

# The Prevalence of Asymptomatic Bacteriuria and Associated Factors among Women Attending Antenatal Clinics in Lower Mulago Hospital, Uganda

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## Abstract

Asymptomatic bacteriuria (ASB) complicates 2-14% of pregnancies. If not treated in pregnancy it may progress to symptomatic urinary tract infection in 25 % of the cases. Some of the complications of untreated ASB in pregnancy include maternal anaemia, pregnancy and premature rupture of membranes. In the fetus it may cause abortion, and premature labour. Our objective was to determine the prevalence of asymptomatic bacteriuria in pregnancy and associated factors. This cross sectional study was carried out in lower Mulago hospital antenatal clinic. We consecutively recruited 385 women with no symptoms of urinary tract infection. The outcome of interest was asymptomatic bacteriuria. A questionnaire was used to record clients' data. Urine specimens were taken for culture and sensitivity. The prevalence of asymptomatic bacteria was determined. Bivariate analysis was done to find the association between asymptomatic bacteriuria, with maternal risk factors. Four hundred and eight (408) pregnant women were enrolled in the study. The prevalence of ASB+ was found to be 12.2%.

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The factors associated with asymptomatic bacteriuria were maternal age  $\geq 35$  years, OR 2.84, 95 % CI ( 1.2-6.4), Gravidity $\geq 5$ , OR 2.2, 95%CI (1.1-4.4), history of UTI, OR 2.6, 95 % CI (1.3-5.1). The prevalence of asymptomatic bacteriuria among women attending antenatal clinic in lower Mulago hospital is high. Screening for asymptomatic bacteriuria should be done for all women attending lower Mulago hospital antenatal clinic with particular emphasis in all women of the age of  $\geq 35$  years, multiparous women and those with history of urinary tract infection.

**Key words:** Prevalence; Asymptomatic; Bacteriuria Antenatal Clinics.

## 1. Introduction

Asymptomatic bacteriuria is defined as the presence of at least  $10^5$ CFU of a single species of uropathogens per millilitre of urine obtained by a clean catch of a MSU from a person without symptoms of UTI [1]. Although ASB occurs with similar frequency in both pregnant and non-pregnant women, it progresses to symptomatic infection more frequently during pregnancy.

Pregnancy related hormonal and mechanical factors induce changes in the renal collecting system that lead to urinary stasis, which is crucial to the pathophysiology of UTI in pregnancy. These changes can be seen as early as six weeks of gestation and may not resolve until six to twelve weeks post-partum. The pathogenesis is not completely defined and is probably related to more than one factor, with differing contributions from each factor at each stage of gestation. High levels of progesterone during pregnancy reduce ureteral tone leading to dilation of the renal pelvis and upper ureters. The dilated collecting system can hold 200-300mls of urine thus serving as an excellent reservoir for bacteria. Progesterone causes relaxation of the muscular wall of the bladder as pregnancy progresses; this combined with reduced intraureteral pressure results into visico ureteral reflux which enhances infection.

The dextro-rotated uterus compresses the right ureter which may become kinked, tortuous and displaced laterally, making it reliable to infection. The female urethra being short ( 3-4cm long) and close to the vagina and rectum facilitates colonization of urine from normal flora of the vagina and the lower GIT facilitated by other factors such as sexual intercourse [2,3,4].

Urinary tract infections are the most common bacterial infections encountered during pregnancy. They can be symptomatic or asymptomatic. Worldwide the prevalence of ASB during pregnancy varies from 2-7% [5]. If ASB is not treated during pregnancy 25% of infected women develop acute symptomatic infection [5]. The prevalence of asymptomatic bacteriuria in pregnancy ranges from 4 to 7%, although in certain groups of patients may vary from less than 2% to 14% [5, 6, 7].

The prevalence of ASB among school girls and sexually active young women in Hiroshima Japan is 1-2% and 5%.respectively [9]. A similar prevalence was found among nuns and working women in USA [10]. Similar prevalence was obtained by Gillen water when he studied prevalence of ASB among school girls in the United States [11]. The prevalence of ASB among women in Sweden was found to be 5% [12].It has been noted that the prevalence of ASB in non-pregnant women increases with age at the rate of approximately 1% for each at

decade of life [2, 13].

