American Journal of Biomedical Sciences
ISSN: 1937-9080
nwpii.com/ajbms

Prevalence of Asymptomatic Bacteriuria in Pregnancy and Urinary Tract Infection in Non-pregnant Symptomatic Womem

Smart Enoch Amala[1*], Rita Karibi-Botoye[1], Easter Godwin Nwokah[1] and Monsi Tombari Pius[1]

[1] Department of Medical Laboratory Science, Rivers State University, Nkpolu- Oroworukwo-Port Harcourt, Nigeria
[*]**Corresponding Author**
Dr. Amala, Smart Enoch
Department of Medical Laboratory Science
RSU Port Harcourt
Nigeria
E-mail:smrtamala@gmail.com
Tel. +2348055362681

Received:08 August 2021; | Revised:22 September 2021; | Accepted:06 December 2021

Abstract

Introduction: Pregnancy predisposes women to asymptomatic bacteriuria (AB) and screening of pregnant women for AB at the early stage of pregnancy is necessary.

Materials and methods: Clean catch midstream urine from pregnant and non-pregnant women were investigated for AB and UTI by cultural methods using appropriate bacteriological media and standard microbiological procedures.

Results: Out of 210 pregnant women examined for bacteriuria the prevalence rate of AB was 34 (16.9%), the prevalence among 200 non-pregnant women used as a control was 8(4.0%), while the prevalence among 200 symptomatic non-pregnant women was 116(58%). The prevalence of AB by trimester among pregnant women was 6(2.9) in the first trimester, 20(9.5%) in the second trimester, and 8 (3.8%) in the third trimester. By age groups, age 26-30 yrs had a high prevalence of 14(6.9%) among pregnant women, while the prevalence of UTI was high 52(26.0%) among non-pregnant from age 41yrs and above. By educational status, graduates among the pregnant women had a prevalence rate of 21(10.0%), secondary 10(4.8%), and primary 3(1.4%). The symptomatic non-pregnant women, graduates had a prevalence rate of 86(43.0%), secondary 26(13.0%) and primary 2(2.0%). AB and symptomatic bacteriuria were high among subjects living in bedroom flats and self-contained than group houses. The percentage occurrences of bacteria from pregnant and non-pregnant women were: The percentage occurrences of bacteria isolated from asymptomatic pregnant women (AP) were *E. coli* 16(47.1%), *Klebsiella* sp. 7(20.6%), *Pseudomonas* sp. 1(2.9%) and *S. aureus* 10(29.4%) respectively. The non-pregnant asymptomatic women (AnP) *E. coli* 8(100%) and the symptomatic non-pregnant women (SnP) *E. coli* 52(44.8%), *Klebsiella* sp. 36(31.0%), *Proteus* sp. 8(6.9%), *Pseudomonas* sp. 12(10.3%) and *S. aureus* 8(6.9%) respectively. The overall percentage occurrences of bacteria isolated were *E. coli* 76(48.1%), *Klebsiella* sp. 43(27.2%), *Staphylococci* sp. 18(11.4%), *Pseudomonas* sp. 12(8.2%) and *Proteus* sp. 8(5.1%).

Conclusion: AB in pregnancy and UTI are of public health concern that calls for intervention to prevent deleterious complications on mother and fetus that may require hospitalization. There was a risk factor associated with age and trimester of pregnancy.

