Bionatura Journal
Ibero-American Journal of Biotechnology and Life Sciences

Article

Toxoplasmosis in pregnant women in Guayaquil: Risk Factors and associated social Determinants of Health

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ABSTRACT

Toxoplasmosis is a zoonosis caused by the parasite Toxoplasma gondii; it has a complex life cycle, with a sexual phase in cats and an asexual phase in warm-blooded hosts, including humans. This research was conducted to determine the risk factors and social determinants of health in pregnant women diagnosed with toxoplasmosis at two health centers in Guayaquil, Ecuador. It was a descriptive, field-based, non-experimental, cross-sectional, and prospective study. It was developed using data collected through self-administered surveys in 2024. The 18-24 age group predominated (45.64%). Pregnant women between 13 and 24 weeks of gestation stood out (38.93%). They lived with cats (12.75%), cleaned the cat litter box without protection (23.48%), and came from rural areas (65.10%). Although 64.43% were aware of the disease and 52.35% knew how it was transmitted, a statistically significant association ($p < 0.05$) was found between infection and variables such as contact with cats and ethnicity. These results highlight the need to strengthen prevention strategies considering social and environmental factors, especially in warm urban contexts such as Guayaquil, where conditions favor the persistence of the parasite.

Keywords: gestational toxoplasmosis, risk marker, social determinants, congenital infection, Ecuador

INTRODUCTION

Toxoplasmosis is a zoonotic disease caused by the *Toxoplasma gondii* parasite. This microorganism has a complex life cycle involving a sexual phase in cats and an asexual phase in warm-blooded hosts, including humans [1-5]. Transmission occurs mainly through oocysts present in cat feces and tissue cysts in undercooked meat [3, 4]. Although usually harmless, toxoplasmosis can cause miscarriages and serious neurological and ocular sequelae in the human fetus if acquired during pregnancy due to the risk of vertical transmission. In newborns, it can manifest as chorioretinitis, hydrocephalus, and psychomotor retardation [1-4].

Toxoplasmosis is influenced by social determinants of health (SDH), which the World Health Organization defines as the socioeconomic conditions in which people are born, grow up, live, are educated, work, and age

[5-7]. In contrast, a risk factor is defined as a condition or behavior susceptible to change that increases the likelihood of an adverse health event [5, 6, 8–10].

In global terms, seroprevalence of toxoplasmosis varies significantly by region. Salari et al. (2025)[10] indicate that South America has the highest global prevalence of toxoplasmosis in pregnant women, at 52.8%. This is followed by Africa, at 46.8%; Europe, at 24.6%; and North America, which has the lowest seroprevalence, at 19.7%.

In Latin America, toxoplasmosis has a high incidence in pregnant women, with an average of 56.2% [11]. The prevalence of this parasitic disease is mainly considered to be a multifaceted condition of social influences, determinants, and risk factors associated with a lack of knowledge about the disease, housing conditions, consumption of raw or poorly washed food, and living with cats, among other issues [10-13]. In countries such as Brazil, which has particularly high rates of congenital toxoplasmosis that may exceed those reported in different regions of the Americas and the Western Pacific [14-17], various studies have also shown that there is a positive relationship between congenital toxoplasmosis and factors such as social vulnerability index, low health coverage, poor prenatal care, risky eating habits, lack of drinking water, low socioeconomic and educational levels, inadequate housing, and limited access to timely diagnosis and treatment [14,16,17].

In Ecuador, toxoplasmosis in pregnant women represents a significant public health challenge [9,18-24]. Studies conducted in provinces such as Pichincha and Guayas report seroprevalence rates of *T. gondii* exceeding 70% in pregnant women, especially during the first trimester of pregnancy. In this regard, some provinces in the country have reported that the agent that causes toxoplasmosis can remain latent in pregnant women during the first trimester of pregnancy. This fact has been reported in provinces such as Pichincha (71.4% of 140 pregnant women), El Oro (16% of 250), and Guayas (73% of 5,683)[20]. The risk factors identified were consumption of undercooked meat, living with young cats, and climatic conditions that can favor the spread of oocysts [20].

