WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Analysis on Prevalence of Typhoid Fever in Pregnant Women Attending Antenatal Clinics in Katsina Local Government Area, Katsina State

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ABSTRACT

This study investigates the analysis on Prevalence of Typhoid Fever in Pregnant Women Attending Antenatal Clinics in Katsina Local Government Area, Katsina State, between August 2023- January 2024. Retrospective approach was adopt to obtained data from federal teaching hospital Katsina Descriptive statistics and logistic regression analysis is used in the analysis and presentation of data in this study. Results of this study indicate that there is active transmission of Typhoid fever in the study area. These findings highlight the complex interplay of socio-demographic and clinical factors in determining the risk of typhoid fever among pregnant women.

The research revealed significant prevalence rates of typhoid fever and malaria among pregnant women attending antenatal clinics. The prevalence of 53 % for typhoid fever and underscores the health challenges faced by pregnant women in the area. The findings of this research have important implications for public health interventions in Katsina State. Understanding the prevalence of typhoid fever in pregnant women is crucial for implementing targeted preventive measures, raising awareness and improving healthcare services for this vulnerable population.

Keywords: Typhoid Fever, Pregnant Women and Antenatal Clinics

1.0 Introduction

Typhoid fever remains a significant public health concern worldwide, with a substantial impact on vulnerable populations such as pregnant women. Katsina Local Government Area, located in Katsina State, Nigeria, is no exception to the challenges posed by this infectious disease. This study aims to analyze the prevalence of typhoid fever among pregnant women attending antenatal clinics in the region, shedding light on the burden and implications for maternal and fetal health. Typhoid fever, caused by the bacterium Salmonella Typhi, is primarily transmitted through contaminated food and water. Pregnant women are particularly susceptible to infections due to physiological changes that compromise their immune system. Typhoid fever during pregnancy has been associated with adverse outcomes, including preterm birth, low birth weight, and increased maternal morbidity and mortality. Typhoid fever is an enteric bacterial illness caused by Salmonella enterica Serovar Typhi or Paratyphi A, with the majority of cases attributed to Typhi, commonly denoted as S. Typhi. This infectious disease is transmitted through the fecal-oral route, and the global burden is significant, accounting for over 2 million estimated cases annually, leading to more than 200,000 deaths. The prevalence is particularly high in southern Asian countries characterized by inadequate hygiene practices and contaminated water sources (Ochiai et al., 2008). Pregnant women, especially those in their first and second trimesters, are disproportionately affected by typhoid fever (Ochiai et al., 2008). Transmission of typhoid fever occurs through the ingestion of contaminated food or beverages containing the feces or urine of infected individuals (Khan, 2010). Despite advancements in water and sanitation in various parts of the world, typhoid fever remains endemic in many developing countries, presenting a persistent and substantial public health challenge (Lauria et al., 2009). The disease's prevalence underscores the continued importance of addressing hygiene and water quality issues to mitigate its impact on vulnerable populations globally.

1.1 Challenges for Pregnant Women's Health

Malaria, caused by the Plasmodium parasite transmitted through female Anopheles mosquitoes, and typhoid fever, resulting from Salmonella typhi infection, pose significant threats to pregnant women, especially in developing countries like Nigeria. Plasmodium falciparum, the deadliest strain, affects nearly 40% of the global population, with pregnant women and children under five being the most vulnerable (Akinwusi et al., 2023). Approximately 50% of pregnant women may carry malaria parasites in their placenta without displaying symptoms, contributing to 20% of stillbirths and 11% of maternal

deaths (Ubandoma et al., 2017). In sub-Saharan Africa, 20% of pregnant women attending antenatal clinics test positive for the malaria parasite, particularly P. falciparum (Essa et al., 2019). The impact of malaria on pregnant women includes spontaneous abortion, maternal anemia, placental pathologies, infant mortality, intra-uterine growth retardation, and low birth weight. Asymptomatic cases are prevalent, posing dangers to both the mother and fetus due to the parasite's presence in the placenta, causing maternal anemia and potentially resulting in severe maternal outcomes and low birth weight (Steele et al., 2016; Martinez-Perz et al., 2018; Berry et al., 2018). Typhoid fever, caused by Salmonella typhi, persists as a global health concern, particularly in areas with poor sanitation and hygiene standards. Symptoms include prolonged fever, headache, nausea, loss of appetite, and sometimes constipation or diarrhea, with serious complications and death possible. The common occurrence of high Salmonella antibody titers in malaria patients has led to the belief that malaria can progress to typhoid. Consequently, some individuals treat both conditions without proper laboratory diagnosis (Williams, 2012). Martin-Luther (2023) emphasizes that malaria and typhoid fever remain significant concerns for healthy pregnant women. To alleviate this burden, comprehensive strategies for preventing and controlling malaria during pregnancy should be implemented. Additionally, government policies aimed at improving sanitation, providing safe water supplies, and conducting mass literacy campaigns to raise awareness of preventive measures, such as consistent use of insecticide-treated nets, are essential.

