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# Prevalence and Factors Associated with Urinary Tract Infections among Pregnant Women Attending Antenatal Care at Hoima Regional Referral Hospital, Western Uganda

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## ABSTRACT

Urinary tract infections (UTIs) are one of the most prevalent health issues in the world during pregnancy. UTIs affect a large proportion of women in their reproductive years, especially in underdeveloped nations. Women who are pregnant are more likely to acquire UTIs due to a number of anatomical and hormonal changes. The effects of UTIs on the mother and fetus are numerous. This study determined the prevalence and factors associated with Urinary Tract Infections among pregnant women attending ANC at Hoima regional referral hospital in Hoima city, Western Uganda. This was a hospital based descriptive cross-sectional study with both qualitative and quantitative approach. Consecutive booked antenatal women who presented at the antenatal clinic during the study period were randomly recruited into the study upon informed consent, either with any of the symptoms suggestive of urinary tract infections or without any symptoms. Each questionnaire was examined and validated for accuracy, missing data, and unclear responses; if any were found, they were manually cleaned up. Data was entered into the computer using Microsoft excel and then exported to SPSS version 20 for analysis. Logistic regression analysis was used to evaluate the association between dependent and independent variables. Descriptive statistics was presented in form of frequency tables, pie charts, P-values and odds ratios. Majority of the study participants were aged above 30 years. Specifically, 85 (48.0%) were aged above 30, 61 (34.5%) were aged 20-29 years and 31 (17.5%) were aged below 19 years. Most (83.6%) of the study participants were married and 39.0% attained secondary education. The prevalence of UTI in pregnancy was 10.7%. At multivariate analysis, level of education, income status, sexual activity, residence, parity and past history of UTI were significantly associated with UTI in pregnancy. The prevalence of UTI among pregnant women is high. Socio-demographic factors influence occurrence of UTI among pregnant women. The factors that influence occurrence of UTI among pregnant women are; level of education, income status, sexual activity, residence, parity and past history of UTI.

**Keywords:** Urinary Tract Infections (UTIs); Pregnancy; Prevalence; Socio-demographic Factors; Antenatal Care

## INTRODUCTION

One of the most prevalent health issues in the world, urinary tract infections (UTIs) during pregnancy, affect a lot of women in their reproductive years, especially in underdeveloped nations [1]. Women who are pregnant are more likely to acquire UTIs due to a number of anatomical and hormonal changes. The effects of UTIs on the mother and fetus are numerous [2, 3]. Antenatal clinics are frequently used by pregnant women and other women of reproductive age for reproductive care. In particular, among the unique group of pregnant women, these ANCs have a crucial role to play in the surveillance, prevention, and treatment of STIs and UTIs among other disorders. This comes after the World Health Organization made testing for STIs a regular part of an ANC visits for pregnant women [3, 4]. Malaria, anemia, hepatitis B, syphilis, and HIV are among the other illnesses that are frequently checked for during ANC visits [5, 6]. A number of challenging global health objectives are outlined in the Agenda 2030 for Sustainable Development. Goal 3 (SDG3), which aims to "Ensure healthy lifestyles and promote well-being

