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Proportion, Aetiology Of Urinary Tract Infections And Healthcare Seeking Behaviours Among Females Of Reproductive Age Attending Out-Patient Clinics In Kinango And Kwale Sub County Hospitals,Kwale County,Kenya

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Abstract

Background information: *Urinary tract infection accounts for a major disease burden globally especially in the developing countries. Community-acquired urinary tract infections (UTIs) occur mostly in women and are commonly caused by Escherichia Coli.*

Objective and study design: *This was a cross-sectional study carried out in Kwale and Kinango Sub-county hospitals, Kenya. This study aimed to determine the proportion and etiology of UTI and establish the factors influencing healthcare seeking behaviour of UTI patients among female attending the outpatient department for a period of twelve months(from September 2014 to September 2015).*

Method: *Mid-steam urine samples were collected from seven hundred and sixty six non-pregnant female participants who consented in our study and fulfilled the study criteria. Physical, chemical, microscopic and culture techniques were performed on urine samples obtained from the seven hundred and sixty six (766) women.for drug sensitivity, Kirby-Bauer technique was employed where 14 antibiotics were ttested against identified uropathogens.*

Results: *Out the 766 female involved in the study,220 were diagnosed with UTI where, 152(69.1%) were young females in the ages between 15 to 29,while those in the age groups 30-39 were 42 (19.1%) the least diagnosed with UTI being females in ages between 40 and 49 who accounted for 11.8%(26 females). Considering marital status of those who were diagnosed with UTI,141(64.1%) were married, while those who reported to be single during the period of the study accounted for 30%(66 women) while the third group which were few, were in the group of divorced or widowed who were only 13,representing 5.9%. Out of the 766 subjects who took part in this study,546 , (71.3%) sought healthcare services while 220(28.7%) did not seek healthcare service even after developing signs of UTI.*

Among those who hadn't sought healthcare services, 110(50%) cited the cost of treatment as the barrier for not seeking healthcare, while 106(48.18%) were ignorant of the disease. Women in the age bracket of 15-29 years old were the most affected. Among the 220 diagnosed with UTI Significant bacteriuria (>10^5 colony forming units/ml of urine was found in 220/766(28.7%) urine specimens. Of the six bacteria isolated, Escherichia coli was the most predominant at 97(44.1%), Candida albicans, 29(13.2%), Pseudomonas aureginosa, 28(12.7%), Staphylococcus aureus, 26(12.7%), Coagulase/Catalase negative Staphylococcus saprophyticus, 20(9.1%) and Proteus mirabilis, 20(9.1%). This study concludes that, Women aged between 15-29 years old were the most affected with 546(71.3%) having sought healthcare compared to only 220(28.7%) who didn't. Escherichia coli were the most predominant urinary tract pathogen isolated (44.1%), with high levels of resistance against most antimicrobial agents to most uropathogens being evident. Low economic status among participants is the major contributing factor that influenced poor healthcare seeking behavior with 28.7% delaying or failing to seek healthcare in the previous episode where 110(50%) citing the cost of treatment as the major barrier for not seeking healthcare. Making evidence based management of urinary tract infections for both asymptomatic and symptomatic compulsory will be helpful in detecting the etiology of UTI, thus reducing period of infection and cost of treatment.The cost of screening UTI should be revised and scaled down to increase detection of the disease causative agent before prescribing of antibiotics to patients by clinicians.

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I. Introduction

Urinary tract infections describe both microbial colonization of the urine and tissue invasion of any structure of the urinary tract (Andriole, 1985 Kibera *et al*; 2009) leading to an inflammatory response of the urotherlium. They are non-sexually transmitted diseases presetting as an acute episode or chronic onset. The clinical manifestation of this infection depends on the portion of the urinary tract involved, the etiologic organism(s), the severity of the infection, and the patient's ability to mount an immune response to it (Sobel, 2000).

Bacteria normally present in the colon and hence on the perineum, may later enter the urethral opening from the skin around the anus and genitals of the patient (Kolawole *et al*., 2009). Women may be more susceptible to urinary tract infections because their urethral opening is near the source of bacteria and the anatomically shorter urethra is shorter aid bacterial accession to the bladder. This is due to a combination of several factors including anatomical predisposition, close approximation of urethra and vagina and sexually active live during these years (Tambekar *et al*; 2006).

Women often suffer silently; with sexually active young women being more susceptible to urinary tract infections (Bohara *et al*., 2012),with those in the reproductive age,15-50 years accounting to 50-80% of all infections(Kibera *et al*;2009. The infections are the most common health problems occurring in all age groups from neonates to old age, with women in this age bracket having experienced urinary tract infection at least once or twice in their lives (Puri *et al*, 2009). Infections of the urinary tract are very challenging, not only because of their high prevalence each year, but also because the diagnosis of the infection is complicated, and secondly, in many health institutions and especially those found in limited resource areas, diagnosis is based on the signs and symptoms manifested(Kolawale *et al*., 2009). However; many infections can have long-term consequences (Ugbogu *et al*; 2010). Of the four uropathogens species isolated in a study carried out in Mulago hospital, *Escherichia coli* accounted for 57.5% with *Staphylococcus aureus* being the second most etiological agent with a rate of 22.5% followed by *Enterococcus* species and *Klebsiella pneumoniae* (Mwaka *et al*; 2006).

Several studies on health seeking behaviour have shown the numerous factors among them past experiences with health services, perception about quality and efficiency of health services and influences at the community level influences on an individual's health behaviour(Sule *et al;*2008 and Mckian,2002). The decision to seek healthcare is also seen to be influenced by an individual's educational and economic status, the extent to which s/he is worried about the symptom and duration of experiencing the symptom (Katung 2001 and Amaghionyeodiwe, 2008). Other enabling factors that have been reported in some studies to determine whether an individual will seek healthcare, even if predisposed, include having some means to obtain health services, that is income, accessibility, acceptability, affordability and availability of health services; and need factors, reflecting the perceived health status, as indicated by severity of the conditions (Anderson *et al*, 1968).

II. Materials And Methods

Study Area

This study was conducted in Kwale and Kinango sub county hospitals between September 2014 and September 2015.The County is in Coast region, covering an area of 8,270.2 square kilometers, bordering Taita-Taveta County to the West, Kilifi to the North West, Indian Ocean to the East and the Republic of Tanzania to the South. It has a population of 649,931 people with 49 % male and Female 51%respectively.

