

Migration, vulnerability, and congenital syphilis in maternal and child health: A cross-sectional study in Brazil

Migração, vulnerabilidade e sífilis congênita na saúde materno-infantil: um estudo transversal no Brasil

Migración, vulnerabilidad y sífilis congénita en la salud materno-infantil: un estudio transversal en Brasil

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ABSTRACT This study aimed to evaluate how sociodemographic and care-related inequalities affect the management of congenital syphilis in a public maternity hospital in Brazil's far-north border region, considering Venezuelan migration as a contextual factor. We conducted an observational, cross-sectional, analytical study using 235 congenital syphilis notification forms extracted from the database of the state referral maternity hospital in Roraima, Brazil, between January and December 2023. Brazilian and Venezuelan migrant pregnant women were compared across sociodemographic, clinical, and care variables, applying statistical tests (chi-square or Fisher's exact for proportions; Mann-Whitney for non-normally distributed continuous variables). Migrants accounted for 39.1% of cases and had lower schooling and labor-market participation. Prenatal care coverage and screening were lower among migrants: prenatal VDRL testing 37.0% vs 58.0% ($p=0.002$) and treponemal tests 65.2% vs 79.7% ($p=0.02$), considering Venezuelan and Brazilian women, respectively; late diagnosis was more frequent among migrants (42.4% vs 27.3%; $p=0.02$). Adequate treatment was low in both groups (10.9% vs 14%; $p=0.49$). Neonatal assessment revealed gaps in clinical and therapeutic follow-up regardless of maternal nationality. Venezuelan migration exacerbates pre-existing inequities and access barriers, undermining the management of gestational and congenital syphilis. Intersectoral actions are needed to expand timely prenatal care, strengthen surveillance, and promote culturally responsive care in border settings.

KEYWORDS Congenital syphilis. Human migration. Prenatal care. Health services accessibility. Emigrants and immigrants.

RESUMO Objetivou-se avaliar como desigualdades sociodemográficas e assistenciais impactam a condução da sífilis congênita em maternidade pública de fronteira no extremo Norte do Brasil, considerando a migração venezuelana. Estudo observacional, transversal e analítico com 235 fichas de notificação extraídas do banco de dados da maternidade pública de referência de Roraima, entre janeiro e dezembro de 2023. Compararam-se gestantes brasileiras e migrantes venezuelanas quanto a variáveis sociodemográficas, clínicas e de atenção, aplicando testes estatísticos (qui-quadrado ou exato de Fisher para proporções; Mann-Whitney para variáveis contínuas sem normalidade). Das fichas, 39,1% referiam-se a migrantes, que apresentaram menor escolaridade e inserção ocupacional. A cobertura de pré-natal e triagem foi inferior entre migrantes: realização de VDRL no pré-natal 37,0% vs 58,0% ($p=0,002$) e testes treponêmicos 65,2% vs 79,7% ($p=0,02$), considerando venezuelanas e brasileiras, respectivamente; o diagnóstico tardio foi mais frequente entre migrantes (42,4% vs 27,3%; $p=0,02$). O tratamento adequado foi baixo em ambos os grupos (10,9% vs 14%; $p=0,49$). Na avaliação neonatal, observaram-se lacunas de seguimento clínico e terapêutico, independentemente da nacionalidade materna. Conclui-se que a condição migratória agrava iniquidades e barreiras de acesso, exigindo ações intersectoriais que ampliem o pré-natal oportuno, fortaleçam a vigilância e promovam cuidado culturalmente sensível em regiões de fronteira.

PALAVRAS-CHAVE Sífilis congênita. Migração humana. Cuidado pré-natal. Acessibilidade aos serviços de saúde. Emigrantes e imigrantes.

RESUMEN El objetivo fue evaluar cómo las desigualdades sociodemográficas y de acceso a la atención médica impactan el manejo de la sífilis congénita en un hospital materno-infantil público en la frontera del extremo norte de Brasil, considerando la migración venezolana. Este fue un estudio observacional, transversal y analítico que utilizó 235 formularios de notificación extraídos de la base de datos del hospital materno-infantil público de referencia en Roraima, entre enero y diciembre de 2023. Se compararon mujeres embarazadas brasileñas y migrantes venezolanas con respecto a variables sociodemográficas, clínicas y de acceso a la atención médica, aplicando pruebas estadísticas (prueba de chi-cuadrado o prueba exacta de Fisher para proporciones; prueba de Mann-Whitney para variables continuas sin normalidad). De los formularios, el 39,1% correspondía a migrantes, quienes presentaban menor nivel educativo e inserción laboral. La cobertura de atención prenatal y cribado fue menor entre las migrantes: la prueba VDRL durante la atención prenatal fue del 37,0% frente al 58,0% ($p=0,002$) y la prueba treponémica fue del 65,2% frente al 79,7% ($p=0,02$), considerando a las mujeres venezolanas y brasileñas, respectivamente; el diagnóstico tardío fue más frecuente entre las migrantes (42,4% frente al 27,3%; $p=0,02$). El tratamiento adecuado fue bajo en ambos grupos (10,9% frente al 14%; $p=0,49$). La evaluación neonatal reveló deficiencias en el seguimiento clínico y terapéutico, independientemente de la nacionalidad materna. Se concluye que la condición migratoria exacerba las inequidades y las barreras de acceso, lo que requiere acciones intersectoriales que amplíen la atención prenatal oportuna, fortalezcan la vigilancia y promuevan una atención culturalmente sensible en las regiones fronterizas.

PALABRAS CLAVE Sífilis congénita. Migración humana. Atención prenatal. Accesibilidad a los servicios de salud. Emigrantes e inmigrantes.

