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Evaluating maternal knowledge and awareness of TORCH infections in primary health care facilities

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ABSTRACT

Background: TORCH infections, Toxoplasmosis, syphilis and other related disease organisms, Rubella, Cytomegalovirus, Herpes simplex virus, have long been recognized as the most common causes of unfavorable outcomes in pregnancy. These vertically transmitted infections can lead to miscarriage, stillbirth, congenital anomalies, and long-term disabilities in newborns. Awareness and early screening are crucial to minimize complications, yet information among pregnant women, especially in primary healthcare settings, remains limited. **Objective:** The purpose of this study was to evaluate the level of knowledge and awareness of TORCH infections in pregnant women attending the selected PHCs; and to investigate the socio-demographic determinants of the knowledge. **Methods:** A descriptive cross-sectional design was employed, involving 130 antenatal women selected through purposive sampling. Data were collected using a self-developed questionnaire consisting of 25 items assessing knowledge alongside socio-demographic information. Knowledge scores were categorized as poor (0–8), average (9–16), or good (17–25). Data analysis was performed with the Statistical Package for the Social Sciences (SPSS). **Results:** The findings indicated that 20.8% of the participants demonstrated poor knowledge, 46.2% had a moderate level of knowledge, while 33% showed good awareness of TORCH infections. Significant associations were found between knowledge scores and educational level, gravida status, and gestational age ($p < 0.05$), while diet type showed no significant correlation. **Conclusion:** A substantial proportion of antenatal mothers lacked adequate knowledge of TORCH infections. Strengthening antenatal education programs and integrating targeted health promotion interventions in PHCs are essential to improve maternal awareness and reduce TORCH-related complications.

Introduction

Pregnancy is a special physiological condition that is associated with significant hormonal, immunological, and metabolic changes. Such adaptations are crucial for enabling the viability of the fetus, but have the potential to render pregnant women are more susceptible to a wide range of infections, some of which bear marked consequences for both maternal as well as neonatal health [1,2]. Amongst these, TORCH infections—

comprising *Toxoplasma gondii*, other agents such as *Treponema pallidum*, Varicella-zoster virus, and Parvovirus B19, along with Rubella virus, Cytomegalovirus (CMV), and Herpes simplex virus (HSV)—are of particular concern, as maternal exposure can lead to serious congenital abnormalities. [3].

TORCH infections are acquired vertically, passing from the mother to her fetus via one of two routes, transplacental or per partum. [4]. There is

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usually minimal or no symptoms of infection in the pregnant patient, but fatal fetal outcomes such as spontaneous abortion, intrauterine growth restriction, congenital malformations, neurodevelopmental abnormalities, stillbirth, or neonatal death have been reported as a result of these infections. The severity of these consequences is predominantly related to gestational age at the place of infection, highest risk occurring with first-trimester infection [5,6].

TORCH threatening infections are associated with a serious risk to the fetus, although limited awareness and knowledge among pregnant women is very low [7]. PHCs are the cornerstone of maternal and child healthcare services in most developing nations. These centers offer important antenatal care such as follow-ups, immunizations, and health education [8]. With over half of pregnant women being seen at PHCs, it is a good vehicle to spread key information on infection prevention and control as the first point of contact for many pregnant women.

However, there is a dearth of information on awareness and knowledge about TORCH infections among the antenatal mothers who are availing the services from PHCs. An understanding of the status of knowledge is crucial for creating specific health-education materials, for the implementation of successful public health interventions, and for preventing congenital infections through timely and actionable preventive actions [9].

Globally, TORCH infections continue to pose a significant public health concern because of their often-asymptomatic course in mothers and their potentially devastating impact on newborns. The burden is more pronounced in low- and middle-income countries, where gaps in routine screening, limited health education, and restricted access to specialized care contribute to delayed detection and inadequate prevention [10]. Previous studies have highlighted that insufficient maternal awareness not only increases the risk of vertical transmission but also limits the effectiveness of timely interventions such as vaccination, early treatment, and counseling [11]. Strengthening antenatal education and integrating structured awareness programs into primary healthcare services are therefore essential steps to minimize preventable congenital infections and enhance the overall health outcomes of both mothers and children [12].