Keywords: Bacteriuria,Asymptomatic Pregnancy,Non-Pregnant Symptomatic

1. Introduction

Urine from healthy people is sterile and a urinary tract infection (UTI) is an infection involving any part of the urinary system, including the urethra, bladder, ureters, and kidney [1-2]. In healthy women, the vagina is colonized by lactobacilli which maintain an acidic environment (low pH) that is hostile to other bacteria and also produces hydrogen peroxides which help to eliminate bacteria and reduce the ability of *Escherichia coli* to adhere to vaginal epithelial cells and cause infection [3]. In pregnancy, urinary tract infections (UTI) are underestimated risk factors associated with deadly outcomes and morbidity in developing countries [4]. Pregnancy causes hormonal and mechanical changes that result in urinary stasis, vesicoureteral reflux changes coupled with the short urethra (about 3-4 cm) in females, and difficult hygiene as a result of protruding pregnant stomach [5]. AB may develop into acute cystitis, pyelonephritis, and other conditions hence screening and treatment of AB/UTI by urine culture is a necessity especially in developing countries just as practiced in the developed countries [6-7-8] The global prevalence of AB in pregnancy ranges from 3- 35% [9]. Women are at more risk of UTI than men, and pregnancy predisposes women to high risk of infection due to pressure of fetus, dilation of the ureters, and renal pelvis [5-9]. UTI is one of the most common medical conditions associated with pregnancy due to physiological changes during pregnancy [4,10,11,12]. The use of antimicrobial agents can alter the normal microbiota of the gastrointestinal tract and vagina resulting in drug-resistant pathogens. Resistance to antimicrobials is linked with high morbidity, mortality, and increased cost of health care [13,14,15]. AB in pregnancy without medical intervention with antibiotics might cause serious complications such as low birth weight, preterm labour, pre-eclampsia, anaemia, hypertension, amonionitis, stillbirth, neonatal death and toxic septicemia [16-17]. The most common routes bacteria enters the urinary tract is the opening of a woman's urethra at the vulva. The infection ascends the urethra to the bladder and sometimes to the kidneys or both. The other possible route is through the bloodstream, usually to the kidney [4]. A study by [18] reported maximum numbers of positive cases in the second trimester followed by the first trimester and third trimester. Other studies carried out by [5], as well as Turpin and his colleagues, [17] had high asymptomatic bacteriuria in the first and third trimester respectively. Other studies also recorded high prevalence in the second trimester because most pregnant women report late to antenatal clinics for booking. *E. coli* was pinpointed to be responsible for more than 80% of all community-acquired UTI. Other bacteria such as *Pseudomonas sp*., *Klebsiella sp*. *Staphylococci sp*., *Enterococci sp*. and others have also been isolated. Most isolates were resistant to first-line antibiotics. Urine culture remains the gold standard for the screening of asymptomatic bacteriuria during pregnancy and UTI [18].

The work is aimed at determining the prevalence of bacteriuria among pregnant women attending antenatal clinics at the University of Port Harcourt Teaching Hospital (UPTH) and urinary tract infection (UTI) among symptomatic non-pregnant women.

2. Materials and Methods

Questionnaire

Questionnaires were employed in collecting some demographic data from the subjects. It was designed to obtain information from the patients on educational, age, vocational, residential status, and occupation. The questionnaire was designed in a multiple-choice type that required respondents to tick yes or no appropriately. A total of two hundred and ten copies of the questionnaires were administered to pregnant women during antenatal days for months and two hundred (200) copies were administered each to the non-pregnant symptomatic

and asymptomatic non-pregnant women used as control.

Collection of urine samples:

Mid-stream, clean-catch urine samples were obtained from the pregnant women attending antenatal clinics in UPTH during their antenatal clinic day. Sterile wide-mouth containers were given to the subjects on arrival at the hospital antenatal clinics, and they were educated on how to collect urine specimens without contamination. The urine specimens were transported to the laboratory immediately for analysis.

Transportation of Sample to the Laboratory

Samples were labeled on collection and immediately transported to the laboratory in a cooler with icebergs for bacteriological analysis and where the delay was envisaged before the cultivation of samples, they were preserved in the refrigerator at 4oC in the laboratory

Preparation of media

All media were prepared according to the manufacturer's instructions. Cysteine lactose electrolyte deficient media and Muller Hinton agar were weighed out respectively into a conical flask, dissolved in distilled water, and sterilized by autoclaving at 121℃ for 15 minutes. About 15 - 20ml of the molten agar was dispensed into disposable Petri-dishes when the temperature had reduced to about 45℃. They were allowed to set, packed, and stored in a refrigerator for subsequent uses.