After flu and common cold, urinary tract infections are the most common medical complaint among women in their reproductive years. An estimated 7 million episodes of urinary tract infection occur each year in USA .and every year about 250,000 American women develop kidney infections (pyelonephritis), and 100,000 are hospitalized for treatment. On average, 10% to 20% of all women will develop urinary tract infection at some time in their lives and 20% of those will have recurrent UTIs [13].

A study was done in Mulago hospital medical wards in 1963. The purpose of the study was to determine ASB among inpatient women in medical wards, significant bacteriuria was found in 8% of admitted women [14]. In 1968 the prevalence of bacteriuria of pregnancy in Kampala district was found to be 21-25 % [15].

In 2003 a study was done in lower Mulago hospital labour ward, the purpose of the study was to determine the prevalence, bacteriology and microbial sensitivity patterns of UTI in pregnant women who are clinically diagnosed to have the disease in Mulago hospital labour ward. It was also to assess the relationship between pyuria and bacteriuria. In that study 168 women with a gestation age  $\geq 28$  weeks with symptoms of urinary tract infection were recruited. 15% (25/168) women had the disease. It was concluded that clinical signs and symptoms are not reliable as a predictor of bacteriuria. It was also found that 80% of the 25 specimen which had growth had significant pyuria. It was therefore recommended that pyuria can be used to initiate treatment while waiting for culture and sensitivity results. The commonest organisms isolated were *E coli* 48% (12/25) and staph aureus. They were sensitive to Nitrofurantoin, nalidixic acid, Gentamycin and cefuroxime but resistant to Ampicillin and cotrimoxazole [16].

Hooton et al and colleagues conducted a study between 1989 and 1994 in Seattle USA. They prospectively evaluated 796 sexually active non-pregnant women from 18-40 years of age over a period of six months for occurrence of ASB. The women were patients at either a university student health centre or a health maintenance organization (HMO). Periodic urine cultures were taken. The incidence of ASB was 5% among women in the university group and 6% among women in HMO group. Organisms isolated were *E. coli*, *S. aureus*, enterococci and group B. streptococci. Symptomatic UTI developed within one week after 8 percent of occasions on which culture showed ASB, as compared to 1% of occasions when ASB was not found, P-value 0.001. ASB was associated with sexual inter course and use of spermicides [1].

Studies have shown risk factors for ASB to be the following, frequent sexual activity, (frequent sexual activity increases the risk to ASB and studies indicate that nearly 80% of all urinary tract infections occur within 24 hours after intercourse,) diabetes mellitus, sickle cell trait, low income groups, grand multiparty, childhood UTIs, history of caesarean section with catheterization, having a first UTI before age 15years and use of spermicides [13]. Education beyond high school and age  $< \text{or} = 30$  years is inversely proportional to UTI whereas sickle cell trait approximately doubles the risk of UTI [2]. In the USA the prevalence of ASB is 2-7%, several factors are associated with an increased frequency in various patient populations. The most significant factor appears to be socio economic status [17].

Although most women with bacteriuria at delivery have been shown to be bacteriuric at the first antenatal visit, approximately 1% to 2% acquires bacteriuria during pregnancy and studies have confirmed a reduction in symptomatic UTIS with screening programs [18]. Screening should occur in the first trimester usually the first antenatal visit. Stenquist et al conducted one large study of more than 3000 pregnant women to assess the optimal time for screening to be conducted. In that study the risk of acquiring bacteriuria during pregnancy increased from 0.8% in the twelfth gestational week to 1.93% at the end of pregnancy. It appeared that screening at the sixteenth gestational week provided the most bacteriuria free gestational weeks [8]. Studies have shown that the prevalence of ASB increases with parity and 40% of those with ASB develop symptoms during pregnancy, and 10-30% develops acute pyelonephritis [19].

At Uludag University, faculty of medicine in Turkey a study was conducted, the purpose of the study was to determine the incidence of ASB during pregnancy and pregnancy complications associated with ASB. The study involved 270 pregnant women up to 32 weeks of gestation. The incidence of ASB was 9.3%. *E. coli* accounted for 79% which was the most frequent of the isolates. Recurrence after treatment was observed in 21.7% of women, they diagnosed preterm labour in 26% of women with ASB. Pyelonephritis in the screened and treated groups was 0.5%, while the prevalence in the untreated group was 2.1% [6].