Hence, this study was carried out to assess the awareness and knowledge about TORCH infections among ante-natal mothers visiting few selected Primary Health Centers. Furthermore, it aims to be able to determine their associated socio-demographic characteristics and to offer evidence-based advice that can guide health program in improving maternal education in primary care.

Materials and Methods

Study Design

The research followed a descriptive cross-sectional design and was conducted according to the STROBE guidelines [www.equator-network.org].

Study Setting

The study was performed in some Primary Health Centers (PHCs) of Basrah in Iraq, between March and August 2025.

Sample and Sampling Technique

The study population included 130 pregnant women attending antenatal care who were selected using a non-probability purposive sampling technique. Those who attended antenatal clinic during the study period and consented to participate in the study were eligible to participate.

Data Collection Tool

A structured questionnaire was developed consisting of 25 items to assess knowledge about TORCH infections. The questionnaire included multiple-choice and yes/no questions covering areas of awareness, routes of transmission, risk factors, complications, and preventive measures. Content validity was confirmed by a panel of three experts. The questionnaire is provided as a supplementary file.

A self-structured questionnaire consisting of two sections:

- Section I: Socio-demographic data (age, education, gestational age, parity, etc.)

- Section II: Multiple-choice questions assessing knowledge of TORCH infections.

Each correct response was assigned a score of 1, while incorrect or “don’t know” answers were scored as 0. The overall knowledge score ranged from 0 to 25. A score of 0–8 indicated poor knowledge, 9–16 reflected average knowledge, and 17–25 represented good knowledge.

Knowledge Scoring

The participants were divided into three categories according to the overall score:

•Poor= 0–8 Average= 9–16
Good=17–25

Ethical Considerations

The present study was reviewed and approved by an ethic of the College of Medicine, University of Basrah. Verbal agreement was obtained from all subjects prior to entering the study. All participants were guaranteed the confidentiality of their data and only pseudonymized information was stored to ensure anonymity.

Data Analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS, version 26). Study findings were presented through descriptive statistics such as mean, standard deviation, and percentage distribution. Associations between knowledge categories and selected demographic variables were examined using Chi-square test, with a p-value less than 0.05 considered statistically significant.

Results

A total of 130 antenatal mothers participated in the study. The demographic analysis revealed that the majority of participants (53.9%) were aged between 20–30 years, while 32.3% were above 30 years and 13.8% were below 20 years. Regarding educational background, 45.4% had completed secondary education, 30.8% had attained higher secondary or college-level education, and the remaining 23.8 % had primary education or were illiterate.

Table 1. Demographic Characteristics of the Study Participants.

Variable		Frequency	Percentage (%)
Age Group	Age < 20	18	13.8
	Age 20–30	70	53.9
	Age > 30	42	32.3
Educational Status	Primary/Illiterate	31	23.8
	Secondary Education	59	45.4
	Higher/College Education	40	30.8
Gravida Status	Primigravida	53	40.8
	Multigravida	77	59.2
Dietary Pattern	Vegetarian	32	24.6
	Non-Vegetarian	98	75.4
Gestational Age	First Trimester	37	28.5
	Second Trimester	38	29.2
	Third Trimester	55	42.3

There was a statistically significant association between education level and knowledge

about TORCH infections ($\chi^2=48.57$, $p<0.001$). Women with higher education were more likely to have good knowledge compared to those with lower education.

There was a statistically significant association between gravida status and knowledge about TORCH infections ($\chi^2=31.05$, $p<0.001$). Multigravida women demonstrated better knowledge compared to primigravida women.

No statistically significant association was found between gestational age and knowledge about TORCH infections ($\chi^2=7.09$, $p=0.131$).