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Introduction

The concept of vulnerability in health expands the understanding of the health-disease process by considering social, cultural, and individual determinants that influence illness, moving beyond the traditional biomedical perspective. In this context, conditions such as gestational and congenital syphilis gain epidemiological significance by highlighting structural inequities and ongoing gaps in public policies for prevention and care, especially among populations at higher risk^{1,2}.

Syphilis, caused by the bacterium *Treponema pallidum*, progresses through distinct clinical stages – primary, secondary, latent, and tertiary – and can be transmitted sexually or vertically. Vertical transmission, although largely preventable, remains a public health challenge. Serological screening, especially with the VDRL test during the first and third trimesters of pregnancy and at delivery, is fundamental for timely diagnosis. International guidelines emphasize the importance of expanded screening as an essential tool to interrupt the chain of vertical transmission^{3,4}.

Recent scientific evidence shows that infection during pregnancy can increase the risk of adverse perinatal outcomes, such as spontaneous abortion, prematurity, stillbirth, and neonatal death, by up to 4.5 times^{5,6}. Timely treatment of pregnant women, along with appropriate management of sexual partners, is among the most effective strategies to prevent these complications^{5,6}. Even so, it is estimated that less than 10% of the approximately two million annual cases of gestational syphilis worldwide are effectively diagnosed and treated, according to the World Health Organization¹.

The Americas account for approximately 25% of this global burden, highlighting shortcomings in surveillance, tracking, and women's health care systems, especially in more vulnerable contexts⁷. In Brazil, congenital syphilis has been a notifiable disease since 1986, and

its monitoring is considered a sensitive marker of prenatal care quality. In 2022, the national detection rate of syphilis in pregnant women reached 34 cases per thousand live births, while the incidence of congenital syphilis reached 9.9 per thousand live births⁸.

The situation is particularly concerning in the state of Roraima, which borders Venezuela and recorded an estimated vertical transmission rate of 45.9% in 2021. This reflects regional structural weaknesses and challenges caused by intense migratory flows, as well as the discontinuity of prenatal care⁷⁻⁹. This scenario has worsened with the increase in Venezuelan migration since 2014, driven by a prolonged political, economic, and humanitarian crisis in the country. Forced displacement not only interrupts prenatal care in the country of origin but also compromises the continuity of care in Brazil, hindering early diagnosis and timely treatment of gestational syphilis, which increases the risk of vertical transmission¹⁰.

Additionally, recent studies show that linguistic, cultural, and institutional barriers – especially those faced by pregnant migrants – negatively affect the quality of prenatal care. Research conducted in primary care units in Boa Vista found that the lack of culturally sensitive welcoming strategies hinders bonding and reduces adherence to care¹¹. These barriers, along with structural inequalities such as poverty, discrimination, and lack of documentation, increase difficulties in accessing maternal and child care and require integrated, equitable, and humanized responses¹².

Given the overlap of structural and contextual vulnerabilities, this study aims to evaluate how sociodemographic and healthcare inequalities affect the management of congenital syphilis cases in a public maternity hospital in the border region of Roraima. By considering migratory status as a contextual variable, the investigation seeks to contribute to understanding the obstacles that hinder timely diagnosis, adequate treatment, and comprehensive maternal and child care in border settings, providing

evidence to support more equitable and culturally sensitive public policies.

Materials and methods

Study location

The study was conducted in the municipality of Boa Vista, the capital of the state of Roraima, located in the North region of Brazil within the Legal Amazon. It is the northernmost Brazilian capital and the only one situated entirely above the Equator. According to estimates from the Brazilian Institute of Geography and Statistics (IBGE), the population of Boa Vista in 2023 was 413,486 inhabitants. In the same year, Roraima had the highest population growth in the country (12.58%), driven by the intense migration of Venezuelan citizens^{13,14}.

The Nossa Senhora de Nazareth Maternity and Children's Hospital (HMINSN) is the main public maternity hospital in the state, serving as a reference center for maternal and child care within the Unified Health System (SUS). After structural renovations, the facility now has 294 inpatient beds, 68 Neonatal Intensive Care Unit (NICU) beds, and five Maternal ICU beds, distributed across 13 blocks and three annexes. The hospital serves pregnant women from all municipalities in Roraima, as well as patients from neighboring countries such as Venezuela and Guyana, including indigenous populations.

Study design

This observational, cross-sectional, analytical study was conducted through documentary analysis of notification forms for congenital syphilis and syphilis in pregnant women, completed throughout 2023 by the Epidemiological Surveillance Section team at HMINSN. These forms, standardized by the Ministry of Health and completed by public network professionals, served as the basis for records sent to

the Notifiable Diseases Information System (SINAN). The forms were obtained directly from the physical collection of the hospital's Epidemiological Surveillance Department.

Sampling

Initially, 248 notification forms for congenital syphilis registered at HMINSN between January 1 and December 31, 2023, were retrieved. After screening, 13 forms were excluded: nine due to incompleteness or illegibility, which made analysis impossible, and four because they corresponded to cases of maternal serological scarring, according to the epidemiological surveillance technical classification. Thus, 235 valid notification forms for cases of congenital syphilis and syphilis in pregnant women were analyzed.

The inclusion criteria covered all cases reported during the period that provided sufficient information to track and link data between the mother and the newborn. Records that were duplicate, illegible, incomplete, or classified as maternal serological scars after cross-referencing information were excluded. The case definition of early congenital syphilis followed the Ministry of Health criteria: (i) newborn, stillborn, or abortion from a woman with untreated or inadequately treated syphilis; (ii) newborn with clinical signs, cerebrospinal fluid abnormalities, or radiological findings compatible with congenital syphilis; or (iii) non-treponemal test titers at least two dilutions higher than those of the mother, with simultaneous collection at delivery.

