.25
8-11 years	41.09	49.68	44.93	41.76	43.08
12 years and more	1.36	1.06	1.62	1.50	1.55
Missing	31.43	29.96	35.04	42.11	40.65
Maternal skin color/race					
White	17.62	16.48	13.73	11.81	11.71
Black	11.90	8.63	8.01	7.93	11.86
Brown	42.38	49.93	43.73	31.63	37.33
Other	0.20	0.42	0.17	0.53	0.22
Missing	27.89	24.54	34.36	48.11	38.88
Prenatal care support					
Yes	86.19	86.50	80.90	84.14	80.85
No	10.54	10.18	12.53	10.66	11.71
Missing	3.27	3.32	6.56	5.20	7.44
Moment of diagnosis					
Prenatal	70.34	72.65	60.78	55.33	51.33
Delivery	23.13	22.26	32.65	33.04	37.04
After delivery	2.52	2.90	2.05	3.61	2.58
Not performed	0.07	0.28	0.34	0.26	0.37
Missing	3.95	1.91	4.18	7.75	8.69
Syphilis treatment					
Adequate	3.40	0.00	8.10	8.02	4.71
Inadequate	73.54	0.00	52.69	42.29	47.13
Not performed	16.46	0.00	25.92	27.22	30.49
Missing	6.60	100.00	13.30	22.47	17.67

Treatment of partner					
Yes	17.69	12.79	8.70	8.37	4.79
No	50.95	56.68	37.94	26.43	21.06
Missing	31.36	30.53	53.37	65.20	74.15

Source: SINAN - <http://tabnet.rio.rj.gov.br/cgi-bin/dh?sinan/definicoes/sifcong2007.def>

Table 3

Percent distribution of classification, outcome, and age at diagnosis, CS cases, Rio de Janeiro, RJ, 2016-2020

Variables	Year				
	2016	2017	2018	2019	2020
Classification					
Early congenital syphilis	92,93	93,22	92,92	92,51	92,56
Late congenital syphilis	0,20	0,28	0,34	0,53	0,22
Abortion	5,24	4,03	3,32	4,23	3,90
Stillbirth	1,63	2,47	3,41	2,73	3,31
Outcome					
Alive	88,84	89,68	90,45	91,19	88,29
Death by CS	0,61	0,92	0,51	0,26	0,88
Death by another cause	0,68	0,85	1,02	0,62	0,88
Abortion	5,24	4,03	3,32	4,23	3,90
Stillbirth	1,63	4,03	3,41	2,73	3,31
Missing	2,99	2,05	1,28	0,97	2,72
Age at diagnosis					
Less than 7 days	92,02	89,02	90,03	87,82	87,77
7-27 days	4,43	6,92	4,98	7,29	7,12
28 days to <1 year	3,07	2,92	2,92	2,76	3,11
≥ 1 year	0,47	0,14	0,00	0,27	0,29
Missing	0,00	1,00	2,06	1,87	1,70

Source: SINAN - <http://tabnet.rio.rj.gov.br/cgi-bin/dh?sinan/definicoes/sifcong2007.def>

Table 4

CS incidence rates, according to maternal sociodemographic profile and prenatal care support, Rio de Janeiro City, RJ, 2016-2020

Variables	2016	2017	2018	2019	2020
Maternal age					
10-19 years	31.05	35.61	25.32	26.33	33.61
20-34 years	17.30	1.31	1.71	1.66	2.06
35 years and more	6.71	4.67	5.65	5.39	6.69
Maternal educational level					
< 4 years	28.11	16.53	15.42	12.52	20.77
4-7 years	25.93	19.88	16.63	14.27	19.35
8-11 years	13.23	15.45	11.75	11.47	14.35
12 years and more	0.94	0.67	0.85	0.81	1.08
Maternal skin color/race					
White	8.53	7.71	5.47	4.99	6.60
Black	22.43	14.70	10.38	9.90	16.18
Yellow	14.02	29.41	8.73	18.69	4.42
Brown	14.31	16.03	12.12	9.29	14.12
Indigenous	0.00	23.26	0.00	0.00	13.70
Prenatal care support					
Yes	15.76	14.95	11.82	12.85	15.67
No	125.20	129.38	162.25	162.42	106.71

