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Original Research Article

Factors associated with the occurrence of asymptomatic bacteriuria among pregnant women in Embakasi Central Sub-County, Nairobi City County

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ABSTRACT

Background: Asymptomatic bacteriuria (ASB) complications are the second leading cause of death in pregnant women globally, trailing only anaemia. Despite the fact that urinary tract infection (UTI) has been a threat to public health in Nairobi for the past five years, especially in the Embakasi Central sub-county, no studies on the occurrence of ASB and related factors have been conducted in Nairobi County.
Methods: A descriptive cross-sectional analytical design study was conducted in five wards of Embakasi central sub-county, Nairobi County, Kenya. A questionnaire and routine urine microscopy were used to collect data from 369 expectant women attending ANC in selected facilities. independent t test and chi-square tests were between the independent and dependent variables at $p \leq 0.05$.
Results: The respondents were 26 years old on average, majority of the women had attained secondary education (46.7%, n=172), were married (66%, n=241) and professed Christianity (72.2%, n=265). The proportion of women in employment (52%, n=192) was slightly higher than the unemployed (48%, n=175). The occurrence of ASB was significantly higher in first trimester as compared to the other trimesters (p=0.000). Also, the occurrence of ASB differed significantly by religion (p=0.002) and by employment status (p=0.003). Most of the expectant mothers had heard of ASB, mainly from health care workers (58.9%, n=119) or the media (31.7%, n=64). ASB was more likely to occur in women who had never heard of ASB (p=0.000).
Conclusions: The prevalence of ASB is relatively higher than the rest of the African continent. Knowledge levels, religion, family sizes, trimester of pregnancy and employment status were strongly linked to ASB. Consequently, a number of interventions and policy recommendations have been made in this paper.

Keywords: Asymptomatic bacteria prevalence, Antenatal clinics, Factors associated

INTRODUCTION

Bacteria in urine without signs or symptoms of infection is known as ASB. It affects 2-15% of pregnancies around the world.[1] Although ASB prevalence among pregnant women in developed countries ranges from 2-7%, it is substantially greater in developing countries.[2] In Nairobi County, a cross-sectional study found a 21.5% prevalence rate of ASB amongst expecting women attending ANC in one of the health facilities.[3] *E. coli* is the primary cause of ASB, accounting for 80 to 90% of UTIs.[4] ASB is the second-commonest cause of mortality among pregnant women after anemia.[1] If mothers with ASB do not seek medical help, it is estimated that 30% of them may develop acute pyelonephritis.[1] Untreated ASB has also been linked to poor birth weight and preterm delivery.[5]

A number of ASB risk factors have been identified. High cases of ASB, for example, have been linked to physiological changes such as an increase in plasma volume and glycosuria.[4] An increase in plasma leads to a decrease in urine concentration.[4] It has also been linked to glycosuria. When pregnant women acquire ASB, structural and hormonal changes promote dilatation of the renal system, resulting in urine stasis. According to Bookallil et al the majority of women seeking ANC services in Nairobi County are socioeconomically disadvantaged, multiparas, and live in poor neighbourhoods, all of which are associated with ASB.[6]

Despite evidence suggesting geographical diversity in the occurrence of ASB[7], no similar research has been conducted in the Embakasi Central sub-county. Furthermore, the DHIS/KHIS does not contain data specifically on ASB in Kenya or Nairobi County. Infections of the urinary tract (UTIs) have been a public health problem in Nairobi, particularly in the Embakasi Central sub-county. According to Mama Lucy Kibaki hospital, a facility with high patient traffic in Embakasi Central sub-county, UTI infections among pregnant women have risen from 150 in 2015 to 700 in 2019. Therefore, this study sought to determine the occurrence of ASB and the relationship between socio-demographic variables, knowledge of ASB and ASB prevalence. The specific objectives for this study were: To identify the socio-demographic characteristics of women attending ANC at selected hospitals c, to find out the occurrence of ASB in women attending ANC in Embakasi Central sub-county hospitals and to determine the association between socio-demographic characteristics, knowledge and occurrence of ASB among women attending ANCs in Embakasi Central sub-county hospitals.

METHODS

A descriptive cross-sectional analytical design was used. Characteristically, analytical studies gather data to measure the association between dependent and independent variables.[8] This study targeted women attending ANCs in selected Embakasi Central sub-county hospitals in Nairobi County, Kenya. The subcounty has five wards, namely, Kayole North, Kayole Central, Kayole South, Komarock, and Matopeni/ spring valley. There are a total of 46 health-care facilities in total.[9] Facilities with a high volume of patients were purposively selected. Cluster sampling was used to group health facilities in terms of wards and a proportionate sample of 369 women randomly recruited from the facilities (Table 1).