for all at all ages, particularly its focus on health-related issues," is of special significance to the suggested strategy [7, 8]. Diseases of public importance, such as UTIs and STIs, must be closely monitored and treated immediately for this to be realized [9]. The Global Health Sector Strategy on Sexually Transmitted Diseases 2016–2021, which was released later in 2016 in response to the creation of the Sustainable Development Goals (SDG), emphasized the importance of combating UTIs and STIs in reaching universally good health and wellbeing [10]. In terms of UTIs burden, the WHO African area contributes significantly to worldwide data [11]. According to the International Classification of Diseases, or ICD-10, urinary tract infections (UTIs) are infections that affect the kidneys, ureters, urinary bladder, and urethra, which are involved in the secretion and evacuation of urine. These infections during pregnancy have the potential to seriously harm both the mother and the unborn child [12]. When a UTI happens more than once before or during pregnancy, or in non-pregnant women, when there have been three infections in the past 12 months or two bouts in the past six months, it is said to be recurrent. Bacteriologic persistence is characterized by persistent bacteriuria 48 hours after the start of treatment with the same organism. A relapse is a recurrent UTI in which the previously treated organism continues to exist in the urinary tract two weeks after the end of the treatment. A "reinfection" is a 'true' recurrence. It is a urinary tract infection occurring after sterilization of the urine, with an organism originating from outside of the urinary tract, either a new bacterial strain or a strain previously isolated that has persisted in the colonizing flora of the gut or vagina, more than two weeks after treatment [13]. UTIs are categorized based on their clinical manifestation, anatomical degree of infection, grade or severity of infection, underlying risk factors, microbiological findings, the microorganisms responsible for the infection, and their treatment-susceptibility. It's critical to keep in mind that UTIs are ascending in nature, with infectious agents migrating from the vagina and perineum. Because of this, the level of the urinary system where the infection has spread anatomically can be the urethra (urethritis), bladder (cystitis), kidney (pyelonephritis), or blood stream (urosepsis) [14]. The kidneys are the transitional organ between these two levels, and the illness can alternatively be classified as an upper or lower urinary tract infection. Lower urinary tract infections are thought to be caused by symptoms suggestive of cystitis, whereas upper urinary tract infections are thought to be caused by symptoms suggestive of pyelonephritis [15]. The most frequent bacterial illness during pregnancy is a urinary tract infection [16]. Contrarily, roughly 1% of pregnancies are complicated by acute cystitis. Pyelonephritis affects 2 - 4% of pregnancies and has a 23% chance of returning soon after birth. Most frequently, it happens around the end of pregnancy. Yet, it can happen at any point during pregnancy and may even appear after a previous bacteriuria test came back negative [16]. Asymptomatic bacteriuria is the major pyelonephritis risk factor. For instance, studies have revealed that between 25 to 30 percent of pregnant women with asymptomatic bacteriuria who did not receive treatment developed pyelonephritis, as opposed to 3.2% of those who did [17]. In a different study, 1.8% of pregnant women without bacteriuria and 30% of those with it got pyelonephritis [18]. Women are more likely to get a UTI while pregnant. An increased risk for UTIs during pregnancy has been linked to a few underlying variables. The prevalence of UTIs during pregnancy has been shown to be strongly correlated with socioeconomic status, diabetes mellitus, recurrent UTIs, and urogenital system structural abnormalities. Age less than 15 years at the time of the first UTI, sickle cell illness, and higher parity have also been considered risk factors [19]. *Escherichia coli* is the bacteria most frequently linked to urinary tract infections (UTIs), accounting for up to 80% of cases, followed by *Klebsiella* (5%), *Enterobacter* (3%), *Proteus* species (5%), and enterococci [20]. *Candida* species are a significant contributor to fungal urinary tract infections, particularly in immunocompromised individuals and those using indwelling catheters [20].

Group B *Streptococcus* (1%) and the genital mycoplasma *Ureaplasma urealyticum* are rare causes of UTIs and are of significance particularly in pregnancy because of their association with chorio-amnionitis [21]. UTI is a serious reproductive health issue that necessitates surveillance and monitoring for early detection and treatment before harmful consequences on the mother and the pregnancy develop. This is especially true in pregnancy [22]. Pregnancy problems include pyelonephritis, stillbirth, low birth weight, and UTIs increase the chance of these outcomes [23]. Pregnant women in sub-Saharan Africa have a very high and continuing frequency of UTIs [23]. The urethra in women is already short, therefore the physical and hormonal changes that take place during pregnancy make pregnant women more susceptible to UTIs than the general population [23]. Several academic works have noted that having a low socioeconomic position is the main predictor of developing UTIs during pregnancy [24]. In poor nations, like Uganda, the majority of women come from low socioeconomic backgrounds, making them more prone to diseases [25]. Early detection and rapid antibiotic treatment for UTIs should be seen as mandatory steps for every pregnant woman who seeks ANC because of the complications linked to the condition [26, 27]. Hoima regional referral hospital treats approximately 15 pregnant women with UTIs every month. However, Hoima Regional Referral Hospital does not routinely screen for UTI among pregnant women. Thus, this

study determined the prevalence and factors associated with UTIs among pregnant women attending Hoima regional referral hospital.