Table 5 shows the levels of knowledge spreading of TORCH infections among the 130 antenatal mothers participated in the study. As per our study, knowledge was poor (0–8 scores) in about 20.8% of the study participants. While a higher percentage, 46.2% had moderate knowledge (scores of 9–16), indicating incomplete knowledge but significant knowledge gaps. The population of respondents who had good knowledge (scores of 17–25) accounted for 33%, this suggests a fairly satisfactory good knowledge, 33% of respondents had adequate knowledge (scores ranged from 17–25) that could be considered as a relatively high level of awareness to health risks of TORCH.

Figure 1. Knowledge Levels about TORCH Infections

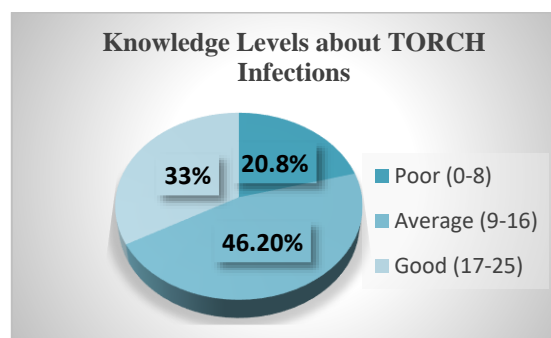
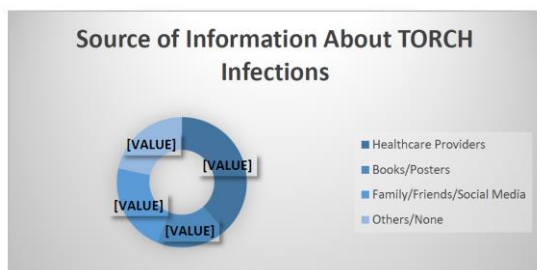


Table 6 presents the distribution of sources through which antenatal mothers received information about TORCH infections. The most commonly reported source was healthcare providers, cited by 38.5% of participants. This was followed by Family/Friends/social media (22.3%), and Books/Posters (17.7%). Notably, 21.5% of respondents reported either no source of information or unspecified/other sources.

Figure 2. Source of Information About TORCH Infections.

Awareness Level: 20.8% had poor knowledge, 46.2% had average knowledge, and 33% had good knowledge.

Source of Information: 17.7% learned about TORCH from books 38.5% from healthcare providers and the rest cited media or peers.

Statistical Findings

A statistically significant association was found between knowledge scores and education level, gravida, and gestational age ($p < 0.05$). No significant association was found with diet type.

Table 2. Association between education level and knowledge about TORCH infections among pregnant women.

Variable		Poor No.(%)	Average No. (%)	Good No.(%)	Total	p-value
Education	Primary/Illiterate	21 (67.7%)	6 (19.4%)	4 (12.9%)	31	0.000
	Secondary	7 (11.9%)	15 (25.4%)	37 (62.7%)	59	
	Higher/College	3 (7.5%)	6 (15.0%)	31 (77.5%)	40	

Table 3. Association between gravida status and knowledge about TORCH infections among pregnant women.

Variable		Poor No.(%)	Average No. (%)	Good No.(%)	Total	p-value
Gravida	Primigravida	28 (52.8%)	13 (24.5%)	12 (22.6%)	53	0.000
	Multigravida	10 (13.0%)	14 (18.2%)	53 (68.8%)	77	

Table 4. Association between gestational age and knowledge about TORCH infections among pregnant women.

Variable		Poor No.(%)	Average No. (%)	Good No.(%)	Total	p-value
Gestational Age	1st trimester	9 (24.3%)	13 (35.1%)	15 (40.5%)	37	0.131
	2nd trimester	5 (13.2%)	12 (31.6%)	21 (55.3%)	38	
	3rd trimester	7 (12.7%)	11 (20.0%)	37 (67.3%)	55	

Table 5. Knowledge Levels about TORCH Infections.

Knowledge Level	Frequency	Percentage (%)
Poor (0-8)	27	20.80%
Average (9-16)	60	46.20%
Good (17-25)	43	33%

Table 6. Sources of Information about TORCH Infections.

