

Increase in congenital toxoplasmosis notifications in Brazil in the post-COVID-19 pandemic context: time-series analysis and discussion of possible explanatory factors

Aumento de las notificaciones de toxoplasmosis congénita en Brasil en el contexto pospandémico de la COVID-19: análisis de series temporales y discusión de posibles factores explicativos

Aumento das notificações de toxoplasmose congênita no Brasil no contexto pós-pandemia de COVID-19: análise de série temporal e discussão de possíveis fatores explicativos

Isadora Carolina Rissi Colombo^{1*}

ORCID: 0009-0007-6089-1959

Pierre Gomes Rodrigues

Turchiari¹

ORCID: 0009-0007-1049-9852

Emilene Dias Fiuza Ferreira¹

ORCID: 0000-0002-6235-6462

¹Universidade Cesumar. Paraná, Brazil.

How to cite this article:

Colombo ICR, Turchiari PGR, Ferreira EDF. Increase in congenital toxoplasmosis notifications in Brazil in the post-COVID-19 pandemic context: time-series analysis and discussion of possible explanatory factors. Glob Acad Nurs. 2026;7(3):e588. <https://dx.doi.org/10.5935/2675-5602.20200588>

*Corresponding author:

isa.carol.colombo@gmail.com

Submission: 07-07-2026

Approval: 08-29-2026

Abstract

This study aimed to analyze the temporal trend of congenital toxoplasmosis notifications in Brazil between 2019 and 2024, investigating case patterns, diagnostic criteria, outcomes, and regional and sociodemographic inequalities. It is a descriptive, ecological time-series study based on secondary data from the Notifiable Diseases Information System (SINAN), provided by DATASUS. Between 2019 and 2024, a 151% increase in the number of notified cases was recorded, with more pronounced growth starting in 2022 and an annual average 107% higher in the post-pandemic period (2022–2024) compared to the pre-pandemic period (2019–2020). Deaths increased by 105%, yet the case-fatality rate remained stable. Most cases were confirmed via laboratory criteria (65.3%), maintaining a similar proportion throughout the historical series. Greater proportional growth was observed among Black individuals, along with a concentration of cases in the Northeast region. The study concludes that there was a sustained increase in notifications during the post-pandemic period without a proportional rise in case-fatality, suggesting a combined influence of expanded diagnostic capacity and the pandemic's indirect repercussions on prenatal care, thereby reinforcing the need to strengthen epidemiological surveillance and maternal-child care.

Descriptors: Congenital Toxoplasmosis; COVID-19; Pandemics; Neonatal Screening; Epidemiological Surveillance.

Resumen

Este estudio tuvo como objetivo analizar la tendencia temporal de las notificaciones de toxoplasmosis congénita en Brasil entre 2019 y 2024, investigando el comportamiento de los casos, los criterios diagnósticos, los resultados y las desigualdades regionales y sociodemográficas. Se trata de un estudio ecológico, descriptivo y de series temporales, basado en datos secundarios del Sistema Nacional de Información sobre Enfermedades de Declaración Obligatoria (SINAN), proporcionado por DATASUS. Entre 2019 y 2024, se registró un aumento del 151 % en el número de casos notificados, con un crecimiento más pronunciado a partir de 2022 y un promedio anual un 107 % superior en el periodo pospandémico (2022–2024) en comparación con el periodo prepandémico (2019–2020). Las muertes aumentaron un 105 %, pero la tasa de letalidad se mantuvo estable. La mayoría de los casos se confirmaron mediante criterios de laboratorio (65,3%), manteniendo una proporción similar a lo largo de la serie histórica. Se observó un mayor incremento proporcional entre las personas de raza negra, y los casos se concentraron en la región noreste. Se concluye que hubo un incremento sostenido en las notificaciones durante el periodo pospandémico, sin un incremento proporcional en la letalidad, lo que sugiere una influencia combinada de la expansión de la capacidad diagnóstica y las repercusiones indirectas de la pandemia en la atención prenatal, reforzando la necesidad de fortalecer la vigilancia epidemiológica y la atención materno-infantil.