## METHODOLOGY

### Study Design

This was a hospital based descriptive cross-sectional study with both qualitative and quantitative approach.

### Study Area

The study was conducted at Hoima Regional Referral Hospital located in Hoima city Western Uganda. It caters for populations of greater Bunyoro, encompassing the districts of Hoima, Kibale, Masindi, Bulisa, Kiryandongo, Kiboga and Eastern part of DR. Congo. Hoima district is located in mid-Western Uganda approximately 200km from Kampala the capital city of Uganda. It shares borders with Bulisa and Masindi districts in the North, Kyankwazi in the East, Kikuube, Ntoroko, Kakumiro and Kagadi districts in the South. It stretches to the national boundary of Democratic Republic of Congo in Western. Hoima district covers a total area of 5735.3square kilometers.

### Study Population

#### Target Population

All pregnant women

#### Eligible Population

Pregnant women attending ANC services Hoima regional referral hospital.

#### Inclusion Criteria

Pregnant women who consented to the study.

#### Exclusion Criteria

Pregnant women who had taken antibiotics 72 hours prior.

#### Sample Size Determination

The sample size was determined using Fishers et al., 2006 formula i.e.  $N=Z^2PQ/D^2$ :

Where;

N is the desired sample size

Z is the standard normal deviation taken as 1.96 at a confidence interval of 95%.

P = 13.3%

D is the degree of accuracy= 0.05.

Q= (1-P) which is the population without the desired characteristics.

$N= 1.96^2 \times 0.133 (1-0.133) / (0.05)^2= 177$

Therefore, the researcher used a sample size of 177 participants.

### Sampling Technique

Consecutive booked antenatal women who presented at the antenatal clinic during the study period were randomly recruited into the study upon informed consent, either with any of the symptoms suggestive of urinary tract infections or without any symptoms.

### Data Collection tool

A structured questionnaire was used for data collection in this study.

### Data Collection Method

Participants were interviewed using a structured questionnaire designed in-house.

Early morning clean-catch midstream urine was collected from each pregnant woman into a wide-mouthed sterile screw capped container. Urine was cultured on to a Blood agar & a MacConkey agar plate. After overnight incubation at 37° C for 24 hours, colony counts yielding bacterial growth of  $\geq 10^5$  / ml was taken as being significant. Centrifuged urine deposit was examined microscopically at high magnification for pus cells, red blood cells, epithelial cells, casts, crystals, yeast-like cells. Pus cells  $>5$ /HPF was also considered significant for infection.

### Quality Control

Prior to the primary study, the questionnaire was pre-tested, and research assistants were hired and properly trained.

### Data Analysis

Each questionnaire was examined and validated for accuracy, missing data, and unclear responses; if any were found, they were manually cleaned up. Data was entered into the computer using Microsoft excel and then exported to SPSS version 20 for analysis. Logistic regression analysis was used to evaluate the association between dependent and independent variables. Descriptive statistics was presented in form of frequency tables, pie charts, P-values and odds ratios.

### Ethical Considerations

The faculty of clinical medicine and dentistry at Kampala International University-Western Campus provided approval. The Hoima regional referral hospital management was consulted for approval. Both verbally and in

writing, informed consent from the respondents was requested. Participants were given the assurance that their information will be kept private and used only for the study. Respect to the community was adhered to in the study and no incentives were offered to patients.

#### Dissemination of Results

Results of the study were disseminated to Hoima regional referral hospital then the faculty of clinical medicine and dentistry Kampala International University.

#### Limitations of the study

Being a cross-sectional study, it may not be able to demonstrate a cause-and-effect relationship.

### RESULTS

#### Distribution of socio-demographic characteristics of study participants

Table 1 below shows that socio-demographic characteristics of the respondents. Majority of the study participants were aged above 30years. Specifically, 85(48.0%) were aged above 30, 61 (34.5%) were aged 20-29years and 31(17.5%) were aged below 19years. Most (83.6%) of the study participants were married and 39.0% attained secondary education.