It is worth noting that although 235 records were analyzed, the sample composition varied by analytical stage. For the prevalence estimate, only 193 cases classified as live births were included, following the Ministry of Health's criteria for calculating the rate per thousand births; cases of abortion or stillbirth were excluded from this denominator. Similarly, analyses of neonatal variables were limited to live newborns, as these indicators do not apply to fetal losses.

Study variables

Since all the records analyzed referred to confirmed cases of congenital syphilis, it was not possible to define an outcome variable in the traditional sense. Therefore, the study focused on analyzing primary variables of interest related to the maternal profile, time of diagnosis, treatment provided, actions taken in the care of the newborn, and the presence of neonatal clinical signs, which were considered secondary outcomes in this study. Among these variables, the nationality of the pregnant woman was considered central to the analysis, given its relevance in the context of intense migratory flows in the region.

Since 2017, the Municipal Superintendence of Health Surveillance of Boa Vista has required completion of this field in notification forms¹⁵. When this information was unavailable, the hospital statistics department was consulted, using the mother's name as an identification criterion. This strategy enabled distinction between cases of congenital syphilis among Brazilian and Venezuelan pregnant women, overcoming a recurring methodological limitation in the literature and allowing for a more precise analysis of the impact of migratory status on maternal and child care.

Statistical analysis

The data were organized into a structured database in Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS), version 30.0. Descriptive analysis was performed, calculating absolute and relative frequencies for categorical variables and the median and interquartile range (IQR) for the continuous variable 'maternal age', given its non-normal distribution. The normality of this variable was verified using the Shapiro-Wilk test ($p < 0.05$). For comparisons between groups according to nationality, the Mann-Whitney test was used for the continuous variable, and Pearson's chi-square test was

used for categorical variables, considering a significance level of 5% ($p < 0.05$).

Since this was a census study that included all valid notification forms registered during the period of interest, no sample size calculation was performed. For missing data, records with incomplete information for the variables analyzed at each stage were excluded without imputation. The final number of observations considered is specified in the respective results tables.

Ethical aspects

This study was approved by the Research Ethics Committee of the Federal University of Roraima, in accordance with Resolution No. 466/2012¹⁶ of the National Health Council. Approval was registered under protocol number CAAE: 75143823.1.0000.5302, opinion: 6.540.020.

Results

The estimated incidence of congenital syphilis in Boa Vista in 2023 was 16.4 cases per 1,000 live births (95% CI: 14.2–18.9), calculated from notification forms filed at HMINSN and referring exclusively to live births. During this period, 248 notifications were identified, of which 235 were considered eligible for analysis after excluding nine due to incompleteness or illegibility and four classified as maternal serological scarring.

Sociodemographic variables of pregnant women

Of the 235 congenital syphilis notification forms analyzed, 143 (60.9%) referred to Brazilian pregnant women and 92 (39.1%) to Venezuelan pregnant women. The maternal age variable showed an asymmetrical distribution in both groups and was compared using the Mann-Whitney test. The median age was 23 years (IQR: 20–27) among Brazilian women and 24 years (IQR: 20–28) among Venezuelan

women. The difference between the distributions was not statistically significant ($p = 0.50$), suggesting similar age profiles between the groups.

Analysis of sociodemographic variables revealed significant disparities associated with the nationality of the pregnant women attended. Regarding labor market participation, only 30 women (12.8%) reported engaging in paid work, with a significantly higher proportion among Brazilian women ($n = 25$; 17.5%) than among Venezuelan women ($n = 5$; 5.4%) ($p = 0.01$), highlighting greater economic vulnerability among Venezuelan migrants.

Regarding education, secondary education (complete or incomplete) predominated in both groups (57%), with a higher proportion among Brazilian women (61.6%) than Venezuelan women (50.0%). In contrast, primary education was more prevalent among migrant women (37.0%) than among Brazilian

women (19.8%). Higher education was under-represented in the sample, reported by nine pregnant women (3.9%), eight of whom were Brazilian. Only three women (1.3%) had no formal education, and 11.1% of the records had missing data. The distribution of education differed significantly between the groups ($p = 0.01$), reflecting inequalities in access to formal education.

Regarding race/skin color, most pregnant women self-identified as mixed-race ($n = 218$; 92.8%), with a similar distribution among Brazilian (91.6%) and Venezuelan (94.6%) women. The categories white, black, and indigenous were less common and showed slight variation between the groups. Comparison of the distributions did not reveal a statistically significant association with nationality ($p = 0.42$), indicating a similar ethno-racial profile among the populations analyzed. Complete data are presented in *table 1*.

Table 1. Distribution of socioeconomic categorical variables of pregnant women with congenital syphilis at HMINSN, according to nationality. Boa Vista/RR, 2023 ($n = 235$)

Socioeconomic and Demographic Variables	Nationality of Pregnant Women			p-value
	Total n (%)	Brazilian (n = 143) n (%)	Venezuelan (n = 92) n (%)	
Paid employment				0.01¹
No	205 (87.2)	118 (82.5)	87 (94.6)	
Yes	30 (12.8)	25 (17.5)	5 (5.4)	
Education level				0.01¹
Without formal education	3 (1.3)	2 (1.4)	1 (1.1)	
Completed or incomplete primary education	63 (26.8)	29 (19.8)	34 (37)	
Completed or incomplete high school education	134 (57)	88 (61.6)	46 (50)	
Completed or incomplete higher education.	9 (3.9)	8 (5.6)	1 (1.1)	
Ignored	26 (11.1)	16 (11.2)	10 (10.9)	
Race				0.42¹
White	5 (2.1)	2 (1.4)	3 (3.3)	
Black	2 (0.9)	1 (0.7)	1 (1.1)	
Indigenous	9 (3.8)	8 (5.6)	1 (1.1)	
Brown	218 (92.8)	131 (91.6)	87 (94.6)	
Unknown	1 (0.4)	1 (0.7)	0 (0)	

Source: Prepared by the authors.