Even if symptomatic UTI does not develop, untreated ASB occurring in the first and third trimester of pregnancy increase the risk of mental retardation and developmental delay in the infant from 1.2% to 2%. *E. coli* increases the risk for abortion and premature delivery even if pyelonephritis does not develop. Infants of women who harbor *Ureaplasma urealyticum* have increased risk of respiratory tract infections [13].

A study was conducted at the school of public health, university of Illinois Chicago. The purpose of the study was to find the association between bacteriuria and adverse fetal maternal out comes. Crude and multivariable analysis was performed versus a perinatal registry cohort of 25746 mother/infant pair. An association was found between urinary tract infection and LBW, prematurity, preterm low birth weight, premature labour, pre-eclampsia, maternal anaemia and amnionitis [20].

Earlier studies have shown a relationship between ASB and adverse fetal maternal outcomes. ASB being associated with adverse fetal out comes such as preterm birth and LBW [21]. Other studies noted an association between LBW and ASB [23]. There also reports about increased risk for LBW, preterm delivery, pre-eclampsia, and maternal anaemia with ASB [20]. A case control study was conducted to investigate risk factors for eclampsia at the epidemiology discipline, school of public health, University of Texas, Houston health science centre, USA. Cases were matched to non pre-eclamptic controls on a 4:1 ratio. Risk factors for eclampsia included bacteriuria OR=4, 95% CI 1.27-14.06.

Results from epidemiological, molecular, microbiologic, obstetrics and animal model investigations as well as from intervention trials demonstrate that infection and inflammation in the mother play primary roles in up to half of episodes of preterm birth and preterm PROM. The long and short-term costs of preterm birth emphasize the need to screen and treat each mother and baby at risk of remediable conditions. For instance, pregnant women should be screened and treated for ASB [22].

In 1962 the incidence of preterm birth was found to be 27% among 95 women with ASB given placebo during pregnancy where as it was only 7% among 84 women treated with antimicrobial agents, the corresponding perinatal death rates were 14% and 0% respectively [21]. Earlier studies also reported an increased incidence of LBW among untreated women with ASB [23].

In the 1970s it was demonstrated that women randomly assigned to tetracycline treatment for ASB had fewer spontaneous preterm deliveries than those assigned to control groups. However, because tetracycline adversely affects the development of fetal teeth and bones, its use during pregnancy was stopped. More recently ASB has been associated with an increased risk of preterm delivery and several randomized trials have provided confirmation that treating ASB not only reduces the risk of maternal pyelonephritis but also reduces the risk of preterm birth [24]. Studies done in Park land hospital (USA) revealed that approximately 2/3 of all cases of pyelonephritis were due to untreated ASB. And screening plus treatment reduced the infection from 4 to 1%. [7].

### **1.1 Screening methods**

The prevalence of ASB is related to the socio economic structure of the population therefore screening for ASB in pregnancy is useful in communities of low socio-economic status. [25]. However, Screening by urine culture is time consuming and expensive, but appears to be a cost effective strategy when the prevalence of ASB is high  $\geq 5-6\%$ . With a low prevalence  $<5\%$  rapid screening with either leucocyte esterase nitrate dipstick or urine catalase activity, with selective urine culture is more cost effective. After an initial negative urine culture 1% or less of women develop UTI [25].

Screening for ASB should be done at every antenatal visit [26]. However routine screening of pregnant women for bacteriuria is expensive and not worthwhile in populations with low prevalence of infection  $<5\%$  [27, 28]. Less expensive tests such as the leukocyte esterase Nitrite dipstick have been shown to be cost effective with prevalence of 2% [29]. Screening using enzymatic detection of catalase activity in urine is effective [30].

*E. coli* is responsible for 75-85% of infections; and it appears to be due to the presence of specific adhesions, which allow the bacteria to adhere to uroepithelial cells and to the capacity of the organisms to induce an inflammatory response. Other organisms include group B streptococcus, proteus, Klebsiella, and pseudomonas [28].

