

Systematic Screening for Toxoplasmosis in Pregnancy in Portugal: Evidence or Tradition?

Rastreio Sistemático da Toxoplasmose na Gravidez em Portugal. Evidência ou Tradição?

Francisca Grilo¹, Mónica Centeno², Luísa Pinto³

Faculdade de Medicina da Universidade de Lisboa

Abstract

The relevance of systematic toxoplasmosis screening during pregnancy remains controversial. This narrative review assesses the current Portuguese screening strategy against established and contemporary screening principles. Available surveillance data suggest a low documented burden of congenital toxoplasmosis, although its true incidence remains uncertain. Evidence supporting the effectiveness of prenatal treatment in reducing vertical transmission or severe congenital disease is limited and inconsistent. Repeated screening also entails substantial healthcare resource use, while its cost-effectiveness in Portugal remains uncertain. Overall, current evidence raises important questions regarding universal screening and supports strengthening primary prevention, targeted screening in defined high-risk situations, and national surveillance.

Keywords: Toxoplasmosis; Congenital toxoplasmosis; Pregnancy; Universal screening; Prenatal treatment.

Resumo

A pertinência do rastreio sistemático da toxoplasmose durante a gravidez permanece controversa. Esta revisão narrativa avalia a atual estratégia de rastreio em Portugal à luz dos princípios de rastreio. Os dados disponíveis sugerem baixa incidência de toxoplasmose congénita, embora a verdadeira incidência permaneça incerta. A evidência relativa à eficácia do tratamento na redução da transmissão vertical ou da doença congénita grave é limitada e inconsistente. O rastreio implica consumo considerável de recursos de saúde, permanecendo incerta a sua relação custo-eficácia em Portugal. Globalmente, a evidência atual suscita questões importantes sobre o rastreio universal e apoia o reforço da prevenção primária, do rastreio em situações de risco e da vigilância nacional.

Palavras-chave: Toxoplasmose; Toxoplasmose congénita; Gravidez; Rastreio universal; Tratamento pré-natal.

INTRODUCTION

Toxoplasmosis is an infection caused by the parasite *Toxoplasma gondii*. Several genotypes of this agent have been identified, with genotypes II and III being the most prevalent in Europe. These are generally associated with lower pathogenicity.

The life cycle of *Toxoplasma gondii* begins with the cat, the only definitive host. The oocysts shed in cat feces are not sporulated and therefore not infectious.

After undergoing sporulation in the environment, the oocysts become infectious. They may contaminate water, soil, or certain food products, which can then be

1. Dr., Graduated from Faculdade de Medicina da Universidade de Lisboa in 2026.

2. Dr., Departamento de Obstetria, Ginecologia e Medicina da Reprodução, ULS Santa Maria; Faculdade de Medicina da Universidade de Lisboa.

3. Professor, Departamento de Obstetria, Ginecologia e Medicina da Reprodução, ULS Santa Maria; Faculdade de Medicina da Universidade de Lisboa.

ingested by intermediate hosts, including humans. In these intermediate hosts, the parasite can form tissue cysts in organs such as the muscles and the brain, where it remains in a latent state.

During infection, the parasite progresses through several intracellular stages. These include tachyzoites (the rapidly replicating form, capable of damaging the central nervous system) and bradyzoites (the latent form within cysts). The transition from one stage to the other takes approximately three weeks. This transformation allows the parasite to establish chronic infections and to spread between hosts, posing a significant threat to pregnant women and other immunocompromised individuals, such as HIV-positive patients^{1,2}. It is important to highlight that the bradyzoite stage is not susceptible to antiparasitic drugs. Consequently, there is only a narrow therapeutic window of about three weeks to act effectively against the tachyzoite stage through the administration of antiparasitic agents³.

The main risk factors for *Toxoplasma gondii* infection include the consumption of raw or undercooked meat, ingestion of food (such as raw vegetables) or water contaminated with cat feces containing sporulated oocysts, and inadequate hand hygiene after handling soil or contact with cats⁴.