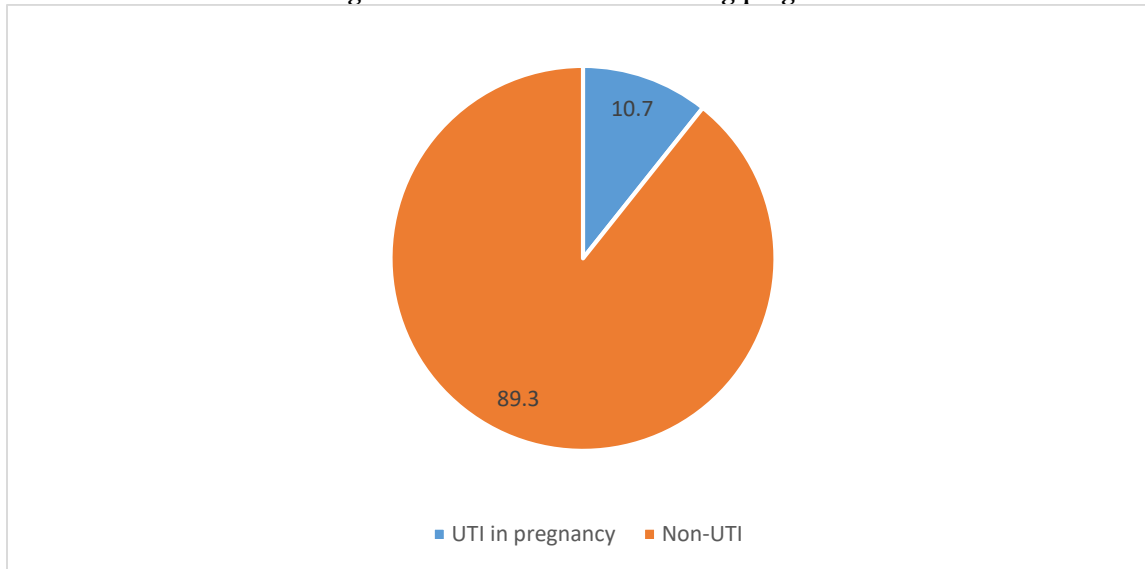
**Table 1: Socio-demographic characteristics of respondents**

Variable	Frequency(N=177)	Percentage (%)
<b>Age (Years)</b>		
≤19	31	17.5
20-29	61	34.5
≥30	85	48.0
<b>Marital status</b>		
Single	29	16.4
Married	148	83.6
<b>Level of education</b>		
None	12	6.8
Primary	56	31.6
Secondary	69	39.0
Tertiary	40	22.6
<b>Occupation</b>		
Housewife	98	55.4
Peasant	33	18.6
Business	19	10.7
Formally employed	27	15.3
<b>Income status (Earned per month)</b>		
≤100,000/=	21	11.9
100,000-200,000/=	102	57.6
≥200,000/=	54	30.5
<b>Sexual activity</b>		
≥3 per week	46	26.0
≤3 per week	131	74.0
<b>Residence</b>		
Urban	71	40.1
Rural	106	59.9
<b>Parity</b>		
Primiparous	68	38.4
Multiparous	109	61.6
<b>Past history of UTI</b>		
Yes	43	24.3
No	134	75.7
<b>Spouse's level of education</b>		
No formal education	05	2.8
Primary	35	19.8
Secondary	70	39.5
Tertiary	67	37.9

**Prevalence of UTI among pregnant women**

According to the study, the prevalence of UTI in pregnancy was 10.7% as shown in the figure below.

**Figure 1: Prevalence of UTI among pregnant women**



**Bivariate analysis of socio-demographic factors associated with UTI in pregnancy**

Bivariate analysis of risk factors showed that level of education, occupation, income status, sexual activity, residence, parity, past history of UTI and spouse's level of education were significant (Table 2).