Study Population

The respondents recruited were only female patients of the reproductive age (15 – 49 years old) attending the out-patient clinics of Kwale and Kinango district hospitals between September 2014 and December 2015.

Study Design

A Cross-sectional study was carried out, adopting a quantitative questionnaire and laboratory request form which entailed respondent's bio-data. These tools enabled the study in determining the proportion of genito-urinary tract infections in female patients, the frequency of the etiological agent(s) relating all these characteristics to the socio-demographic characteristics of the respondents and determine the patterns of antimicrobial drug of the isolated pathogenic microorganisms.

Sampling Technique

The study recruited a total of 766 women attending Kinango and Kwale district hospitals. The convenience sampling method was used until the required sample size was obtained. All the respondents who qualified for the study were selected without consideration to their symptomatology. Sample Size Determination

The sample size calculation was based on prevalence of genito-urinary tract infections among non-pregnant females attending Mulago hospital, where the study established prevalence of 10 %

(Mwaka *et al*, 2006).Fisher's method was used as the appropriate formula as it accommodates calculation of small size of observations.

The method: $n= (z)^2xp (1-p) \div d^2$

Where n = required sample size

z = Standard Normal Deviation at 95% level of confidence (=1.96)

p= Estimated prevalence of female genito-urinary tract infection (FGI) is 10%. d= Degree of precision set at +10%

The following formula was used **:**$(1.96)^2 \times 0.1(1-0.1) \div 0.1^2$

Then arrived at this sample size: $3.842 \times 0.1 \times 0.9 \div 0.01=345$

In order to achieve precision the above sample size was adjusted for attribution as shown below:

Sample size population was 345.

Adjustment obtained by: 345/ 1-0.1 = 345/0.9= 383 (sample size for each hospital)

Check the spacing and justification of your paragraphs margins

Inclusion Criteria

1. All female patients attending the out-patient clinic in Kwale and Kinango district hospitals.
2. Female patients willing and accepted to sign a consent form to participate in the study
3. Women in the ages between 15-49 years.

Exclusion criteria

1. All women with one or more of the following: pregnancy, puerperium, any vaginal bleeding at the time of the study, long term (14 days) catheterization ending in the last 30 days prior to the study, history of gynecological or recent urological surgery.
2. Women with overt vaginal or uterine prolapse on history.
3. All women in the age of 15-49 years but on antibiotics at the time of the study.

Ethical Considerations

Approval was sought from the board of postgraduate students, scientific steering committee and ethics committee of KEMRI which was submitted to Kwale county department of health. Informed consent and/or assent were obtained from all participants before the interviews and collection of samples were conducted (SSC Protocol Number 2762).

Data Collection Tools

A pre-coded, multilingual questionnaire was used together with laboratory request form to help get accurate information from the respondents (Appendices II).The questionnaire was used to solicit for socio-demographic characteristics of the respondents such as age, level of education, family structure, and occupation and alsoassessed care seeking behavior.

A laboratory request form (bearing same code to the questionnaire of same respondent) was useful to record the laboratory diagnostic information which included physical examination (color, turbidity), proteins, nitrite, glucose, and ketones for biochemistry analysis, microscopic and culture analysis and the antimicrobial drug susceptibility patterns of the isolated pathogenic microorganisms.

The interviews were carried out by two research assistants who were trained by the principal investigator. The training was done in one week covering how to communicate with respondents, which entailed explaining the purpose of the study, asking questions in the questionnaire guide and how to fill the questionnaire and enter data in SPSS.They were also trained on data cleaning and storage maintainingconfidentiality.

A sample of the questionnaire was used during the training to demonstrate the activity in the first three days. The research assistants were then required to repeat the exercise before the principal investigator and supervisors to evaluate them. The exercise was repeated during questionnaire pretesting. A computer installed with the SPSS and the exact template for filling was used during the training so as to make sure the research assistants understood it as is shown in the questionnaire (Appendices II).

Collection of Urine Samples

Mid-stream urine (MSU) was collected from all 766 participants in order to give the asymptomatic ones an opportunity. Before collecting the urine sample, every respondent was adequately educated on how to collect the mid-stream urine sample. Each participant was issued with eight (8) pieces of sterile gauze swabs, four (4) soaked in liquid soap and four (4) soaked in saline. They were then requested to sit and set wide the legs, spread apart the vulvae with the left and middle fingers, clean the vulvae from front to back with the sterile gauzes provided, starting with the ones soaked in liquid soap followed by the saline ones, four times before starting to pass urine (Karlowsky *et al*; 2006). Midway during voiding, without stopping the urinary stream, plunge with the right hand a sterile wide mouth screw cap plastic bottle to collect about 30mls of mid-stream urine, and soon thereafter tightly close the bottle and hand to the research assistant (Cheesbrough,2006). Each specimen collection container was labeled with patient's name and given the same code as the one on the questionnaire, specific to each participant.

Macroscopic Examination of Urine

The aseptically collected clean cached mid-stream urine sample was observed macroscopically for characteristics such as color and turbidity and results recorded on the laboratory request form part attached with the questionnaire.

Urine Chemistry Analysis

Each urine sample collected was first divided into two portions, one was used for determination of urine chemistry composition and the remaining sample in the sterile bottle spared for culture technique. The urine samples were subjected to a semi-quantitative test using Dirui H 10 (Dirui Industrial Company, China) urine test strips to characterize the presence and levels of chemical entities such as proteins, leukocytes, nitrite, glucose, and Ketones. This was done by dipping a test strip into each urine sample and comparing the observed color changes on the strip to a reference color chart provided on the package of the test strip. The findings/results were recorded on the questionnaire

Urine examination under the Microscope

A portion of each urine sample was poured into labeled test tubes and span at 3000 rpm for five minutes using a centrifuge, model LW Scientific 800-726-7316 Ultra-8UV. The supernatant was then discarded and the deposits remixed by tapping the bottom of the tube to homogenize it. A drop of the deposit was transferred unto well cleaned and dry glass slide and covered with a cover slip.

The slide was then examined under microscope (Olympus, CX 21, Optical Company Limited, Japan) using both low and high power objective lenses (10X and 40X) with the condenser iris closed sufficiently to give good contrast for identification of pus cells, cast, crystals, and motile bacteria. The results obtained after examination of the urine sample were put down in the same request form attached with the questionnaire (Cheesbrough; 2004).