When the infection is acquired during pregnancy, vertical transmission is possible. It is known that the rate of vertical transmission increases as pregnancy progresses. The protective role of the placenta is most effective during the first trimester. As placental vascularization increases, the placental barrier becomes more permeable, allowing greater passage of parasites. It is also known that parasitic transmission occurs in approximately 30% of cases during the second trimester and in 60-70% of cases during the third trimester⁵. However, the severity of fetal infection decreases as pregnancy advances. During the first and second trimesters, infection may lead to spontaneous abortion or result in neurological defects or ocular lesions, whereas in the later weeks of gestation, manifestations are generally less severe or absent⁵.

In Portugal, systematic screening for toxoplasmosis during pregnancy is performed through serological testing. It is conducted in the first trimester (IgG and IgM)

for all pregnant women, and in the second and third trimesters for seronegative women.

Controversy persists regarding systematic screening across different countries. According to the Annual Epidemiological Report for 2021, countries such as France, Austria, Slovakia, Slovenia, Belgium, and Greece implement mandatory screening in the first trimester, with subsequent assessments for seronegative pregnant women, usually on a monthly basis. However, countries including Denmark, Estonia, Iceland, Ireland, Malta, the Netherlands, Norway, and Sweden do not have national systematic screening, testing only pregnant women with suspicious findings. Similarly, in the United States, Canada and the United Kingdom universal screening is not recommended, being indicated only in cases of clinical suspicion, that is, when the pregnant woman presents symptoms or has significant exposure. Instead, counseling and prevention are emphasized. There are also countries such as Bulgaria, the Czech Republic, Germany, and Hungary, where screening is voluntary and offered only in very specific contexts or locations, without national obligation. The burden of this form of the disease in the EU/EEA cannot be accurately assessed due to substantial differences between national surveillance systems, screening programs, and follow-up procedures for pregnant women⁶. Certain ultrasound findings may suggest *Toxoplasma gondii* infection, including microcephaly, hyperechogenic nodular foci, periventricular abscesses, ventriculomegaly, hyperechogenic bowel, hepatosplenomegaly, and ascites. However, infection can also occur without any detectable ultrasound changes⁷.

The signs and symptoms most frequently associated with congenital toxoplasmosis are intracranial calcifications, hydrocephalus, and chorioretinitis, which may result in cognitive deficits and vision loss. Infection during pregnancy can also lead to auditory, hepatic, and cardiac abnormalities, and may result in spontaneous abortion⁸.

OBJECTIVES

The aim of this article is to assess the relevance of systematic screening for toxoplasmosis during pregnancy in Portugal at the present time.

MATERIALS AND METHODS

Given the objective of critically discussing the Portuguese screening strategy within the framework of established screening principles, this article followed a narrative review.

A literature search was performed in PubMed/MEDLINE, the Cochrane Library and relevant guideline repositories (including ACOG, SOGC, UK National Screening Committee and ECDC publications) up to December 2025. Search terms included combinations of “toxoplasmosis”, “congenital toxoplasmosis”, “pregnancy”, “universal screening” and “prenatal treatment”.

Publications were assessed for relevance according to the predefined objectives of the review, with particular emphasis on epidemiological burden, maternal screening strategies, prenatal treatment effectiveness, screening test performance, prevention, economic considerations and recommendations from professional and public health organisations. Preference was given to systematic reviews, cohort studies, clinical guidelines and official epidemiological reports. Studies published in English, French and Portuguese were included. Animal studies, studies not involving pregnancy, and publications not directly related to screening policy were excluded.

DISCUSSION

Screening refers to the identification of asymptomatic individuals at risk for a specific disease or in its early stages, enabling early diagnosis and intervention to prevent the disease or modify its natural course, thereby improving prognosis⁹.

When screening programs are designed to be implemented across the entire population or a numerically significant group, they must adhere to strict criteria. Although such programs can lead to early diagnosis and treatment, they may also cause harm, resulting in false diagnoses and incurring economic and psychological costs that may sometimes be unacceptable.

The classic Wilson and Jungner criteria, published in 1968, established the conditions under which a situation could be considered suitable for universal screening¹⁰. These criteria have undergone modifica-

tions by various organizations but remain largely relevant today. Indeed, more recent articles particularly emphasize the risk of “overscreening,” a potential trigger for anxiety and unnecessary interventions¹¹.

