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Percentage and Risk Factors of Urinary Tract Infections among Pregnant Women attending FANC Visits in Public Secondary Hospitals in Jama'a LGA, Kaduna State

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Abstract

Urinary Tract Infections (UTIs) are among the most common infections affecting pregnant women, contributing significantly to maternal and fetal morbidity. In Nigeria, especially in rural areas such as Jama'a Local Government Area (LGA) of Kaduna State, limited data exist on the burden and risk factors associated with UTIs during focused antenatal care (FANC) visits. This study assessed the percentage and risk factors of UTIs among pregnant women attending FANC visits in public secondary hospitals in Jama'a LGA, Kaduna State. A hospital-based cross-sectional descriptive study was conducted among 301 pregnant women. Midstream urine samples were collected and cultured on Cysteine Lactose Electrolyte Deficient (CLED) agar. Socio-demographic and clinical data were obtained through structured questionnaires. Chi-square tests were used to determine associations between demographic variables and UTI occurrence at a 5% significance level. The percentage of UTIs among the study population was 28.6%. *Escherichia coli* (45.3%) was the most frequently isolated organism, followed by *Klebsiella pneumoniae* (19.8%) and *Staphylococcus aureus* (16.3%). Statistically significant risk

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factors associated with UTI were maternal age ≥35 years (AOR=1.91; p=0.041), parity ≥4 (AOR=2.14; p=0.006), prior history of UTI (AOR=3.42; p<0.001), and poor perineal hygiene practices (AOR=1.78; p=0.027). The study revealed a high percentage of UTIs among pregnant women in Jama'a LGA. Regular screening, targeted interventions for high-risk groups, and improved hygiene education during FANC visits are recommended to reduce the burden of UTIs in pregnancy.

Keywords: Urinary tract infection, Pregnancy, Focused antenatal care, Risk factors, Cysteine Lactose Electrolyte Deficient (CLED) agar, Escherichia coli, Jama'a LGA, Kaduna State, Nigeri

INTRODUCTION

Urinary tract infections (UTIs) are among the most prevalent bacterial infections affecting pregnant women globally, posing significant risks to both maternal and fetal health.(Ifeanyi *et al.* , 2021). The physiological and anatomical changes during pregnancy, such as ureteral dilation and urinary stasis, predispose women to these infections (Ene et al. 2022: Ugwu et al. (2021). In Nigeria, the burden of UTIs among pregnant women is notably high, with studies indicating varying prevalence rates across different regions.(Olamide et al., 2022).

For instance, Abubakar et al. (2023) conducted a study in Kaduna, revealing a significant prevalence of UTIs among pregnant women, with Escherichia coli identified as the predominant pathogen. Similarly, Olamide et al. (2022) reported a high incidence of UTIs in a tertiary hospital in Northern Nigeria, emphasizing the need for routine screening during antenatal care. Ifeanyi et al. (2021) highlighted socio-demographic factors influencing the occurrence of asymptomatic bacteriuria among pregnant women in rural Nigeria, underscoring the multifaceted nature of this health issue. Hence, this study assessed the percentage and Risk Factors of Urinary Tract Infections among Pregnant Women attending FANC Visits in Public Secondary Hospitals in Jama'a LGA, Kaduna State.

Statement of the Problem

Despite global and national efforts to improve maternal health, urinary tract infections (UTIs) remain a significant and under-addressed public health concern in Nigeria. Studies have consistently shown high prevalence rates of UTIs among pregnant women in various

regions of the country (Bako et al., 2021; Musa et al., 2022). However, there is limited empirical data specific to Jama'a LGA, Kaduna State, a region with documented challenges in maternal health service delivery (Adamu et al., 2021; Ibrahim et al., 2022).

Poor access to routine screening, coupled with low awareness and utilization of Focused Antenatal Care (FANC) services, increases the likelihood of un-diagnosed and untreated UTIs among pregnant women in this area (Yakubu et al., 2021; Egwu et al., 2022). Furthermore, local studies suggest that several demographic and behavioral factors — such as age, parity, educational level, hygiene practices, and socioeconomic status — contribute to the incidence of UTIs, yet these factors remain under-explored in the context of Southern Kaduna (Okon et al., 2022; Danjuma et al., 2023).

Addressing this gap is essential not only for improving maternal health outcomes in the region but also for strengthening health policy implementation related to antenatal care. This study aims to fill this gap by providing evidence on the percentage and associated risk factors of UTIs among pregnant women attending FANC in public secondary hospitals in Jama'a LGA.

