Factors Associated With Recurrent Urinary Tract Infections Among Females of Reproductive Age at Kisugu Health Centre Iii, Uganda: A Cross-sectional Study

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Research Article

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Abstract

Background

Recurrent urinary tract infections (UTIs) remain a significant public health concern among women of reproductive age in Uganda. This study assessed factors associated with recurrent UTIs among females aged 15–49 years attending Kisugu Health Centre III, Kampala.

Methods

A cross-sectional study conducted on 144 randomly selected samples with the help of an interviewer-administered questionnaire to assess knowledge, attitudes and practices of recurrent UTI. The analysis of data was done in SPSS version 21. For the association, chi-square was applied at $p < 0.05$. Overall, 36.8% of participants reported recurrent UTIs.

Results

Most respondents acknowledged that UTIs can recur, indicating general awareness. However, only 53.5% demonstrated good overall knowledge, which was significantly associated with recurrence ($p = 0.049$). Identified risk factors included improper perineal wiping techniques, high frequency of sexual intercourse, poor medication adherence, and co-existing medical conditions such as diabetes. Although many participants sought healthcare, several reported barriers to receiving timely support, primarily due to embarrassment.

Conclusions

Recurrent UTIs among women in this setting are influenced by behavioral and clinical factors. Strengthening preventive strategies, improving counselling, and delivering targeted health education may help reduce recurrence and improve health-seeking practices.

Background

Urinary tract infections (UTIs) remain a serious public health problem on a worldwide basis. Annually, between 150 and 160 million people are affected (Gupta et al., 2001). Women in particular, carry a significantly greater burden, and the incidence estimated over their lifetime ranges from 50–60 per cent (Besty Foxman & Brown, 2003). Geographic variation is apparent: figures of prevalence ranging from 19.6 to 20 percent are reported throughout Europe, while prevalence figures in developing countries are closer to 24 percent (Medina & Castillo-Pino, 2019). In Asia, a multicounty analysis showed a prevalence of 9.8 per cent (Lee et al., 2018). Data from surveillance in Africa shows large variations with Algeria reporting 4.5% and Senegal only 0.7%. Recurrent UTIs (two episodes within six months or three within

twelve months) are not uncommon; a study of Spanish patients found that 27% of women had recurrence within six months (Alós, 2005).

Etiologically, Escherichia coli is the dominant causative agent in the majority of community acquired UTIs (Payam Behzadi, 2010). Other significant pathogens are Klebsiella spp, Proteus spp and Pseudomonas aeruginosa (Yilmaz et al., 2016). Recurrent UTIs have been widely reported in relation to risk factors such as high sexual practices (K *et al.*, 1999; Cai, 2021), spermicide use, and incorrect wiping strategies that have allowed into the urethra fecal contamination (Alós, 2005). Diabetes mellitus is highly correlated with recurrent infections due to impaired immunity, glycosuria and bladder dysfunction (De Lastours & Foxman, 2014; Fünfstück *et al.*, 2012; Nicolle, 2005; Gorter, *et al.*, 2010; Schneeberger, *et al.*, 2008). International studies from China, Brazil, Israel and Egypt support the importance of poor glycemic control in recurrent UTI (Wang, *et al.*, 2013; Truzzi et al., 2008; Nitzan, *et al.*, 2015; Aly, 2016). Behavioral practices such as delayed voiding, vaginal douching and use of non-cotton undergarments also contribute to susceptibility (Scholes, 2000; Dimetry et al., 2007).

Knowledge and attitudes towards UTIs are considerably different in different populations. Few levels of awareness have been recorded in Nepal (Adhikari & Dhakal, 2015), Ethiopia (Tadesse et al., 2014), Kenya (Onyango et al., 2018), and Tanzania (Masinde et al., 2009). Educational attainment has a critical effect on both knowledge and preventive practices (Geerlings, 2008). Attitudinal barriers (such as stigma and embarrassment) often delay care-seeking (Minejima et al., 2019), although some research shows generally positive attitudes towards prevention in the presence of awareness program (Navarro et al., 2019; Santoso et al., 2017; Hazwell and Sichilima, 2020).