Culture of the urine samples

Three agar media were used in the isolation of microorganisms in the collected urine samples; which included Blood, MacConkey and CLED agars. Media were prepared as per the manufacturers' instructions where is the reference? and preserved in an LG refrigerator specific for prepared media.

Blood agar was useful for primary isolation of urine pathogens. Microorganisms such as *Escherichia coli* grow well in this agar producing beta hemolytic zones (Cheesbrough; 2004). MacConkey is a selective agar which helped to selectively isolate and differentiate the Gram negative rods that ferment lactose such as *Escherichia coli* from non-lactose fermenters such as *Staphylococcus spps* (Cheesbrough; 2004). Cysteine Lactose Electrolyte Deficient (CLED) agar was used as it gives consistent growth and allows the growth of both gram negative and gram positive bacterial pathogens. CLED agar also prevents swamming of *Proteus species* (Cheesbrough M, 2000). All inoculated plates were incubated for 24 hours at 37 ^{0}C and observed for growth the following day; where growth was not obtained after 24 hours, incubation was prolonged to 48 hours after which the plates were examined for growth. All inoculated plates showing growth were used to record positive results, while those without growth were recorded for negative results. All results, positive or negative were recorded in the laboratory form attached with the questionnaire.

Identification and counting of bacteria isolates

Only culture plates showing microbial growths were picked and the different bacterial colonies identified on the basis of their colonial morphology, color, and growth size and growth pattern.

Bacterial counts were determined by the product of colony count on agar media. Significant genito-urinary tract infection (significant bacteria growth) was determined by a bacterial colony forming units (CFU) count greater than 10^5(Cheesbrough; 2004).

Gram staining for the isolated colonies

Further identification of uropathogens from the culture plates showing growth was done by use of Grams staining technique. Smears were prepared by picking a bacterial colony using a sterile wire loop, emulsified in a drop of normal saline on a clean glass slide and air dried. The smear was then stained using the

Gram stain technique; where smear was covered with Crystal violet for a minute, washed under running tap water, and then a mordant, Gram's iodine added for thirty seconds, washed and then decolorized using acetone before adding the secondary stain, Neutral red for thirty seconds(Cheesbrough; 2004).

The secondary stain was removed by holding the slide under running tap water and placed on a drying rack. The dry stained smears were examined under microscope, under oil immersion, using high power (X100), according to Cheesbrough (Cheesbrough, Laboratory manual; 2004).

Isolates were identified by use of Bergey's Manual for Determinative Bacteriology (Buchanan, *et al*; 1974). Data for each case was recorded in their specific questionnaires attached with a laboratory request form carrying all particulars of the respondent, which was later entered into the SPSS computer analytical program.

Biochemical Tests on the isolated colonies

Further microbial identification was done using standard biochemical tests including Simmon's citrate agar, triple sugar iron test, and Urease, Indole, Catalase, Coagulase,Oxidase, and motility tests as described by Cheesbrough (2006) to aid in for identification and characterization of culture positive organisms isolated. For fungal identification and confirmation, sugar assimilation and germ tests were performed(Cheesbrough, 2006).This process was aided by use of control stock samples used as positive controls so as to improve the accuracy of diagnosis, identification and characterization of the isolated pathogenic organisms in the samples collected. The findings were recorded in the coded laboratory request for.

Antibiotic Susceptibility Testing

Antibiotic susceptibility test was done on Muller Hinton Agar plate. This was done to record antibiotic reaction(s) against the isolated microbial pathogens. The method is based on Kirby-Bauer's disk-diffusion principle as guided by Clinical and Laboratory Standards Institute (CLSI).

Various drugs were used in the susceptibility tests for isolated uropathogens including: Ampicillin (30mcg), Gentamycin (10mcg), Norfloxacin (10mcg), and Nalidixic acid(30mcg Cefotaxime (30mcg), Nitrofurantoin (300mcg), Ceftriaxome, Ceftazidime, Ciprofloxacin, Ceftizoxime, Trimethoprim-sulfamethoxale, Erythromycin, Minocycline and Doxycycline. These tests were performed according to National Committee and Clinical Laboratory Standards. Zones of inhibitions were observed and interpreted as either sensitive for the drugs which inhibited growth or resistant for those which failed to inhibit microbial growth. Results were recorded in the specific questionnaire for each patient.

Data Management and Analysis

Data collected was stored in two forms; as electronic and hard copy by the principal investigator. The electronic (soft copy) data was stored in a specific laptop, Dell model, owned by the principal investigator. Test results were recorded in two request forms, one given to the respondent for submission to the clinician for treatment or direction, especially for those diagnosed with bacterial infection and the second one left with the research where results were filled into the computer as part of the respondent's data for this study. Laboratory request forms bearing results were stored together with the filled questionnaires in the same cabinet at the two hospitals that is Kinango and Kwale hospital laboratory.

Data was entered into computer using the statistical software SPSS version 20, double checked and cleaned before analysis. Analysis was done using Fisher's test to assess the bivariate relationships between independent disease, risk factors, including interaction terms, personal hygiene parity, symptoms and laboratory diagnosed genito-urinary tract pathogens. These were analyzed together with socio-demographic characteristics such as age, level of education, occupation status, marital status and socioeconomic status of the household.

The following variables were considered during analysis: age, level of education, family structure, occupation, if treatment was sought or not, reasons for not seeking medical intervention and number of deliveries. The proportion of genito-urinary tract infections was computed, comparing with socio-demographic characteristics.

Laboratory diagnosis compared with clinical diagnosis and reported symptoms were described separately. The Fisher's test used in this study was helpful in determining comparisons between significant and non-significant bacteriuria, and also demonstrated association between categorical variables. A P-value of 0.05

was used to determine level of statistical significance. The descriptive statistics were expressed using frequencies and percentages.

III. Results And Findings

A total of seven hundred and sixty six participants were recruited for this study from the out-patient clinic in Kwale and Kinango sub county hospitals.