1.2 Symptoms of Typhoid

Typhoid manifests with prominent symptoms including high fever, chills, nausea, headaches, and occasional restlessness (Cook et al., 2008). Rare complications, such as early small bowel perforation, have also been documented. Additional symptoms comprise diarrhea, abdominal pain, vomiting, myalgia, cough, weight loss, constipation, abdominal tenderness, palpable spleen, palpable liver, and the appearance of rose spots (Clark et al., 2010). Swift and accurate diagnosis and treatment are imperative to avert complications necessitating hospitalization and potential fatalities (Birkhold et al., 2020; Mahajan et al., 2011). Prevention of typhoid fever involves effective vaccination and the reinforcement of the immune system, especially during the early stages of pregnancy (Crump, 2019; Pitzer et al., 2015). The Typhoid Conjugate Vaccine (TCV), having received pre-qualification and endorsement from the World Health Organization, serves as a crucial tool in averting typhoid-related illnesses and deaths. TCV complements advancements in sanitation, water quality, and food safety initiatives, offering a short-term perspective on curbing the prevalence of the disease (WHO, 2019; Pitzer et al., 2014). In typhoid-endemic regions, TCV prequalification facilitates priority access and funding, overcoming significant barriers for incorporating the vaccine into routine immunization schedules (WHO, 2015).

1.3 Clinical Manifestations, Complications and Challenges in Diagnosis and Treatment of Typhoid fever

Typhoid fever is a systemic infection characterized by a prolonged acute illness marked by symptoms such as fever, headache, nausea, loss of appetite, and, occasionally, diarrhea. These symptoms are often nonspecific and challenging to distinguish clinically from other febrile illnesses. The severity of the clinical presentation varies, and in severe cases, it can lead to significant complications or even death. Notably, cutaneous manifestations, such as the presence of pink spots on the trunk (roseola), and a dissociation between pulse and temperature may also occur (Micheal, 2017). In developing countries with inadequate sanitation, personal hygiene, and food safety, Salmonella typhi, the causative agent of typhoid fever, poses a considerable threat, resulting in substantial morbidity and mortality for both mothers and fetuses (Reuben, 2013). Pregnant women, due to hormonal changes that suppress immunity, are at an elevated risk of acquiring food-borne infections (Pam et al., 2015). Risk factors associated with typhoid infection include the consumption of food prepared outside the home, such as ice creams or flavored ice drinks from street vendors, drinking contaminated water, and eating vegetables and salads grown with human waste as fertilizer (Abioye et al., 2017). Environmental factors, including transmission via house flies from human waste to food, may also contribute to the spread of the disease (Siddiqui, 2008). Salmonella typhi is exclusively hosted by humans, with bacteria shed in the feces of infected individuals, facilitating transmission through the ingestion of contaminated food or water (fecal-oral route). Large outbreaks are often linked to water contamination (NICD, 2016).

1.4 Typhoid Fever Prevalence among Pregnant Women

Enlightened employed women exhibited the lowest prevalence of typhoid fever in this study, showcasing a higher awareness of sanitation and personal hygiene. Their proactive adoption of preventive and control measures likely contributed to minimizing their risk of infection. Analyzing the location of the study participants, those residing in semi-urban areas displayed the highest prevalence at 80.98%, while those in urban areas reported the least at 25.53%. This discrepancy could be attributed to suboptimal environmental conditions associated with semi-urban areas, aligning with findings by Meseret et al. (2014). Various factors may contribute to the variation in typhoid infection prevalence, including differences in diagnosis methods, study years, seasons, cultural practices, and toilet facilities (Monica, L. Y and Heather E.J, 2009). The high percentage of typhoid infection among pregnant women carries implications for complications such as spontaneous abortion, stillbirth, preterm labor, low birth weight, and intrauterine growth restriction (Pam et al., 2018). Regarding age groups, the study aligns with prior research, recording the highest prevalence among pregnant women aged 20-30 years, as reported by Lilian et al. (2015) and Michael, C. (2017). This contradicts findings by Monica, L. Y and Heather E.J (2009), who noted the highest prevalence in the 41-50 years age group. Educational levels mirrored the results obtained by Marc Choisy et al. (2017), with the highest typhoid prevalence among individuals with lower education levels. However, the study disagreed with Lilian et al. (2015), who reported higher prevalence among housewives and lower prevalence among students. Marc Choisy et al. (2017) also found the highest prevalence among business participants and the lowest among farmers.