Cultivation of samples

Each urine sample was inoculated and streaked out on Cysteine Lactose Electrolyte Deficient agar plate using a wire loop calibrated to deliver 0.002mL of urine. The plates were incubated aerobically at 37℃ for 18-24 hours. Colony-forming unit up to 100,000 (105) CFU/mL were considered as significant bacteriuria

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Identification of Isolates

Isolates were identified following standard microbiological protocols including Gram stain, carbohydrate metabolisms, indole test, motility test, oxidase test, urease test, catalase test, citrate test, DNAase test, litmus milk decolorization test, coagulase test.

Antimicrobial susceptibility testing

Pure culture of each isolate was tested for antimicrobial susceptibility using Kirby-Bauer disc diffusion method on Muller Hinton agar plate as recommended by [19]. The antibiotics tested against isolated bacteria were: ciprofloxacin, nalidixic acid, ampicillin, gentamycin, co-trimoxazole, streptomycin, erythromycin, tetracycline and nitrofurantoin against the rods, whereas gentamycin, ciprofloxacin, ofloxacin, ceftatriozone, ampicillin, cloxacillin, clotrimazole and streptomycin were tested against *Staphylococci.*

Exclusion Criteria

Women excluded were: (a) Women with a history of antibiotic therapy for the past two weeks, (b) Women with underlying diabetes mellitus (c) Pyrexia

Statistical Analyses

Where appropriate, statistical analyses were performed using an unpaired t-test in which a two-tailed P-value was calculated (GraphPad Prism Software Version 5.03, San Diego, CA). Statistical significance was defined as a P-value of less than 0.05 at a 95% confidence interval.

3. Results

Prevalence of Bacteria

The prevalence rate of asymptomatic bacteriuria among pregnant women was 34(16.7%), the prevalence rate of bacteriuria among non-pregnant women used as a control was 8(4.0%), and the prevalence rate of bacteriuria among symptomatic non-pregnant women was 116(58%) respectively, as shown in figure 1.

Prevalence of Bacteriuria in Pregnancy by Trimester

The prevalence of asymptomatic bacteriuria among pregnant women by trimesters was first trimester 6(2.9%), second trimester 20(9.7%), and third trimester 8(3.8%), respectively. As shown in figure 2.