Socio-Demographic Characteristic

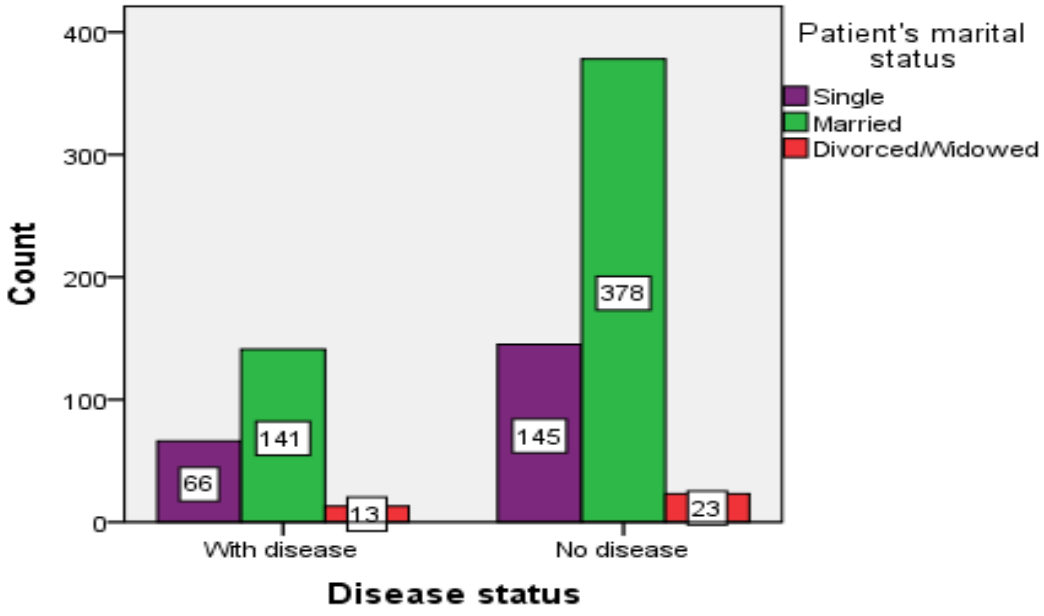
The socio-demographic information of those diagnosed having urinary tract infection is shown in Table 4.1 below. Out of the 220 of the participants diagnosed with UTI, 152(69.1%) were young females in the ages between 15 to 29,while those in the age groups 30-39 were 42 (19.1%) the least diagnosed with UTI being females in ages between 40 and 49 who accounted for 11.8%(26 females). Considering marital status of those who were diagnosed with UTI,141(64.1%) were married, while those who reported to be single during the period of the study accounted for 30%(66 women) while the third group which were few, were in the group of divorced or widowed who were only 13,representing 5.9%.Out of the 220 participants found with UTI,135(61.4%) reported not having any income at all, followed by those who had a low income, earning between KES500 and KES 5000,217 (22.7%),while those with a medium and higher income were 30 and 5 females respectively.

Table 4.1: Socio-demographic characteristic of those diagnosed with evident UTI

Socio-demographic characteristics	Frequency(n=220	Percentage(%)
Age in years		
15-24	152	69.1
30-39	42	19.1
40-49	26	11.8
Total	220	100
Level of Education		
None	33	15
Primary	119	54.1
Secondary	51	23.2
Tertiary	17	7.7
Total	220	100
Marital Status		
Single	66	30
Married	141	64.1
Divorced/Widowed	13	5.9
Total	220	100
Household income		
No income	135	61.4
Low(<5000)	50	22.7
Medium(5000-10000)	30	13.6
High(>10000)	5	2.3
Total	220	100

Marital status significantly influences medication behavior, the time person stays with the disease and the disease burden as shown in figure 4.1 below. Marital status affects disease status (single, married and divorced) p = 0. 03.The disease burden was high among the patients who are in marriage than those who are single or divorced.

Figure 4.1 Distribution of disease against marital status of the participants



The Proportion and Etiology of UTI

Urine Examinations and Findings

Different parameters were used to determine recruitment of sample for culture including physical appearance, turbidity and even the chemical reactions such as leucocytes. All samples were examined for the different parameters which helped the research in recruiting samples for further analysis.

The physical appearance of the urine samples showed different patterns as shown in figure 4.2 below. Urine samples examined and found to be milky, 222(29%) indicated presence of high amount of pus cells in the sample.

Figure 4.2:Distribution of Physical appearence of urine sample

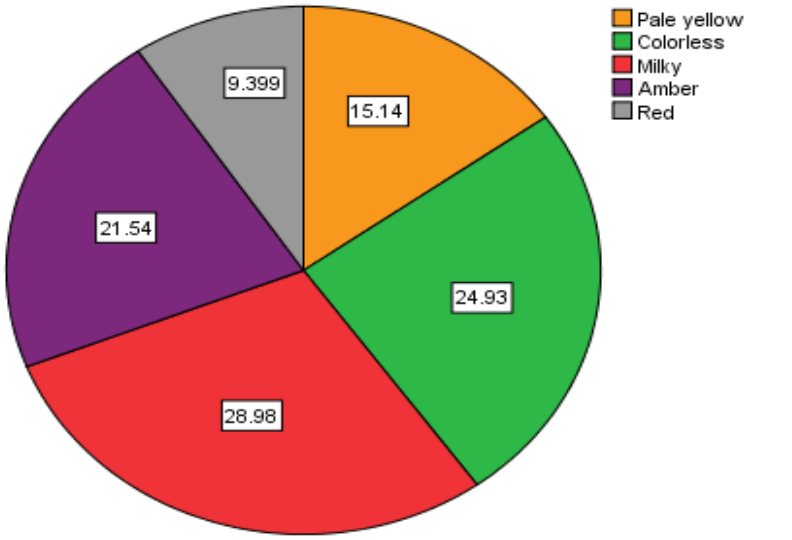


Figure 4.2 above shows the frequency of different urine characteristics as they were observed physically after they were received from the patients. Majority of the samples, 222(29%) were milky in color and appearance due presence of pus cells,dead white blood cells (an indication of symptomatic bacteriuria) while those with a red appearance (haematuria) were the least, 72(9.4%)

Table 4.2: Microscopic findings from the urine samples collected from female patients per high power field

Parameter		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Epithelial cells++	38*	5.0	5.0	5.0
	No abnormality detected	182*	23.8	23.8	28.7
	Pus cells<10	121*	15.8	15.8	44.5
	Pus cells>100	160*	20.9	20.9	65.4
	Pus cells>20,Yeast cells	29*	3.8	3.8	69.2
	Pus cells>50	160*	20.9	20.9	90.1
	Pus cells>50,Red blood cells++	36*	4.7	4.7	94.8
	Pus cells>20,Red blood cells++,OSH	40*	5.2	5.2	100.0
	Total	766	100.0	100.0	

Of the 766 midstream urine samples, three hundred eighty five (50.3%) were recruited for culture where only those having a pus cell density of 10^4 pus cells /ml of urine were considered, while 381(49.7%) had non-significant bacteriuria. Two hundred and twenty, 220,(57.1%) of the samples cultured on the three different media, that is CLED, Blood agar and MacConkey showed significant bacterial growth while 165(42.9%) had no growth obtained even after prolonged incubation for 72 hours.