Source: SINAN - <http://tabnet.rio.rj.gov.br/cgi-bin/dh?sinan/definicoes/sifcong2007.def> e SINASC - http://tabnet.rio.rj.gov.br/cgi-bin/dh?sinasc/definicoes/sinasc_apos2005.def

Table 5

Infant and fetal mortality rates (per 100.000 LB), Rio de Janeiro City, 2016 to 2020 according to different sources of information

Outcome and data source	Year				
	2016	2017	2018	2019	2020
Infant mortality rates					
SINAN	10.74	15.25	7.20	3.88	15.10
SIM	14.45	22.49	13.34	11.75	28.84
Fetal mortality rates					
SINAN	28.63	41.05	48.02	40.06	61.09
SIM	57.27	66.85	85.23	78.82	109.97

Source: SINAN - <http://tabnet.rio.rj.gov.br/cgi-bin/dh?sinan/definicoes/sifcong2007.def>, SINASC - http://tabnet.rio.rj.gov.br/cgi-bin/dh?sinasc/definicoes/sinasc_apos2005.def and SIM - http://tabnet.rio.rj.gov.br/cgi-bin/dh?sim/definicoes/sim_apos2005.def

Table 6

Incompleteness of some variables from CS form on SINAN, Rio de Janeiro city, 2016-2020

Variables	Year				
	2016	2017	2018	2019	2020
Maternal age	1.43	1.91	6.65	8.46	4.64
Maternal level of education	31.43	49.96	35.04	42.11	40.65
Maternal skin color/race	27.89	24.54	34.36	48.11	38.88
Prenatal care support	3.27	3.32	6.56	5.2	7.44
Moment of diagnosis	3.95	1.91	4.18	7.75	8.69
Maternal treatment	6.6	100	13.3	22.47	17.67
Partner treatment	31.36	30.53	53.37	65.2	74.15
Outcome	2.99	2.05	1.28	0.97	2.72
Age at diagnosis	0	1	2.06	1.87	1.7

Source: SINAN - <http://tabnet.rio.rj.gov.br/cgi-bin/dh?sinan/definicoes/sifcong200>

CS incidence according to sociodemographic variables and prenatal care support

Higher incidences occurred in teenage mothers, peaking in 2020 – 35,6 cases/1000 LB, in those with low educational levels and black/brown colored women. Mothers without prenatal care had the highest rates, reaching 162,4 cases/1000 LB in 2019.

Infant and Fetal mortality rates by congenital syphilis

Infant mortality rates reduced from 2016 to 2019, and a pronounced increase occurred in 2020. There was a divergence between the information systems databases regarding the values found, which were always underestimated by SINAN. As for fetal mortality rates, there was an increase over the period and as observed for infant mortality, higher values were obtained according to SIM, with a maximum rate of 109.9 when compared to SINAN.

Completeness of data from CS forms on SINAN

Among fields with the highest percentage of missing data, the treatment of the partner stands out - with a maximum value in 2020 of 74.15%, followed by skin color/race and maternal education, both with a variation of 25 to 50%. The only fields with excellent completeness¹² were case outcome and age at diagnosis. Partner treatment was the

only one with a very poor degree of completeness during the studies period from 2018 to 2020. The other fields were distributed between fair and poor degrees of completeness.

DISCUSSION

The present study showed that Rio de Janeiro City maintains high and unequal CS rates. Rates remain above the national average, reaching, in 2020, 18.6 cases per 1000 live births. In addition, the association between CS cases and social vulnerabilities was evident, as CS predominates in young women, brown or black, with low education levels and absent or inadequate prenatal care. There was a decrease in the infant mortality rate related to CS, but with a divergence between the information systems databases - SIM and SINAN. Data incompleteness continues as a problem, especially for maternal sociodemographic variables and partner treatment.

The higher rates presented throughout the study may be due to the greater notification of cases and prenatal care coverage with an effective diagnosis of the disease, but they certainly correspond to observed rates for acquired and gestational syphilis¹³. Data differ from the Syphilis Epidemiological Bulletin of 2021², as the study is based on data from the municipal system, which is constantly updated.

Rio de Janeiro state has the main CS risk cluster in the country¹⁴, and Rio de Janeiro city, its capital, with the largest population and high rates,

certainly contributes to it. Considering previous studies in the city, congenital syphilis rates in the last 10 years varied from 17.3 to 19.6 cases/1000 LB.