In Uganda, there are already some existing studies which show a prevalence of UTIs of 13.3% (Andabati & Byamugisha, 2010), with E. coli being the main pathogen. Risk factors like back to front wiping and diabetes have been identified repeatedly (Andabati & Byamugisha, 2010; Odoki et al., 2019). However, the literature has generally focused on UTI and bacteriuria when discussing them in aggregate and not specifically on recurrent UTIs. No published research has looked at the relationship between knowledge, attitudes and practices and recurrence of UTIs among women of reproductive age in Uganda and no one has looked at these determinant factors in Kisugu Parish despite its urban character and high utilization of health services.

This is a conspicuous evidence gap that highlights the need for context-specific research to help decipher the behavioral and clinical predictors of recurrent UTIs in this setting. Findings will guide targeted health education, fortification of preventive approaches, as well as at primary healthcare facilities.

Consequently, the present study aimed at assessing the factors associated with recurrent urinary tract infections among women of reproductive age attending Kisugu Health Centre (III) Kampala, Uganda.

Methods

Study Aim, Design and Setting

The present investigation aimed at elucidating the determinants of recurrent urinary tract infections (UTIs) in reproductive age females attending Kisugu Health Centre III, Kampala, Uganda. The study was carried out using a cross-sectional design and was conducted at this urban primary care facility located in Kisugu Parish, Makindye Division. The center provides out-patient, maternal and reproductive health services to a heterogeneous urban group.

Study Population

The target population was females aged 15–49 years who sought care at Kisugu Health Centre III in the study interval.

Inclusion Criteria

Females aged 15–49 years old capable of providing written informed consent.

Exclusion Criteria

Women who were unconscious or in some other way unable to participate in an interview, and those who were in active labor at the time of the data collection.

Sample Size Determination

The necessary size of the sample was calculated by using the formula:

$N = 4P\ (1\text{-}P)/d^2$

$N = 144$

where P is the estimated proportion of women with recurrent UTIs (10%) and d is the error margin tolerated (5%). This calculation had a minimum sample size of 144 participants.

Sampling Procedure

A simple random sampling strategy was adopted. The sampling frame included eligible females aged 15–49 years that attended the facility during the study period. A lottery method was used to ensure every individual a chance of selection until the target of 144 was reached. Recruitment has been done across different service units to reduce selection bias.

Study Variables

Dependent Variable

Recurrent UTI, defined as > = 2 episodes of UTI within 6 month or > = 3 episodes of UTI within 12 month, based on self-reported history.

Independent Variables

Knowledge-related factors

Causes, symptoms, prevention, risk factors, recurrence.

Attitudinal factors

Stigma, embarrassment, Health seeking attitudes, Treatment Beliefs

Practice-related factors

hygiene practices, wiping technique, type of undergarments, sexual activity, voiding habits, adherence to medication, lifestyle factors, comorbidities (e.g., diabetes, hypertension).

Data Collection Tools and Procedures

Data were collected using a pre tested structured, interviewer administered questionnaire. The instrument gained sociodemographic data; UTI history; knowledge of causes, prevention, symptoms and recurrence; attitudes toward UTIs; and hygiene, sexual behavior, voiding habits and lifestyle practices and.

Interviews were carried out privately by the principal investigator and trained research assistants, to maintain confidentiality and minimize social desirability effect. Clarifications were provided in the local languages where needed. Responses were systematically recorded and reviewed on a daily basis for completeness and consistency.

Data Quality Control

A pilot test was conducted on a small sample, external to the researchers, to refine the questionnaire. Training was given to the research assistants on study objectives, interview techniques and ethics. Completed questionnaires were inspected daily for completeness, accuracy and consistency. Double data entry and verification was done to minimize errors.