Uropathogens isolated by culture

Different organisms were isolated from the urine samples collected. There were three hundred and eighty five (50.3%) samples were recruited for culture, but bacterial growth was obtained in two hundred and twenty (57.1%) samples

The isolated organisms were in the following descending pattern *Escherichia coli*>*Candida albicans*>, *Pseudomonas aureginosa*, >*Staphylococcus aureus* >*Staphylococcus saprophiticus* and *Proteus mirabilis* respectively (Figure 7).

Table4.3: Confirmatory tests for the isolated organisms

Observation	**Positive**	**Negative**
Gram stain reaction	34.1%	65.7%
Coagulase test	57.8%	42.2%
Catalase Test	57.8%	42.2%
Hydrogen Sulphide Production	12.1%	87.9%
Oxidase Test	21.4%	78.6%
Germ tube Test	53.7%	46.3%
Cellular Morphology	20.9%	65.9%

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The isolated organisms were in the following pattern *Escherichia coli*>*Candida albicans*>, *Pseudomonas aureginosa*, >*Staphylococcus aureus* >*Staphylococcus saprophiticus*and *Proteus mirabilis* respectively (Table4.3) above.

Table 4.4: The pattern of isolated organism from the urine samples

Organism	Frequency	Valid Percent
Escherichia coli	97	44.1
Pseudomonas aureginosa	28	12.7
Staphylococcus aureus	26	11.8
Candida albicans	29	13.2
Staphylococcus saprophiticus	20	9.1
Proteus mirabilis	20	9.1
Total	220	100.0

The final analysis was done after considering the outcomes of all tests done, where the frequencies of the different characteristics were used to determine the status of disease. Culture results were used to make the final conclusion of presence of urinary tract infection and also the causative agent involved the dominance or commoness of the involved microbial agent and antimicrobial susceptibility and the antimicrobial patterns of the different antibiotics used. The disease status computation is as illustrated in Figure 4.2 below with those diagnosed with no disease being 546 (71.3%) while 220(28.7%) having been diagnosed with disease.

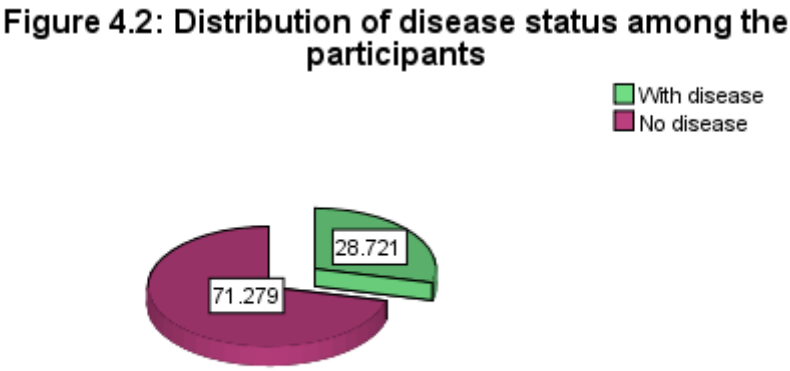

Figure 4.2: The incidence of UTI determined by the number of women with positive urine microbial culture when their urine samples were cultured. This indicates the disease status of the female patients attending the two hospitals and who took part in the study, where 28.7% were diagnosed with disease

Antimicrobial Susceptibility Test (AST)

The antimicrobial susceptibility patterns of isolated uropathogens in this study are shown in Table 4.5. *Escherichia coli* which, the most prevalent pathogen isolated was susceptible to most of the antibiotics with Doxycycline showing the highest antimicrobial activity(86.7%) against *Escherichia coli* while Ampicillin recorded the least sensitivity (31.9%) to most uropathogens.

Table 4.5: Antibiotic Susceptibiity of Isolates

Antibiotics	**Microbial Isolates**				
	E coli	*Pseudomonas aureginosa*	*Staphylococcus aureus*	*Staphylococcus saprophyticus*	*Proteus mirabilis*
	T(%S)	T(%S)	T(%S)	T(%S)	T(%S)
Cephaloxime	97(80.4)	25(64)	11(36.4)	Nd	20(65)
Ceftriaxome	91(73.6)	23(69.6)	5(80)	10(100)	20(80)
Ceftazidime	91(70.3)	23(73.9)	5(100)	Nd	20(55)
Gentamycin	83(63.9)	25(68)	14(57)	11(81.2)	20(45)
Ampicillin	84(34.5)	23(26)	19(21)	17(35.3)	20(35)
Nitrofurantoin	96(74)	27(74)	20(60)	15(73.3)	20(70)
Nalidixic acid	94(67)	26(69.2)	23(65.2)	19(63.2)	20(75)
Ciprofloxacin	77(75.3)	19(89.5)	14(85.7)	14(82.3)	20(70)
Ceftizoxime	20(50)	Nd	17(47)	11(54.5)	Nd
Trimethoprim-Sulfamethoxale	50(80)	10(100)	16(68.8)	13(76.9)	Nd
Erythromycin	30(60)	20(0)	19(73.6)	14(78.6)	Nd
Norfloxacin	19(60)	17(80)	17(64.7)	18(88.9)	Nd
Minocycline	16(75)	17(88.2)	15(93.3)	10(90)	Nd
Doxycycline	15(86.7)	17(100)	17(94.1)	11(72.7)	Nd

T=Total tested, %S= Percentage Sensitive, Nd=Not done

Table4.5: shows the antimicrobial susceptibility patterns of isolated uropathogens in this study. *Escherichia coli* which was the most prevalent pathogen isolated was susceptible to most of the antibiotics with Doxycycline showing the highest antimicrobial activity against *Escherichia coli*while Ampicillin recorded the least sensitivity to most uropathogens.