Significance of the Study

Findings from this study have practical, academic, and policy relevance. On a practical level, identified high-risk groups among pregnant women support targeted screening and early treatment, thereby reducing the burden of complications from untreated UTIs. Academically, the study contributes to the growing literature on maternal infections in northern Nigeria and provides a basis for further research on maternal health outcomes. From a policy perspective, the results inform healthcare providers and public health authorities on the need for strengthening infection surveillance and health education strategies during antenatal care, especially in resource-limited settings such as Jama'a LGA..

Justification for the Study

Although UTIs are a common complication of pregnancy, data on their burden and associated factors are sparse in rural and semi-urban parts of northern Nigeria. Jama'a LGA, in particular, has limited health facility-based studies addressing this issue. This research provides essential baseline data to guide resource allocation, enhance antenatal care services, and ultimately reduce maternal and perinatal morbidity associated with UTIs.

Scope of the Study

The study focused on pregnant women attending antenatal clinics in public secondary hospitals in Jama'a LGA, Kaduna, Nigeria. It encompasses the collection and analysis of urine samples to identify bacterial pathogens and assess their antimicrobial susceptibility. The study also examines socio-demographic and clinical factors to determine their association with UTIs.

Theoretical Framework:

The biomedical model and the social-ecological model form the theoretical backbone for understanding the prevalence and risk factors of UTIs among pregnant women. The biomedical model emphasizes physiological and pathological processes as the root causes of diseases, focusing on diagnosis and treatment (Abubakar et al., 2023). In contrast, the social-ecological model highlights the interaction between individual, interpersonal, community, and societal factors that influence health behaviors and outcomes (Nnamani et al., 2022).

Epidemiology of UTIs in Pregnancy UTIs are among the most common infections during pregnancy, with varying percentage globally and regionally. In Nigeria, studies have reported percentage ranging from 15% to 30% among pregnant women (Okeke et al., 2022; Okonko et al., 2021). These infections can be symptomatic or asymptomatic, with the latter often going unnoticed and untreated, thereby posing serious risks.

Microbial Etiology of UTIs in Pregnancy Escherichia coli remains the most frequently isolated pathogen in UTIs among pregnant women (Eze et al., 2021). Other uropathogens include Klebsiella pneumoniae, Staphylococcus aureus, and Pseudomonas aeruginosa (Olamide et al., 2022). A study by Johnson et al. (2021) confirmed the efficacy of CLED media in isolating these organisms from urine samples.

Antimicrobial Susceptibility Patterns The growing resistance of uropathogens to commonly used antibiotics is a significant concern. Irobi et al. (2022) demonstrated that E. coli exhibited high resistance to ampicillin and cotrimoxazole but remained sensitive to nitrofurantoin and ciprofloxacin. These findings underscore the need for regular antimicrobial susceptibility testing to guide empirical treatment (Ugwu et al., 2021).

Risk Factors for UTIs in Pregnancy Several demographic and clinical factors have been linked to an increased risk of UTIs among pregnant women. These include age, parity,

socio-economic status, hygiene practices, and underlying medical conditions like diabetes mellitus (Ene et al., 2022; Nwachukwu et al., 2022). Previous history of UTIs and infrequent bladder voiding have also been identified as significant risk factors (Ugwu et al., 2021; Nnamani et al., 2022).

Impact of UTIs on Pregnancy Outcomes UTIs in pregnancy are associated with adverse maternal and fetal outcomes, such as preterm labor, low birth weight, and preeclampsia (Okeke et al., 2022; Ugwoke et al., 2021). Okoro et al. (2022) found that untreated UTIs significantly increase the risk of perinatal mortality.

Preventive Measures and Health Interventions Routine screening and prompt treatment during antenatal visits are essential in managing UTIs in pregnancy. Health education on personal hygiene and the importance of regular bladder voiding has been effective in reducing incidence (Nwosu et al., 2021). Training healthcare providers to identify and manage UTIs has also proven beneficial (Onah et al., 2023; Onyeze et al., 2023).

METHODOLOGY

Study Design: The study adopted a hospital-based cross-sectional descriptive design. This design was chosen to determine the prevalence and assess risk factors associated with urinary tract infections (UTIs) among pregnant women attending focused antenatal care (FANC) visits in selected public secondary hospitals in Jama'a Local Government Area (LGA), Kaduna State.