Statistical Analysis

Data were coded, cleaned and entered into the software (SPSS v21). Descriptive statistics (frequencies, percentages, means) summarized participant characteristics and outcome measures. Inferential analysis, using the chi-square tests, checked the association of independent variables (knowledge,

attitudes, practices) and recurrent UTI. A p-value < 0.05 based on the 95% confidence level was associated with statistical significance. The fixed sample size found based on prevalence estimates eliminated the need for a separate power calculation.

Results

Prevalence of Recurrent UTIs

The frequency of recurrent UTIs was identified by determining the number of UTI incidences in 1 year. The respondents that reported three or more episodes were considered to experience recurrent UTIs. The findings include that 36.8% of the respondents had recurrent UTIs (Fig. 2) and 63.2% had less than three incidences (Fig. 2). This proves that over a third of the women visiting the facility had experienced recurrent UTIs, which indicates that there was a high burden among this group of people.

Knowledge on Recurrent UTIs

The first knowledge was measured by asking the respondents to answer whether they were aware of the possibility of recurrence of UTIs. Basic awareness was high as most participants (88.9) indicated they were aware of UTI recurrence (Fig. 3).

In addition to mere awareness, general knowledge of respondents was measured and divided into poor, average or good. More than 53.5% of the respondents represented good knowledge (Table 1), whereas 31.3% represented poor knowledge and 15.3% represented average knowledge.

Table 1
General Knowledge on UTIs in it. The correlation between the general knowledge and the UTI recurrence was studied using a cross- tabulation. The results revealed that frequent UTIs were more prevalent among poorly knowledgeable respondents than good knowledge ones.

Knowledge Level	Frequency (n)	Percentage (%)
Poor	45	31.3
Average	22	15.3
Good	77	53.5
Total	144	100

Table 2
Cross-tabulation of Knowledge Level and UTI Recurrence

Knowledge Level	Recurrent UTIs (≥ 3 episodes)	Non-recurrent UTIs (< 3 episodes)	Total
Poor	10	35	45
Average	10	12	22
Good	33	44	77
Total	53	91	144

Interpretation

The relationship between knowledge level and the frequency of UTI was observed to vary between the initial and subsequent UTIs (Table 2).

A cross-tabulation was conducted to examine the relationship between general knowledge and UTI recurrence. The findings indicated that recurrent UTIs were more common among respondents with poor knowledge compared to those with good knowledge (as shown in Fig. 4 below).

A chi-square test was used to reveal the statistically significant relationship (Table 3) between the level of knowledge and recurrent UTIs ($p = 0.049$). This implies that women who have low knowledge levels will have higher chances of developing recurrent UTI cases and thus proper health education on UTI prevention is significant.

Table 3
Chi-square Test of Knowledge and Recurrent UTIs

Variable Tested	Chi-square Value (χ^2)	df	p-value
Knowledge level vs UTI recurrence	6.035	2	0.049*

Attitudes on recurrent UTIs.

The attitude of the respondents towards UTIs was measured to determine how perceptions and emotional attitudes might affect the health-seeking behavior. Almost half of the respondents said that they were embarrassed to have a UTI and 41% said they felt embarrassed to consult a doctor. Nevertheless, most (93.8%) of them reported that they would consult a doctor in case they experienced the symptoms of UTI, and 97.9% of them would clearly describe their symptoms to a specialist (Table 4).

Table 4
Attitudes Towards Recurrent UTIs

Attitude Statement	Response Category	Frequency (n)	Percentage (%)
Embarrassed to have a UTI	Yes	68	47.2
	No	76	52.8
Embarrassed to seek medical attention	Yes	59	41.0
	No	85	59.0
Would seek medical attention when experiencing UTI symptoms	Yes	135	93.8
	No	9	6.3
Would clearly explain symptoms to the doctor	Yes	141	97.9
	No	3	2.1

Indeed, the majority of nurses exhibit a moderate level of disinterest in their work. As a matter of fact, most nurses are moderately disinterested in their work.