The dependent variable was the occurrence of ASB women attending ANCs in selected Embakasi Central sub-county hospitals in Nairobi County, Kenya. To determine the prevalence, routine microscopy was done on midstream urine samples collected from women attending ANC clinics. The independent variables included background characteristics (trimester, age, education, marital status, employment status, religion) and knowledge (which was assessed on a composite scale of 6 items). From the scale, those who scored 5-6 were highly knowledgeable, 3-4 were averagely knowledgeable, and 0-2 were poorly knowledgeable. A researcher-administered questionnaire was used to gather data from ANC mothers on background and knowledge-related factors. To ensure validity and reliability, the items in the questionnaires were developed after a thorough literature review of related studies. Additionally, the tools were reviewed by peers. Furthermore, a pre-test was performed in comparable facilities in the neighbouring sub-county.

For continuous variables, the mean differences between the positive and negative groups were examined using an independent t test. The chi-square test was used to investigate the associations between categorical variables (namely background and knowledge factors) and ASB status. The results were considered significant at $p \leq 0.05$.

Table 1: Sampling frame.

Name of the ward	Facility selected	ANC pop.	No. recruited	Prop. (%)
Kayole North	Kayole 1 HC, Penda MC, St Patrick HC, Mofa Afya MC	653	92	24.9
Kayole South	Equity Afya Kayole, Kayole 2 hospital, Kayole outpatient clinic, Mama M and N home, St. Begson clinic	1034	144	39.3
Kayole Central	Diwopa HC, Kayole hospital, Meera MC, P.C.E.A Kayole hospital, Arrow web M and N home	293	42	11.4
Komarock ward	Agha Khan Univ. Hosp, MLKH, St. Jude MC, EDARRP Komarock, St. Mourice MC	646	90	24.4
Matopeni	Well living MC	6	1	0
Total	23	2632	369	100

RESULTS

The study targeted a sample of 369 pregnant women. A response rate of 99.7% (n=368) was attained. However, there were variations in the response rates across the different questions. Table 2 shows the background features of the respondents. The mean age of the women was 26 years (range=18-41, SD=5). The respondents who were in their 1st, 2nd, and 3rd trimesters of pregnancy were almost equally represented in the survey. The majority of the women had attained secondary education (46.7%, n=172), were married (66%, n=241) and professed Christianity (72.2%, n=265). The percentage of women who were in employment (52%, n=192) was slightly higher than the unemployed (48%, n=175).

Table 2: Background characteristics of the respondents.

Characteristics		Frequency		Percent (%)	
Trimester	1st	119		32.5	
	2nd	124		33.9	
	3rd	123		33.6	
	Total	366		100	
Education level	Primary school	103		28.0	
	Secondary school	172		46.7	
	Tertiary/ college	93		25.3	
	Total	368		100.0	
Marital status	Student	10		2.7	
	Single	113		31.0	
	Married	241		66.0	
	Separated	1		0.3	
	Total	365		100.0	
Employment status	Un-employed	175		47.7	
	Employed	192		52.3	
	Total	367		100.0	
Religion	Muslim	102		27.8	
	Christian	265		72.2	
	Total	367		100.0	
	N	**Mean**	**Min**	**Max**	**SD**
Age of respondents in years	368	25.96	18	41	4.9

An independent samples t test was performed to compare the mean ages of pregnant women who had ASB against those who were negative. There was not a significant difference in mean ages between those who returned positive results (M=25.68, SD=4.95) and the women who were negative for ASB (M = 26.04, SD = 4.95); t (363), p=0.573. The association between test results and trimester, level of pregnancy, marital status, employment status, and religion was assessed using a chi-square test of independence as shown in Table 3. Among the women with asymptomatic ASB, 51.9% (41) of them were in their first trimester of pregnancy, 22.8% (22) were in their second, and those in the third trimester were 20.3% (16). On cross-tabulation, the occurrence of ASB was significantly higher in the first trimester as compared to the other trimesters (p=0.000). Also, the occurrence of ASB differed significantly by religion (p=0.002) and by employment status (p=0.003). The prevalence of ASB was significantly higher among Christians (85.9%, n=67) as compared to Muslim women (14.1%, n=11), p=0.05. Higher rates of ASB infections were also observed among the unemployed (63%, n=49) compared to those in some form of employment. However, there was no significant relationship between the test results and the woman's level of education (p=0.135) or marital status (p=0.143).