The population incidence of pyelonephritis varies and depends on the prevalence of ASB [31]. Renal infection is common after mid-pregnancy; it is unilateral in more than half of cases, and bilateral in a quarter. In most women between 75-95% of renal infection are caused by bacteria that have P- fimbriae – adhesions [8]. In a survey of 190 women admitted to Park land hospital, *E. coli* was isolated in 77% of the subjects, *Klebsiella pneumonia* in 11%, *enterobacter* and *P. mirabilis* in 4% [32]. Organisms that cause urinary tract infection are those from the normal perineal flora [1]. Twenty-five percent of all pregnant women with ASB progress to symptomatic infection if not treated [5]. The prevalence of symptomatic UTI among pregnant women admitted to labour at  $\geq 28$  weeks of gestation is 15% [16].

Asymptomatic bacteriuria is associated with low birth weight (LBW). In Mulago Hospital LBW contributes to 10 – 12% of all deliveries [33]. ASB is associated with abortions, intrauterine fetal death (IUFD), premature labour and early neonatal death (ENND) [2]. Preterm birth is the leading preventable cause of neonatal morbidity. Common genital urinary infections which can easily be treated cause large numbers of babies to be born prematurely. Because of their biologically immature organs these infants require intensive neonatal care which leads to excess hospital costs early in life. Long term these children require follow up for a range of disabling conditions such as cerebral palsy, mental retardation, blindness and deafness. Inexpensive screening during pregnancy can detect such infections as asymptomatic bacteriuria [35]. Prelatures account for 6.95% of all deliveries in lower Mulago hospital labour ward, and account for 48.9% of all admissions in special care unit where they account for 65.7% of all deaths [34].

Despite the above complications to the mother and the fetus, which may be attributable to asymptomatic bacteriuria, the prevalence of asymptomatic bacteriuria among women attending Antenatal Clinic in lower Mulago hospital was unknown. The factors associated with asymptomatic bacteriuria among women attending antenatal clinic in lower Mulago hospital had never been studied.

Even though asymptomatic bacteriuria is common and appears to be associated with adverse outcomes such as pyelonephritis in pregnant women, abortions, intrauterine fetal death, spontaneous premature labour, intrauterine fetal death, premature rupture of membranes, low birth weight, early neonatal deaths, neonatal respiratory infections, developmental delay, low IQ, pre-eclampsia, maternal anaemia, puerperal sepsis, and symptomatic urinary tract infection, little was known about its prevalence and associated factors among women attending antenatal clinic in lower Mulago hospital. Therefore, this study was undertaken to evaluate the prevalence and factors associated with asymptomatic bacteriuria among women attending antenatal clinic in lower Mulago hospital. Knowledge of this would strengthen advocacy for antenatal screening and treatment of ASB thus reducing complications like those mentioned above.

We carried out the study so that we answer the following questions, what is the prevalence of asymptomatic bacteriuria among women attending antenatal clinic in lower Mulago hospital? What are the factors associated with asymptomatic bacteriuria among women attending antenatal clinic in lower Mulago hospital?

Our objectives were as follows, the general objective was to determine the prevalence of asymptomatic bacteriuria and associated factors among women attending antenatal clinic in lower Mulago hospital. Our specific objectives were to determine the prevalence of asymptomatic bacteriuria among women attending antenatal clinic in lower Mulago hospital and to describe the relationship between asymptomatic bacteriuria with maternal age, level of education, previous history of urinary tract infection, frequency of sexual intercourse, marital status, type of marriage, blood glucose level and HIV status among women attending antenatal clinic in lower Mulago hospital.

## **2. Materials and Methods**

The Study design was Cross-sectional study. The study was conducted over one month in February 2005 at

lower Mulago hospital antenatal clinic. Mulago hospital is located in the north east part of Kampala district the capital city of Uganda. Mulago hospital serves as the national referral hospital, the district hospital for Kampala, as well as the teaching hospital for Makerere University Medical School. The antenatal clinic is run on three days a week, i.e. Tuesday, Wednesday, and Thursday. The clinic is run by Senior Consultants, consultants, specialist obstetricians and gynecologists, post graduate students, intern doctors and midwives. About 250-300 women attend lower Mulago antenatal clinic per visit, of these 80-100 are first attendees. A total of about 10,000 – 15,000 women attend the antenatal clinic per year [34]. It is a high risk antenatal clinic for women referred from upper Mulago ANC, and other ANC within and outside Uganda.

### **2.1 Study population**

The study population comprised of women who attended lower Mulago antenatal clinic during the study period.

### **2.2 Inclusion criteria**

Participants were women with confirmed pregnancy without symptoms suggestive of urinary tract infection.