Descritores: Toxoplasmosis Congénita; COVID-19; Pandemias; Tamizaje Neonatal; Vigilancia Epidemiológica.

Resumo

Objetivou-se analisar a tendência temporal das notificações de toxoplasmose congênita no Brasil entre 2019 e 2024, investigando o comportamento dos casos, critérios diagnósticos, desfechos e desigualdades regionais e sociodemográficas. Trata-se de estudo ecológico, descritivo, de série temporal, baseado em dados secundários do Sistema de Informação de Agravos de Notificação (SINAN), disponibilizados pelo DATASUS. Entre 2019 e 2024, registrou-se aumento de 151% no número de casos notificados, com crescimento mais acentuado a partir de 2022 e média anual 107% superior no período pós-pandêmico (2022–2024) em comparação ao pré-pandêmico (2019–2020). Os óbitos aumentaram 105%, porém a letalidade permaneceu estável. A maioria dos casos foi confirmada por critério laboratorial (65,3%), mantendo proporção semelhante ao longo da série histórica. Observou-se maior crescimento proporcional entre indivíduos da raça/cor preta e concentração dos casos na região Nordeste. Conclui-se que houve aumento sustentado das notificações no período pós-pandêmico, sem incremento proporcional da letalidade, sugerindo influência conjunta da ampliação da capacidade diagnóstica e das repercussões indiretas da pandemia sobre a assistência pré-natal, reforçando a necessidade de fortalecer a vigilância epidemiológica e o cuidado materno-infantil.

Descritores: Toxoplasmose Congênita; COVID-19; Pandemias; Triagem Neonatal; Vigilância Epidemiológica.



Introduction

Congenital toxoplasmosis is an infection resulting from the vertical transmission of *Toxoplasma gondii*, capable of causing severe clinical manifestations in the newborn, including retinochoroiditis, intracranial calcifications, and impairment of neuropsychomotor development¹. The severity of the disease is directly related to the timing of infection during pregnancy, being generally more severe when transmission occurs in the early stages of pregnancy². It is a condition of high relevance to public health, especially in countries with high circulation of parasites and inequalities in access to prenatal care.

In Brazil, confronting congenital toxoplasmosis depends fundamentally on the adequate performance of serological screening during prenatal care and neonatal screening. In recent decades, the country has advanced in expanding the National Neonatal Screening Program, with the progressive incorporation of new conditions into the Newborn Screening Test. However, structural, regional, and social barriers persist that compromise the coverage and quality of maternal and childcare, directly influencing early detection and clinical outcomes of the disease³.

The COVID-19 pandemic represented a significant disruption in the organization of health services, with documented reduction in the coverage of prenatal consultations and exams. The decrease in access to serological screening for *Toxoplasma gondii* may have compromised the timely identification of maternal infection and the adequate initiation of treatment, which may, in turn, influence vertical transmission in subsequent years. National studies indicate a decline in the performance of essential exams during the pandemic period, evidencing vulnerabilities in prenatal care in the context of a health crisis⁴.

In parallel, the enactment of Law No. 14,154, of May 26, 2021, progressively expanded the list of diseases screened by the National Neonatal Screening Program, favoring the expansion of screening strategies in different federal units⁵. This advance may have contributed to greater detection of congenital toxoplasmosis cases, including those previously underdiagnosed. Although it represents an important strengthening of epidemiological surveillance, this scenario imposes the challenge of distinguishing between a real increase in the incidence of the disease and the increase in notifications resulting from the expansion of diagnostic capacity.

In this context, a progressive growth in notifications of congenital toxoplasmosis is observed in Brazil in the post-pandemic period, especially from 2022 onward. However, it is not yet clear whether this increase results predominantly from greater vertical transmission associated with the fragilities of prenatal care during the pandemic, from the expansion of case detection resulting from the expansion of neonatal screening, or from the interaction between these factors.