Each of these screening principles will be examined individually, considering the Portuguese context regarding systematic screening for toxoplasmosis during pregnancy:

The condition should constitute an important public health problem

The seroprevalence of toxoplasmosis varies greatly across different regions of the world, reaching up to 80% in tropical countries, 31% in France and falling below 10% in the United Kingdom^{12,6}. In Portugal, in 2018, the seroprevalence was approximately 20%, with decreasing values over the preceding three decades¹³. These results could suggest that, since most of the population is susceptible to this agent, the risk of infection would be high; however, epidemiological data does not support this assumption.

Regarding the incidence of infection during pregnancy, figures are equally heterogeneous, with France reporting 2/1,000¹⁴ and the United States around 0.2/1,000 births¹⁵. Congenital infection occurs in 1/10,000 births according to the New England Regional Newborn Screening Program, conducted between 1986 and 1992, of which fewer than 1/100,000 are symptomatic at birth and therefore have a high likelihood of developing severe sequelae¹⁶. Reinforcing this idea, an article refers that there were no published cases of congenital toxoplasmosis in Portugal until 2014¹⁷, and another article published in 2016 reported three cases of congenital toxoplasmosis per year¹³. According to the Surveillance Atlas of Infectious Diseases from ECDC, based on data provided by WHO and Ministries of Health of affected countries, in Portugal, there were 2 cases in 2021, 0 in 2022, 3 in 2023 and 2 in 2024¹⁸. No follow-up records of these cases are available.

It is important to emphasize that infection is not synonymous with disease: between 85 and 90% of infected individuals are asymptomatic and most will not develop severe sequelae. The remaining may present ocular or intracranial lesions, the significance of which is unclear⁵. In a prospective European study, only 6% of infected fetuses exhibited ultrasound abnormalities,

and 2% of the total showed severe neurological alterations or death¹⁹. In a multicenter study including 178 infected and 572 uninfected children, developmental and behavioral abnormalities at ages 3 to 4 were not more frequent in infected children, suggesting that treatment did not confound these findings²⁰.

Thus, available Portuguese data suggest a low documented burden of congenital infection by *Toxoplasma gondii*. These data should be interpreted as indicators of disease burden rather than precise estimates of incidence, because of differences in referral practices, diagnostic pathways and follow-up procedures.

Overall judgment: not fulfilled because currently available data suggest a low documented burden of disease.

There must be an established treatment recognized as effective for individuals with confirmed disease

Several studies have sought to evaluate the effects of treatment on vertical transmission and on the manifestations of congenital toxoplasmosis. In a prospective multicenter cohort study involving 1,208 pregnant women, no beneficial effect of the type or timing of prenatal treatment on vertical transmission could be demonstrated. The odds ratio (OR) for vertical transmission in treated versus untreated women was 0.57 (95% CI 0.27-1.17). No statistically significant difference was found between those treated with spiramycin and those receiving the pyrimethamine/sulfadiazine combination, with an OR of 1.1 (95% CI 0.63-1.91)²¹.

One of the most well-known works in this field is the SYROCOT study, a systematic review with individual data analysis from 20 cohort studies, including 1,438 pregnant women. This study assessed the rate of vertical transmission depending on whether treatment was initiated within 3 weeks of suspected infection or between 3 and 8 weeks. A reduction in vertical transmission was observed when treatment was initiated within 3 weeks of suspected infection (aOR 0.48, 95% CI 0.28-0.8). However, no difference was found in fetal manifestations among 550 fetuses/newborns who were infected and either treated or untreated *in utero* (aOR 1.1, 95% CI 0.61-2.02). Thus, this study provided only weak evidence for an association between early treatment and reduced risk of congenital toxoplasmosis²².

In 2005, a prospective study involving 13 European centers aimed to assess the efficacy of prenatal therapy on the clinical manifestations of congenital toxoplasmosis, particularly intracranial and ocular lesions. This study showed a reduction in the incidence of intracranial lesions only when treatment was initiated within 4 weeks of suspected maternal infection (<4 weeks: OR 0.28, 95% CI 0.08-0.75; >4 weeks: OR 0.76, 95% CI 0.35-1.59). Regarding ocular lesions, no differences were found with respect to the timing or type of treatment²³.