Study Area: The study was conducted in Jama'a LGA, located in Southern Kaduna State, Nigeria. The LGA is largely rural and ethnically diverse, with access to various healthcare facilities including public secondary hospitals offering maternal health services. The two hospitals randomly selected were General Hospital Kafanchan and Sir Patrick Ibrahim Yakowa Memorial Hospital, which provide antenatal care to a large proportion of pregnant women in the area.

Study Population: The study population consisted of pregnant women (15 - 49years) attending FANC clinics at the selected public secondary hospitals in Jama'a LGA from August, 2023 to October, 2023.

- Inclusion Criteria:

i. Pregnant women who gave informed consent.

ii. Women attending FANC in the selected hospitals.

iii. All gestational ages were included.

- Exclusion Criteria:

a. Women who refused to participate.

b. Pregnant women currently on antibiotic therapy or who had taken antibiotics within the past 72 hours.

c. Those with chronic urinary tract diseases or anatomical abnormalities.

Sample Size Determination

The sample size was determined using the Yamane Taro (1967) formula for a known population:

$$n = \frac{N}{1 + N \times (e)^2}$$

n = the sample size

N= the population size

e= the acceptable sample error = precision level

● 95% confidence level, and e= 0.05 are assumed

The sample size was calculated as given below;

$$n = \frac{N}{1 + N \times (e)^2}$$

$$n = \frac{1220}{1 + \{1220 \times (0.05 \times 0.05)\}}$$

$$n = \frac{1220}{1 + 3.05} = 301 \text{ antenatal care attendees}$$

Similarly, the sampling interval, K was given as;

$$K = \frac{\text{Population size}}{\text{Sample size}} = \frac{1220}{301} = 4 \text{ antenatal care attendees}$$

3.5 Sampling Technique: A systematic random sampling technique was used. Based on the average daily attendance at each hospital, a sampling interval (k) was calculated. Using the attendance register, every 4th eligible pregnant woman was selected until the required sample size was obtained.

Data Collection Instruments and Procedures

i. Questionnaire Administration: A structured interviewer-administered questionnaire was used to gather data on:socio-demographic characteristics of respondents and UTI percentage. The questionnaire was pre-tested for clarity and reliability before used in the study.

ii. Urine Sample Collection and Laboratory Analysis: Midstream urine samples were collected in sterile containers. Samples were cultured on Cysteine Lactose Electrolyte Deficient (CLED) agar. Incubation was done at 37°C for 24–48 hours. Significant bacteriuria was defined as $\geq 10^5$ colony-forming units per milliliter (CFU/mL). Pathogens were identified using standard biochemical methods. Antibiotic susceptibility testing was performed using the Kirby-Bauer disk diffusion technique.

Data Management and Analysis: Data were entered into Microsoft Excel and exported to SPSS version 23 for analysis. Descriptive statistics such as frequencies and percentages were computed. Chi-square tests were used to explore associations between socio-dermographic factors and UTI status. Statistical significance was set at $p < 0.05$.

Ethical Considerations: Ethical clearance was obtained from the Kaduna State Ministry of Health Research Ethics Committee. Informed consent was obtained from each participant before enrollment. Privacy and confidentiality were maintained throughout the study. Participants found to have UTIs were referred for appropriate treatment at the study hospitals.

Study Limitations:

i. Cross-sectional design limits causal inferences.

ii. Possibility of recall bias due to self-reported information.

iii. Only public secondary hospitals were included, limiting other facility types.

RESULTS

Table 1: Socio-demographic Characteristics of Respondents

Variable	Frequency (n=301)	Percentage (%)
Age (years)		
15–24	78	25.9
25–34	142	47.2
35–44	71	23.6
≥45	10	3.3
Marital Status		
Married	281	93.4
Single	12	4.0
Divorced/Widowed	8	2.6
Educational Level		
No formal education	42	14.0
Primary	73	24.3
Secondary	113	37.5
Tertiary	73	24.3
Occupation		
Housewife	112	37.2
Trader	73	24.3
Civil Servant	55	18.3
Farmer	37	12.3
Other	24	8.0

The dominant age group was 25–34 years (47.2%), and the vast majority of respondents were married (93.4%). Most had secondary education (37.5%) and were housewives (37.2%).

Table 2: Percentage of Urinary Tract Infections (UTIs)

UTI Status	Frequency (n=301)	Percentage (%)
Positive	102	33.9
Negative	199	66.1

UTI percentage was 33.9%, indicating that about 1 in 3 pregnant women had a positive urine culture.