Given this scenario, the question arises whether the increase in notifications of congenital toxoplasmosis observed in Brazil after the COVID-19 pandemic stems from

greater vertical transmission, from the expansion of diagnostic capacity provided by the expansion of neonatal screening, or from the combination of these factors. Thus, the present study aimed to analyze the temporal trend of notifications of congenital toxoplasmosis in Brazil between 2019 and 2024, investigating the behavior of cases in the pre- and post-pandemic period, the diagnostic criteria used, the clinical outcomes, and the regional and sociodemographic inequalities associated with the distribution of the disease.

Methodology

This is an ecological, descriptive, time-series study based on secondary data from the Notifiable Diseases Information System (SINAN), made available by the Department of Informatics of the Unified Health System (DATASUS), through the TabNet tool⁶.

The study was composed of all notified cases of congenital toxoplasmosis in Brazil between January 2019 and December 2024, registered in SINAN. No exclusion criteria were established, and all records available in the analyzed period were included. The time frame was defined to contemplate the period immediately before the COVID-19 pandemic, the years of greatest impact of the health crisis (2020–2021), and the subsequent period, marked by the reorganization of health services and the gradual advancement of the expansion of neonatal screening in different Brazilian states after the enactment of Law No. 14,154/2021⁵.

The variables analyzed were year of diagnosis, geographic region of notification, race/color, diagnostic criterion, and case outcome. The race/color variable was considered according to the classification of the Brazilian Institute of Geography and Statistics (IBGE), comprising the categories white, black, brown, yellow, and indigenous. The geographic region was categorized into North, Northeast, Southeast, South, and Central-West. The diagnostic criterion was classified as laboratory, clinical-epidemiological, or ignored/blank, while the case outcome was categorized as cure, death, and other recorded outcomes.

Data were exported from TabNet to an electronic spreadsheet, where they were organized and analyzed. Absolute and relative frequencies, proportions, lethality rate, and percentage variations were calculated. Annual lethality was obtained by the ratio between the number of deaths from congenital toxoplasmosis and the total number of cases notified in the respective year, multiplied by 100. Percentage variations between 2019 and 2024 were also calculated, in addition to the comparison of annual means of the periods 2019–2020 and 2022–2024. A stratified analysis was performed by geographic region and by race/color, aiming to identify differences in the distribution of cases according to territorial and sociodemographic characteristics.

As it involves research based exclusively on public domain data, without individual identification of participants, there was an exemption from review by the Research Ethics Committee.

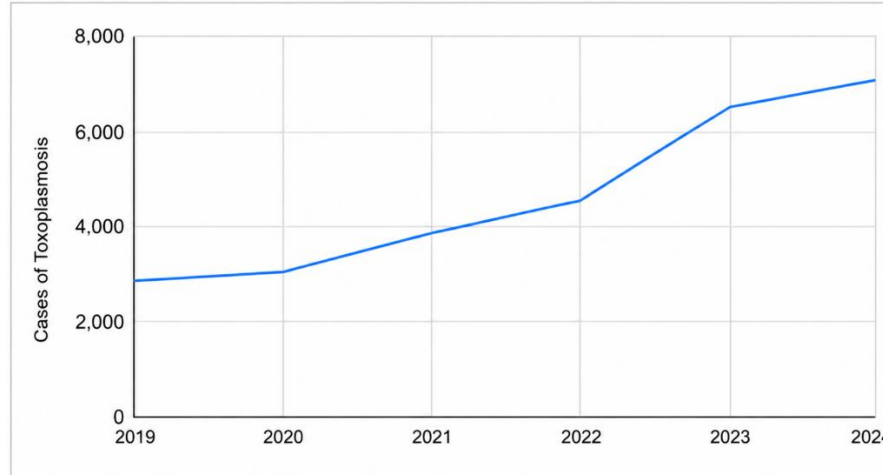


Results and Discussion

Between 2019 and 2024, a progressive and sustained increase in the number of notified cases was observed, going from 2,858 records in 2019 to 7,172 in 2024, corresponding to an absolute increase of 4,314 cases (+151%) (Figure 1). The elevation became more accentuated from 2022 onward, with a significant increase between 2022 and 2023. When comparing the pre-pandemic period (2019–