### **2.3 Exclusion criteria**

These included women with urogenital fistula, those who had received antibiotics in the last two weeks, those with active bleeding, women with communication barrier and those who declined HIV screening.

### **2.4 Study variables**

The following maternal social demographic and medical characteristics were taken as the independent study variable: - maternal age, level of education, gravidity, gestational age, previous history of urinary tract infection, frequency of sexual intercourse, marital status, type of marriage, level of blood glucose, and HIV sero- status. The primary outcome variable was presence of asymptomatic bacteriuria. The secondary outcome measures were age structure, education structure, employment structure, HIV sero-prevalence.

### **2.5 Sample Size Estimation**

The sample size was calculated using the formula of Kish and Leslie (1965) which states that  $n = Z^2 p (1-p) / \alpha^2$ . Where: -n = Minimum sample size, p = Estimate of proportion of pregnant women with ASB. For Mulago hospital p was unknown therefore we assumed p = 50%,  $\alpha$  = Sampling error that could be tolerated = 5%, 1-p = Probability that outcome of interest did not occur, Z = standard normal variant corresponds to 95% CI and is 1.96, Therefore:  $n = 1.96 \times 1.96 \times 0.5(1-0.5) / 0.05 \times 0.05$ ,  $n = 384$ . Therefore, our minimum sample size was 384 participants.

### **2.6 Study procedures**

The women were interviewed with the use of pre-coded, pre-tested, interviewer administered questionnaires to

collect and record maternal social demographic characteristics. Laboratory forms were used to record information and results after urine analysis.

### ***2.7 Sampling strategy***

Consecutive sampling was used for recruitment of the study subjects. If a woman was found not to be eligible to the study, the next would be recruited. We recruited both first attendees and re-attendees. A participant was recruited only once for the purpose of the study. A room was chosen and all women who passed through that room were interviewed consecutively.

### ***2.8 Specimen collection***

#### ***2.8.1 Urine specimen***

The study was carried out by the Principal Investigator assisted by two research assistants who had had pre-training in specimen handling and transport. The study subject was instructed on how to collect a mid stream urine (MSU) without contamination. The subject was requested to remove her under pants completely and asked to sit comfortably on the toilet and to abduct one knee to the side as far as she could. The subject was instructed on how to wash with a prepared sterile sponge soaked in dettol soap, wiping from the front of the perineum towards the back. The subject rinsed with a moistened cotton swab with the same front to back motion. The subject remained holding the labia apart and then allowed the first drops of urine into the toilet. She then passed the remaining urine into a sterile universal container to about half the volume, and then placed the lid on the container. The urine container was labeled with her study number. The urine specimen a clean catch of a MSU was then transported to Makerere University Medical Microbiology Laboratory within one hour of collection for culture and sensitivity.

#### **Performing and reading of cultures**

In the laboratory using a pipette 10mls of urine was placed on MacKonckey Media, CLED Agar and Blood Ager. The plates were then incubated at 35<sup>o</sup>c-37<sup>o</sup>c for 18-24 hours after which the plates were evaluated. Colony counts were done and counts above 300 colonies were only estimated. Counts >10<sup>5</sup> CFUs/ml of urine were considered significant. The organisms were identified using standard biochemical reactions; sensitivity to antibiotics was done on Muller Hurton Agar. The antibiotics used included ciprofloxacin 5mcg, cefuroxime, Nitrofurantoin 50mcg, Amoxycillin 10mcg, Gentamycin 100mcg, Ampicillin 10mcg, and cotrimoxazole 25mcg.

#### ***2.8.2 Specimen for random blood sugar***

This was done by use of a glucometer (one touch). A finger was disinfected with spirit, a lancet was used to stab the disinfected finger and a drop of venous blood was dropped on a glucose test strip for random blood glucose estimation and results were recorded on the questionnaire.

#### ***2.8.3 HIV Screening***



Only those subjects who had, had their HIV sero-status tested with prevention of mother to child transmission of HIV (PMTCT) program in Mulago hospital were recruited in the study. The results and date of screening were recorded on the questionnaire as either HIV positive or HIV negative. For HIV negative clients results were considered only if they had been tested on the day of recruitment.

Testing for HIV Serostatus was done by use of, Determine HIV kit (Abbot diagnostic Kit) for screening, Start pack HIV kit was used for confirmation of results, Unigold was used as a tie breaker in case of conflicting results.