Factors influencing health seeking behavior among those with UTI

Figure 4.3 below shows that household income of patients influenced medication among those with disease as majority of them either delayed in seeking healthcare or did not seek attention at all. This is shown in the presentation above where those with no income and low income not taking any medication by the time they presented in the health institution. Pearson value < 0.005(P-value 0.000) as shown in the Chi square table above is lower therefore showing a relationship between medication and patient's household income. Out of the 766

subjects who took part in this study,546 , (71.3%) sought healthcare services while 220(28.7%) did not seek healthcare service even after developing signs of UTI as it is shown in Table 4.6 below.

Among those who hadn't sought healthcare services, 110(50%) cited the cost of treatment as the barrier for not seeking healthcare, while 106(48.18%) were ignorant of the disease. They did not seek healthcare services because they thought the disease would clear on its. They decided to seek healthcare later after the infection had become persistent. This is evident as it is exhibited in Figre 3 below showing a delay in seeking healthcare. The remaining four 4(1.82%) out the two hundred and twenty visited traditional healers as they associated the infection to either witchcraft or some misfortune. They only decided to seek healthcare after the condition started to worsen.

Figure 4.3: Duration of sickness, medication and patient's household income as control

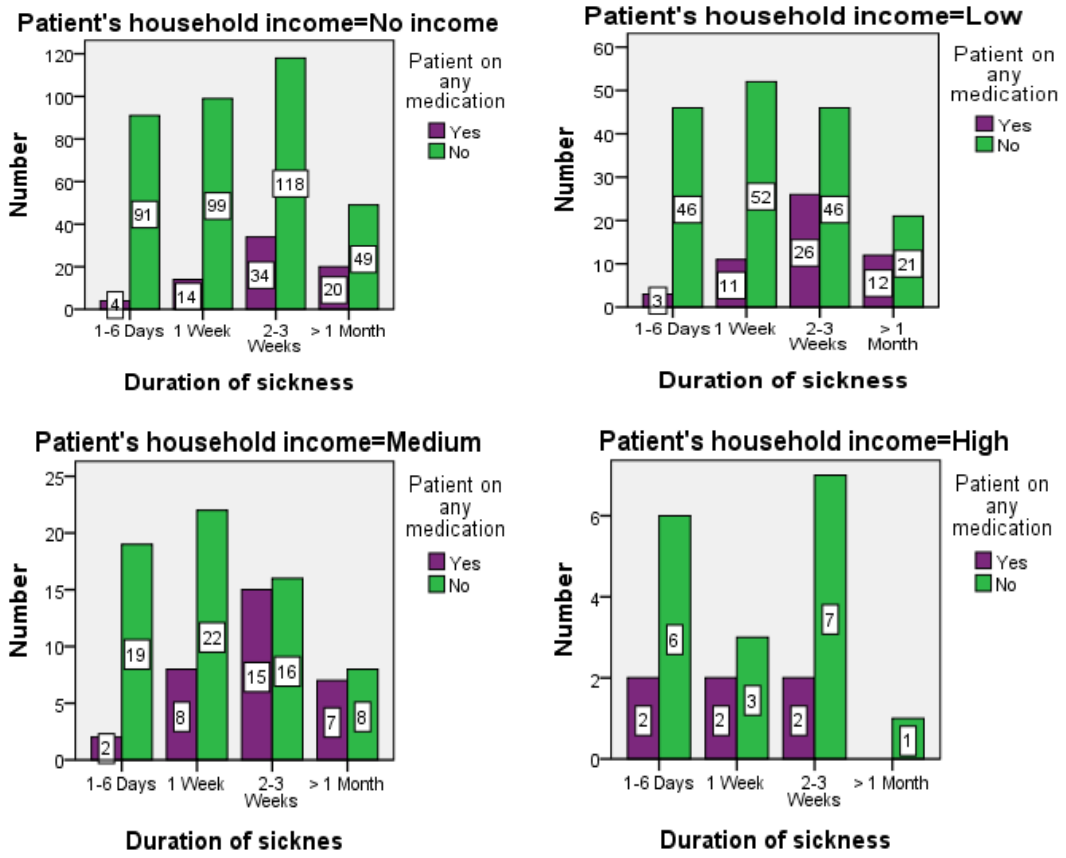

Figure 4.3 above that household income of patients influenced medication among those with disease. This is shown in the presentation above where those with no income and low income not taking any medication by the time they presented in the health institution. Pearson value < 0.005(P-value 0.000) as shown in the Chi square table above is lower therefore showing a relationship between medication and patient's household income

Seventy one point three percent(71.3%) sought healthcare services while 220(28.7%) did not seek healthcare service even after developing sings of UTI as it is shown in Table 4. 6 below. Among those who hadn't sought health care services, 106(48.2%) was due to ignorance of the disease and signs, 110(50%) cited the cost of treatment as the barrier for not seeking healthcare, while 4(1.8%) visited traditional healers Table 7 below.

Table 4.6: Frequency of patient seeking healthcare services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	546	71.3	71.3	71.3
	No	220	28.7	28.7	100.0
	Total	766	100.0	100.0	

Table 4.7: Barriers that prevented patient from seeking healthcare

Count

					Total
		Cost of treatment	Tradition/culture/religion	Ignorance	
Disease status	With disease	110	4	106	220
	No disease	213	16	317	546
Total		323	20	423	766

Majority of the participants who sought health care sevices were residing in the rural pats of both Kwale and Kinango towns where the hospitals are situated. Out of the seven hunded and sixty six, 539(70.4%) were living in the rural parts but they travelled some distances to seek health care while only 227(29.6%) were living within the towns. Among the two hundred and twenty confirmed to be having UTI by the laboratory tests done,115(52.3%) were from rural area,but they sought health care immediately they observed first symptoms,while only 36 (16.4%) delayed seeking health care in the two hospitals. For those living within the urban area, 62(28.2%) sought healthcare immediately after while 7(3.2%) took a longer period beore they made a decision of visiting a clinic as shown in Table 4.8 below. This shows that those in rural area sought care immediately they observed first symptoms as we can not directly conclude that the disease status was high among those people who live in rural areas of Kwale and Kinango town.