2020) and the expanded post-pandemic period (2022–2024), a substantial increase in the annual mean of notifications was verified. Although there was a slight reduction in relation to the peak observed in 2023, the year 2024 maintained a high number of cases, indicating persistence of the growth trend throughout the historical series.

Figure 1. Time series of reported cases of congenital toxoplasmosis in Brazil. Maringá, PR, Brazil, 2019–2024

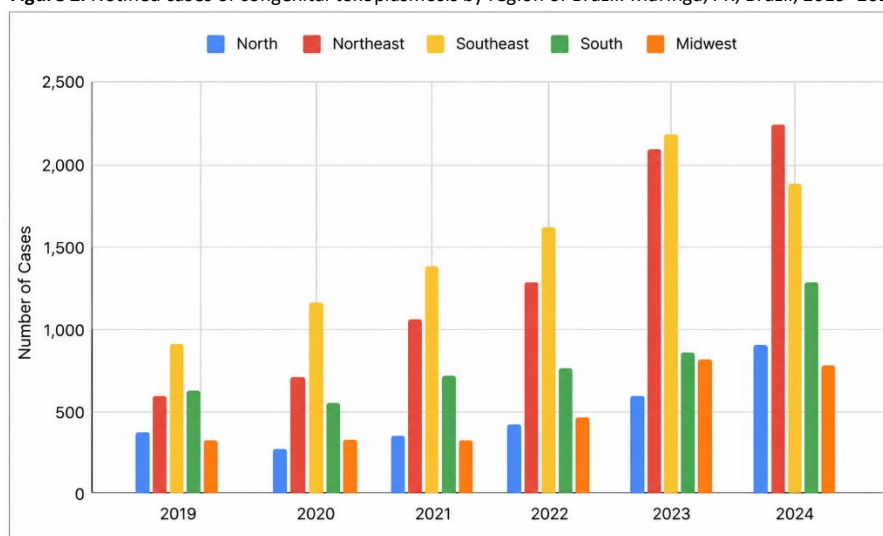


The 151% increase in notifications between 2019 and 2024 should not be interpreted as an exclusively epidemiological phenomenon, but rather analyzed considering structural changes in surveillance, prenatal screening, and the social assistance conditions of the period. The interaction between the expansion of diagnostic capacity, indirect repercussions of the COVID-19 pandemic, and regional inequalities constitutes a plausible explanation for the observed trend.

Congenital toxoplasmosis presents a high proportion of asymptomatic cases at birth, with clinical manifestations often delayed, favoring underdiagnosis in the absence of systematic screening¹.

In this context, the absolute growth of laboratory confirmations observed in the period, associated with the maintenance of a similar proportion over the years, suggests strengthening of diagnostic capacity and not merely changes in case classification. In countries with structured prenatal screening programs, a reduction in clinical severity and earlier identification of cases is observed, evidencing that the strengthening of screening modifies the epidemiological profile of the disease¹. The stability of lethality throughout the historical series reinforces this interpretation, suggesting that the increase in notifications occurred predominantly due to greater identification of cases.

Figure 2. Notified cases of congenital toxoplasmosis by region of Brazil. Maringá, PR, Brazil, 2019–2024



Regionally, all macro-regions showed a growth trend in notifications, but the increase was more accentuated in the Northeast, especially from 2022 onward (Figure 2). Between 2019 and 2024, this region presented an increase of 276% (601 to 2,263 cases), concentrating 38.5% of the national absolute growth and indicating an important contribution to the expansion of notifications in the country.