Studies conducted in Guayaquil indicate that the prevalence of antibodies against *T. gondii* in adults is estimated at 74%, while in those under 20 years of age it reaches 50%. In addition, the risk of congenital transmission is estimated at 1.8 per thousand inhabitants, representing approximately 106 cases per year. Of these, 65% would be asymptomatic and 35% would present clinical manifestations [9].

Some other important aspects to consider are that in Ecuador, toxoplasmosis in pregnant women represents a public health problem due to its potential impact on the fetus and the mother, becoming a cause for concern because there is insufficient information on the risk factors and health determinants that may influence the incidence and management of this disease, all of this, coupled with the fact that in 2013, the disease was no longer reported in daily morbidity records [20, 24], resulting in a lack of knowledge about the true situation regarding the prevalence of infection. Certain aspects, such as socioeconomic status, education, housing conditions, and access to health services, can play a key role in exposure to the *T. gondii* parasite and in the prevention of complications. Therefore, this study seeks to identify pregnant women who have the infection, characterize the context in which they live, and prioritize the conditions that allow transmission. In this way, with the results obtained, useful information can be generated that allows for early recognition of the environment where the parasite develops, to prevent neonatal complications, spontaneous abortions, and congenital malformations, benefiting mothers and the general population.

This research was conducted to determine the risk factors and social determinants of health in pregnant women with toxoplasmosis at two health centers in Guayaquil, Ecuador.

MATERIAL AND METHODS

This was a descriptive, field-based, non-experimental, prospective, cross-sectional study. It was developed using collected data through surveys during 2024 at two health institutions located in the city of Guayaquil, Ecuador. The surveys were conducted at a high-complexity hospital (IESS) in Ceibos and at a Class C health center (MSP) that offers prenatal care. Both belong to the country's public health sector.

From a population of 242 pregnant women residing in the province of Guayas, based on the inclusion criteria, a representative sample of 149 pregnant women with toxoplasmosis was taken. Non-probabilistic sampling was used, since the participants were selected according to specific criteria, i.e., it was a random selection, whose participation criteria were: being pregnant, receiving care at one of the two health centers where this research was conducted, and having consented to participate after providing informed consent. An instrument was designed to collect the information, which was validated by the Human Research Ethics Committee of the University of Guayaquil, as a subproject of the project entitled: Comparative study of IgG and IgM antibody levels in pregnant teenagers and women of childbearing age (code CEISH-UG 008).

The data collection technique was a survey, structured into sections to obtain data from a representative sample of the population. The survey was conducted by sixth-semester medical students from the Infectious Diseases Department at the University of Guayaquil, in conjunction with the researchers participating in the project. The survey allowed for the systematic collection of information on the variables included in the study's specific objectives. The structured instrument was based on sections focused on: the identification of risk factors, analysis of social determinants, and assessment of the level of knowledge about toxoplasmosis. The questionnaire was structured logically and coherently to facilitate data interpretation and analysis, following established guidelines.