### ***2.9 Data management***

A pre-coded pretested interviewer administered questionnaire was used to take the participants' social demographic data and relevant history. A laboratory form was used to record the laboratory results after urinalysis. All data was reviewed by the principle investigator to see that the forms were correctly filled with no missing data. Data was stored on the questionnaires and laboratory forms. The urine specimens and cultures were discarded following standard procedures after reading and interpretation of the results.

### ***2.10 Statistical data analysis***

Data was entered, cleaned and analyzed using Epi-INFO version 6 software package with help of a statistician. The Chi-square test was used in testing association of categorical variables, a P-value of  $< \text{or} = 0.05$  was considered statistically significant. Odds ratio (OR) was used to determine the strength of association. Two groups of subjects were formed i.e. those positive for ASB and those negative for ASB. The prevalence of asymptomatic bacteriuria was determined by dividing the total number of cultures with evidence of asymptomatic bacteriuria by the total number of valid urine cultures performed. Univariate analysis to identify risk factors for asymptomatic bacteriuria was performed with maternal age, gravidity, gestational age, level of education, history of UTIs, and frequency of sexual intercourse, marital status, glycaemia and HIV sero-status as variables.

### ***2.11 Quality control***

The data collection was carried out by the principal investigator assisted by two research assistants who were registered nursing officers. A precoded, pretested, interviewer administered questionnaire was used, a cleaner helped to clean the toilets with JIK and water whenever there was spillage or contamination of the toilet seat or the floor. The subjects were instructed on how to collect a MSU without contamination. The reading of the cultures was done by two independent microbiologists at Makerere University Medical Microbiology Laboratory, supervised by a senior lecturer in the department of Medical Microbiology Makerere University.

### ***2.12 Follow up***

Study subjects were given appointment to return after one week and those found with bacteriuria were treated according to results of culture sensitivity. Where drugs were not available a prescription form was given.

### 2.13 Ethical considerations

A comprehensive explanation of the study and a written consent explaining the nature, purpose, benefits, and possible inconveniences was given to the participants. Confidentiality was assured by use of numbers on the forms. An assent form was signed by those who were below 18 years. The study was approved by the review committees i.e. Mulago hospital Department of Obstetrics and Gynecology Ethics and Research Committee, Makerere University Faculty of Medicine Ethics and Research Committee, the Uganda National Council of Science and Technology. After screening those with infection were given appropriate treatment and in case of shortage of medicine a prescription form was given.

## 3. Results

### 3.1 Study Population Characteristics

**Table 1:** socio demographic characteristics of the study population

<b>Variable</b>	<b>Frequency (%)</b>
<b>Age group</b>	
≤17	83(21.0)
<20	144(37.4)
20-24	80(20.7)
25-29	67(17.4)
30-34	50(13.0)
≥35	44(11.4)
<b>Level of education</b>	
Non	25(6.5)
Primary	167(43.4)
Secondary	155(40.3)
Tertiary	38(9.9)
<b>Marital status</b>	
Single	99(25.7)

Married/cohabiting	286(74.2)
<b>Type of marriage</b>	
Monogamous	301(78.2)
Polygamous	84(21.8)
<b>Employment</b>	
Non	341(88.6)
Employed	44(11.4)
<b>Freq of sex /week</b>	
<4	75(19.5)
≥4	310(80.5)
<b>Gravidity</b>	
Prime	179(46.5)
Gravida2	47(12.5)
Gravida3	36(9.4)
Gravida4	24(6.2)
Gravida≥5	98(25.5)

### 3.2 Univariate analysis

**Results:** Four hundred and eight (408) pregnant women were enrolled in the study.

The prevalence of ASB+ was found to be 12.2 %.( 47/385).

### 3.3 Bivariate analysis

The factors associated with asymptomatic bacteriuria were maternal age  $\geq 35$  years, OR 2.84, 95 % CI ( 1.2-6.4), Gravidity $\geq 5$ , OR 2.2, 95% CI (1.1-4.4), history of UTI, OR 2.6, 95 % CI (1.3-5.1).

Other risk factors such as HIV infection, frequency of sexual intercourse and other were not statistically associated with ASB.