These results show a general positive health-seeking attitude in spite of a feeling of embarrassment that can delay the accessibility of timely care among some individuals.

Recurrent UTIs Practices.

The hygiene, sexual, medical, and obstetric practices were looked into in order to determine the behavioral determinants of recurrent urinary tract infections (UTIs). Hygiene data showed that 51.4% of the respondents used a back-to-front wiping method (Fig. 5) and this is a factor that trans locates perianal bacteria into the urethral canal. Only 38.9% of the participants followed the suggested front-to-back method.

Sexual habits were also exhibiting tendencies that were relevant to UTI recurrence. A large proportion of respondents (88.2%) reported a sexual activity with most of them reporting a sexual experience with a husband (Fig. 6) and 29.3% with a boyfriend. Sexual activity is a documented risk factor of UTIs, and this trend can be one of the reasons for the recurrence rates.

It can be contended that the target audience consists of older adults who are sexually active and who might face certain challenges or difficulties in fulfilling their sexual desires and needs. One can argue that the target audience is that of the older adult population that is sexually active and may experience some challenges or problems in their sexual needs and desires.

Medical related practices: The adherence rate to prescribed antimicrobials was at (79.9%), showing a high level of association with the recurrent UTIs. In addition, although a small proportion of the study

population had uncontrolled diabetes (0.7) and hypertension (2.8), the conditions were relatively highly associated with recurrence as it has been reported that metabolic mismanagement (poorly controlled diabetes) increases predisposition to infection. Mode of delivery also showed a very strong relationship (Table 5), and women who had vaginal delivery were more likely to report recurrent UTIs.

Other steps that were undertaken during the last UTI episode showed that a number of respondents self-medicated, used herbal remedies, or used analgesics without consulting a professional medical care-behaviors that are linked to high recurrence risks.

Table 5
Practices Related to Recurrent UTIs

Practice Variable	Response Category	Frequency (n)	Percentage (%)
Wiping method	Back to front	74	51.4
	Front to back	56	38.9
	Wash with water	14	9.7
Sexual intercourse	Yes	127	88.2
	No	17	11.8
Sex partner	Husband	85	59.0
	Boyfriend	42	29.3
	Not sexually active	17	11.8
Drug adherence	Non-adherence	115	79.9
	Adhered	29	20.1
Comorbidities	Uncontrolled diabetes	1	0.7
	Uncontrolled pressure	4	2.8
Mode of Delivery	Vaginal delivery	88	61.1
	C-section	12	8.3
	No delivery history	44	30.6
Action during last UTI episode	Self-medication	9	6.3
	Used herbs	3	2.1
	Took painkillers only	5	3.5
	Went to health facility	127	88.2

Discussion

Prevalence of Recurrent Urinary Tract Infections

The present investigation showed that 36.8% of the subjects in this investigation reported recurrent urination tract infections (UTIs) defined operationally as three or more episodes of infection within a twelve-month period. This percentage is significantly higher than the 14.6% prevalence found in the national survey in Uganda conducted by Kabugo et al. (2016), and well above the rates recorded in other settings in Africa, such as Algeria (4.5%) and Senegal (0.7%). The marked burden observed in Kisugu, therefore, warrants consideration of local behavioral and environmental determinants, especially of personal hygiene, sexual practices and patterns of health seeking behavior which may allow for repeated episodes.

International data support this trend. A Spanish cohort, for example, found a 27% recurrence rate in a six-month window (Alos, 2005) and highlights the importance of recurrent UTIs in women of reproductive age all over the world. Biological susceptibility due to female anatomy, combined with high amounts of sexual activity and certain hygienic practices in this cohort are likely to underlie these high recurrence rates.

Knowledge on Recurrent UTIs

Despite an impressive level of awareness about the possibility of recurrence (88.9%), only 53.5% of the respondents showed a good knowledge base, and 31.3% showed poor knowledge. Importantly, low knowledge was statistically related to recurrent UTIs ($p = 0.049$), which attests to the fact that it is not enough to be aware, but rather to comprehend how one can be effective in preventing recurrence.