**Table 2: Bivariate analysis of socio-demographic factors associated with UTI in pregnancy**

Variable	N=177	UTI n(%)	COR(95% CI)	P-value
<b>Age(Years)</b>				
≤19	31	05(16.1)	0.36(0.06-0.77)	0.283
20-29	61	08(13.1)	0.14(0.02-0.53)	0.512
≥30	85	06(7.1)	Reference	
<b>Marital status</b>				
Single	29	02(6.9)	Reference	
Married	148	17(11.5)	0.78(0.28-1.62)	0.360
<b>Level of education</b>				
None	12	04(33.3)	2.09(0.91-4.67)	0.042
Primary	56	08(14.3)	1.38(0.58-2.71)	0.105
Secondary	69	06(8.7)	0.41(0.10-1.06)	0.413
Tertiary	40	01(2.5)	Reference	
<b>Occupation</b>				
Housewife	98	15(15.3)	2.18(1.24-5.37)	0.051
Peasant	33	03(9.1)	1.63(0.90-3.18)	0.016
Business	19	01(5.3)	1.40(0.70-2.24)	0.214
Formally employed	27	-	Reference	
<b>Income status(Earned per month)</b>				
≤100,000/=	21	07(33.3)	2.35(1.50-6.14)	0.114
100,000-200,000/=	102	11(10.8)	1.76(0.74-4.06)	0.037
≥200,000/=	54	02(3.7)	Reference	
<b>Sexual activity</b>				
≥3 per week	46	12(26.1)	3.81(1.48-9.03)	0.006
≤3 per week	131	07(5.3)	Reference	
<b>Residence</b>				

Urban	71	05(7.0)	Reference	
Rural	106	14(13.2)	2.51(1.55-5.80)	0.055
<b>Parity</b>				
Primiparous	68	06(8.8)	Reference	
Multiparous	109	13(11.9)	3.69(2.00-7.62)	0.126
<b>Past history of UTI</b>				
Yes	43	10(23.3)	1.94(0.65-3.79)	0.004
No	134	09(6.7)	Reference	
<b>Spouse's level of education</b>				
No formal education	05	02(40.0)	1.19(0.81-4.02)	0.015
Primary	35	09(25.7)	0.97(0.42-2.26)	0.145
Secondary	70	07(10.0)	0.41(0.21-1.05)	0.327
Tertiary	67	01(1.5)	Reference	

### Multivariate analysis of socio-demographic factors associated with UTI in pregnancy

At multivariate analysis, this study observed that level of education, income status, sexual activity, residence, parity and past history of UTI were significantly associated with UTI in pregnancy as shown in the table below.

**Table 3: Multivariate analysis of socio-demographic factors associated with UTI in pregnancy**

Variable	N=177	UTI n(%)	AOR(95% CI)	P-value
<b>Level of education</b>				
None	12	04(33.3)	1.54(0.54-3.90)	0.007
Primary	56	08(14.3)	1.01(0.22-2.04)	0.016
Secondary	69	06(8.7)	0.22(0.07-0.85)	0.025
Tertiary	40	01(2.5)	Reference	
<b>Occupation</b>				
Housewife	98	15(15.3)	1.86(0.95-4.56)	0.075
Peasant	33	03(9.1)	1.25(0.61-2.60)	0.062
Business	19	01(5.3)	0.77(0.45-1.73)	0.439
Formally employed	27	-	Reference	
<b>Income status(Earned per month)</b>				
≤100,000/=	21	07(33.3)	2.04(1.03-5.92)	0.005
100,000-200,000/=	102	11(10.8)	1.31(0.50-3.44)	0.022
≥200,000/=	54	02(3.7)	Reference	
<b>Sexual activity</b>				
≥3 per week	46	12(26.1)	2.98(1.10-8.19)	0.003
≤3 per week	131	07(5.3)	Reference	
<b>Residence</b>				
Urban	71	05(7.0)	Reference	
Rural	106	14(13.2)	2.18(1.21-4.34)	0.018
<b>Parity</b>				
Primiparous	68	06(8.8)	Reference	
Multiparous	109	13(11.9)	2.76(1.33-6.00)	0.030
<b>Past history of UTI</b>				
Yes	43	10(23.3)	1.25(0.27-2.88)	0.001
No	134	09(6.7)	Reference	
<b>Spouse's level of education</b>				
No formal education	05	02(40.0)	0.83(0.52-3.50)	0.059
Primary	35	09(25.7)	0.56(0.11-1.49)	0.076
Secondary	70	07(10.0)	0.17(0.05-0.65)	0.841
Tertiary	67	01(1.5)	Reference	