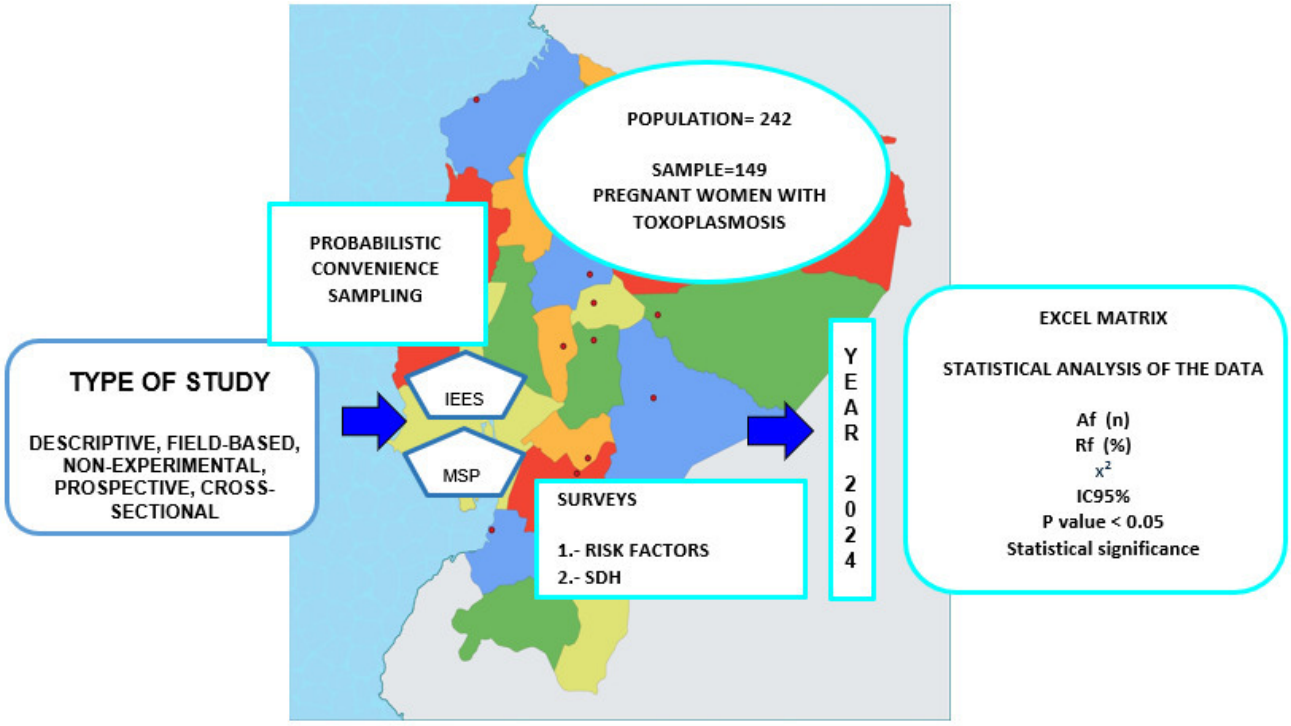

Figure 1. Toxoplasmosis: Work methodology. SDH: Social Determinants of Health. Af: Absolute frequencies. Rf: Relative frequencies

Statistical analysis was performed using Microsoft Excel, which allowed the data to be organized into a matrix for coding and classification. A univariate analysis was then performed, including absolute and relative frequencies for categorical variables. Descriptive statistics were also performed using the Chi-square (χ^2) test for categorical variables to assess risk factors and *T. gondii* infection. A p-value <0.05 indicated statistical significance for all variables (Figure 1). Results were presented in tables and graphs. Radar graphs were used to compare quantitative variables and to visualize which variables were most similar and decisive in determining the most prevalent risk factors and determinants. These results allowed for a clear interpretation aligned with the study's objectives.

RESULTS

Table 1, indicates the risk factors identified in the study population. The most notable variables were the age group 18-24 years (n=68; 45.64%), women with 13-24 weeks of gestation (n=58; 38.93%), rural origin (n=97; 65.10%), and in relation to occupation, most were dedicated to housework (n=33; 22.14%). Regarding the presence of animals in the home, (n=48; 32.21%) had contact with animals and (n=19; 12.75%) had direct contact with cats. The cleaning of cat litter boxes was also analyzed, with (n=35; 23.48%) reporting not using protection when doing so. Concerning the home floor, (n=39; 26.17%) reported having a dirt floor. Furthermore, responses highlighted that (n=16; 10.73%) consumed unwashed food and (n=47; 31.54%) ate raw meat. The chi-square test revealed a statistically significant association with the variable "direct contact with cats" (p<0.05).

Risk factors			Af (n)	Rf (%)	X^2	P <0.05
Age (years)	12-17		14	9.39	-	-
	18-24		68	45.64		
	25-34		49	32.89		
	35-44		17	11.41		
	45-59		1	0.67		
Weeks of gestation	1-12		33	22.14	-	-
	13-24		58	38.93		
	25-36		42	28.19		
	37-40		16	10.75		
Place of origin	Rural		97	65.10	2	0.1573
	Urban		52	34.90		
Occupation	Merchant		25	16.77	1	0.3175
	Domestic worker		16	10.33		
	Secretary		17	11.44		
	Professor		11	7.38		
	Teacher		22	14.76		
	Hairdresser		7	4.69		
	Housework		33	22.14		
	Unemployed		18	12.08		
Presence of animals	Contact with animals	Yes	48	32.21	2	0.1573
		No	101	67.78		
	Direct contact with cats	Yes	19	12.75	3.66	0.05
		No	130	87.24		
	Cat litter box	Yes	35	23.48	2	0.1573