¹ p-value obtained from Pearson's Chi-square test with Yates continuity correction.

Maternal clinical-epidemiological variables

Table 2 compares maternal clinical-epidemiological variables by nationality, highlighting significant disparities in access to prenatal care, serological coverage, and therapeutic management. Most pregnant women received prenatal care (84.3%), with higher coverage among Brazilian women (88.8%) than Venezuelan women (77.2%) (p = 0.02). For the number of consultations, 41.7% of women attended 0 to 3 consultations, a pattern more common among migrants (57.6%) than Brazilian women (31.4%). In contrast, 35.0% of Brazilian women had more than six consultations, compared to only 13.1% of Venezuelan women (p < 0.001), indicating lower adherence to care among migrants.

Serological coverage was also lower among Venezuelan pregnant women. Only 49.8% of pregnant women underwent VDRL testing during prenatal care, with a higher proportion among Brazilian women (58.0%) than Venezuelan women (37.0%) (p = 0.002). The treponemal test was recorded in 74.0 % of cases, with a higher frequency among Brazilian

women (79.7%) than Venezuelan women (65.2%) (p = 0.02). Syphilis was diagnosed predominantly during prenatal care (66.4%), and was more common among Brazilian women (72.0%) compared to migrant women (57.6%). The difference in timing of diagnosis between the groups was statistically significant (p = 0.02), suggesting that late identification of the infection, at or after delivery, is more frequent among migrant women.

Regarding treatment, 56.2% of pregnant women received therapeutic prescriptions during prenatal care, with a higher proportion among Brazilian women (61.5%) than Venezuelan women (47.8%) (p = 0.002). Prescriptions for sexual partners occurred in only 22.6% of cases, being lower among migrants, although this difference was not statistically significant (p = 0.07). Only 12.8% of women were classified as having received adequate treatment according to Ministry of Health criteria, with no significant difference between Brazilian (14.0%) and Venezuelan (10.9%) women (p = 0.49). These findings indicate persistent failures in the care pathway, even among pregnant women who accessed health services.

Table 2. Distribution of clinical-epidemiological categorical variables of pregnant women with congenital syphilis cases at HMINSN, according to nationality. Boa Vista/RR, 2023 (n = 235)

Clinical-Epidemiological Variables	Nationality of Pregnant Women			p-value
	Total (n=235) (%)	Brazilian (n = 143) n (%)	Venezuelan (n = 92) n (%)	
Underwent prenatal care				0.02 ¹
Yes	198 (84.3)	127 (88.8)	71 (77.2)	
No	37 (15.7)	16 (11.2)	21 (22.8)	
Number of appointments				<0.001 ¹
0 to 3	98 (41.7)	45 (31.4)	53 (57.6)	
4 to 6	46 (19.6)	30 (21)	16 (17.4)	
More than 6	62 (26.4)	50 (35)	12 (13.1)	
Unknown	29 (12.3)	18 (12.6)	11 (12)	

Table 2. Distribution of clinical-epidemiological categorical variables of pregnant women with congenital syphilis cases at HMINSN, according to nationality. Boa Vista/RR, 2023 (n = 235)

Clinical-Epidemiological Variables	Nationality of Pregnant Women			p-value
	Total (n=235) (%)	Brazilian (n = 143) n (%)	Venezuelan (n = 92) n (%)	
VDRL test during prenatal care				0.002¹
Yes	117 (49.8)	83 (58)	34 (37)	
No	118 (50.2)	60 (42)	58 (63)	
Treponemal testing during prenatal care				0.02¹
Yes	174 (74)	114 (79.7)	60 (65.2)	
No	61 (26)	29 (20.3)	32 (34.8)	
Timing of diagnosis of gestational syphilis				0.02¹
During prenatal care	156 (66.4)	103 (72.0)	53 (57.6)	
At the time of delivery/curettage	71 (30.2)	38 (26.6)	33 (35.9)	
After childbirth	7 (3)	1 (0.7)	6 (6.5)	
Unknown	1 (0.4)	1 (0.7)	0 (0)	
Treatment prescribed during prenatal care				0.043¹
Yes	132 (56.2)	88 (61.5)	44 (47.8)	
No	103 (43.8)	55 (38.5)	48 (52.2)	
Treatment prescribed to partner during prenatal care				0.07¹
Yes	53 (22.6)	38 (26.6)	15 (16.3)	
No	182 (77.4)	105 (73.4)	77 (83.7)	
Pregnant woman received appropriate treatment				0.49¹
Yes	30 (12.8)	20 (14)	10 (10.9)	
No	205 (87.2)	123 (86)	82 (89.1)	

Source: Prepared by the authors.

¹ p-value obtained from Pearson's Chi-square test with Yates' continuity correction.