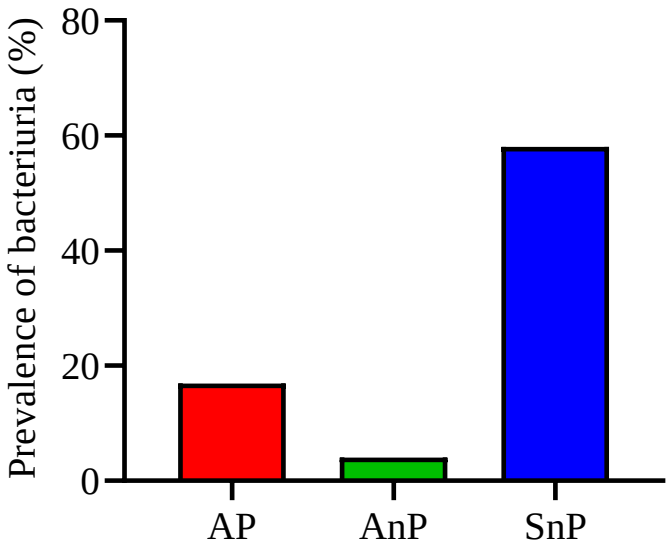

Figure 1: Prevalence of bacteriuria among pregnant and non-pregnant women

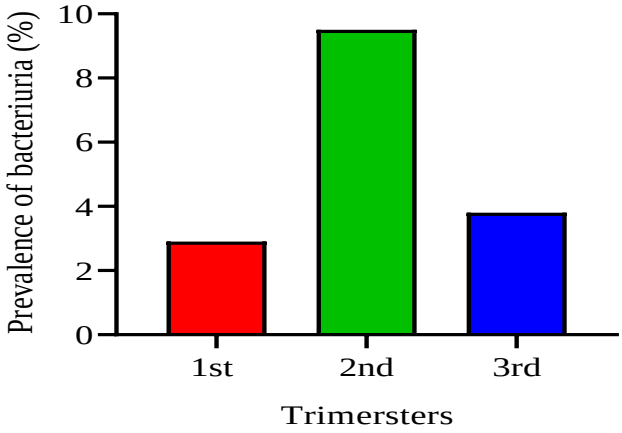

Figure 2: Trimester prevalence of bacteriuria among pregnant women

Prevalence of Bacteriuria by Age Groups

The prevalence of asymptomatic bacteriuria by age groups, the age group 16 -20yrs SnP were 24, 16(8.0%) had infection. Age group 20-25 yrs AP were 36, 2(1.0%) had bacteriuria, AnP were 60, 2(1.0%) and SnP were 8, 4(2.0%) had infection respctively. Age group 26-30 yrs AP were 102, 14(6.9%) had bacteriuria, AnP were 66, 4(2.0%) and SnP were 36, 16(8.0%) had significant bacteriuria respectively. Age group 31-35yrs AP were 44, 9(4.3%) had bacteriuria, while AnP were 30, 2(1.0%) and SnP were 20, 16(8.0%) had bacteriuria respectively. Age group 36-40 yrs AP were 24, 8(3.8%) had infection, whereas AnP were 24, none was infected and SnP were 20, 12(6.0%) were bacteriuric respectively. Age group 40yrs and above SP were 6, 1(0.5%) had bacteriuria and SnP were 96, 52(26.0%) had infection as shown in table 1.

Table 1: Prevalence of bacteriuria by age group among pregnant and non-pregnant women

	Asymptomatic Pregnant Women (AP)		Asymptomatic non- Pregnant Women (AnP)		Symptomatic non-Pregnant Women (SnP)	
Age groups	Number Sample	Number Positive	Number Sampled	Number Positive	Number Sampled	Number Positive
16-20	4	0(0.00)	0(0.00)	0(0.00)	24	16(8.0)
21-25	36	2(1.0)	60	2(1.00)	8	4(2.0)
26-30	102	14(6.9)	66	4(2.00)	36	16(8.0)
31-35	44	9(4.3)	30	2(1.00)	20	16(8.0)
36-40	24	8(3.8)	24	0(0.00)	20	12(6.0)
41 above	6	1(0.5)	0	0(0.00)	92	52(26.0)
TOTAL	210	34(16.2)	200	8(4.0)	200	116(58.0)

Numbers in parenthesis = Percentages, Chi-square, df 25.63, 10, p = 0.0043

Prevalence of Bacteriuria by Educational Status

The prevalence of asymptomatic bacteriuria by education, graduate asymptomatic pregnant women AP were 146, 21(10.0%) had bacteriuria, while asymptomatic non-pregnant women (AnP) were 104, 8(4.0%) had bacteriuria, and symptomatic non-pregnant women (SnP) were 136, 86(43.0%) had UTI. The women who had secondary education (WASC) AP were 60, 10(4.8%) were bacteriuric, whereas AnP were 70, none was had bacteriuria and SnP 54, 26(13.0%) had UTI. Women with just primary school education (FSLC) AP were 4, 3(1.4%) had bacteriuria, AnP were 26, 0(0.00%) and SnP were 10, 2(2.0%) had UTI. The prevalence of bacteriuria was high among women with tertiary education in AP, AnP and SnP respectively as shown in table 2.

Table 2:Prevalence of Bacteriuria by educational status

	Asymptomatic Pregnant Women(AP)		Asymptomatic non- Pregnant Women (AnP)		Symptomatic non-Pregnant Women (SnP)	
Educational Status	Number Sample	Number Positive	Number Sampled	Number Positive	Number Sampled	Number Positive
Graduate	146	21(10.0)	104	8(4.0)	136	86(43.0)
WASC	60	10(4.8)	70	0(0.00)	54	26(13.0)
FSLC	04	3(1.4)	26	0(0.00)	10	2(2.0)
TOTAL	210	34(16.2)	200	8(4.0)	200	116(58.0)

Numbers in parenthesis = Percentages, Chi-square, df, 1.985, 4, p = 0.7386

Prevalence of Bacteriuria by Residential status (Accommodation)