Figure 1 shows that 64% of respondents (n=187) had low knowledge of ASB, whereas 46% (n=105) were highly or averagely knowledgeable.

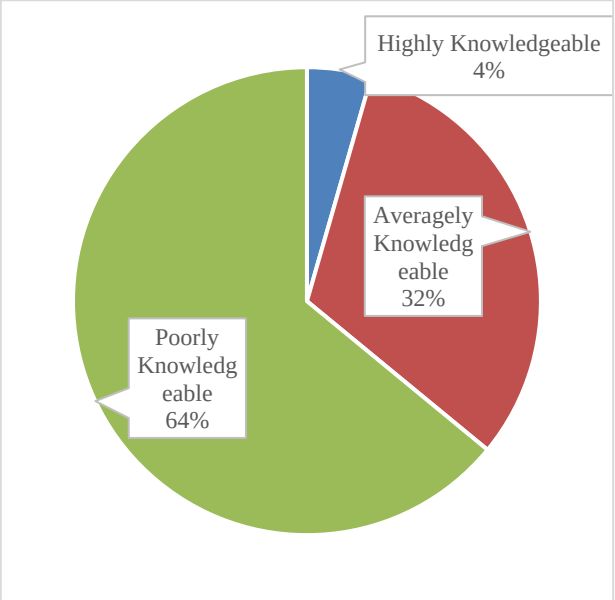

Figure 1: Percentage of respondents knowledgeable on ASB.

Table 4 shows the source of information on ASB. Slightly more than half (55.6%, n=203) of the expectant mothers had heard of ASB, mainly from healthcare workers (58.9%, n=119) or the media (31.7%, n=64).

A chi square test was done to assess if the test results of pregnant women who had ever heard of ASB differed significantly from those who had not (Table 5). Majority of women (79.7%, n=63) with ASB had never heard of ASB. Therefore, ASB was more likely to occur in women who had never heard of ASB (p=0.000). It was also observed that women with limited information (75%) were more likely to be positive, whereas those with moderate knowledge (33.5%) were more likely to be negative. However, these differences were statistically insignificant (p=0.225).

Table 3: Prevalence of ASB by background factors.

Factors			ASB test results		Total	Significant at p≤0.05
			Negative	Positive		
Trimester	1st	Count	78	41	119	0.000
		% within ASB test results	27.2	51.9	32.5	
	2nd	Count	102	22	124	
		% within ASB test results	35.5	27.8	33.9	
	3rd	Count	107	16	123	
		% within ASB test results	37.3	20.3	33.6	
Total		Count	287	79	366	
		% within ASB test results	100	100	100	
Education level	Primary school	Count	74	29	103	p=0.135
		% within ASB test results	25.6	36.7	28	
	Secondary school	Count	141	31	172	
		% within ASB test results	48.8	39.2	46.7	
	Tertiary/ college	Count	74	19	93	
		% within ASB test results	25.6	24.1	25.3	
Total		Count	289	79	368	
		% within ASB test results	100	100	100	
Marital status	Student	Count	7	3	10	0.143
		% within ASB test results	2.5	3.8	2.7	
	Single	Count	82	31	113	
		% within ASB test results	28.8	39.2	31	
	Married	Count	196	45	241	
		% within ASB test results	68.8	57	66.2	
Total		Count	285	79	365	
		% within ASB test results	100	100	100	
Religion	Muslim	Count	91	11	102	0.002
		% within ASB test results	31.5	14.1	27.8	
	Christian	Count	198	67	265	
		% within ASB test results	68.5	85.9	72.2	
Total		Count	289	78	367	
		% within ASB test results	100	100	100	
Employment status	Un-employed	Count	126	49	175	0.003
		% within ASB test results	43.6	62.8	47.7	
	Employed	Count	163	29	192	
		% within ASB test results	56.4	37.2	52.3	
Total		Count	289	78	367	
		% Within ASB test results	100	100	100	

Table 4: Source of information on ASB.

Heard from who?	Frequency	Percentage (%)
HCW	119	58.9
Friends	19	9.4
Media	64	31.7
Total	202	100

Table 5: ASB status by knowledge factors.

Variables			ASB test results		Total	Significant at p≤0.05
			Negative	Positive		
Heard of ASB	No	Count	99	63	162	0.000
		% within ASB test results	34.6	79.7	44.4	
	Yes	Count	187	16	203	
		% within ASB test results	65.4	20.3	55.6	
Total		Count	286	79	365	
		% within ASB test results	100	100	100	

Continued.