Clinical and epidemiological variables of newborns

Table 3 shows the gestational outcomes for the 235 reported cases of congenital syphilis, categorized by maternal nationality. Most pregnancies resulted in live births (n = 193; 82.1%), with a slightly higher proportion among Brazilian women (n = 122; 85.3%) than among Venezuelan women (n = 71; 77.2%). There were 29 recorded abortions (12.3%), with a relatively balanced distribution between the groups (11.2% among Brazilians and 14.3% among Venezuelans). Six stillbirths (2.6%) were reported, equally divided between

Brazilian and Venezuelan women (three in each group). Six neonatal deaths attributed to congenital syphilis were identified (2.6% of the total), with a higher proportional frequency among newborns of Venezuelan mothers (4.4%) compared to Brazilian mothers (1.4%). Additionally, one death due to another cause was recorded (n = 1; 0.4%) and classified within the Venezuelan group to complete the outcome variable. Despite the observed variations in perinatal outcomes, the differences between the groups were not statistically significant (p = 0.39), indicating a similar overall pattern of gestational outcomes between Brazilian and Venezuelan women.

Table 3. Distribution of the ‘evolution of newborns’ categorical variable reported for congenital syphilis at HMINSN, according to nationality. Boa Vista/RR, 2023 (n = 235)

Evolution of Reported Cases	Nationality of Pregnant Women			p-value
	Total (n=235) (%)	Brazilian (n = 143) n (%)	Venezuelan (n = 92) n (%)	
Evolution				0.39¹
Live births	193 (82.1)	122 (85.3)	71 (77.2)	
Abortion	29 (12.3)	16 (11.2)	13 (14.3)	
Stillborn	6 (2.6)	3 (2.1)	3 (3.3)	
Deaths due to congenital syphilis	6 (2.6)	2 (1.4)	4 (4.4)	
Deaths due to other causes	1 (0.4)	0 (0)	1 (1.1)	

Source: Prepared by the authors.

¹ p-value obtained from Pearson’s Chi- square test with Yates’ continuity correction.

Clinical and laboratory variables of live newborns with congenital syphilis

Clinical and laboratory evaluation of newborns diagnosed with congenital syphilis showed that most underwent VDRL testing in peripheral blood (n = 174; 90.2%), with similar proportions among infants of Brazilian (89.3%) and Venezuelan (91.5%) mothers (p = 0.81). Lumbar puncture was performed in only 12.4% of cases, with no statistically significant difference between the groups (p = 0.76), which may indicate gaps in neurological investigation. Among the few who underwent lumbar puncture, only one newborn (0.5%)—the child of a Venezuelan mother – had a reactive VDRL in the cerebrospinal fluid. However, most medical records were classified as ‘not performed’ or ‘ignored’ (87.6%), hindering a conclusive assessment of neurosyphilis. Similarly, biochemical changes in cerebrospinal fluid were rare (1.6%), observed exclusively among newborns of Brazilian mothers (p = 0.67). Radiographs of long bones were requested in 45.0% of cases, with findings suggestive of congenital syphilis in only three neonates (1.6%), all children of Brazilian mothers, with no significant difference between the groups

(p = 0.32). The low number of tests performed or recorded may indicate failures in the systematic diagnostic approach.

From a clinical standpoint, most newborns were considered asymptomatic (77.2%), with a balanced distribution between Brazilians and Venezuelans. The most common clinical manifestation was jaundice (19.6%), followed by anemia, hydrocephalus, hepatomegaly, and palmo-plantar desquamation, all with low frequency (< 2%). There was no statistically significant difference between the maternal groups regarding clinical presentation (p = 0.35).

Regarding the treatment instituted, crystalline penicillin G was the most frequently used therapeutic regimen (75.6%), with a similar distribution among the analyzed groups. Benzathine penicillin G was used in 8.8% of cases. Notably, 22 neonates (11.4%) did not receive any treatment, representing a serious failure in the care pathway, although the difference between groups was not statistically significant (p = 0.48). These findings are detailed in *table 4* and reveal important gaps in the diagnostic investigation and appropriate treatment of newborns with congenital syphilis, regardless of maternal nationality.

Table 4. Distribution of clinical-epidemiological categorical variables of live newborns reported for congenital syphilis at HMINSN, according to nationality. Boa Vista/RR, 2023 (n = 193)

Clinical-Epidemiological Variables	Nationality of Pregnant Women			p-value
	Total (n = 193) (%)	Brazilian (n = 122) n (%)	Venezuelan (n = 71) n (%)	
VDRL blood test				0.81¹
Yes	174 (90.2)	109 (89.3)	65 (91.5)	
No	19 (9.8)	13 (10.7)	6 (8.5)	
Lumbar puncture				0.76¹
Yes	24 (12.4)	14 (11.5)	10 (14.1)	
Not/unknown	169 (87.6)	108 (88.5)	61 (85.9)	
VDRL in cerebrospinal fluid				0.41¹
Reactive	1 (0.5)	0 (0)	1 (1.4)	
Non-reactive	23 (11.9)	14 (11.5)	9 (12.7)	
Not performed/unknown	169 (87.6)	108 (88.5)	61 (85.9)	
Biochemical alteration in cerebrospinal fluid				0.67¹
Yes	3 (1.6)	3 (2.5)	0 (0.0)	
No or not carried out	190 (98.4)	119 (97.5)	71 (100.0)	
Long bone X-ray				0.45¹
Yes	87 (45)	58 (47.5)	29 (40.8)	
No	106 (55)	64 (52.5)	42 (59.2)	
Long bone X-ray abnormalities				0.32¹
Yes	3 (1.6)	3 (2.5)	0 (0)	
No	84 (43.5)	55 (45.1)	29 (40.8)	
Not performed	106 (55)	64 (52.5)	42 (59.2)	
Clinical signs and symptoms				0.35¹
Asymptomatic	149 (77.2)	94 (77)	55 (77.5)	
Jaundice	38 (19.6)	26 (21.3)	12 (16.9)	
Anemia	3 (1.6)	1 (0.8)	2 (2.8)	
Hydrocephalus	1 (0.5)	0 (0)	1 (1.4)	
Hepatomegaly	1 (0.5)	0 (0)	1 (1.4)	
Palmoplantar desquamation	1 (0.5)	1 (0.8)	0 (0)	
Treatment performed on newborns				0.48¹
Crystalline penicillin G	146 (75.6)	93 (76.2)	53 (74.6)	
Benzathine penicillin G	17 (8.8)	9 (7.4)	8 (11.3)	
Procaine penicillin G	1 (0.5)	1 (0.8)	0 (0)	
Other protocols	7 (3.6)	3 (2.5)	4 (5.6)	
Treatment not performed	22 (11.4)	16 (13.1)	6 (8.5)	

Source: Prepared by the authors.