Table 4.8 Patients' residence vs seeking health care

Count

Disease status			Residence		Total
			Rural	Urban	
With disease	Patient sought healthcare services	Yes	115	62	177
		No	36	7	43
	Total		**151**	**69**	**220**
No disease	Patient sought healthcare services	Yes	271	98	369
		No	117	60	177
	Total		**388**	**158**	**546**
Over all Total	Patient sought healthcare services	Yes	386	160	546
		No	**153**	**67**	**220**
	Total		539	227	766

IV. Discussion

Socio demographic characteristics of participants

In this study, the participants had varying characteristics, ranging from age, level of education, marital status to household income. These socio-demographic characteristic contribute in one way or another to the occurrence of the infection in man, health care seeking and the behavior or attitude of the participant to urinary tract infection. Most of the respondents, 509(66.4%) in the current study were in the 15-29 years age group, which constitutes a substantial part of the active reproductive age group and thus susceptible to urinary tract infections, which is in agreement with several studies conducted among them Bohara *et al*., 2012 found in their study. Also in this study, it was observed that among the 220 respondents identified to be having UTI after a culture test, 152(69.1%) were those in the ages 15-29. These findings are not different from other studies such as 85 % (Alex *et al*, 2012),in another study that observed a prevalence of 52.6% (Mwaka et al; 2010), and 20% (Hanna K; *et al*, 2011);even though the findings of the current study was slightly lower compared to what Alex *et al*,2012 reported in their study; however, this study reported a higher prevalence of UTI in the ages 15-29 than the findings reported by Mwaka *et al;* 2010 and Hanna, *et al;2011*, however ;the findings of this study showed a different pattern of UTI distribution against age group when compared to the findings by Nabbugodi *et al*,2014(Kenya) of 15.3% among respondents in same age group (15-25 years),although their study was dealing with pregnant mothers, which is a different cohort.

Majority of the participants 676 (88.3%) can read and write while only 90(11.7%) had no formal education. Marital status significantly influenced the disease status (single, married and divorced). p = 0. 03 as the disease burden were high141 (64/1% among the respondents who are in marriage than those who are single or divorced. In their study, Tazabew et al, reported analytical figure of 99.4 % of married respondents,abit higher than the current study,thus this study can report that marital staus influence occurrence of urinary tract infection. In a cohort study conducted by Hoton *et al* marital history was found to have a statisticallysignificant association with the incidence of UTI in one of the groups.

Prevalence of significant bacteriuria

The proportion of significant bacteriuria/UTI in this study of 28.9 %(220/766) is of high public health concern and provides new information about infection of the urinary tract as published studies that assessed prevalence of bacteriuria/UTI in women in the general population are hard to find,as it was reported in previous ones (Mwaka, AD; *et al*,2010). In a study to evaluate UTI prevalence in a population of patients attending Dalhartu Araf Specialist hospital Nigeria observed prevalence of 60%, a figure that is twice higher than what the current study found. In the Dalhartu study, there were 300 respondents who took part, where out of the 180(60%) diagnosed with genito-urinary tract infection, 120(66.7%) were females while males accounted for only 33.3 %(Kolawale*et al*; 2009) indications that female are more predisposed to UTI than male, which is in agreement to many other studies.

Moges et al (2002) found prevalence of genito-urinary tract infection of 39.5% in a study carried out in Ethiopia, which included 70 in patients which would have accounted in part for a higher prevalence.

Among pregnant women aged 15-44 years in Tanzania, prevalence of bacteriuria was found to be 17.9% and 13% in asymptomatic and symptomatic respondents respectively(Masinde *et al;*2009). This prevalence is lower than the findings of our study. A research carried out in Mulago hospital outpatient department in Uganda established that a significant number of women aged 18 years and above had bacteriuria and genito-urinary tract infection accounting to a prevalence of 10%; three times lower than what we found in this study. The proportion of urinary tract infection was observed to be 18% in a study that involved in-patients in intensive care unit in Kenyatta hospital (Hannah K, *et al*; 2011).

Prevelence of Uropathogens isolated by culture (significant growths)

Of the six(6) uropathogen species isolated in this study, *Escherichia coli* was the most frequent isolate accounting for 44.1%. This is in agreement and comparable with other studies in Africa where *Escherichia coli* was isolated in 40-46%(Wanyama J, *et al*;2003,Kayima JK,1996,Moges AF *et al*,2002;Mayanja R, *et al*;2005). A recent study in India similarly isolated high proportion of *Escherichia coli* (Kothari A, *et al*; 2008). Our findings though were high compared to what Ayansima *et al*; 2012 found in a study that evaluated incidence of resistant enterobacteria in university undergraduate where the prevalence of *Escherichia coli* as the most frequent uropathogen isolated was 35.1%,a study that involved 120 participants,(60 male and 60 female). In a study carried out in Tanzania, (Sabrina J, *et al*, 2009) assessing the etiology and antibiotic pattern of urinary pathogens isolated *Escherichia coli* as the prevalent etiology of UTI where the rate of *Escherichia coli* was 33.3%, a rate that is slightly lower than what we found in this study.

The second highest isolated pathogen was yeast cells, *Candida albicans*, and the causative agent of candidiasis. This is a common organism causing vaginitis in females with itching presentation.

Pseudomonas aureginosa an organism commonly known to cause UTI in nosocomial situations was predominant in this study, where 26 cases were isolated. This proportion was high compared to findings in other previous studies (Alex *et al*, 2012).

The other bacteria isolated were *Staphylococcus aureus* with 11.8% isolation rate. The isolation of *Staphylococcus aureus* as uropathogen is not unique to this study. In other studies, *Staphylococcus aureus* have been isolated. However, a study in India assessing UTI in general population did not isolate *Staphylococcus aureus* (Kothari A, *et al*, 2008). *Staphylococcus aureus* has been in the recent time been found as causative agent mainly in complicated UTI (Loren GM *etal*, 2004; Wagenlehner FME *et al*; 2004) causing cystitis.

The 26 patients with *Staphylococcus aureus* significant bacteriuria presented with history of recurrent infection of the urinary tract and had positive leucocytes esterase tests. It is probable that these patients had *Staphylococcus aureus* bacteriuria with seeding to urinary tract. Similarly high isolation rates of *Staphylococcus aureus* were demonstrated elsewhere in Africa (Kayima JK, *et al*; 1996, Moges AF, *et al*, 2002).

Other isolates in included 20 *Staphylococcus saprophiticus* and *Proteus mirabilis*. The findings of our study were also in agreement to what Hannah et al 2011 determined in their study where they isolated *Escherichia coli* as the most frequent organism at 27%, *Pseudomonas aureginosa* at 13.6%, *Candida albicans*, 9% and *Proteus species* at 9%, although their study was involving in- patients, a group that is predisposed and therefore different from the population considered in our study.