**Table 2:** shows the medical history of the study population.

Variable	Frequency (%)
<b>History of UTI</b>	
Yes	114(29.6)
No	271(70.4)
<b>HIV Serostatus</b>	
Positive	26(6.8)
Negative	359(93.2)
<b>Random blood sugar</b>	
<4mmol/l	140(36.4)
4-6.6mmol/l	240(62.3)
>6.6mmol/l	5(1.3)

**Table 3:** Culture and Sensitivity Results

Organisms	Antibiotic Sensitivity (%)						
	CIP	CXM	Nit	AMOX	Gent	Amp	COTR
E.coli n=23	97.5	87	78.3	17.4	82.6	17.4	13
S.aureus n=6	100	100	100	33.3	83.3	16.7	0
S.pyogens n=1	100	100	0	100	100	0	0
P.mirabilis n=5	80	100	0	0	60	0	0
K.pneum. n=2	100	100	0	0	50	0	0
S.faecalis n=6	83.3	100	83.3	83.3	83.3	66.7	0
P.eruginosa n=4	75	50	25	0	0	0	0

Key: Ciprofloxacin (CIP), Amoxicillin(AMOX), Cotrimoxazole(COTR), Cefuroxime(CXM), Gentamycin (GENT), Nitrofurantoin(NIT), Ampicillin(AMP). A total of 408 urine cultures were obtained, 23 cultures showed mixed growth (5.7 % contamination). 385 pure cultures were analyzed, 47culture plates showed growth, *E. coli* was the most frequent of the isolates, (48.9), followed by *S. aureus* (12.8%).

**Table 5:** Association between ASB with social demographic characteristic

VARIABLE	ASB		ODDS RATIO	P-VALUE
	POSITIVE	NEGATIVE		
<b>Age (years)</b>			0.85(0.42-1.68)	0.611
<20	16	128		
≥20	31	210		
<b>Age (years)</b>			<b>2.824(1.22-6.43)</b>	<b>0.006</b>
≥35	<b>11</b>	<b>33</b>		
<35	<b>36</b>	<b>305</b>		
<b>Education</b>			0.91(0.32-2.81)	0.850
≤ Secondary	42	305		
>Secondary	5	33		
<b>Marital status</b>			0.653(0.304-1.403)	0.272
Single	9	90		
Married	38	248		
<b>Marriage type</b>			1.83(0.89-3.73)	0.073
Polygamy	15	69		
Monogamy	32	269		
<b>Employment</b>			0.87(0.32-2.43)	0.758
Unemployed	41	300		
Employed	6	38		
<b>Sex frequency</b>			1.02(0.45-2.40)	0.951
≥4	38	272		
<4	9	66		
<b>Gravidity</b>			<b>2.22(1.12-4.39)</b>	<b>0.012</b>
≥5	<b>19</b>	<b>79</b>		

<5	28	259		
<b>UTI history</b>			<b>2.60(1.34-5.05)</b>	<b>0.002</b>
<b>Yes</b>	<b>23</b>	<b>91</b>		
<b>No</b>	<b>24</b>	<b>247</b>		
<b>HIV serostatus</b>			2.327(0.885-6.129)	0.080
Positive	6	0 20		
Negative	41	1 318		

#### 4. Discussion of Results

**The Prevalence of ASB:** The prevalence of asymptomatic bacteriuria among women attending antenatal clinic in lower Mulago hospital was found to be 12.2%. This prevalence is higher than that of developed countries such as U.S.A which is 2-7% [1, 2], Higher than Japan 1-2% [9] and higher than Turkey 9.31% [6]. However, though the prevalence of ASB is high among women attending antenatal clinic in lower Mulago hospital, it follows the range of 2-14% reported from other studies [7].

Our findings are consistent with the hypothesis that ASB is a frequent occurrence that results when urinary tract pathogens, particularly E.coli enter the bladder without causing symptoms [1].

#### Association between ASB and maternal age

In this study ASB was found to be associated with maternal age  $\geq 35$  years, with a P-value of 0.006, odd ratio 2.824, 95% CI (1.22-6.43). This findings is consistent with other studies where by age  $< \text{or} = 30$  years is inversely proportional to ASB [2], and also the fact that the prevalence of ASB in non-pregnant women increases with age at a rate of approximately 1% for each decade of life [4, 13].