Variables			ASB test results		Total	Significant at p≤0.05
			Negative	Positive		
Level of knowledge about ASB	Highly knowledgeable	Count	11	2	1	0.225
		% within bacteraemia test results	4.4	4.5	4.5	
	Averagely knowledgeable	Count	83	9	92	
		% within bacteremia test results	33.5	20.5	31.5	
	Poorly knowledgeable	Count	154	33	187	
		% within bacteremia test results	62.1	75	64	
Total		Count	248	44	292	
		% within bacteremia test results	100	100	100	

DISCUSSION

The prevalence of ASB among expectant mothers in Embakasi central sub-county, Nairobi County was 21.5%, with 11.2% of them being in the first trimester. A cross-sectional study conducted in Nairobi County established a 21.5% prevalence rate of ASB among pregnant women attending ANC.[3] However, the prevalence reported in this is much higher than that reported in Iran (8.8%) 10, Cameroon (5.7%) 7 and Nigeria (39.2%).[11]

The association between ASB and the background characteristics (namely age, trimester, level of pregnancy, marital status, employment status, and religion) was also assessed. The mean age of the expectant women was 26 years (range=18-41, SD=5). This compares closely with a study done in urban hospitals in Cameroon that established the mean age of expectant women to be 28 years ±4.4.[7] Further, in the present study, a woman's level of education, marital status, and age had no statistically significant influence on the ASB. The findings on age and marital status are consistent with those of Tchente et al who found no link between ASB and marital status or age.[7] Perhaps it is because most women have children at close ages. However, the finding that a level of education is not associated with ASB differs from what is reported in literature. According to Tchente et al ASB occurs with less frequency in women with higher levels of education as compared to those in lower levels.[7]

The occurrence of ASB was significantly higher in the first trimester as compared to the other trimesters. Some past studies have also observed that ASB prevalence varies by gestational age. In Bangladesh's rural Rajshahi region, E. coli was shown to be the most common cause of ASB in 12% of second-trimester expecting women.[12] In their study in Nairobi County, Ayoyi et al noted that age, marital status, parity, gestational age, and educational status had no statistically significant influence on ASB occurrence.[3] However, a study in Cameroon by Tchente et al reported no link between trimester and ASB occurrence.[7]

The prevalence of ASB was also significantly higher among Christians as compared to Muslim women. Correspondingly, a study conducted at the Teaching University of Benin observed that Christian expectant women were more vulnerable to ASB than their Muslim counterparts.[13] It is also important to note that the proportion of Muslim women recruited in this study was relatively lower than their Christian counterparts, and therefore the variation could be explained by the sample representation differences. The finding that the unemployed were more likely to have ASB than the employed is in tandem with most previous studies. Fatima and Ishrat observed a substantial occurrence of ASB in pregnancy, which they linked to multiple pregnancies, illiteracy, and poor socioeconomic status.[14] In Iran, a study by Enayat et al also reported a higher prevalence of ASB among women from low socio-economic setups.[10]

This study looked into women's knowledge of ASB and whether the level of knowledge influences ASB occurrence. Slightly more than half (55.6%) of the expectant mothers had heard of ASB, mainly from healthcare workers (58.9%) and sometimes from the media. This study found a significant link between knowledge of ASB and ASB prevalence, with women who had never heard of ASB being more vulnerable. From a study in India, Rajaratnam maintained that testing pregnant women for ASB during their initial ANC visit and raising awareness about its effects helps avoid its effects on pregnancy.[15] Previous research has suggested health education be used to prevent ASB and its complications.[7]

CONCLUSION

In conclusion, the prevalence of ASB in Embakasi Central, Nairobi, Kenya, is relatively higher than the rest of the African continent. It was also noted that a sizeable portion of the sampled population were poorly knowledgeable on ASB, which was significantly linked to higher ASB occurrence in the uneducated group. This study has revealed that Christian women, women coming from relatively bigger family sizes, women in their first trimester of pregnancy, and unemployed women were more likely to have ASB. Consequently, the authors recommend that health education campaigns be amplified to increase awareness among the unreached population. Furthermore, and in view of the observation that expectant Christian women are more vulnerable to ASB than their Muslim counterparts, this study recommends further research where there is adequate representation from each religious group to ascertain this conclusion.

This is especially important because the Muslim representation in the sample was disproportionately lower than that of the Christian members.

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