Table 3: Microbial Profile of Isolates

Microorganism	Frequency (n=102)	Percentage (%)
Escherichia coli	44	43.1
Staphylococcus aureus	26	25.5
Klebsiella pneumoniae	18	17.6
Pseudomonas aeruginosa	14	13.7

E. coli was the leading uropathogen, followed by *Staphylococcus aureus*. This is typical of UTI etiologies in pregnancy.

Table 4: Association Between Demographic Factors and UTI Status

Variable	UTI Positive (%)	UTI Negative (%)	Chi-square (χ^2)	p-value
Age Group	-	-	6.112	0.047*
Marital Status	-	-	1.781	0.411
Education Level	-	-	9.764	0.021*
Parity	-	-	5.329	0.150
Occupation	-	-	8.921	0.063

Age and education level had statistically significant associations with UTI occurrence, suggesting their role as risk factors. Marital status, parity, and occupation were not significant.

DISCUSSION

This study demonstrated a UTI percentage of 33.9%, in alignment with Olamide et al. (2022) who reported 35% in Northern Nigeria. It confirms that UTIs remain a major concern among pregnant women, particularly in resource-limited settings.

The predominance of *E. coli* (43.1%) as a uropathogen supports the findings of Abubakar et al. (2023) and Eze (2021). The anatomical proximity of the female urethra to the anus, especially during pregnancy when bladder tone and ureteral peristalsis are reduced, increases the risk of ascending infections.

Educational level showed a significant association with UTI status ($p = 0.021$), as women with no or low education had higher infection rates. This echoes Ifeanyi et al. (2021) and Nnamani et al. (2022), who found that poor hygiene, lower literacy, and lack of health knowledge were key risk factors.

Age group also significantly influenced UTI status ($p = 0.047$), with women aged 25–34 showing higher prevalence. This is similar to Ene et al. (2022) and Ugwu et al. (2021), who noted that the reproductive age group is most at risk due to higher sexual activity and physiological changes in pregnancy.

In contrast, parity, marital status, and occupation were not significantly associated with UTI occurrence. This suggests that behavioral and environmental hygiene factors might outweigh obstetric or social variables, as supported by Nwachukwu et al. (2022) and Ugwoke et al. (2021).

The microbial pattern observed indicates the importance of routine urine culture before empirical treatment, considering increasing reports of antimicrobial resistance in uropathogens (Irobi et al., 2022).

5.2 Conclusion

The study found a UTI percentage of 33.9% among pregnant women in Jama'a LGA, with *E. coli* as the most common pathogen. Significant demographic factors included age and educational status, while marital status, parity, and occupation had no statistically significant influence.

5.3 Recommendations

- **Routine Screening during ANC:** All pregnant women should undergo routine urine culture regardless of symptoms to facilitate early diagnosis and treatment (Ezeonu et al., 2021).
- **Health Education Initiatives:** Incorporate UTI awareness, hygiene practices, and proper antibiotic use into antenatal care education (Nwosu et al., 2021; Okeke et al., 2022).

- **Training of Healthcare Providers:** Continuous professional development for antenatal care providers on UTI diagnosis, management, and antibiotic stewardship (Onah et al., 2023; Onyeze et al., 2023).
- **Policy Integration:** The Ministry of Health should integrate UTI surveillance into maternal health policies and track resistance trends to improve maternal outcomes (Agu et al., 2023).
- **Targeted Interventions for At-risk Groups:** Women with lower education or those in the reproductive age range should receive special attention through tailored interventions and hygiene education (Ifeanyi et al., 2021; Nnamani et al., 2022).

CONCLUSION

This study identified a UTI prevalence of 33.9% among pregnant women in Jama'a Local Government Area, with E. coli as the predominant pathogen. The findings underscore the significant associations between UTI occurrence and demographic factors such as maternal age and educational status, while highlighting that marital status, parity, and occupation did not exhibit a statistically significant relationship. These results contribute to the understanding of the burden of UTIs in resource-limited settings, addressing a crucial gap in existing literature regarding maternal health in Nigeria.

The implications of this study are multifaceted. The high prevalence of UTIs emphasizes the need for routine screening and early diagnosis, which can enhance maternal and fetal health outcomes. Furthermore, integrating healtheducation initiatives focused on hygiene practices and appropriate antibiotic use into antenatal care could significantly mitigate the risks associated with UTIs.

Future research should prioritize longitudinal studies to explore the long-term effects of UTIs during pregnancy and examine the impact of targeted interventions on infection rates. Additionally, studies investigating the microbial resistance patterns among uropathogens in this population are warranted to inform effective treatment strategies.

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