The prevalence of bacteriuria by residential status among AP in 1 or 2 rooms (public toilet, bathroom and kitchen) were 24, 2(2.9%) had bacteriuria, AnP were 26, 0(0.00) and (SnP) were 30, 18(9.0%) had UTI. The women residing in self contained, AP were 42, 8(3.8%) had bacteriuria, while AnP were 70, 4(2.0%) had bacteriuria and SnP were 70, 42(21.0%) had UTI. The subjects living in bedroom flats AP were 114, 20(9.5%) had bacteriuria, the AnP were 104, 4(2.0%) had bacteriuria and the SnP were 100, 52(28.0%) had UTI as shown in table 3.

Table 3 : Prevalence of bacteriuria by residential status

	Asymptomatic Pregnant Women (AP)		Asymptomatic non- Pregnant Women (AnP)		Asymptomatic non-Pregnant Women (SnP)	
Type of Accommodation	Number Examined	Number Positive	No. Sampled	No Positive	No Sampled	No Positive
1 or 2 rooms	24	2(2.86)	26	8(0.0)	30	18(9.0)
Self-contained	42	8(3.81)	70	4(2.0)	70	42(21.0)
Bedroom Flat	114	20(9.52)	104	4(2.0)	100	56(28.0)
TOTAL	210	34(16.2)	200	8(3.8)	200	116(58.0)

Numbers in parenthesis = percentages. Chi-square, df 2.215, 4. P-value = 0.6962

Prevalence of Bacteriuria by Residential status (Accommodation)

The prevalence of bacteriuria by residential status among asymptomatic pregnant women (AP) in 1 or 2 rooms (public toilet, bathroom and kitchen) were 24, 2(2.9%) had bacteriuria, asymptomatic non-pregnant women (AnP) were 26, 0(0.00) and symptomatic non-pregnant women (SnP) were 30, 18(9.0%) had UTI. The women residing in self-contained, AP were 42, 8(3.8%) had bacteriuria, while AnP were 70, 4(2.0%) had bacteriuria and SnP were 70, 42(21.0%) had UTI. The subjects living in bedroom flats AP were 114, 20(9.5%) had bacteriuria, the AnP were 104, 4(2.0%) had bacteriuria and the SnP were 100, 52(28.0%) had UTI as shown in table 4.

Table 4 Percentage occurrences of isolated bacteria

Bacteria	Asymptomatic Pregnant(AP)	Asymptomatic non-Pregnant(AnP)	Symptomatic non-Pregnant (SnP)	**TOTAL**
E. coli	16(47.1)	8(100)	52(44.8)	76(48.1)
Klebsiella sp.	7(20.6)	0(0.00)	36(31.0)	43(27.2)
Proteus sp.	0(0.00)	0(0.00)	8(6.9)	8(5.1)
Pseudomonas sp.	1(2.9)	0(0.00)	12(10.3)	13(8.2)
S. aureus	10(29.4)	0(0.00)	8(6.9)	18(11.4)
TOTAL	**34(16.2)**	**8(4.0)**	**116(58.0)**	**158**

The numbers in parenthesis = percentages, Chi-square, df 126.1, 8. P-value<0.0001.

Antibiogram of Isolated Bacteria

All the bacterial isolates were 100% susceptible to nitrofurantoin except *Pseudomonas sp.* which was 23.1% resistant. *E. coli* and *Klebsiella sp.* were 11.5% resistant to ofloxacin respectively, Proteus sp. were 50% resistant to ofloxacin whereas *Pseudomonas sp.* were 100% susceptible to ofloxacin. *E. coli* were 62.3% resistant to gentamycin, while *Klebsiella sp.* and *Proteus sp.* are 57.2% and 25.0% resistant to gentamycin respectively. *Pseudomonas sp.* was completely susceptible to gentamycin. All isolated bacteria were 100% resistant to ampicillin, tetracycline, streptomycin, nalidixic acid and cotrimoxazole respectively as shown on table 5.