Source of Information	Frequency	Percentage (%)
Healthcare Providers	50	38.5%
Books/Posters	23	17.70%
Family/Friends/Social Media	29	22.30%
Others/None	28	21.50%

Discussion

The present study findings reveal a large gap in maternal awareness about TORCH infections among pregnant women at PHCs in Basrah, Iraq. Although 33% of the participants showed good knowledge, most of them had poor to fair information that is almost consistent with what was found in other Middle East countries. For instance, a study conducted in Saudi Arabia reported that awareness of cytomegalovirus (CMV)—one of the TORCH pathogens—was extremely low, with only 8.2% of women having heard about the infection, while the vast majority (over 90%) were unaware of its potential risks during pregnancy [13]. Similarly, other surveys from different regions of the Kingdom have highlighted poor knowledge regarding toxoplasmosis and rubella, despite high seroprevalence rates, emphasizing the critical gap between exposure risk and maternal awareness [14,15]. In Egypt, maternal knowledge regarding TORCH infections has also been shown to be limited. For example, a study in Al-Sharqia Governorate reported that although a considerable proportion of pregnant women had serological evidence of exposure to *Toxoplasma gondii* (36.7%) and other TORCH agents, nearly one-third (28.6%) were seronegative, reflecting both ongoing susceptibility and gaps in preventive awareness [16]. Another Egyptian survey highlighted that misconceptions and inadequate knowledge about congenital infections such as cytomegalovirus and toxoplasmosis were common among antenatal women, indicating that lack of awareness is not confined to Iraq but is a broader public health issue across the Middle East [17].

Our result shows that the mothers' level of education was a significant influence on the knowledge that agrees well with the result in some Middle East countries. For instance, in Iran, a study by Khademi et al. found that higher education was highly preventive of the awareness of congenital infections in women [18]. Similarly, low education has a direct relationship with mothers' knowledge of torch-related issues, as reported from Jordan. These findings support our findings and indicate that education may be a crucial factor in promoting awareness of maternal care in the Middle East [19]. Another key finding from our study was that most participants relied on health workers as their primary source of information—a promising insight, though one whose reliability may vary over time. In Egypt, a qualitative investigation of

pregnant women's health-information behaviors revealed that family members, peers, and friends are commonly turned to for advice—especially those who are currently pregnant or have recently delivered—via cell phones or face-to-face communication. Additionally, platforms like the internet and social media played a substantial role in daily information-seeking, highlighting the mixed reliability of informal channels [20]. In summary, the lack of awareness of TORCH throughout the Middle East is associated with several causes, including suboptimal awareness and preventive measures. In contrast, studies show that the country's antenatal screening reduces perinatal morbidity and mortality.

Limitations:

This study was limited by its cross-sectional design, relatively small sample size (130 women), and reliance on a self-reported questionnaire, which may have introduced reporting bias. Although the study was conducted in several PHCs in Basrah, the findings may not be generalizable to all pregnant women in Iraq.

Conclusion

Therefore, education should be enhanced in PHC antenatal setting on TORCH. The development and incorporation of TORCH awareness by PHC significantly reduce the problem with additional cultural appropriateness.

Conflict of interest

The authors state that they have no conflicts of interest to disclose.

Financial disclosure

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Data availability

The datasets generated and/or analyzed in this study can be obtained from the corresponding author upon reasonable request

Authors' contributions

Author 1: Conceptualization, study design, supervision, drafting of the manuscript, and final approval. Author 2: Data collection, questionnaire administration, field coordination, and drafting of the manuscript. Author 3: Data analysis, statistical

interpretation, literature review, critical revision, and drafting of the manuscript.