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	cleaning	No	114	76.51		
Housing characteristics	Dirt floors	Yes	39	26.17	2	0.1573
		No	110	73.82		
Food consumption	Consumption of unwashed food	Yes	16	10.73	2	0.1573
		No	133	89.26		
	Consumption of raw meat	Yes	47	31.54	2	0.1573
		No	102	68.45		

Table 1. Toxoplasmosis. Risk factors identified in the study

Table 2 shows the social determinants of health in pregnant women with toxoplasmosis. In terms of the environment, the temperature and humidity of the city of Guayaquil were considered, with the minimum temperature being 21°C and the maximum 31°C; while the minimum relative humidity was 54% and the maximum 95%. Regarding genetic determinants, the predominant ethnic group was mestizo (n=113; 75.84%), blood type O+ was the most prevalent (n=68; 45.64%), and high blood pressure was the most relevant hereditary condition (n=41; 27.51%). As for lifestyle, the highest frequency in terms of education was obtained in the group with completed secondary school (n=70; 46.98%), and the middle (n=107; 71.81%) and low (n=34; 22.81%) socioeconomic levels predominated. In addition, positive responses stood out regarding knowledge of the disease and its transmission mechanism (n=96; 64.43% and n=78; 52.35%), respectively. The chi-square test revealed a statistically significant association with the determinant "ethnic group" ($p<0.05$).

Environment	Temperature	Min 21ºC ; Max 31ºC				
	Relative humidity	Min 54% ; Max 95%				
Genetic	Ethnic group		**Af (n)**	**Rf (%)**	**X^2**	**P<0.05**
		Mestizo	113	75.84	8.6	0.00336
		Afro-Ecuadorian	8	5.37		
		White	7	4.70		
		Indigenous	4	2.68		
		Montubio	17	11.41		
	Blood type	A+	33	22.15	0.4286	0.51269
		A-	3	2.01		
		B+	22	14.75		
		B-	3	2.01		
		O+	68	45.64		
		O-	8	5.37		
		AB+	12	8.05		
	Hereditary history	Hypertension	41	27.51	2.7143	0.09945
		Type 2 diabetes	36	24.16		
		Arthritis	8	5.36		
		Sickle cell anemia	3	2.01		
		Rh incompatibility	4	2.68		
		Cancer	26	17.44		
		No history	31	20.80		
Lifestyle	Education	Completed Primary school	2	1.34	2.2	0.13801

		Uncompleted Primary school	2	1.34		
		Completed Secondary school	70	46.98		
		Uncompleted Secondary school	24	16.11		
		Higher education	51	34.23		
	Socioeconomic level	High	8	5.37	1	0.31731
		Middle	107	71.81		
		Low	34	22.81		
	Knowledge about the disease	Yes	96	64.43	2	0.1573
		No	53	35.57		
	Knowledge of the transmission mechanism	Yes	78	52.35	2	0.1573
		No	71	47.65		

Table 2. Toxoplasmosis. Social determinants of health were identified in the surveyed population.