Table 5 : Resistance pattern of Gram negative rods isolated

	E. coli			*Klebsiella* sp.			*Proteus* sp.			*Pseudomonas* sp.			
Antibiotics	**PW**	**AnP**	**SnP**	**PW**	**AnP**	**SnP**	**PW**	**AnP**	**SnP**	**PW**	**AnP**	**SnP**	**Percentage Resistance**
Nitrofurantoin	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	Nill	Nill	0 (0)	1 (100)	Nill	2 (33.3)	3(3.2)
Ofloxacin	0 (0)	0 (0)	3. (11.5)	0 (0)	0 (0)	3 (11.5)	Nill	Nill	2 (50)	0 (0)	Nill	0 (0)	8(8.5)
Gentamycin	5 (31.3)	1 (25)	4 (15.3)	0 (0)	0 (0)	4 (15.3)	Nill	Nill	2 (50)	0 (0)	Nill	0 (0)	18(19.2)
Nalidixic acid	16. (100)	4 (100)	26 (100)	7 (100)	4 (100)	26 (100)	Nill	Nill	4 (100)	1 (100)	Nill	6 (100)	94(100)
Co-trimozole	16 (100)	4 (100)	25 (96.2)	7 (100)	4 (100)	26 (100)	Nill	Nill	4 (100)	1 (100)	Nill	6 (100)	93(98.9)
Ampicillin	16 (100)	4 (100)	26 (100)	7 (100)	4 (100)	26 (100)	Nill	Nill	4 (100)	1 (100)	Nill	6 (100)	94(100)
Tetracyclin	16 (100)	4 (100)	26 (100)	7 (100)	4 (100)	26 (100)	Nill	Nill	4 (100)	1 (100)	Nill	6 (100)	94(100)
Streptomycin	16 (100)	4 (100)	26 (100)	7 (100)	4 (100)	26 (100)	Nill	Nill	4 (100)	1 (100)	Nill	6 (100)	94(100)

Numbers in parenthesis = Percentage resistance, Nil = No growth, PW= Pregnant women, NPA= Non Pregnant women (control), NPS=Non pregnant symptomatic women.

Resistance Pattern of Staphylococcus aureus to Antimicrobial Agents Tested Against it

S.aureus were 11.1% resistant to gentamycin, 5.5% to ciprofloxacin, 16.7% to ofloxacin, 22.2% to ceftatriozone and 77.8% each to ampicillin, cloxacillin and cotrimozole respectively as shown on table 6.

Table 6 Resistance pattern of Staphylococcus aureus isolates

	Staphylococcus aureus			
Antibiotics	**AP**	**AnP**	**SnP**	**Percentage Resistance**
Gentamycin	2 (20)	Nill	0 (0)	2(4.3)
Ciprofloxacin	0 (0)	Nill	1 (25)	3(21.4)
Ofloxacin	0 (0)	Nill	3 (75)	4(28.6)
Ceftatriozone	0 (0)	Nill	4 (100)	4(28.6)
Ampicillin	10 (100)	Nill	4 (100)	14(100)
Cloxacillin	10 (100)	Nill	4 (100)	14(100)
Cotrimozole	10 (100)	Nill	4 (100)	14(100)
Streptomycin	10 (100)	Nill	4 (100)	I4(100)

Numbers in parenthesis=percentage resistance, Nil=no growth

4. Discussions

The prevalence rate of bacteriuria among pregnant women (AP) attending antenatal at the University of Port Harcourt Teaching Hospital (UPTH), was 34 (16.9%) and the prevalence rate for the asymptomatic non-pregnant women was 8(4.0%). The prevalence among symptomatic non-

pregnant women was 116(58%). The prevalence rates of bacteriuria obtained in some regions or zones in Nigeria are not in agreement with the result obtained from this research. South-Eastern Nigeria [20] had a prevalence rate of 52.0% in Benin City [21] had a prevalence rate of 50% also in Benin City and Akure [22] recorded a prevalence rate of 61%. In some African countries, the results got were also at variance with the findings of this study, such as [23] in Egypt had a prevalence rate of 53.5%, [24] in Ethiopia had a prevalence rate of 21.2% and Uganda [25] had a prevalence rate of 32.2%. Beyond Africa, Kirkuk City Irag [26] obtained a bacteriuria prevalence rate of 43%.