## DISCUSSION

Numerous physiological changes in pregnant women increase the risk of urinary tract infections (UTIs) [27]. The primary cause is related to hormonal and mechanical changes that result in urine stasis and vesicoureteral reflux [28]. Even when the infection is asymptomatic, it is linked to higher risks of maternal and neonatal morbidity and mortality (Hooton, 2012). Untreated asymptomatic bacteriuria during pregnancy increases the risk of future urinary tract infections by about 25% [28]. It is linked to a number of negative consequences for both the mother and the baby, including low birth weight, premature labor and prematurity, stillbirth, preeclampsia, maternal anemia and sepsis, and amnionitis [28]. According to this study, the prevalence of urinary tract infections among pregnant women was found to be 10.7%. This figure is lower compared to prevalence of UTI among pregnant women reported to be 15.37% in Ethiopia [29]. The factors proposed to influence occurrence of UTI among pregnant women were; level of education, income status, sexual activity, residence, parity and past history of UTI. In this study, the odds of UTI among pregnant women with a monthly income of less than 100,000/= were higher than their counterparts. This finding is line with studies conducted in Ethiopia and Egypt [30]. This might be as a result of the relationship between poor socioeconomic status and immunity, particularly in pregnant women. Parity was another factors significantly associated with UTI among pregnant women. Multiparous women had higher odds of developing UTI compared to primiparous women. This is consistent with a finding of a study in Ethiopia [31]. The relationship between multiparity and UTI is brought on by considerable physiologic changes that the entire urinary system experiences during pregnancy, which have a significant impact on the course of UTI throughout gestation [31]. Women who experience many pregnancies in rapid succession are more prone to experience these alterations, which vary from patient to patient. The female urethra is also vulnerable to trauma during childbirth due to its physical proximity to the vagina [31].

Further, previous history of UTI was significantly associated with UTI among pregnant women. Higher odds of occurrence of UTI were observed among women with previous history of UTI compared to their counterparts. This result is in agreement with a studies in Pakistan, Qatar and Philippines [32]. This may be demonstrated by the fact that pregnant women with a history of UTI are more likely to develop resistance strains. Sexual activity was also another associated risk factor that was found to be significantly associated with UTI. Pregnant women who had recent sexual intercourse of three or more times per week had higher odds of UTI compared to their counterparts. Similar finding was reported by a study in Ethiopia [33]. The likelihood of bacterial contamination of the female urethra may increase as a result of sexual activity. Women who have sex may also develop UTIs because sex can push bacteria into the urethra [34]. Due to its physical relationship to the vagina, the female urethra is susceptible to injury during sexual activity and also bacteria can be massaged into the bladder from the urethra during pregnancy/childbirth [34]. The present study also revealed that level of education was significantly associated with UTI in pregnancy. The prevalence of UTI in pregnancy was inversely proportional to the level of education. This is inconsistent with a study which found that level of education had no association with UTI in pregnancy. Low maternal education is a marker of low socio-economic status which is a frequently reported risk factor of UTI in pregnancy.

## CONCLUSION

The prevalence of UTI among pregnant women is high. Socio-demographic factors influence occurrence of UTI among pregnant women. The factors that influence occurrence of UTI among pregnant women are; level of education, income status, sexual activity, residence, parity and past history of UTI.

## Recommendation

To reduce the high prevalence of UTI during pregnancy and related complications, the Ministry of Health and its stakeholders should provide standardized prenatal care services as advised to identify such risk factors early. Strategies focusing on universal access to family planning and economic improvements were required.

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