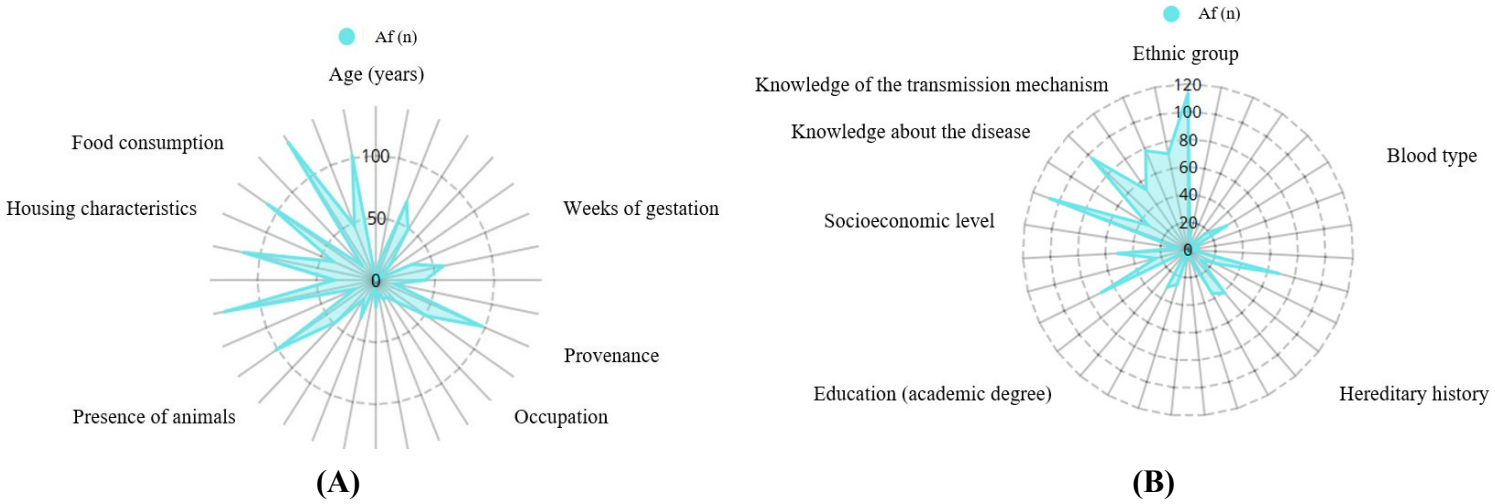


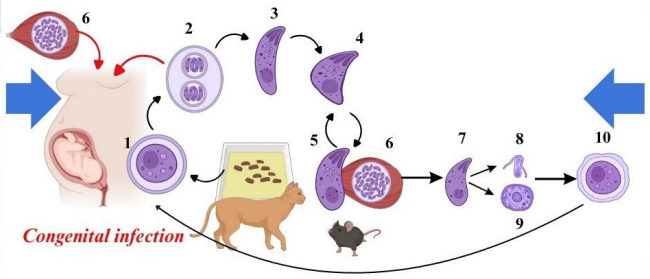
Figure 2. Radar graphs. (A): Risk factors identified in pregnant women with toxoplasmosis. (B): Social Determinants of Health identified in pregnant women with toxoplasmosis

Figures 2A and 2B represent radial or radar graphs that compare categorical variables with numerical ones. The central axis displays the absolute frequencies of the risk factors and social determinants of health that most influence the prevalence of *T. gondii* infection in the pregnant women interviewed. The risk factors and social determinants with peak frequencies nearest to the edge of the circle represent the variables that exert the greatest impact on the sample studied, that is, those that most influenced toxoplasmosis transmission in the pregnant women surveyed. Among the risk factors (Figure 2A), the highest values or peaks are observed on the left side of the figure, with food consumption standing out, as its peak is closest to the edge of the circle. This is explained by the fact that a high number of pregnant women (n=133) reported eating unwashed food and consuming undercooked or raw meat (n=102). Likewise, the presence of animals in the home, especially cats, was identified as a relevant risk factor (n=30). Figure 2B shows the variables classified among the social determinants of health that were most prevalent in pregnant women with toxoplasmosis. Among these, the ethnic group had the highest frequency, with mestizo women predominating, followed by montubio and afro-ecuadorian women (n=113; n=17; n=8). Another relevant determinant was socioeconomic level, which reached its highest value closest to the edge of the circle. Notably, the majority of respondents reported

belonging to the middle (n=107) and low (n=34) socioeconomic strata. In contrast, the other social determinants presented lower values, with peaks located further from the edge of the circle.

Figure 3 integrates two fundamental aspects in the analysis of gestational toxoplasmosis: biological and environmental risk factors, and the social determinants of health. The left panel shows the assessed risk factors (place of origin, weeks of gestation, occupation, exposure to animals, litter box cleaning, housing conditions, and consumption of raw or poorly washed food). Of these, only direct *contact with cats* showed a statistically significant association ($p<0.05$), confirming its role as a key epidemiological factor in the transmission of the parasite. The right panel presents the social determinants of health (educational level, socioeconomic status, knowledge of the disease, ethnic group, blood type, and hereditary history). The *mestizo and montubio* ethnic groups were the only ones that showed a significant association ($p<0.05$), suggesting that sociocultural factors also influence vulnerability to toxoplasmosis.