Finally, another prospective study including 293 newborns found that prenatal treatment reduced the risk of severe neurological disease (OR 0.24, 95% CI 0.07-0.71). The number needed to treat to prevent one case was 3 (95% CI 2-15) following maternal seroconversion at 10 weeks, and 18 (95% CI 9-75) at 30 weeks, with no differences between spiramycin and pyrimethamine/sulfadiazine. However, the authors caution that these results should be interpreted carefully, given the small sample size and uncertainty regarding the timing of seroconversion¹⁹.

Therefore, while observational studies have reported a potential reduction in severe neurological outcomes following prenatal treatment, the evidence is not yet robust enough to confirm a consistent and significant benefit across populations. Any potential therapeutic benefit appears to depend on very early diagnosis and treatment initiation, often within three weeks of maternal infection, which may be difficult to achieve in routine clinical practice.

Overall judgement: partially fulfilled, given the possibility of benefit but lack of robust evidence.

Facilities and resources for diagnosis and treatment should be available

Since diagnosis is based on serology and treatment is carried out in an outpatient setting, this requirement is fulfilled.

Overall judgement: fulfilled.

The condition should have a recognizable latent or early symptomatic stage

As this is usually an asymptomatic disease, or one with very nonspecific symptoms, there is no identifiable latent or early symptomatic stage that would allow for timely detection³.

Although serological testing can detect maternal infection before fetal or neonatal manifestations become apparent, serological detectability should not be equated with a recognizable latent or early symptomatic stage of clinically significant disease. Therefore, the condition does not have a sufficiently recognizable early clinical stage.

Overall judgement: not fulfilled.

There should be a suitable test or examination for screening

Screening for toxoplasmosis relies on serological tests for the detection of Immunoglobulin G (IgG) and Immunoglobulin M (IgM). Although IgG is classically associated with past infection and IgM with acute infection, in practice, IgM may remain positive for years, complicating the interpretation of serology. In such cases, IgG avidity testing can be used, although low avidity may also persist in long-standing infections. Moreover, false-positive IgM results may occur due to cross-reactivity with other pathogens, which can generate significant anxiety and lead to unnecessary exposure to treatment²⁴.

Ideally, samples should be referred to specialized reference laboratories, although this is not always feasible in practice.

Overall judgement: Partially fulfilled.

The test should be acceptable to the population

As it consists of a peripheral venous blood draw, the test is generally well accepted by pregnant women. However, in cases of suspected fetal infection, confirmation may require an amniocentesis to detect the presence of *Toxoplasma gondii* DNA in the amniotic fluid. This is an invasive procedure associated with a small but significant risk of complications, which may generate anxiety and reduce overall acceptance of the screening process. Therefore, while the initial serological test is simple and well tolerated, subsequent diagnostic steps may not be as readily acceptable.

Overall judgement: Fulfilled.

The natural history of the disease, including the progression from latent to symptomatic stages, should be adequately understood

As previously noted, this is typically an asymptomatic

disease, and its progression is not fully understood. Although the biological life cycle of *Toxoplasma gondii* is well established³, important uncertainties remain regarding the clinically relevant natural history of congenital toxoplasmosis. In particular, the relationship between the timing of maternal infection, the probability of vertical transmission, the occurrence and severity of fetal disease, and subsequent long-term clinical outcomes is not fully predictable.

Overall judgement: Not fulfilled.

There should be consensus regarding who should receive treatment

According to the literature and given the lack of robust evidence on the effectiveness of therapy – both in reducing vertical transmission and in lessening the severity of neonatal disease – there is controversy about who should be treated and how.

Overall judgement: Not fulfilled.

The cost of screening, including diagnosis and treatment of individuals testing positive, should be economically balanced against potential healthcare expenses overall

No real cost-effectiveness studies on toxoplasmosis screening have been conducted in Portugal. However, the serology test for toxoplasmosis (IgG and IgM) costs approximately €20.66. Multiplying this by the number of births per year, which was 84 788 in 2024 (INE, 2025), results in an expenditure of about €1,751,720.08 for the first serology test. Adding two more tests for the 80% of pregnant women who are seronegative leads to a total annual cost of approximately €4,554,472.20 for this screening program.

This estimate does not include costs related to confirmatory testing, specialist consultations, amniocentesis, treatment, management of false-positive results, or long-term care of affected children.