Regarding outcomes, the absolute number of deaths increased by 105% in the analyzed period, going from 19 in 2019 to 39 in 2024. However, lethality remained relatively stable, ranging from 0.66% to 0.54%. In parallel, an absolute increase in the number of cures was observed throughout the historical series, with an upward trend until 2023. These findings suggest that the increase in notifications was not accompanied by a proportional increase in the severity of diseases at the population level.

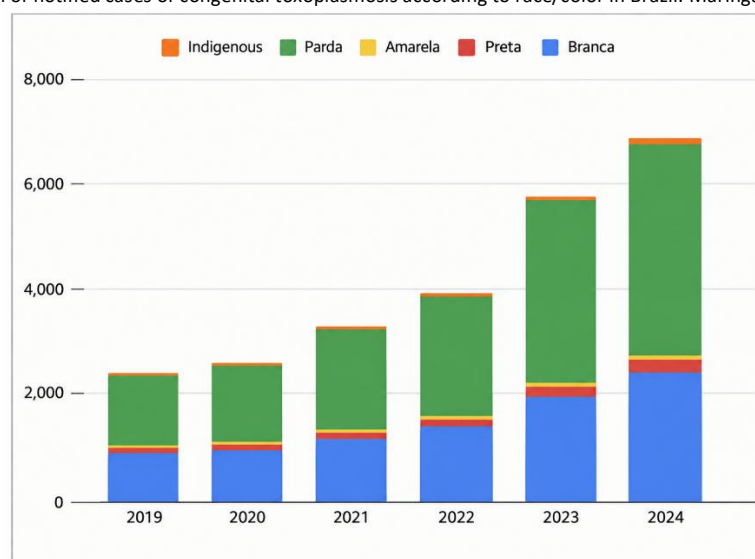
Regarding the diagnostic criterion, 65.3% of cases were confirmed laboratorially, totaling 18,387 records. There was an absolute increase of 146% in laboratory confirmations between 2019 and 2024 (1,813 to 4,459 cases), while the proportion remained relatively stable throughout the historical series (63.4% in 2019 versus 62.1% in 2024). This behavior indicates an expansion of the absolute number of diagnoses, without relevant alteration in the participation of the laboratory criterion among confirmed cases. In contrast, 24.7% of notifications were recorded as ignored/blank criteria, with a growth of 165% in the period (760 to 2,012 cases), a percentage higher than the total growth of cases. A regional concentration of these incomplete records was also observed, especially in the Northeast and Southeast regions, suggesting fragilities in information quality.

However, the expansion of diagnostic capacity, in isolation, does not explain the magnitude of the observed increase. The COVID-19 pandemic promoted reorganization

of health services and a significant reduction of procedures in Primary Health Care. A national ecological study demonstrated a significant drop in procedures related to prenatal care during the first months of the pandemic⁷. An integrative review evidenced harm to gestational follow-up and difficulties in accessing health services⁸. In this context, the reduction of serological screening during pregnancy may have contributed to a greater number of undiagnosed maternal infections and to the absence of timely treatment, increasing the risk of vertical transmission. Considering that the probability of transmission and fetal severity vary according to the timing of gestational infection¹, temporary interruptions in prenatal follow-up may have contributed to the increase in notifications observed in subsequent years. Furthermore, clinical reports demonstrate that the pandemic context also hindered neonatal diagnosis and serological follow-up, illustrating how structural changes in health services can interfere with the diagnostic trajectory of cases⁹.

Regarding distribution by race/color (Figure 3), the brown population concentrated the highest proportion of cases throughout the analyzed period, representing 50.7% of national notifications. However, growth was observed in all race/color categories, being proportionally more pronounced in the black population, with an increase of 289% between 2019 and 2024. Regionally, the Northeast concentrated the highest number of cases in the brown population, while the North region presented a proportionally higher participation of the indigenous population. These findings evidence important heterogeneity in the distribution of cases according to race/color and region, and should be interpreted considering possible classification biases, underreporting, and structural inequalities in access to health services.