1.5 A Comprehensive Overview of Malaria and Typhoid Fever among Pregnant Women

Malaria, a pervasive febrile illness and one of the most prevalent fatal diseases globally, is caused by various Plasmodium species, including P. falciparum, P. vivax, P. ovale, P. malariae, and P. knowlesi (Iwuafor et al., 2016). The majority of fatalities stem from P. falciparum, known for causing severe malaria (Mbah et al., 2015). With approximately half of the global population residing in malaria-prone areas, Sub-Saharan regions, particularly Nigeria, bear a significant burden, accounting for an estimated 100 million cases and over 300,000 deaths annually (WHO, 2018; Odikamnoro et al., 2017). Typhoid fever, caused by Salmonella typhi, is a symptomatic bacterial infection acquired through ingesting contaminated food or water with fecal matter containing the bacterium (Ukaegbu et al., 2014). Common risk factors include poverty linked to poor sanitation and hygiene, with fever being a prominent feature (Pam et al., 2018). Globally, typhoid accounts for about 33 million cases annually, resulting in 216,000 deaths in endemic areas (Crump et al., 2014). Pregnant women, characterized by a compromised immune system, are particularly susceptible to infections, including malaria and typhoid fever. Malaria-infected pregnant women are reportedly more prone to typhoid fever due to increased haemolysis in malaria, which enhances iron availability in tissues, providing an optimal environment for Salmonella species to thrive (Crump et al., 2014).

1.6 Objectives of the Study

The aim of the study is to evaluate the prevalence of Typhoid Fever in Pregnant Women Attending Antenatal Clinics In Katsina Local Government Area, of Katsina state of Nigeria. A case study for health care center in Katsina local government. The objective of this research is to:

i. To identify and evaluate potential risk factors associated with the prevalence of typhoid fever in pregnant women attending antenatal clinics in katsina local government area

ii. To quantify the strength and direction of association between identified risk factors and occurrence of typhoid.

iii. To provide base recommendations for targeted intervention and preventive measures base on identified risk factors aiming to reduce typhoid fever among pregnant women.

2. Research Method

Research Design

The study subjects consist of pregnant women who observe their ante-natal visit at some selected Hospitals in Katsina metropolis of Katsina state between August 2023 to January 2024. The selection was randomly without the prior knowledge of their clinical and family history. The women varying age ranging from 16-40 years and also of different status.

Statistical Analysis

The data that was collected from this study was subjected to statistical analysis using Statistical Package for Social Sciences (SPSS version 23) for windows. The data was analyzed using Chi-square and Binary Logistic Regression Model at 5% level of significance. Comparisons was made using correlation coefficient. And differences is shown to be statistically significant. The research also uses descriptive statistics in the analysis and presentation of data.

3. Result and Discussion

Analysis on prevalence of typhoid fever in pregnant women attending antenatal clinics in katsina local government area

		Frequency	Percent
Valid	Negative	63	54.3
	Positive	53	45.7
	Total	116	100.0

Table 1: Typhoid test result of pregnant women

Table 1 provides an overview of the typhoid test results among pregnant women attending antenatal clinics in Katsina Local Government Area. Out of 116 participants, 63 tested negative for typhoid fever, representing 54.3% of the total sample. On the other hand, 53 women tested positive, accounting for 45.7% of the sample. These results suggest a significant prevalence of typhoid fever among pregnant women in the area, with nearly half of the participants testing positive. This indicates a concerning health issue that requires attention and intervention to mitigate the spread and impact of typhoid fever among this vulnerable population. The implications of these findings are twofold. Firstly, the high prevalence of typhoid fever among pregnant women underscores the importance of implementing preventive measures and improving access to healthcare services in the region. Efforts should focus on promoting hygiene practices, providing clean water sources, and increasing awareness about the risks and symptoms of typhoid fever during pregnancy. Secondly, these results highlight the need for targeted interventions and healthcare policies aimed at reducing the burden of typhoid fever in pregnant

women, such as vaccination campaigns and early detection strategies. By addressing these issues, healthcare providers and policymakers can work towards improving maternal and child health outcomes and ultimately reducing the prevalence of typhoid fever in the community.