¹ p-value obtained from Pearson's Chi-square test with Yates' continuity correction.

Discussion

The findings of this study reveal a persistent and alarming pattern of congenital syphilis in Roraima, highlighting not only isolated failures in prenatal care but also structural limitations in health surveillance mechanisms. The concentration of cases among pregnant Venezuelan migrants illustrates the inability of current policies to respond equitably to the demands imposed by forced migration. This scenario, more than reflecting the humanitarian crisis in Venezuela, exposes the weaknesses of a health system that, even when supported by the universal principles of the Brazilian Unified Health System (SUS), has failed to guarantee timely and effective access in border territories.

The estimated incidence of 16.4 cases per 1,000 live births in Boa Vista in 2023 is almost double the national average for the same period (9.9 per 1,000 live births)⁸, suggesting a problem that extends beyond the clinical sphere to social and institutional dimensions. Although the analysis was limited to live births, the magnitude of the problem is likely underestimated, as it does not include stillbirths and spontaneous abortions related to maternal infection¹⁷. This limitation of surveillance, already noted in other studies, reinforces the hypothesis that the true burden of the disease is significantly greater than what is captured by official notifications.

The disparities identified between pregnant migrants and Brazilian women – especially low education levels, lack of income, precarious housing, and language barriers – should not be seen merely as contextual variables, but as structural determinants that perpetuate the exclusion of these women from the health system¹⁸⁻²⁰. Lower prenatal coverage, fewer consultations, and low adherence to laboratory tests show that, in practice, the SUS (Brazilian Unified Health System) has operated selectively and unequally, even in services officially open to all. In this sense, the findings align with national evidence that migration exacerbates existing inequities in maternal and child care²¹⁻²⁷.

A high proportion of pregnant women without VDRL or treponemal testing during pregnancy is particularly concerning. Both tests are low-cost, available in primary care, and mandatory during prenatal care according to national and international protocols. Their absence, therefore, does not result from technological barriers but from institutional failures that reflect disorganization of the care pathway and negligence in complying with established guidelines^{16,17}. More than an operational gap, this finding reflects the violation of basic health rights and the perpetuation of a pattern of late diagnosis, often performed only at delivery^{28,29}.

Although failures have also been observed among pregnant Brazilian women, the adverse effects disproportionately affect migrants, highlighting a process of institutionalized inequity. Low adherence to the reverse diagnostic algorithm recommendations from the Ministry of Health and the Pan American Health Organization (PAHO) demonstrates that the gap between guidelines and practice remains a central obstacle to controlling congenital syphilis. This contradiction – well-defined guidelines versus poor execution – compromises the effectiveness of preventive actions and reinforces the need for monitoring and accountability strategies for services.

Regarding treatment, the differences identified in the prescription of treatment for Venezuelan pregnant women during prenatal care, compared to Brazilian women, highlight a dimension of inequality that extends beyond initial access to care. Although both groups use the same public healthcare network, migrants were less frequently treated according to recommendations, revealing equity failures in the provision of care that should be universal. More concerning, however, is the finding that, in both groups, the proportion of pregnant women and partners who received adequate treatment was alarmingly low. This fact cannot be interpreted merely as an operational deficiency but as a reflection of a system that fails to ensure comprehensive care. Other national studies support these results, showing that

even after the diagnosis of gestational syphilis, access to adequate therapy remains a concrete and recurring challenge^{30,31}. The absence of treatment for both partners perpetuates the risk of reinfection, reduces the effectiveness of the intervention, and directly compromises the control of vertical transmission, constituting a collective failure of the healthcare network.

In the neonatal setting, although clinical outcomes were similar between groups, failures in immediate diagnostic management after birth highlight the fragility of the care pathway. Omitting essential tests, such as lumbar puncture and long bone radiography, compromises proper case stratification and leads to the empirical and sometimes prolonged use of therapeutic regimens such as crystalline penicillin G³²⁻³⁵. This pattern reflects a defensive and non-standardized clinical practice that overburdens hospital infrastructure, exposes newborns to additional risks, and masks the true magnitude of the disease.

Some methodological limitations must be acknowledged, but they also require critical interpretation. Identifying the nationality of pregnant women was challenging due to the lack of standardization in official records, revealing not only a technical limitation but also the system's negligence in recording essential information for health surveillance in border areas. The heterogeneity in the training and experience of the professionals responsible for completing the forms may have compromised data quality, with potential biases from under-reporting of neonatal clinical signs and inconsistencies in descriptive fields. Strategies such as rigorous inclusion criteria, cross-checking of information, and exclusion of inconsistent records were adopted to mitigate these risks, but the structural problem remains: the fragility of the information systems reflects the lack of priority given to qualified monitoring of this health issue. Furthermore, the absence of variables such as length of residence in Brazil, documentation status, degree of integration into the health system, and language fluency limits a deeper understanding of migratory

determinants. The sample's focus on a single maternity hospital also limits the generalizability of the findings. However, the fact that the unit analyzed handles most of the obstetric demand in the region gives the study high epidemiological relevance.