References

- Vinnars MT, Bixo M, Damdimopoulou P. Pregnancy-related maternal physiological adaptations and fetal chemical exposure. *Mol Cell Endocrinol* 2023; 578:112064.
- Soma-Pillay P, Nelson-Piercy C, Tolppanen H, Mebazaa A. Physiological changes in pregnancy. *Cardiovasc J Afr* 2016; 27(2):89–94. doi:10.5830/CVJA-2016-021.
- Jaan A, Rajnik M. TORCH Complex. [Updated 2023 Jul 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK560801/>
- McCluskey JM, Sato AI. Vertical Transplacental Infections. [Updated 2024 Aug 16]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK564336/>
- Megli CJ, Coyne CB. Infections at the maternal-fetal interface: an overview of pathogenesis and defence. *Nat Rev Microbiol* 2022; 20(2):67–82.
- Boushra M, Carlson K, Farci F. Antepartum Infections. [Updated 2025 Jun 2]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK560801/>
- Han L, Li R, Xiong W, Hu Y, Wu J, Liu X, et al. Prevalence of preconception TORCH infections and its influential factors: evidence from over 2 million women with fertility desire in southern China. *BMC Womens Health* 2023; 23(1):425.
- Mustafa A, Shekhar C, Shri N. A situation analysis of child delivery facilities at primary health centers (PHCs) in rural India and its association with likelihood of selecting PHC for child delivery. *BMC Health Serv Res* 2021; 21:1210.
- Devaraju M, Li A, Ha S, Li M, Shivakumar M, Li H, et al. Beyond TORCH: A narrative review of the impact of antenatal and perinatal infections on the risk of disability. *Neurosci Biobehav Rev* 2023; 153:105390.
- Neu N, Duchon J, Zachariah P. TORCH infections. *Clin Perinatol* 2015; 42(1):77–103. doi:10.1016/j.clp.2014.11.001.
- Adgoy ET, Elfatih M, Elhadi B, Zerizgie H, Said SM, Tekle F, et al. Seroprevalence of TORCH infections in women with spontaneous abortions and stillbirths. *Excell J Med Sci* 2024; 6(2):44–54.
- Lynn MK, Aquino MSR, Self SCW, Kanyangara M, Campbell BA, Nolan MS. TORCH congenital syndrome infections in Central America's Northern Triangle. *Microorganisms* 2023; 11(2):257.
- Almishaal AA. Knowledge of cytomegalovirus infection among women in Saudi Arabia: A cross-sectional study. *PLoS One* 2022; 17(9):e0274863. doi:10.1371/journal.pone.0274863.
- Ghazi HO, Telmesani AM, Mahomed MF. TORCH agents in pregnant Saudi women. *Saudi Med J* 2002; 23(4):464–467.
- Hazazi NA, Hakami AM, Bajawi SM. Seroprevalence of TORCH infections among women with spontaneous abortions in Jizan region, Saudi Arabia. *Egypt Acad J Biol Sci C Physiol Mol Biol* 2023; 14(2):81–90.
- El-Shahawy GY, El-Metwally AM, Fathy A. Seroprevalence of TORCH infections among pregnant women in Al-Sharqia Governorate, Egypt. *Bull Natl Res Cent* 2023; 47(1):38. doi:10.1186/s42269-023-01099-6.
- El-Kady AA, El-Sayed N, Abd El-Aziz S, Ismail TA. Toxoplasmosis among pregnant women in Egypt: Seroprevalence and risk factors. *East Mediterr Health J* 2005; 11(1–2):128–136.
- Khademi N, Shojaeian Z, Alizadeh A, Shojaeian S. Awareness of TORCH infections among women of reproductive age in Hamadan, Iran. *Womens Health Bull* 2019; 6(3):1–6. doi:10.5812/whb.87303.
- Obeidat BA, Amarin ZO, Al-Darby AM. Awareness of toxoplasmosis among pregnant women in Jordan. *J Chin Med Assoc* 2015; 78(9):574–578. doi:10.1016/j.jcma.2015.05.010.
- Mansour E. Egyptian pregnant women's health information needs and behaviour: A qualitative study. *Inf Dev* 2021; 39(4):891–901. (Original work published 2023).