Overall judgement: cannot be established based on currently available Portuguese evidence.

Screening should be a continuous process rather than a “once and for all” project

Adhering to this principle would place considerable logistical and financial demands on the healthcare system, since infection can occur at any time during

TABLE I. ASSESSMENT OF THE CURRENT PRENATAL TOXOPLASMOSIS SCREENING STRATEGY IN PORTUGAL ACCORDING TO THE WILSON AND JUNGNER CRITERIA AND CONTEMPORARY SCREENING PRINCIPLES.

Wilson and Jungner criterion	Application to prenatal toxoplasmosis screening in Portugal	Judgement
1. The condition should constitute an important public health problem.	Available ECDC surveillance data indicate a low documented burden of congenital toxoplasmosis in Portugal. However, the true incidence remains uncertain because of limitations in case ascertainment, reporting and surveillance.	Not fulfilled
2. There should be an established treatment recognised as effective for individuals with confirmed disease.	Prenatal treatment is available. However, evidence regarding its effectiveness in reducing vertical transmission or preventing severe congenital disease remains limited and inconsistent.	Partially fulfilled
3. Facilities and resources for diagnosis and treatment should be available.	Serological diagnosis, confirmatory testing, specialist assessment and prenatal treatment are available within the healthcare system.	Fulfilled
4. There should be a recognizable latent or early symptomatic stage.	Maternal infection is usually asymptomatic or associated with non-specific symptoms. Although infection can be detected serologically, this does not reliably identify pregnancies in which clinically significant congenital disease will develop.	Not fulfilled
5. There should be a suitable test or examination for screening.	IgG and IgM serology is widely available. However, IgM may persist for prolonged periods and false-positive results may occur, sometimes requiring specialised confirmatory testing.	Partially fulfilled
6. The test should be acceptable to the population.	Maternal serology is minimally invasive and generally acceptable. However, positive or uncertain results may lead to additional investigations, including amniocentesis, with associated anxiety and procedural risks.	Fulfilled
7. The natural history of the disease should be adequately understood.	Although the biological life cycle of <i>Toxoplasma gondii</i> is well established, important uncertainties remain regarding the relationship between maternal infection, fetal infection, disease severity and long-term outcomes.	Not fulfilled
8. There should be consensus regarding who should receive treatment.	Uncertainty remains regarding which women should receive treatment and the optimal treatment regimen, reflecting the limited and inconsistent evidence of therapeutic benefit.	Not fulfilled
9. The cost of screening, including diagnosis and treatment, should be economically balanced against potential healthcare expenses overall.	No formal cost-effectiveness analysis of antenatal toxoplasmosis screening has been performed in Portugal. The available cost estimate cannot be reliably weighed against health outcomes or cases prevented.	Cannot be established
10. Screening should be a continuous process rather than a “once and for all” project.	Because susceptible women may acquire infection at any point during pregnancy, screening requires repeated testing of seronegative women, with associated financial and organisational implications.	Not fulfilled

ECDC, European Centre for Disease Prevention and Control; IgG, immunoglobulin G; IgM, immunoglobulin M.

pregnancy. To be truly effective, screening would require frequent serological testing (ideally monthly) for all seronegative pregnant women, which would substantially increase both costs and implementation complexity.

Overall judgement: Not fulfilled.

For all the reasons outlined above and given evidence showing that prophylactic measures reduce the likelihood of maternal infection, we argue that

universal screening for *Toxoplasma gondii* in Portugal should be questioned²⁵. Considering universal screening of toxoplasmosis during pregnancy requires a thorough balance between preventing a small number of potentially severe cases and avoiding the costs and harms associated with large-scale screening, including false-positive results and overtreatment. However, selective screening should be performed preconceptionally and during pregnancy in women with: symptoms compatible with acute toxoplasmosis; suspicious fetal ultrasound findings; significant high-risk exposure history; immunocompromised pregnant women; women originating from regions with substantially higher prevalence²⁶. This position, based on scientific evidence, is supported by recommendations from international organizations such as the American College of Obstetricians and Gynecologists²⁷, the UK National Screening Committee²⁸ and the Society of Obstetricians and Gynaecologists of Canada²⁶, which do not recommend systematic screening for this condition.