These findings are similar to those from studies in Nepal (Adhikari & Dhakal, 2015) and Kenya (Onyango et al., 2018), where high awareness was accompanied by limited knowledge of etiological factors, risk determinants and preventive behaviors. Geerlings (2008) similarly noted that lower education attainment is predictive of poor comprehension of UTIs.

In this cohort, those with deficient knowledge also practiced maladaptive practices (such as inappropriate wiping, failing to adhere to medication and delaying health-seeking) that are consistent with theoretical models specifying that knowledge influences attitudes and actions. As such, knowledge deficiencies are a direct risk factor for recurrence.

Attitudes About Recurrent UTIs

The study identified a dual attitude pattern. About half of the participants (47.2%) reported embarrassment relating to the presence of a UTI, and 41.0% felt shame relating to care seeking. Notwithstanding, majority (93.8%) respondents reported a plan to visit a doctor in case of symptoms and 97.9% said they were happy to communicate their symptoms openly.

Embarrassment is a recognized psychosocial barrier, which delays the initiation of treatment (Minejima et al., 2019). However, the dominance of positive health seeking intentions found here is similar to those

in Indonesia (Santoso et al., 2017) and the Philippines (Navarro et al., 2019), in which women showed high preparedness to prevent and manage UTIs despite knowledge gaps.

Thus, stigma may delay, but does not completely inhibit, treatment; such delays may compromise bacterial clearance and increase risk of recurrence.

Recurrent UTI Practices

Hygiene Practices

More than half of respondents (51.4%) reported wiping from back to front, a well-documented risk factor for UTIs because of the possibility of the migration of perianal flora, especially Escherichia coli, into the urethra. These observations are in line with studies in the United States, Egypt and Uganda identifying improper wiping as a major contributor to UTI recurrence (Alos, 2005, Dimetry et al., 2007, Andabati and Byamugisha 2010). Anatomically, the proximity of the anus and urethra in females increases sensitivity when the use of non-optimal hygiene.

Practices for Sexual and Reproductive

A large number of the participants (88.2%) were sexually active, with a proportion of these reporting multiple partners (which are strongly correlated with UTI recurrence in multiple studies; K *et al.*, 1999; Foster, 2008. Comparable associations have been reported in Australia, Spain and North America, strengthening the concept of sexual activity as an important risk factor.

Delivery mode was also a strong predictor of recurrence: women who had given birth by vaginal delivery were more likely to have recurrent UTIs. Previous evidence indicates that obstetric trauma and pelvic floor alterations could be a predisposing factor for women developing incomplete bladder emptying, a known risk factor for infection (Franco, 2005).

Practices Relating to the Medical and Treatment

Noncompliance with antimicrobial therapy was strikingly high (79.9%). Poor adherence promotes bacterial persistence and increases risk of recurrence which accords with the results of Canadian studies (Nicolle, 2005) and Kuwaiti studies involving diabetic women (Sewify et al., 2016).

Although the number of participants with uncontrolled diabetes or hypertension was low, there was a strong correlation between these comorbidities and recurrence. This finding is consistent with reports from the Netherlands and Israel suggesting that suboptimum glycemic control negatively affects immune competence and favors bacterial growth (Gorter et al., 2010; Nitzan et al., 2015).

Self-medication, herbal usage and dependence on analgesics alone during UTI episodes were observed with few but it is a major contributor of inadequate therapy. Such behaviors reflect both knowledge deficits as well as access barriers and, eventually, increase the risk of recurrence.

Integration to the Conceptual Framework

The results strongly endorse this conceptual framework, which states that knowledge, attitudes, and practices together affect the recurrence of UTIs. Knowledge gaps catalyze improper hygiene, non-adherence and delayed care. Attitudes (notably, embarrassment) modulate health seeking behaviors. Practices are the nearest determinants of recurrence in terms of direct biological effect on the risk of infection.