Figure 3. Distribution of notified cases of congenital toxoplasmosis according to race/color in Brazil. Maringá, PR, Brazil, 2019–2024



The observed regional pattern reinforces the influence of social determinants of health on the distribution of the disease. National evidence demonstrates that

pregnant women's knowledge about congenital toxoplasmosis remains insufficient, especially among women with lower education and greater social

vulnerability¹⁰. The lack of information compromises basic preventive measures and reduces early seeking of prenatal care. In parallel, studies on educational strategies in the Unified Health System indicate that preventive actions aimed at toxoplasmosis are still heterogeneous and poorly systematized across different Brazilian regions¹¹.

Thus, the predominance of cases in the brown population and the proportionally more intense growth in the black population suggest that the increase in notifications presents a socially unequal distribution, reflecting differences in access to information, screening, and timely care. A relevant growth of records classified as ignored or blank was also observed, indicating partial fragility in the quality of notified information. Periods of health crisis can compromise the completeness of information systems due to care overload⁹. However, the maintenance of the proportion of laboratory confirmations throughout the historical series makes it unlikely that the increase in notifications is explained exclusively by inconsistencies in records. The findings suggest that the increase in notifications of congenital toxoplasmosis between 2019 and 2024 results from a multifactorial phenomenon, involving the expansion of diagnostic capacity, indirect repercussions of the pandemic on prenatal follow-up, and the persistence of structural inequalities in access to health services. These results reinforce the need to strengthen prenatal screening, qualify epidemiological surveillance, and expand educational strategies aimed at populations in greater situations of vulnerability.

The present study presents limitations inherent to the use of secondary data, including the possibility of underreporting, inconsistencies in the completion of variables, and heterogeneous quality of records among different regions of the country. Furthermore, the use of absolute numbers, without standardization by live births or reference population, limits direct comparisons of the magnitude of the observed growth between years and between regions. Finally, because it is an ecological study, it is not possible to establish causal relationships between the findings and the possible impacts of the COVID-19 pandemic, and the results are interpreted as associations observed at the population level.

Conclusion

The present study demonstrated an expressive and sustained increase in notifications of congenital

toxoplasmosis in Brazil between 2019 and 2024. The growth was 151% in the analyzed period, with more evident acceleration from 2022 onward and maintenance of a high number of cases until 2024. The annual mean of notifications in the 2022–2024 triennium was 107% higher than that observed in the pre-pandemic period, evidencing a consistent change in the profile of notifications at the national level.

The maintenance of lethality at stable levels (0.66% in 2019 and 0.54% in 2024), associated with the absolute growth of laboratory confirmations and the increase in the number of cures, suggests that the expansion of diagnostic capacity, including the gradual expansion of neonatal screening strategies after Law No. 14,154/2021, has contributed significantly to the increase in notifications. These findings indicate that the observed growth does not, in isolation, represent a worsening of the epidemiological situation, but probably reflects greater identification of previously underdiagnosed cases.

However, the magnitude and distribution of this growth suggest a multifactorial phenomenon. The indirect repercussions of the COVID-19 pandemic on serological screening in prenatal care and the continuity of gestational care may have contributed to maternal infections not timely diagnosed, with possible reflections on vertical transmission in subsequent years. Furthermore, the increase occurred heterogeneously, highlighting the greater proportional growth in the Northeast (+276%), the predominance of cases in the brown population (50.7%), and the greater relative increase in the black population (+289%), evidencing the influence of structural inequalities in the distribution of the disease.

The results reinforce the need to strengthen public policies for maternal and child health, with emphasis on qualifying prenatal care, consolidating neonatal screening as an early detection strategy, improving the quality of epidemiological records, and expanding educational actions aimed at populations in situations of greater vulnerability. The integration between epidemiological surveillance, prenatal care, and health equity constitutes a fundamental element for confronting congenital toxoplasmosis in Brazil.