Other researchers in Nigeria had lower prevalence rates than those already cited above such as [27] in Port Harcourt recorded a prevalence rate of 29.5%, while [28] had a prevalence rate of 29.5%. A related study at Abakilike Nigeria [29] reported a prevalence rate of bacteriuria to be 24.7%. These values were slightly higher compared to the value obtained in this study. Tantamount with the result of this research were the findings of [30] who had a prevalence rate of 18.21% in Enugu, and in Ghana [31] obtained a bacteriuria prevalence rate of 17.5%, these were synonymous with the value recorded in this study. Some researchers had even recorded lower prevalence rates of bacteriuria such as [32] 10.7% in Ibadan. Pakistan [33] recorded a prevalence rate of 5%, while [34] in Cameron reported a prevalence rate of 7.8%, and [35] in Tanzania had a prevalence of 8.9%. These results clearly showed that different zones, regions, or countries may have varying prevalence rates of bacteriuria. It could depend on the unawareness of predisposing factors associated with bacteriuria such as individual or personal hygiene, juxtapose of the female anus with the vagina, short female urethra, pressure due to sexual massage, pregnancy conditions and other predisposing factors due to common practices in the area. The prevalence of UTI among SnP was 58% from this study which was in line with 50.3% obtained by [36] in Iraq among the non-pregnant women, UTI was more prevalent among subjects from age 40 yrs and above as was also noted by [36]

The prevalence of AB among AP by trimester was high in the second trimester 20(9.5%). Some studies have shown a high prevalence rate of bacteriuria in the third trimester which was not in conformity with this research such as [28] had a prevalence rate of 65% in the 3rd trimester, [37] reported a high prevalence in the third trimester. In agreement with the result obtained in this research [30] in Enugu stated a high prevalence in the second trimester in Abakaliki, [28] had a high prevalence rate of 21, 9% also in the second trimester. Another African country such as Ethiopia [38] had a high prevalence rate of bacteriuria in the second trimester. Some pregnant women are jaded from registering at antenatal clinics in the first trimester when AB could have been detected early and arrested clinically by interventions with antimicrobial agents. Statistical analysis showed that there was a significant difference at $P<0.05$ by trimester.

The prevalence of AB by education status of the subjects showed that subjects with tertiary educational qualifications were more predisposed to AB among the AP 21(10.0%) and UTI among SnP 86(43%). This result is contrary to the verdict of [39] had a high bacteriuria prevalence rate of 36(55.4%) among subjects with secondary education in Port Harcourt, Nigeria; [40] recorded 52% among subjects who had secondary education. [32] had a high prevalence of bacteriuria 6(14.6%) among women with secondary education in Ibadan. In Pakistan [41] also obtained a high prevalence rate of 45% among subjects with secondary education, which were not in conformity with the result of this research. Benin City [28] had a high prevalence rate of 65.6% among illiterates and [26] in Iraq communicated a prevalence rate of 48.4% among illiterate women which differs from the report of this study. In parallel with our result, [35] conveyed a high prevalence of 52% among women with tertiary levels of education. In Northern India [9] had a high prevalence among the educated, [31] in Ghana also had a high prevalence of 26.7% among women with tertiary level of education which was analogous with the account of this research. Most educated women are either working class or in different types of business which may expose them to ex-marital sex that may predispose them to genitourinary tract infection. Voiding in public toilets which is not hygienically maintained as those in the developed countries may expose women to AB and or UTI. Statistical analysis at $P<0.05$ did not show a

significant difference in the educational status of the women.