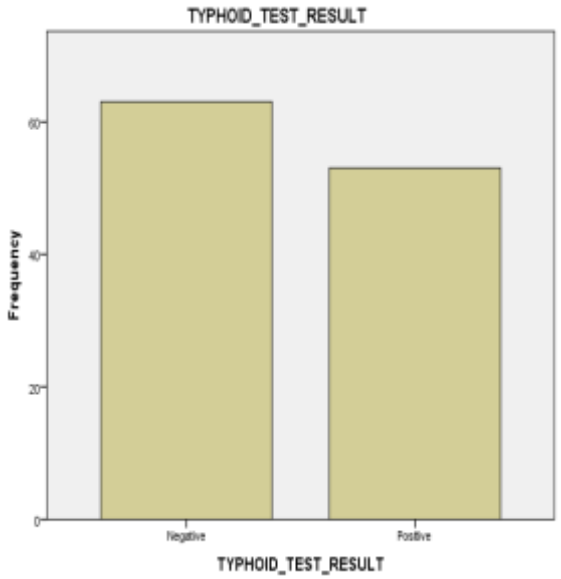

Fig. 1. Barchart representing the Typhoid test result of pregnant women

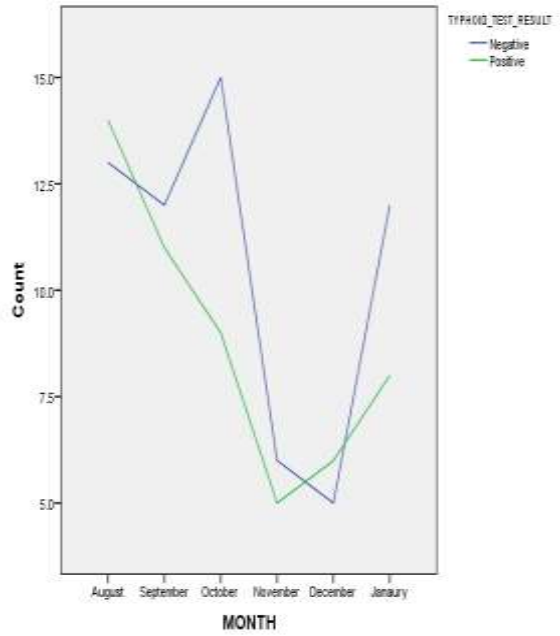

Fig. 2. chart representing the trending of Typhoid among pregnant women

Logistic Regression

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	116	100.0
	Missing Cases	0	.0
	Total	116	100.0
Unselected Cases		0	.0
Total		116	100.0

Table 2. weight effect classification table for the total number of cases

		Frequency	Parameter coding	
			(1)	(2)
SOCIO_ECONOMIC_STATUS	Low	31	1.00	.00
	Middle	78	.00	1.00
	hight	7	.00	.00

Table 3. Categorical Variables of parameter Codings for socio economic status

Classification Table[a,b]

	Observed		Predicted		
			TYPHOID_TEST_RESULT		Percentage Correct
			Negative	Positive	
Step 0	TYPHOID_TEST_RESULT	Negative	63	0	100.0
		Positive	53	0	.0
	Overall Percentage				54.3

Table 4.2.3 classification table for the model with constant

Variables in the Equation

		B	S.E.	Wald	Df	Sig.	Exp(B)
Step 0	Constant	-.173	.186	.860	1	.354	.841

Variables not in the Equation

			Score	Df	Sig.
Step 0	Variables	AGE	1.472	1	.225
		SOCIO_ECONOMIC_STATUS	1.291	2	.524
		SOCIO_ECONOMIC_STATUS(1)	.240	1	.624
		SOCIO_ECONOMIC_STATUS(2)	.880	1	.348
		HEMOGLOBIN_LEVEL	.259	1	.611
		SEASON	.005	1	.941
	Overall Statistics		2.957	5	.707

Table 4. Analysis of socio economic status with different significant

Omnibus Tests of Model Coefficients

		Chi-square	Df	Sig.
Step 1	Step	3.007	5	.699
	Block	3.007	5	.699
	Model	3.007	5	.699

Table 5. Omnibus Tests of Model Coefficients

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	156.940[a]	.026	.034

a. Estimation terminated at iteration number 3 because parameter estimates changed by less than .001.