RISK FACTORS	STATISTICALLY SIGNIFICANT ASSOCIATION
Place of origin: Rural	X
From 13 to 24 weeks of gestation	X
Occupation: Domestic work	X
Direct contact with cats	✓
Exposure to animals	X
Cat litter box cleaning	X
House floors with dirt	X
Consumption of unwashed food and consumption of raw or undercooked meat	X



1. Non-sporulated oocyst
2. Sporulated oocyst
3. Sporozoite
4. Tachyzoite
5. Bradyzoite
6. Tissue cyst (filled with bradyzoites)
7. Merozoites
8. Microgametocyte
9. Macrogametocyte
10. Zygote

SOCIAL DETERMINANTS OF HEALTH	STATISTICALLY SIGNIFICANT ASSOCIATION
Educational level: Complete secondary education and higher education	X
Middle and low socioeconomic level	X
Knowledge of the disease and its transmission mechanism	X
Mestizo and Montubio ethnic group	✓
Blood type O+ and A+	X
Hereditary history: Hypertension Type 2 Diabetes Cancer No history	X

Figure 3. Statistically significant association between direct contact with cats and ethnic group, with the presence of gestational toxoplasmosis (P<0.05)

DISCUSSION

In the present study conducted in two health centers in Guayaquil, 22.81% of the pregnant women surveyed belonged to the low socioeconomic level, while 71.81% belonged to the middle level, with the predominant age ranges being 18-24 years (45.64%) and 25-34 years (32.89%). In this regard, Bahia-Oliveira et al. (2003)[25] conducted a study in Brazil, in a city located north of Rio de Janeiro, and found a seroprevalence of infection at 84% for the lowest socioeconomic level, compared to 63% and 23% seroprevalence for the middle and high socioeconomic level groups, respectively. They indicated that most people in the low socioeconomic level (84%) were 15 years old when they became infected, while those in the middle socioeconomic level were infected at the age of 20. The authors point out that this result could be due to a lack of water supply, as the poorest areas consumed unfiltered water. In contrast, in our study, the difference in seroprevalence and socioeconomic strata could be due to the accessibility of diagnosis in Brazil, which is aimed at the vulnerable population, unlike in Guayaquil, where women from middle socioeconomic strata are the ones who pay for the test.

The results of our study, which indicate that most infected women who attended these health institutions belonged to the lower-middle socioeconomic strata, are consistent with previous research highlighting the importance of socioeconomic factors and health determinants [25-27]. In particular, pregnant women from low

socioeconomic strata face significant barriers to accessing adequate medical care and preventive education about toxoplasmosis.

As for the origin of the pregnant women surveyed, 65.10% came from rural areas of the province of Guayas and 34.90% of urban regions. Condori-Sarzuri et al. (2020)[26] reported in their study on ocular toxoplasmosis in the department of Santa Cruz, Bolivia, prevalences of 57.6% in the urban population and 71.6% in the rural population, indicating that it is a public health problem that is difficult to solve due to the conditions that cause the prevalence of this disease, particularly the lack of basic sanitation. This is especially true in developing countries such as Bolivia, where there are no policies aimed at promoting diagnosis, prevention, and control, as well as in Ecuador, specifically in Guayaquil, where this research was conducted.

46.98% of the pregnant women who participated in the study reported having completed secondary education, and 34.23% had higher education. In addition, 64.43% had knowledge about the disease, and 52.35% knew how it was transmitted. However, all of them were infected with toxoplasmosis, which means that their level of knowledge about the disease and how it is transmitted did not prevent the women surveyed from becoming infected. Results from other studies conducted in Latin America, such as the one carried out by Chávez-Arévalo et al. (2022)[27] in Colombia, show that a low level of knowledge and insufficient practice of preventive measures are key factors in the increase in the incidence of toxoplasmosis in pregnant women. However, a high level of education and basic knowledge of the disease do not, on their own, guarantee the adoption of effective preventive practices. It is therefore essential to strengthen and standardize measures to prevent toxoplasmosis during pregnancy to avoid accidental exposure to the parasite in the environment.

The city of Guayaquil has social and economic conditions similar to those observed in other studies, such as those conducted in Manta, Quito, and El Empalme [18, 21, 22]. In these studies, poor hygiene in food handling, exposure to contaminated water, and direct contact with cats were identified as risk factors for T. gondii infection.