The prevalence of bacteriuria by age groups from this study was high 14(6.9%) among AP in the age group 26-30 yrs. In Akure Nigeria, [22] had a high prevalence among pregnant women in the age group 25-34 yrs 101(52.2%), Ibadan Nigeria [28] had a high prevalence rate of bacteriuria 71.4% among the age group 21-35 yrs. In Port Harcourt, Nigeria [27] recorded a prevalence rate of 40% in UPTH among subjects in age the group 30-34 yrs. [32] had a high prevalence of 11.5 % in Ibadan Nigeria among subjects in age the group 26-35 yrs. Jos, Northern Nigeria, the prevalence of bacteriuria was high among the age group 24-28 yrs was 5.1% [39]. In other countries [40] in Pakistan had a similarly high prevalence of 55% among this same age group. Tanzania [35] had a high prevalence of 78% among the age group 21-30 yrs. In Ghana [31] also had a high prevalence of 18.8% among age 26-30 yrs and in Iraq [26] had a high prevalence of 58.4% among the age group 21- 30 yrs. These age groups are noted to be very active in social and sexual activities which may account for the high prevalence among them [5]. There was statistical significance difference among the AP by age at $P<0.05$.

Grouping the women by residential status was concomitant with socioeconomic status. AB increased with better accommodation. The prevalence of AB among those living in bedroom flats was 20(9.5%) for AP and 56(28.0%) for SnP. Related research [27] and [40] conveyed a high prevalence of AB among the middle class which differs from the result of this research. [9] also reported a high prevalence of AB among the high-class women which consents with our result.

The percentage occurrences of bacteria isolated from AP, AnP and SnP from this study were *E. coli* 76(48.1%), *Klebsiella* sp. 43(27.2%), *Staphylococci* sp. 18(11.4%), *Pseudomonas* sp. 13(8.2%) and *Proteus* sp. 8(5.1%). Our result differed from what was arrived at by researchers such as [29] in Abakiliki Nigeria recorded *Staphylococcus* as the most prevalent bacteria with a percentage occurrence of 24.7%, [26] record had a percentage occurrence of 20.6% *Staphylococci*. [32] had *Klebsiella* sp. 8(36.8%) as the highest bacteria in percentage occurrence. In alignment with our work [27] in Port Harcourt noted that *E. coli* was highest in percentage occurrence 24.6%, in Akure *E. coli* accounted for 58(31.7%), in Jos *E. coli* was predominantly 71.4%, in another study of AB in Enugu [30] recorded *E. coli* as 26.6% and Benin City [28] *E. coli* 54.0% in AB among pregnant women. Other countries such as Ghana [31] recorded *E. coli* as the most prevalent bacteria 62.5%, Uganda E. *coli* was highest 41.2%, in Ethiopia [24] had *E. coli* to be 34.6%. In other countries, *E. coli* was also documented as the most prevalent bacteria in Tanzania 50% [35]. Iran *E. coli* accounted for 58% [33]. All the recent references were in line with our findings.

E. coli, *Klebsiella* sp., and *Proteus* sp. were bacteria that may be associated with the human and animal intestine and infections with these bacteria could be linked to faecal contamination. In the female, the anus and the vagina juxtapose in addition to the short urethra that enables bacteria to transverse to the bladder easily [5]. *Staphylococci* are normal human microbiota inhabiting nostrils, skins, palms etc. infections by *Staphylococci* may come from normal flora and or by contacts with infected materials. Pseudomonas is a recalcitrant organism that can establish in sinks, disinfectants and form biofilms on moist surfaces. It may cause infection from unimagined contaminated sources, even faeces.

The result of antimicrobial susceptibility testing of all isolated suggests nitrofurantoin which showed the highest susceptibility to isolated bacteria as the first drug of choice, followed by ofloxacin and gentamycin in the treatments of AB and UTI associated with Gram-negative rods. *Staphylococci* sp. gentamycin, ciprofloxacin, ofloxacin and ceftriaxone respectively may be considered in that order for treatment of infections caused by *Staphylococci* sp. The result of the antimicrobial susceptibility portrays the challenge posed on the health sector in the treatment of AB/UTIs as a result of developments of antimicrobial resistance to antimicrobial drugs.

5. Conclusion

Our research reported risk factors such as conception age in the second trimester, maternal age group 26-30yrs and age 40 yrs and above for SnP

women. There was no significant association between the level of education and socioeconomic status with AB/UTI. *E. coli* was the most prevalent bacteria isolated from the urine of PW, PnP and SnP respectively.

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