Current rates are lower than those from Niterói, a neighboring city (23.2 cases/1000 LB in 2016)¹⁵ and São Gonçalo, the second most populous city in RJ state (41.6/ 1000 LB in 2018)¹⁶. However, they are much higher than observed in other places in the Southeast. In São José do Rio Preto (SP), the maximum incidence was 11.1 cases/1000 LB in 2014¹⁷. In 2018, the state of São Paulo recorded a rate of 6.6/1000 LB¹⁸, and Minas Gerais reached 9.3/1000 LB¹⁹. In Espírito Santo, in 2019, the rate was 7.6/1000 LB²⁰.

It should also be noted that the results corroborate the association between social vulnerability and congenital syphilis, with a higher incidence in children of black and brown mothers, aged between 10 and 19 years, and with low education levels. This profile of social inequalities in CS rates was found in other national studies^{15,16,21,22}, confirming that, in Brazil, the distribution of CS cases is related to the socioeconomic status of the population. Thus, to reduce CS, health measures alone are not enough, and integrated actions must be promoted to improve the quality of life of the most vulnerable population.

In addition, the importance of prenatal care was reaffirmed, evidenced by the high incidence of CS in children of mothers who did not receive it, with a rate of up to 162.42 cases/1000 live births. However, the quality of care provided can be questioned since most women had prenatal care. A decrease in early diagnosis was observed, as well as a considerable number of women who did not undergo treatment or receive an inadequate therapeutic regimen. This reality was present throughout the national territory^{14-17,19,22,23}, showing that, even with the expansion of prenatal coverage, there are still difficulties regarding the standard of this assistance. Swayze et al. (2021) found that, during the benzathine penicillin G supply crisis in Brazil, pregnant women with higher VDRL titers (greater than or equal to 1:16) were 44% more likely to receive this medication. Based on this finding, it looks like lower titers can be considered false-positive results or "serological scar" from a previous infection, especially given the national epidemiological scenario; so, pregnant women with this result are less likely to receive treatment²⁴.

Is it possible to improve care for syphilis during pregnancy? Cerqueira et al. (2021) analyzed

an intervention to improve care for pregnant women with syphilis in Rio de Janeiro²⁵. Based on ten criteria, there was a significant improvement after the intervention, in only four of them: notification of the disease; adequate treatment scheme (drug and doses); completion of treatment at least 30 days before delivery; and adequate record of the pregnant woman and her partnership treatments. Even with the improvement, percentages of compliance with the criteria were low. The total indicator (combining the ten criteria) increased from 64.4% to 71.0% (not significant). The study also highlighted that, although only four criteria showed improvement, the success of the intervention was related to external regulatory pressure, UBS management, health teams' commitment and motivation, and the available infrastructure²⁵.

As for infant and fetal mortality, when comparing the coefficients obtained from SINAN and SIM, considerable underreporting was observed in the former, leading to divergent mortality rates. This finding highlights the underreporting of deaths due to CS. Other surveys in the country have shown similar problems. In Fortaleza (CE), differences were found between SINAN and SIM data, with a high percentage of underreporting in both systems²⁶, a result also observed in Recife (PE) between 2010 and 2016²⁷. At a national level, perinatal and fetal mortality rates due to CS are underestimated, and linkage between databases should be used²⁸. Therefore, obstacles are perceived in the subsidy epidemiological surveillance can offer to maternal and child care, hindering the implementation of adequate public policies based on these data.

Regarding data completeness, there was an increase in the percentage of missing information during the studied period. Saraceni et al. (2017) compared CS data from six Brazilian federative units, including Rio de Janeiro state (RJ), which had a higher percentage of missing for most fields, reaching 51.4% for the maternal treatment field²³. This finding was also observed in other studies^{15,16,19}. Data incompleteness also compromises the support that epidemiological surveillance can offer for the development of more targeted public health measures aiming to reduce CS cases.

A large percentage of missing for treatment of the partner field may be related to the informative note No. 2-SEI/2017 of the Ministry of Health, which disregards the concomitant treatment of the

pregnant woman's sexual partnership as a criterion for adequate treatment and for the definition of CS cases. This note aimed to prioritize clinical, epidemiological, and laboratory criteria of mother and newborn for epidemiological surveillance. However, it is important to emphasize that the diagnosis and treatment of a sexual partnership, as well as the notification of cases, must be reinforced, in the context of public health, not only for cases of acquired syphilis but also for other sexually transmitted infections.