Although the Wilson and Jungner criteria remain a useful framework, subsequent adaptations have placed greater emphasis on the balance between benefits and harms, evidence of programme effectiveness, cost-effectiveness, sustainability, and equity of access²⁹. Applying these broader principles to the Portuguese context raises similar concerns: the effectiveness of prenatal treatment in preventing clinically relevant congenital disease remains uncertain; the available Portuguese surveillance data suggest a low documented burden of congenital toxoplasmosis, although the true burden remains uncertain; the financial and organisational implications of repeated serological screening should be considered against the uncertain magnitude of the benefits that may be achieved, and any alternative strategy should ensure equitable access from counselling to treatment. Thus, the contemporary screening framework reinforces the need to reassess whether universal screening remains the most appropriate strategy in the Portuguese context.

The application of the Wilson and Jungner and more contemporary screening principles to prenatal toxoplasmosis screening is summarised in Table I.

To strengthen this study and support this proposal, it would be very important to have data from the National Obstetric Data Consortium, which includes

around 35% of the hospitals with maternity units in Portugal. This would allow for a clearer understanding of the true rate of *Toxoplasma* seroconversion in the country and provide updated information on the rate of congenital infections in recent years.

CONCLUSION

Available epidemiological data from Portugal suggest a low documented burden of congenital toxoplasmosis, although important uncertainties remain due to potential limitations in national surveillance and comprehensive registry data.

When assessed against the Wilson and Jungner screening principles and subsequent adaptations, several aspects of the current universal screening strategy warrant re-evaluation: evidence supporting prenatal treatment remains limited and inconsistent, the disease burden appears low, and the economic implications of repeated screening are substantial.

Taken together, these considerations raise important questions regarding the justification for universal toxoplasmosis screening during pregnancy in Portugal. Rather than supporting definitive abandonment of screening, the current evidence may favor a shift towards strengthened primary prevention measures, targeted screening in clearly defined high-risk situations, and improved national surveillance systems capable of accurately monitoring maternal seroconversion and congenital infection.

REFERENCES

1. Attias M, Teixeira DE, Benchimol M, Vommaro RC, Crepaldi PH, De Souza W. The life-cycle of *Toxoplasma gondii* reviewed using animations. *Parasit Vectors*. 2020;13(1):588.
2. Vilela VLR, Feitosa TF. Recent Advances in *Toxoplasma gondii* Infection and Toxoplasmosis. *Trop Med Infect Dis*. 2024;9(7).
3. Dunay IR, Gajurel K, Dhakal R, Liesenfeld O, Montoya JG. Treatment of Toxoplasmosis: Historical Perspective, Animal Models, and Current Clinical Practice. *Clin Microbiol Rev*. 2018;31(4).
4. Hassanen EAA, Makau DN, Afifi M, Al-Jabr OA, Abdulrahman Alshahrani M, Saif A, et al. Interplay between cross sectional analysis of risk factors associated with *Toxoplasma gondii* infection in pregnant women and their domestic cats. *Front Vet Sci*. 2023;10:1147614.
5. Bollani L, Auriti C, Achille C, Garofoli F, De Rose DU, Mero-ni V, et al. Congenital Toxoplasmosis: The State of the Art. *Front Pe-*

diatr. 2022;10:894573.

6. Annual Epidemiological Report for 2021. European Centre for Disease Prevention and Control; 2021.

7. Codaccioni C, Picone O, Lambert V, Maurice P, Pomar L, Wiener N, et al. Ultrasound features of fetal toxoplasmosis: A contemporary multicenter survey in 88 fetuses. *Prenat Diagn.* 2020;40(13):1741-52.

8. Cerisola A, Francia M, Gesuele JP. Congenital toxoplasmosis. *Semin Pediatr Neurol.* 2025;54:101203.

9. Nielsen C, Lang RS. Principles of screening. *Med Clin North Am.* 1999;83(6):1323-37, v.

10. Wilson JMG, Jungner G, World Health O. Principles and practice of screening for disease. Geneva: World Health Organization; 1968.