Antimicrobial susceptibility test profiles of the isolated uropathogens

The emergence of antimicrobial resistance in the management of UTI is an important public health issue that require proper planning and developing of measures that will lead to prevention of serious life threatening conditions and morbidity due to urinary tract infection. Most of the antibiotics that were useful in treatment of UTI have since lost the antimicrobial strength leading to increased rates of antimicrobial resistance (Ho *et al*; 2004).

There was a varying drug action against the different isolated organisms in the current study with the drug sensitivity rate ranging from 60% to 10%, with most organisms showing resistance to most antibiotics. The

drug pattern observed in this study was similar to previous studies (Ayansina, AD *et al*; 2012; Henn EW, 2010). Ampicillin, Nitrofurantoin, Cephaloxime, Ceftazidime, Ceftriaxome and Nalidixic acid showed a lower sensitivity rate of 10% against most organisms just as observed in other studies (Sabrina J *et al*; 2009, Ayansima A.D, *et al*; 2012).

This high resistance to drugs shown by most organisms could probably be associated to antibiotic administration to patients without employing appropriate diagnostic technique such as culture technique. Culture technique is not scheduled as a routine technique in the two hospitals. However, *Escherichia coli* the most frequent organism isolated in this study was slightly sensitive to most antibiotics. High sensitivity was observed to antibiotics such as Cephaloxime, Ceftriaxome, Ceftazidime, Gentamycin, Nitrofurantoin, Ciprofloxacin and Doxycycline of between 40% and 50%.This was in agreement to other observation in previous studies (Ayansima AD, *et al*; 2012), (Mwaka AD, *et al*; 2006), Alex *et al*, 2012 where *Escherichia coli* were reported to have shown resistance to Ampicillin and Amikacin.

This can be linked to the high disease recurrence of 93.7% reported by participants and recorded in this study. According to the participants, they had been treated with antibiotics in previous episodes of UTI. The increase in bacterial resistance to antimicrobials has been reported in many previous studies where sensitivity of *Escherichia coli* isolated from urine samples to Gentamycin, Ciprofloxacin, Ampicillin, Norfloxacin, Tetracycline and Nalidixic acid was observed and reported to be 63.9%,75% ,60% and 67 respectively. There was no significant difference between the findings of the current study and the previous ones which reported a 92.3%,100%,84.6%,46.2% and 23.1% antimicrobial sensitivity against Escherichia coli respectively as observed by Mansouri *et al*;2002.

Factors influencing health seeking behavior among those with UTI

Urinary tract infection presents with discomfort and in prolonged and untreated situation, the infection becomes complicated, where the pathogens ascend to the bladder and kidneys causing cystitis and pyelonephritis respectively(Colgan *et al*; 2011);(Kalyanakrishnan *et al*, 2005).

The current study reports a significant number, 220(28.7%) of patients with UTI not seeking healthcare even after observing signs and symptoms of the infection. The findings show that there is poor healthcare seeking behavior among women in the region which is not different from what was reported in a disease surveillance report of 2009((Integrated Disease Surveillance Report; 2009) Other factors contributing to lack of data about genito-urinary tract infections in Kenya is weakness in case detection and reporting (Integrated Disease Surveillance Report; 2009).In a previous study, the healthseeking behavior was noticed more among subjects, who were financially stable more than enough income (71.4%), almost double the rate of those with 'just enough'. Specifically, as predicted in their study, the working women revealed higher health -seeking behavior (43.8%) compared to 97% of those who are not working who did not seek medical help (Kuo Chin Huang,2016).

There was a relationship between household income and seeking healthcare service (Pearson value < 0.005(P-value 0.000) in this study.The patients with no income and low income reported not to have been taking any medication by the time they presented in the health institution, while others delayed in seeking health care services.When asked why they did not seek healthcare,323(42.2%) of the general population of participants reported cost of treatment as the major barrier to getting health services, given that patients pay for services in the two hospital. The findings of the current study were in agreement with previous ones where low economic status was reported as the common factor associated with high prevalence of UTI as most patients delay or fail to seek health care even after developing the disease (Trecee, 2011).

The factors discussed above contribute to high UTI burden among women as several disease cases are either not detected at all or detected late,thus leading to lack of documented data showing the rates of occurrence of the infections (Jolleys JV, 1991.,Malta *et al*; 2007). Failure to get treatment, delaying in seeking healthcare,or getting incorrect treatment has been contributing to recuurence(similar disease) of UTI.Most cases of recurring UTIs are reinfections. A reinfection occurs several weeks after antibiotic treatment has cleared up the initial episode and can be caused by the same bacterial strain that caused the original episode or a different one.

What this study could not establish is whether it was reinfection or relapse as there was no previous diagnosis report showing if culture had been done to establish the uropathogens involved in causation of the disease.

V. Conclussion And Recommendation

Conclusions

An overall urinary tract infection proportions of 28.9% observed in this study shows the clinical and epidemiological significance attained by urinary tract infection. Women in the age bracket of 15-29 years old were the most affected, with a high disease recurrence being observed in most of the participants. *Escherichia coli*were the most predominant urinary tract pathogen isolated, with high levels of resistance aginst most antimicrobial agents to most uropathogens being evident. Low economic status among participants is the major contributing factor that influenced poor healthcare seeking behavior with 28.7% delaying or failing to seek healthcare in the previous episode.

Recommendations

We do recommend for an early,evidence based management of urinary tract infections, both asymptomatic and symptomaticby making microbial screening including culture as a compulsory (routine) investigation for all patients suspected to have UTI.

Cost of screening and management of patientspresenting with urinary tract infection to be reconsidered by the authoritiesso that prompt treatment is initiated in order to prevent recurrence of the infection and development of complications such as renalfailure and sepsis in female patients.

There is also urgent need for education and creation of awareness on the importance of seeking healthcare early enough whenever signs and symptoms of UTI are exhibited.

Key stakeholders in the health ministry must come up with measures both short term and long term to address urinary tract infection and its complications in women especially this time when the nation is putting more efforts to meet Millennium Development Goals pertaining Maternal (reproductive).

Study limitations

Not all subjects with female genito-urinary tract infections were tested as some were on or had been covered with antibiotics at the time of the study, while others may have sought health care services in other institutions.Other respondents declined to consent and missed the opportunity to be tested.

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