CONCLUSION

Based on this study, CS was confirmed as a persistent problem in Rio de Janeiro city, with rates higher than in other regions of the country and above the national average, a reality that is also reflected in other cities in the Metropolitan Region of Rio de Janeiro state.

Social inequality is also highlighted as a determinant of the disease, demanding health actions aimed at the most vulnerable population, especially young, black, and brown-colored mothers with low education levels and without access to prenatal care.

Other obstacles related to congenital syphilis control include surveillance activities, underreporting, a divergence between different databases, and incompleteness of notification and investigation forms. Thus, adequate knowledge of the disease and its repercussions, which subsidizes the elaboration of public health policies, is jeopardized.

In this sense, much still needs to be done, especially regarding public health. Some possible actions involve the education of health professionals for the diagnosis and treatment of pregnant women and sexual partnerships, with emphasis on complying with protocols and encouraging the notification and investigation of cases; the joint work of health and education fields to benefit the most vulnerable population and provide adequate epidemiological monitoring.

REFERENCES

1. Korenromp EL, Rowley J, Alonso M, et al. Global burden of maternal and congenital syphilis and associated adverse birth outcomes—Estimates for 2016 and progress since 2012. *PLoS One*. 2019; 14: e0211720.
2. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de Doenças Crônicas e Infecções Sexualmente Transmissíveis. Boletim Epidemiológico: Sífilis 2021. Brasília, 2021. Disponível em: <http://www.aids.gov.br/pt-br/pub/2021/boletim-epidemiologico-de-sifilis-2021>. Acesso em: 09 dez. 2021.
3. Domingues CSB, Duarte G, Passos MRL, Sztajnbok DCDN, Menezes MLB. Protocolo Brasileiro para Infecções Sexualmente Transmissíveis 2020: sífilis congênita e criança exposta à sífilis. *Rev Soc Bras Med Trop*. 2021;54(suppl 1):e2020597.
4. Nurse-Findlay S, Taylor MM, Savage M, et al. Shortages of benzathine penicillin for prevention of mother-to-child transmission of syphilis: An evaluation from multi-country surveys and stakeholder interviews. *PLoS Med*. 2017;14(12):e1002473.
5. Domingues RM, Saraceni V, Hartz ZM, Leal MD. Sífilis congênita: evento sentinela da qualidade da assistência pré-natal. *Rev Saúde Pública*. 2013; 47:147-56.
6. Prefeitura da Cidade do Rio de Janeiro. Secretaria Municipal de Saúde. Superintendência de Atenção Primária. Atenção ao Pré-Natal: Rotinas para gestantes de baixo risco. Coleção Guia de Referência Rápida: 1ª edição. Rio de Janeiro – RJ: 2016. Disponível em: http://www.rio.rj.gov.br/dlstatic/10112/6552790/4176323/GuiaPrenatal_reunido.pdf.
7. Reis GJ, Barcellos C, Pedroso MM, Xavier DR. Diferenciais intraurbanos da sífilis congênita: Análise preditiva por bairros do Município do Rio de Janeiro, Brasil. *Cad Saúde Pública*. 2018; 34 (9):e00105517.
8. Araujo RS, Souza ASS, Braga JU. A quem afetou o desabastecimento de penicilina para sífilis no Rio de Janeiro, 2013–2017? *Rev Saúde Pública* 2020; 54: 109.
9. Braga JU, Araujo RS, de Souza ASS. The Shortage of Benzathine Penicillin and Its Impact on Congenital Syphilis Incidence: An Ecologic Study in the City of Rio de Janeiro. *Clin Infect Dis*. 2021;72(5):e79-e87.
10. IBGE, Censo Demográfico 2010, Área territorial brasileira. Rio de Janeiro: IBGE, 2011. Disponível em: <https://cidades.ibge.gov.br/brasil/rj/rio-de-janeiro/panorama>
11. IBGE, Diretoria de Pesquisas, Coordenação de População e Indicadores Sociais, Estimativas da população residente com data de referência 1o de julho de 2021. Disponível em: <https://cidades.ibge.gov.br/brasil/rj/rio-de-janeiro/panorama>
12. Romero, DE, Cunha, CB. Avaliação da qualidade das variáveis sócio-econômicas e demográficas dos óbitos de crianças menores de um ano registrados no Sistema de Informações sobre Mortalidade do Brasil (1996/2001). *Cad Saúde Pública*. 2006; 22(3): 673-81.
13. Santos M, Lopes AK, Roncalli AG, Lima KC. Trends of syphilis in Brazil: a growth portrait of the treponemic epidemic. *PLoS One*. 2020;15:e0231029.