Despite these limitations, the results presented offer concrete and critical evidence for developing public policies on maternal and child health in border contexts. The complexity of migratory flows and overlapping vulnerabilities requires institutional responses that are not only normative but also effective and sensitive to territorial specificities. In this scenario, congenital syphilis emerges not only as a marker of healthcare failures but also as an expression of a social, ethical, and structural crisis. Its persistence signals the system's inability to translate guidelines into effective practices and underscores the urgency of institutional strategies that move beyond fragmented responses and place equity at the center of care.

Conclusions

The high incidence of congenital syphilis in Roraima, especially among pregnant migrants, underscores persistent structural failures in prenatal and maternal-infant care. The results show that, in border regions, the institutional response remains inadequate amid overlapping social vulnerabilities and barriers to access. Addressing this health issue requires more than protocols; it demands political commitment, investment in infrastructure, and equity-focused strategies that can turn guidelines into effective practices and truly ensure the right to health for all pregnant women and their children.

Authorship contributions

Lacerda PCM (0000-0009-0158-657 X)* contributed to the conception and design of the study, data collection, analysis and

interpretation, manuscript writing, and final approval of the version to be published. Horta MAP (0000-0003-4117-5379)* contributed to

the study design, critical review of the intellectual content and final approval of the version to be published. ■

References

1. Pan American Health Organization; World Health Organization. Guidance for the elimination of syphilis and congenital syphilis in the Americas [Internet]. Washington, DC: PAHO; 2024 [acesso em 2025 nov 15]. Disponível em: <https://www.paho.org/en/documents/guidance-elimination-syphilis-and-congenital-syphilis-americas>
2. Florêncio RS, Moreira TMM. Modelo de vulnerabilidade em saúde: esclarecimento conceitual na perspectiva do sujeito-social. *Acta Paul Enferm.* 2021;34:eAPE00353. DOI: <https://doi.org/10.37689/acta-ape/2021AO00353>
3. American College of Obstetricians and Gynecologists. Screening for syphilis infection in pregnancy [Internet]. Washington, DC: ACOG; 2024 [acesso em 2025 nov 15]. Disponível em: <https://www.acog.org>
4. US Preventive Services Task Force, Silverstein M, Wong JB, et al. Screening for syphilis infection in pregnancy: US Preventive Services Task Force recommendation statement. *JAMA.* 2025;333(22):2006-2012. DOI: <https://doi.org/10.1001/jama.2025.5009>
5. Gao L, Li K, Zhou X, et al. Maternal syphilis and adverse pregnancy outcomes: a systematic review and meta-analysis. *Int J Gynaecol Obstet.* 2023;160(3):594-604. DOI: <https://doi.org/10.1002/ijgo.14503>
6. Gomez GB, Kamb ML, Newman LM, et al. Untreated maternal syphilis and adverse outcomes of pregnancy: a systematic review and meta-analysis. *Bull World Health Organ.* 2013;91(3):217-26. DOI: <https://doi.org/10.2471/BLT.12.107623>
7. Organização Pan-Americana da Saúde. Eliminación de la transmisión materno-infantil de infecciones [Internet]. Washington, DC: OPAS; 2021 [acesso em 2025 nov 15] Disponível em: <https://www.paho.org>
8. Ministério da Saúde (BR). Sífilis. *Boletim Epidemiol MS* [Internet]. 2024 [acesso em 2025 nov 15];(Esp):1-59. Disponível em: <https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/especiais/2024/boletim-epidemiologico-de-sifilis-numero-especial-out-2024.pdf>
9. Secretaria de Estado da Saúde (RR). Doenças negligenciadas no estado de Roraima, 2018-2023 [Internet]. Boa Vista: SESAU; 2024 [acesso em 2026 jan 25]. Disponível em: <https://vigilancia.saude.rr.gov.br/wp-content/uploads/2024/03/relatorio-doencas-negligenciadas-roraima-2018-2023.pdf>
10. Triani A, Silveira LC, Santos TM, et al. Fragmentação do cuidado pré-natal em gestantes migrantes na Amazônia: desafios à eliminação da sífilis congênita. *Cad Saúde Pública.* 2023;39(2):e00009822. DOI: <https://doi.org/10.1590/0102-311X00009822>
11. Costa ABO, Silva GF, Silva PS. Práticas assistenciais de acolhimento à puérpera migrante venezuelana na atenção primária à saúde. In: Pereira RSF, Passinho RS, organizadores. *Enfermagem no cuidado à saúde de populações em situação de vulnerabilidade.* Brasília, DF: Editora ABEn; 2023. p. 49-57. DOI: <https://doi.org/10.51234/aben.23.e19.c06>