Future studies using standardized rates, analysis by live births, and analytical designs may contribute to better understanding the determinants of the observed increase and support more effective strategies for the prevention and control of congenital toxoplasmosis in the country.

References

1. Dubey JP, Murata FHA, Cerqueira-Cézar CK, Kwok OCH, Yang YR, Su C, et al. Congenital toxoplasmosis in humans: an update of worldwide rate of congenital infections. *Parasitology*. 2021;148(12):1406-16. <https://doi.org/10.1017/S0031182021001013>
2. Sociedade Brasileira de Pediatria (SBP). Novo documento da SBP aborda a toxoplasmose congênita [Internet]. São Paulo: SBP; 2022 [citado em 12 maio 2025]. Disponível em: <https://www.sbp.com.br/imprensa/detalhe/nid/novo-documento-da-sbp-aborda-a-toxoplasmose-congenita/>
3. Melo WS, Malta DC, Bernal RTI, Szwarcwald CL, Silva AG, Barros MBA, et al. Prevalência e fatores associados à realização dos exames de triagem neonatal no Brasil: comparação da Pesquisa Nacional de Saúde 2013 e 2019. *Cienc Saude Colet*. 2024;29(6):e10482023. <https://doi.org/10.1590/1413-81232024296.10482023>



4. Fabri ER, Salci MA, Meirelles BHS, Lentsck MH, Baldissera VDA, Mathias TAF, et al. Prevalência e fatores associados à realização de exames pré-natais na pandemia de COVID-19: um estudo transversal. *Esc Anna Nery*. 2024;28:e20230009. <https://doi.org/10.1590/2177-9465-EAN-2023-0009>
5. Brasil. Lei nº 14.154, de 26 de maio de 2021. Altera a Lei nº 8.069, de 13 de julho de 1990, para aperfeiçoar o Programa Nacional de Triagem Neonatal, por meio do estabelecimento de rol mínimo de doenças a serem rastreadas pelo teste do pezinho. *Diário Oficial da União*. 27 maio 2021; Seção 1:1.
6. Brasil. Ministério da Saúde. Departamento de Informática do SUS (DATASUS). TabNet [Internet]. Brasília: Ministério da Saúde; 2022 [citado em 5 maio 2025]. Disponível em: <https://datasus.saude.gov.br/>
7. Chisini LA, Costa FS, Sartori LR, et al. Impact of the COVID-19 pandemic on prenatal, diabetes and medical appointments in the Brazilian National Health System. *Rev Bras Epidemiol*. 2021;24:e210013. <https://doi.org/10.1590/1980-549720210013>
8. Santos WCF, Oliveira RR, Silva JMB, et al. O impacto da pandemia de COVID-19 na saúde materna de gestantes no Brasil: uma revisão integrativa. *Res Soc Dev*. 2022;11(13):e258111335334. <https://doi.org/10.33448/rsd-v11i13.35334>
9. Dao VTV, Roux D, Matys J, et al. First description of congenital toxoplasmosis after maternal coinfection with *Toxoplasma gondii* and severe acute respiratory syndrome coronavirus 2: a case report. *J Med Case Rep*. 2023;17:121. <https://doi.org/10.1186/s13256-023-03855-8>
10. Araújo ECS, Almeida RCS, Santos LPS, et al. Relevância clínica do conhecimento acerca da toxoplasmose congênita por parte das gestantes. *Rev Eletrônica Acervo Saúde*. 2024;24(9):e16962. <https://doi.org/10.25248/REAS.e16962.2024>
11. Teixeira CC, Ferreira TMS, Lima JF, et al. Prevenção da toxoplasmose congênita através da construção de cartilha educativa para promoção da saúde em gestantes. *Interfaces Cienc Saude*. 2022;1(1):e4484. <https://doi.org/10.47385/interfaces.4484.1.2022>