In this study, 10.73% of women reported consuming food without washing it first, and 31.54% consumed raw meat. It is important to note that seroprevalence in humans is influenced by anthropogenic factors, such as eating habits, meat cooking, hand-washing practices, vegetable cleaning, types of vegetables or meats consumed, among others[, 28-31]. However, this study did not assess the kind of vegetables or meat consumed by the surveyed population, an aspect that should be thoroughly evaluated in subsequent analyses. Pinto-Ferreira et al. (2019)[32], in their research on transmission patterns and sources of infection in human toxoplasmosis outbreaks, indicated that more attention should be paid to the production and disinfection of vegetables and to the quality of drinking and irrigation water. In addition, legislation should be created to monitor outbreaks of toxoplasmosis in order to eliminate transmission routes, with the aim of preventing exposure or inactivating the parasite before it is consumed.

Other determinants are economic, cultural, and social factors specific to the country and the context of the city of Guayaquil, such as water quality and environmental sanitation. Water is considered a very important source of human infection, especially in areas where the population consumes unfiltered water or recreational water, which leads to the ingestion of T. gondii oocysts[33-36]. Research conducted by Cárdenas-Sierra et al. (2023)[37] in northeastern Colombia on the risk factors associated with gestational toxoplasmosis indicates that the use of tap water to wash fresh fruits and vegetables increased the risk of toxoplasmosis, which has led to suggestions that the skin or peel of these foods should be removed to protect consumer health. These authors suggest conducting future studies to determine the role of drinking water and toxoplasmosis in Colombia.

On the other hand, it is important to note that, among all the pregnant women surveyed, 48 indicated that they had contact with animals, 19 of them had direct contact with cats (with statistically significant differences), and 35 cleaned litter boxes without protection. In this sense, environmental exposure, especially in women who live near animals, particularly cats, remains one of the main risk factors in the transmission of the parasite. As highlighted in the study by Bracho-Mora et al. (2022)[18], living with cats increases the risk of contracting toxoplasmosis, particularly if pregnant women have direct contact with the feces of these animals. In addition, other studies have also pointed to a significant association between living with cats and the risk of infection by the parasite [37].

In the city of Guayaquil, the maximum humidity reaches 95% and the average temperature ranges between 21 °C and 31 °C, conditions typical of humid tropical climates, which are associated with higher prevalences of toxoplasmosis. Environmental conditions are determinants for the survival of the parasite's oocysts, which explains the high prevalence of this disease in South American and African countries [34, 38-40]. Gangneux & Dardé (2012) report that external physical, chemical, and ecological factors, including climatic characteristics, influence the prevalence of toxoplasmosis cysts and oocysts in intermediate hosts. Areas with dry and warm climates are more unfavorable for the subsistence of the oocyst in felids and wild animals, and even in humans, they are associated with lower prevalences.

Another risk factor was occupation. In our study, among the 149 pregnant women surveyed, the majority (22.14%) reported being dedicated to housework, which could represent a determining risk factor if they live with cats and have certain housing conditions, such as dirt floors (26.17%). It is important to note that the concentration of oocysts in the environment must be identified to determine the risk they pose to health. In this regard, some research has shown that the land, sea, and oceans could be contaminated with T. gondii. In addition, the concentration of oocysts in the soil varies depending on geological and environmental characteristics, temperature, texture, and soil chemistry [38-40]. Under optimal conditions, oocysts can survive for approximately 4 years due to factors such as the presence of water or moisture, cold (but not freezing) temperatures, and sufficient oxygen, in addition to the high number of cats present in the area. All of this increases the likelihood of infecting all species [38].

Of the social determinants identified in this study, "genetics" and, among them, the "mestizo" ethnic group were indicated in 75.84% of pregnant women with toxoplasmosis, with statistically significant differences found. In this regard, in a study conducted in the United States, serological evidence of toxoplasmosis infection was determined with high frequency in Hispanic and Black individuals, or those born abroad with low educational attainment and socioeconomic status[28]. Similarly, Cortés et al. (2012)[29] indicate that the differences found in race or ethnicity are associated with the geographical and epidemiological factors in which the infection was acquired, rather than with the genetic characteristics of the host. However, in studies conducted in France, native women had a higher incidence of toxoplasmosis than women of Norwegian nationality[41].