#### Association between ASB and adolescence

In this study the association between adolescence and ASB was not statistically significant. P-value 0.611, odds ratio 0.85, 95% CI (0.42-1.68)

#### Association between ASB and Education

In USA Education lower than high school is associated ASB [2], however in this study the association between low education and ASB was not statistically significant with a p value of 0.850, odds ratio 0.91, 95%CI (0.32-2.81).

### **Association between marital status and ASB**

In this study the association between ASB and marital status was not statistically significant. With a P-value =0.272 odds ratio for marital status (Single/married), 0.653, 95% CI 0.304 -1.403.

### **Association between polygamy and ASB**

In this study the association between polygamy and ASB was not statistically significant, P. value of 0.074, odds ratio (polygamy/monogamy) 1.83, 95% CI (0.89-3.73).

### **Association between ASB and occupation**

Poor social economic status is highly associated with ASB [13]. However, in this study the association between ASB and unemployment was not statistically significant. P-value =0.695 odds ratio (unemployed/employed) 1.242 (0.42-3.66).

### **Association between frequency of sexual intercourse and ASB**

Sexual intercourse predisposes to UTI by facilitation of colonization of the genital tract by normal vaginal flora. Studies elsewhere have shown that sexual intercourse of  $\geq 4$  times a month predisposes to UTI [13]. However, in this study the association between frequency of sexual intercourse and ASB was not statistically significant.

### **Association between ASB and grand multiparty**

Grand multiparty is associated with ASB [4]. In this study the association between grand multiparty i.e. number of pregnancies greater or equal to 5 was statistically significant with a p value of 0.012, odd's ratio 2.22. 95% CI (1.12-4.39).

### **Association between ASB and previous history of urinary tract infection**

Women who get urinary tract infection are likely to get other episodes during their life time [13]. In this study the association between a previous episode of UTI and ASB was statistically significant with a P – value of 0.02, Odd's ratio 2.60, 95% (1.34 -5.05).

### **Association between HIV infection and ASB**

HIV is thought to be associated with many infections. However, in this study the association between HIV infection and ASB was not statistically significant, had a P – Value of = 0.08. Odds ratio (HIV positive /HIV negative). 2.327, 95% CI (0.883-6.129).

### **Association between blood sugar and ASB**

One hundred and forty (140) of the respondents had a random blood sugar of < 4mmol per litre, 240 had a

random blood sugar between 4 – 6.6mmol per litre, and 5 of the respondents had a random blood sugar of greater than 6.6mmol/Litre.

Hyperglycaemia > 6.6mmol leads to glycosuria and therefore is believed to predispose the patient to bacteriuria, however in this study the association between ASB and blood sugar levels could not be analyzed because there was a cell with less than 5 counts. I.e. there were no ASB+ women with blood glucose > 6.6mmol/l .

### **5. Strengths of the study**

The study was carried out using culture and sensitivity which is the most reliable method for detection of microorganisms in urine [28]. All subjects had been screened for HIV and their HIV sero-status was known. All subjects had their blood glucose level determined.

### **6. Findings and policy**

In this study it was found that the prevalence of ASB is very high (12.2%). WHO recommends screening for ASB using multiple dipstick tests; however this method is not recommended in populations of high prevalence of ASB >5% [27'28]. Urinalysis and reagent strip testing is not recommended because it is associated with high false negative rates [35]. Urine dipstick testing for nitrites identifies only 50% of all patients with bacteriuria [36].

### **7. Study limitations**

We were not able to screen for anatomical urinary tract abnormalities and haemoglobinopathies, which are known risk factors for ASB.

### **8. Conclusion /Recommendations**

The prevalence of asymptomatic bacteriuria among women attending antenatal clinic in lower Mulago hospital is high (12.2%). It is therefore recommended that routine screening for asymptomatic bacteriuria should be done for all women attending lower Mulago hospital antenatal clinic.

There was an association between asymptomatic bacteriuria and the following factors, women with age  $\geq$  35 years, grandmultiparous women and women with a previous history of urinary tract infection. It is therefore recommended that screening for ASB in these groups should be emphasized.

### **9. Unanswered questions and future research**

There is need to carry out a study to see whether treatment of ASB can have an impact on the adverse fetal maternal outcomes such as LBW, premature Labour, PROM, maternal anemia etc. in lower Mulago hospital.



## Competing interests

Authors did not have any conflict of interest

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