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12. Pescarini JM, Rocha JV, Barros AJD, et al. Perinatal health outcomes of international migrant women in Brazil: language barriers, discrimination, and access to antenatal care. *Travel Med Infect Dis.* 2024;57:102672. DOI: <https://doi.org/10.1016/j.tmaid.2023.102672>
13. Cidades [Internet]. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; ©2017. Panorama Roraima censo 2022. [acesso em 2026 abr 6]. Disponível em: <https://censo2022.ibge.gov.br/panorama/?localidade=14>
14. Cidades [Internet]. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; ©2017. Panorama Roraima censo 2022 – Domicílios. [acesso em 2026 abr 6]. Disponível em: <https://censo2022.ibge.gov.br/panorama/indicadores.html?localidade=14&tema=2>
15. Roraima. Secretaria Municipal de Saúde de Boa Vista. Nota Técnica nº 03/2017. Boa Vista: SMSA; 2017.
16. Conselho Nacional de Saúde (BR). Resolução nº 466 de 12 de dezembro de 2012. Aprova diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos. *Diário Oficial da União, Brasília, DF.* 2013 jun 13; Edição 112; Seção 1:59.
17. Ministério da Saúde (BR) [Internet]. Brasília, DF: Ministério da Saúde; [2022]. Protocolo Clínico e Diretrizes Terapêuticas para Infecções Sexualmente Transmissíveis; 2022 ago 3 – [acesso em 2026 abr 6]. Disponível em: <https://www.gov.br/aids/pt-br/central-de-conteudo/pcdts/2022/ist/pcdt-ist-2022-isbn-1.pdf>
18. Organização Pan-Americana da Saúde. ETMI Plus: marco para la eliminación de la transmisión materno-infantil del VIH, la sífilis, la hepatitis y la enfermedad de Chagas [Internet]. Washington, DC: OPAS; 2017 [acesso em 2026 jan 25]. Disponível em: <https://iris.paho.org/bitstreams/07cd9-6422-4b4a-be07-ae5784e87991/download>
19. Portela B, Carneiro Júnior N, Bastos S, et al. Análise comparativa do acesso à atenção pré-natal de mulheres migrantes internacionais e brasileiras. *Periplos [Internet].* 2024 [acesso 2025 nov 15];8(1):41-58. Disponível em: https://periodicos.unb.br/index.php/obmigra_periplos/article/view/48546/39052
20. Rodrigues CB, Thomaz EBAF, Batista RFL, et al. Prenatal care and human rights: addressing gaps between medical and legal frameworks in Brazil. *PLoS One.* 2023;18(2):e0281581. DOI: <https://doi.org/10.1371/journal.pone.0281581>
21. Cabieses B, Hill PS, Oyeyemi-Oleha F, et al. Impact of stigma on healthcare access for migrant populations. *Lancet Reg Health Am.* 2024;22:100620. DOI: <https://doi.org/10.1016/j.lana.2023.100620>
22. Leal MC, Carvalho TDG, Santos YRP, et al. Migration of Venezuelan women to Brazil: living conditions and health service use. *BMC Public Health.* 2024;24:1051. DOI: <https://doi.org/10.1186/s12889-024-18021-3>
23. Bahamondes L, Laporte M, Margatho D, et al. Maternal health among Venezuelan migrants at the Brazilian border. *BMC Public Health.* 2020;20:1771. DOI: <https://doi.org/10.1186/s12889-020-09880-3>
24. Zaman M, McCann V, Friesen S, et al. Experiences of pregnant Venezuelan migrants in Latin America. *BMC Pregnancy Childbirth.* 2024;24:157. DOI: <https://doi.org/10.1186/s12884-024-06341-2>
25. Supimpa LS, Souza SRRK, Prandini NR, et al. Immigrant women's experience of labor and birth. *Rev Esc Enferm USP.* 2024;57:e20220444. DOI: <https://doi.org/10.1590/1980-220X-REEUSP-2022-0444>
26. Zarth MD, Fernández PA, Baggio MA, et al. Cross-cultural nursing care for immigrant women. *Rev Gaucha Enferm.* 2024;45:e20230161. DOI: <https://doi.org/10.1590/1983-1447.2024.20230161>
27. Cavalcante Neto AS, Oliveira MAC, Egry EY. Vulnerability of Venezuelan immigrants in Boa Vista. *Rev Esc Enferm USP.* 2023;57:e20230074. DOI: <https://doi.org/10.1590/1980-220X-REEUSP-2023-0074>
28. Centers for Disease Control and Prevention. Sexually transmitted infections treatment guidelines. *MMWR [Internet].* 2021;70(4):1-192. Disponível em: <https://www.cdc.gov/mmwr/preview/mmwrhtml/sexually-transmitted-infections-treatment-guidelines-2021-a0041a10.htm>

www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

29. Uchôa TLDA, Araújo EDC, Silva RAR, et al. Determinants of gestational syphilis in the Brazilian Amazon. *Front Public Health*. 2022;10:930150. <https://doi.org/10.3389/fpubh.2022.930150>
30. Freitas CHSM, Silva J, Santos M, et al. Inequalities in access to HIV and syphilis testing in prenatal care in Brazil. *Cad Saúde Pública*. 2019;35(6):e00170918. DOI: <https://doi.org/10.1590/0102-311X00170918>
31. Oliveira GL, Azevedo LJ, Marcelino ICS, et al. Adequacy of prenatal care, diagnosis and treatment of syphilis in pregnancy. *Lancet Reg Health Am*. 2023;13:100362. DOI: <https://doi.org/10.1016/j.lana.2022.100362>
32. Costa IB, Pimenta IDSF, Aiquoc KM, et al. Congenital syphilis in Brazil: an ecological study. *PLoS One*. 2024;19(6):e0306120. DOI: <https://doi.org/10.1371/journal.pone.0306120>
33. Pires CP, Mareto LK, Medeiros MJ, et al. Associated factors and management of gestational and congenital syphilis. *Rev Inst Med Trop Sao Paulo*. 2024;66:e21. DOI: <https://doi.org/10.1590/S1678-9946202466021>
34. American Academy of Pediatrics. Syphilis in pregnancy: fetal and neonatal complications. *NeoReviews*. 2024;25(6):e375-e389. DOI: <https://doi.org/10.1542/neo.25-6-e375>
35. Villarreal D, Lewis K, Cielo M, et al. Congenital syphilis at Los Angeles General Medical Center. *Open Forum Infect Dis*. 2025;12(Supl 1):ofae631.1556. DOI: <https://doi.org/10.1093/ofid/ofae631.1556>

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