Blood type was assessed in this study, considered a genetic social determinant of health. In our research conducted in Guayaquil, type O+ was the most common (45.64%), followed by A+ (22.15%); no statistically significant differences were found. Research exploring the relationship between the ABO blood group system and the presence of anti-T. gondii antibodies have reached contradictory conclusions. Some studies have found an association between infection with this parasite and blood groups B and AB, proposing the hypothesis that the B antigen could act as a potential receptor for *T. gondii*[42, 43]. However, other studies have found no evidence of such a link. One example is the study by Magboul et al. (2023)[44] conducted in pregnant women in Sudan, and determined that the ABO system has no relationship with the absence or presence of anti-T. gondii antibodies, observing that the factors most closely related to the presence of toxoplasmosis were contact with cat feces, consumption of raw meat, and agricultural activity.

The survey inquired about hereditary diseases reported by the pregnant women interviewed. In our research, high blood pressure, type 2 diabetes, and cancer had the highest percentages (27.51%, 24.16%, and 17.44%, respectively). In this regard, a relationship has been identified between genetic diversity in clinical samples from pregnant women with T. gondii and hereditary diseases associated with diabetes, HIV, and cancer [45].

Finally, it is essential to highlight that health education plays a key role in the prevention of toxoplasmosis in pregnant women [46-50]. The study by Merizalde-Mora, et al. (2025)[51] reports that health education programs on hygiene practices and the prevention of toxoplasmosis are effective in reducing the risk of infection. Similarly, research by Gavilán-Cabrera et al. (2023)[46] in Paraguay showed that more than 50% of women between the ages of 18 and 35 were unaware of key information about toxoplasmosis, including how it is transmitted and preventive measures. It was also found that there is a persistent misconception that the parasite is transmitted through cat hair, which highlights the need to strengthen health education among the general population. In this regard, it is necessary to implement community programs in health centers that inform pregnant women about appropriate prevention methods, such as hand washing, proper food handling, and the use of gloves when handling cats or contaminated soil. Health education is a key factor in breaking the cycle of transmission and improving health outcomes in this vulnerable group [47-52].

LIMITATIONS OF THE STUDY

The study may be biased, as it only included women who attended health centers, excluding those who do not have access to these services, and the fact that some data was obtained from the participants' recollections means there is a risk of errors in the information. On the other hand, measuring the social determinants of health posed another challenge, as some structural variables, such as poverty, overcrowding, or violence, were difficult to quantify accurately and may have been underestimated due to the sensitivity of the issues addressed. Finally, the multi-causal nature of toxoplasmosis and regional diversity limit the extrapolation of the results to other populations. Despite these limitations, the findings provide useful evidence on the social and behavioral factors associated with toxoplasmosis in women.

SUGGESTIONS FOR FUTURE RESEARCH

Consider that the size of the sample could limit the representativeness of the population studied and restrict the possibility of generalizing the results to other contexts in the country. Evaluate the feasibility of broader studies with mixed approaches.

CONCLUSIONS

A direct relationship was found between contracting the disease and contact with animals, especially cats, and the ethnicity of the surveyed population, most of whom came from rural areas and belonged to the lower-middle socioeconomic level or stratum.

The population's knowledge (level of education) is not linked to whether or not a person contracts the dis-ease, but they are at greater risk of contracting it if they live in cities with high temperatures and humidity, such as Guayaquil, where the parasite's oocysts are able to survive.

Conflicts of interest: The authors declare that they have no conflicts of interest.

Acknowledgements: The authors would like to thank the sixth-semester medical students in the Infectious Diseases course at the University of Guayaquil for their contribution to this research. They would also like to thank the patients for their support and attitude in achieving the objectives set out in this study.

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Received:14 July 2025 / **Accepte**d: 23 August 2025 / **Published:** 15 September 2025

Citation: Velásquez-Serra GC, Molleda-Martínez PM, Aguayo-Vera D. Toxoplasmosis in pregnant women in Guayaquil: Risk Factors and associated social Determinants of Health. Bionatura Journal 2025;2(3):17. doi: 10.70099/BJ/2025.02.03.17

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Peer review information. Bionatura thanks anonymous reviewer(s) for their contribution to the peer review of this work using https://reviewerlocator.webofscience.com/

ISSN.3020-7886

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