11. Bulliard JL, Chiolerio A. Screening and overdiagnosis: public health implications. *Public Health Rev.* 2015;36:8.

12. Welton NJ, Ades AE. A Model of Toxoplasmosis Incidence in the UK: Evidence Synthesis and Consistency of Evidence. *Journal of the Royal Statistical Society Series C: Applied Statistics.* 2005;54(2):385-404.

13. Gargaté MJ, Ferreira I, Vilares A, Martins S, Cardoso C, Silva S, et al. Toxoplasma gondii seroprevalence in the Portuguese population: comparison of three cross-sectional studies spanning three decades. *BMJ Open.* 2016;6(10):e011648.

14. Picone O, Fuchs F, Benoist G, Binquet C, Kieffer F, Wallon M, et al. Toxoplasmosis screening during pregnancy in France: Opinion of an expert panel for the CNGOF. *J Gynecol Obstet Hum Reprod.* 2020;49(7):101814.

15. Maldonado YA, Read JS. Diagnosis, Treatment, and Prevention of Congenital Toxoplasmosis in the United States. *Pediatrics.* 2017;139(2).

16. Hsu HW, Grady GF, Maguire JH, Weiblen BJ, Hoff R. Newborn screening for congenital Toxoplasma infection: five years experience in Massachusetts, USA. *Scand J Infect Dis Suppl.* 1992;84:59-64.

17. Lopes AP, Dubey JP, Dardé ML, Cardoso L. Epidemiological review of Toxoplasma gondii infection in humans and animals in Portugal. *Parasitology.* 2014;141(13):1699-708.

18. Surveillance Atlas of Infectious Diseases from ECDC

19. Cortina-Borja M, Tan HK, Wallon M, Paul M, Prusa A, Buffolano W, et al. Prenatal treatment for serious neurological sequelae of congenital toxoplasmosis: an observational prospective cohort study. *PLoS Med.* 2010;7(10).

20. Freeman K, Salt A, Prusa A, Malm G, Ferret N, Buffolano W, et al. Association between congenital toxoplasmosis and parent-re-

ported developmental outcomes, concerns, and impairments, in 3 year old children. *BMC Pediatr.* 2005;5:23.

21. Gilbert R, Gras L. Effect of timing and type of treatment on the risk of mother to child transmission of Toxoplasma gondii. *Bjog.* 2003;110(2):112-20.

22. Thiébaud R, Leproust S, Chêne G, Gilbert R. Effectiveness of prenatal treatment for congenital toxoplasmosis: a meta-analysis of individual patients' data. *Lancet.* 2007;369(9556):115-22.

23. Gras L, Wallon M, Pollak A, Cortina-Borja M, Evengard B, Hayde M, et al. Association between prenatal treatment and clinical manifestations of congenital toxoplasmosis in infancy: a cohort study in 13 European centres. *Acta Paediatr.* 2005;94(12):1721-31.

24. Montoya JG. Laboratory diagnosis of Toxoplasma gondii infection and toxoplasmosis. *J Infect Dis.* 2002;185 Suppl 1:S73-82.

25. Femicola F, Colciago E, Capitoli G, Merelli E, Arienti F, Polletti De Chaurand V, et al. Limited Knowledge of Toxoplasmosis-Specific Preventive Behaviors in Pregnant Women: A Survey Study in Northern Italy. *Int J Environ Res Public Health.* 2025;22(4).

26. Paquet C, Yudin MH. No. 285-Toxoplasmosis in Pregnancy: Prevention, Screening, and Treatment. *J Obstet Gynaecol Can.* 2018;40(8):e687-e93.

27. Practice bulletin no. 151: Cytomegalovirus, parvovirus B19, varicella zoster, and toxoplasmosis in pregnancy. *Obstet Gynecol.* 2015;125(6):1510-25.

28. External review against criteria set by the UK National Screening Committee. 2015.

AUTHOR CONTRIBUTIONS

FG – bibliographic research and writing of the first draft of the manuscript; MC – supervision and critical review of the manuscript; LP – original idea for the study, supervision and critical review of the manuscript.

CONFLICT OF INTEREST

The authors declare no competing interests nor financial support for this review.

CORRESPONDENCE TO:

Francisca Grilo

E-mail: franciscagpgrilo@gmail.com

<https://orcid.org/0009-0003-3654-6638>

RECEIVED: 28/10/2025

ACCEPTED: 07/09/2026