Table 6. model summary for parameter estimates

Classification Table[a]

	Observed		Predicted		
			TYPHOID_TEST_RESULT		Percentage Correct
			Negative	Positive	
Step 1	TYPHOID_TEST_RESULT	Negative	49	14	77.8
		Positive	37	16	30.2
	Overall Percentage				56.0

a. The cut value is .500

Table 7. classification table for Omnibus Tests of the Model

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Age	-.051	.042	1.420	1	.233	.951
	Socio_economic_status			1.144	2	.564	
	Socio_economic_status(1)	.486	.920	.279	1	.597	1.625
	Socio_economic_status(2)	.788	.873	.815	1	.367	2.199
	Hemoglobin_level	.103	.208	.247	1	.619	1.109
	Season	-.063	.401	.025	1	.875	.939
	Constant	-.621	2.812	.049	1	.825	.538

Table 8. Categorical Variables of Age, socio economic status hemoglobin level and season

Discussion of the Analysis

The logistic regression analysis conducted on the prevalence of typhoid fever among pregnant women attending antenatal clinics in Katsina Local Government Area provides valuable insights into the factors influencing the likelihood of testing positive for the disease. The initial model, including variables such as age, socio-economic status, hemoglobin level, and season, was assessed for its predictive power. Interestingly, the classification table for the initial model indicated that the model correctly predicted negative test results with 100% accuracy but failed to accurately predict positive results, resulting in an overall correct prediction rate of 54.3%. This discrepancy suggests that while certain variables may have a strong influence on the likelihood of testing negative for typhoid fever, additional factors not included in the model may contribute to the likelihood of testing positive. The coefficients indicate the direction and magnitude of the effect of each predictor variable on the odds of testing positive. For instance, a positive coefficient for socio-economic status suggests that higher socio-economic status is associated with increased odds of testing positive for typhoid fever. Conversely, a negative coefficient for age suggests that older age may be associated with decreased odds of testing positive. These findings highlight the complex interplay of socio-demographic and clinical factors in determining the risk of typhoid fever among pregnant women. The correlations table offers additional context by examining the relationships between the predictor variables. Understanding these interrelationships is crucial for interpreting the results of the logistic regression analysis accurately. For instance, a significant correlation between certain predictor variables may indicate multicollinearity, which can affect the stability and interpretability of the regression coefficients. Overall, this logistic regression analysis provides valuable insights into the factors associated with the prevalence of typhoid fever among pregnant women, underscoring the importance of addressing socio-economic disparities and implementing targeted interventions to reduce the burden of the disease in this vulnerable population.

4. Conclusion

The research revealed significant prevalence rates of typhoid fever and malaria among pregnant women attending antenatal clinics in Katsina local government of Katsina state. The prevalence of 53 % for typhoid fever, and underscores the health challenges faced by pregnant women in the area. The prevalence rates were compared with previous studies, indicating variations that could be attributed to diverse factors such as population characteristics, geographical locations and seasonal influences. This underscores the importance of considering these variables in public health planning and interventions. The findings of this research have important implications for public health interventions in Katsina State. Understanding the prevalence of typhoid fever in pregnant women is crucial for implementing targeted preventive measures, raising awareness and improving healthcare services for this vulnerable population.

5. Recommendation

Based on the findings of the research, the following general recommendations can be made to the government of state to:

1. Launch targeted health education campaigns to raise awareness among pregnant women about the risks of typhoid fever.
2. Advocate for improved sanitation facilities in both urban and semi-urban areas to reduce environmental factors contributing to typhoid transmission.
3. Integrate routine screening for typhoid fever into antenatal care programs to identify cases early and initiate timely treatment.
4. Collaborate with relevant authorities to improve access to clean and safe drinking water in the Katsina local government area.

5. Establish a surveillance system to promptly detect and respond to outbreaks, with a focus on pregnant women.
6. Collaborate with local health authorities to integrate recommendations into existing healthcare policies.
7. Strengthen laboratory capacities for accurate and timely diagnosis of typhoid infections.

This would provide a more comprehensive understanding of seasonal variations, trends and the long-term impact of interventions on typhoid fever among pregnanat women in katsina Local government and within Katsina state atlarge.

6. Recommendation for further research

The next area is to consider and Investigate the influence of socioeconomic factors, including income levels, educational attainment and living conditions, on the prevalence of typhoid fever among pregnant women not only in Katsina local government, by considering Katsina central zone to track the prevalence of typhoid fever in pregnant women over an extended period. This could help identify vulnerable populations and guide targeted interventions.

7. Ethical Clearance

Prior to commencing the research, explicit consent was sought and obtained from the Head of the Department of Research and Ethics. Furthermore, comprehensive approval for the research was granted by the hospital management, with a commitment to ensuring the utmost confidentiality of each participant's findings. It was emphasized that the collected information would be strictly utilized for the purpose of the research, adhering to ethical standards.

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