14. Oliveira VS, Rodrigues RL, Chaves VB, et al. Aglomerados de alto risco e tendência temporal da sífilis congênita no Brasil. *Rev Panam Salud Publica*. 2020;44:e75.
15. Heringer AL, Kawa H, Fonseca SC, Brignol SM, Zarpellon LA, Reis AC. Inequalities in congenital syphilis trends in the city of Niterói, Brazil, 2007-2016. *Rev Panam Salud Publica*. 2020;44:e8.
16. Morais LS, Pimentel SVT, Kawa H, Helia, Fonseca SC. Tendência da sífilis congênita no município mais populoso da região metropolitana II do estado do Rio de Janeiro. *Rev Paul Pediatría*. 2023; 41: e2021337.
17. Maschio-Lima T, Machado ILL, Siqueira JPZ, Almeida MTG. Perfil epidemiológico de pacientes com sífilis congênita e gestacional em um município do Estado de São Paulo, Brasil. *Rev Bras Saúde Mater Infant*. 2019; 19(4): 865-72.
18. São Paulo. CENTRO DE REFERÊNCIA E TREINAMENTO DST/AIDS - PROGRAMA ESTADUAL DE DST/AIDS – CCD – SES-SP. NOTA INFORMATIVA CONJUNTA Nº 001/2019/SPSP/SBI/ATSC/CRT-PEDST/AIDS/SES-SP. Disponível em: https://www.saude.sp.gov.br/resources/crt/publicacoes/publicacoes-download/nt.001.2019_spsp_sbi_ses_25.11.2019.pdf.
19. Amorim EKR, Matozinhos FP, Araújo LA, Silva TPRD. Tendência dos casos de sífilis gestacional e congênita em Minas Gerais, 2009-2019: um estudo ecológico. *Epidemiol Serv Saúde*. 2021; 30 (4): e2021128.
20. Vicente, CR, Oliveira Silva Caliman, M. Perfil epidemiológico da sífilis congênita no estado do Espírito Santo, 2010-2019. *Rev Bras Pesq Saúde*. 2021; 22(4): 46-55.
21. de Souza TA, Teixeira KK, Santana RL, 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*. 2021;115(9):1010-1018.
22. Domingues RM, Leal Mdo C. Incidência de sífilis congênita e fatores associados à transmissão vertical da sífilis: dados do estudo Nascer no Brasil. *Cad Saude Publica*. 2016;32(6):S0102-311X2016000605002.
23. Saraceni V, Pereira GFM, da Silveira MF, Araujo MAL, Miranda AE. Vigilância epidemiológica da transmissão vertical da sífilis: dados de seis unidades federativas no Brasil. *Revista Panam Salud Publica*. 2017; 41:e4444.
24. Swayze EJ, Nielsen-Saines K, Segura ER, et al. Failure to recognize low non-treponemal titer syphilis infections in pregnancy may lead to widespread under-treatment. *Int J Infect Dis*. 2021;104: 27-33.
25. Cerqueira BGT, Silva EPG, Gama ZADS. Melhoria da qualidade do cuidado à sífilis gestacional no município do Rio de Janeiro. *Rev Saúde Pública* 2021, 55: 34.
26. Cardoso, ARP, Araújo, MAL, et al. Underreporting of Congenital Syphilis as a Cause of Fetal and Infant Deaths in Northeastern Brazil. *PLoS ONE* 11(12): e0167255.
27. Belo MMA, Oliveira CM, Barros SC, Maia LTS, Bonfim CVD. Estimativa da subnotificação dos óbitos por sífilis congênita no Recife, Pernambuco, 2010-2016: relacionamento entre os sistemas de informações sobre mortalidade e de agravos de notificação. *Epidemiol Serv Saude*. 2021;30(3):e2020501.
28. Canto SVE, Leite Araújo MA, Miranda AE, Cardoso ARP, Almeida RLF. Fetal and infant mortality of congenital syphilis reported to the Health Information System. *PLoS One*. 2019 Jan 4;14(1):e0209906.

Authors' contribution

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