The interaction between cognitive, behavioral and psychosocial factors is therefore indicative that recurrent UTIs in this population are the result of a multifactorial process that correlates with international research suggesting that recurrence is influenced by lifestyle, hygiene, sexual behavior, comorbidities and psychological factors.

Study Limitations

A number of limitations should be acknowledged. First of all, the self-reported history of UTI may cause recall bias. Second, the cross-sectional design does not allow a definite causally effect, as exposures and outcomes were measured at the same time. Third, the study was carried out at one health facility, and this may affect generalizability to the other Ugandan contexts. Lastly, the data on comorbidities were based on participant self-reporting rather than clinical verification which may underestimate the prevalence of metabolic or chronic conditions.

Conclusion

This study identified a high burden of recurrent urinary tract infections among females of reproductive age attending Kisugu Health Centre III, with more than one-third reporting three or more episodes annually. Upon conducting this investigation, I found a high burden of recurrent urinary tract infections among women of reproductive age attending Kisugu Health Centre III with more than one-third reporting 3 or more episodes a year. Such a prevalence implies a multifactorial interaction of behavioral, cognitive and clinical determinants that together increase susceptibility to repeated infections.

The data indicate that the knowledge, attitudes and practices have a strong impact on the recurrence of UTI. Although general awareness of recurrence of UTI was high, some significant gaps were noted in a deeper understanding of causative factors, risk profiles and preventive measures. These gaps were found to be highly correlated with recurrence and manifested in inappropriate behaviors such as improper wiping techniques, non-adherence to prescribed regimens and self-medication. Attitudinal barriers, specifically embarrassment, further delayed seeking care, or resulted in less-than-optimal management.

Clinical factors such as uncontrolled diabetes, hypertension, and history of vaginal delivery significantly contributed to the risk of recurrence, adding to the known information about metabolic and obstetric factors. Sexual activity, especially among participants with multiple partners, was a factor that

contributed to high risk, suggesting patterns seen in epidemiological studies that have been done in other situations.

Overall, the study helps to confirm that in this population, recurrent UTIs are caused by a combination of knowledge deficit, behavior practices, psychosocial factors, and underlying health conditions. These findings highlight the need for formal health education, improved counselling at the facility level and the need for specific interventions around modifiable risk factors. A holistic approach to these determinants offers potential for reduction in the recurrence rate and quality of life of women in this community.

Abbreviations

AMR
Antimicrobial Resistance
AST
Antimicrobial Susceptibility Testing
CTX
Cotrimoxazole
CDC
Centre for Disease Control
CA-UTI
Community Acquired Urinary Tract Infections
E. coli
Escherichia coli
ESBL
Extended spectrum Beta Lactamase
HA-UTI
Hospital Acquired Urinary Tract Infection
MHA
Muller Hinton Agar
MIC
Minimum Inhibitory Concentration
S. Aureus
Staphylococcus aureus
UTI
Urinary tract infections
WHO
World Health Organization
XDR
Extensively Drug-resistant

Declarations

Ethics approval and consent to participate

This study was carried out in accordance with the Declaration of Helsinki and all pertinent ethical guidelines for conducting research involving human participants. Ethic approval was secured from the Clarke International University Research Ethics Committee (CIU-REC): Reference No. CLARKE-2021-21. Written informed consent was obtained from all the participants before data collection.

Consent for publication

Not applicable. The manuscript does not contain any individual person's data in any form.

Competing interests

The authors declare that they have no competing interests.

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Author Contribution

Kavuma Sharif: conceived the study, designed the proposal including questionnaire, data collection, performed data analysis, collected data and drafted the manuscript, contributed to literature review and interpretation of results and manuscript finalizations.

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Data Availability

The datasets generated during the current study are available from the corresponding author on reasonable request. **Mail:** sharifbunhanifa@gmail.com

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Figures

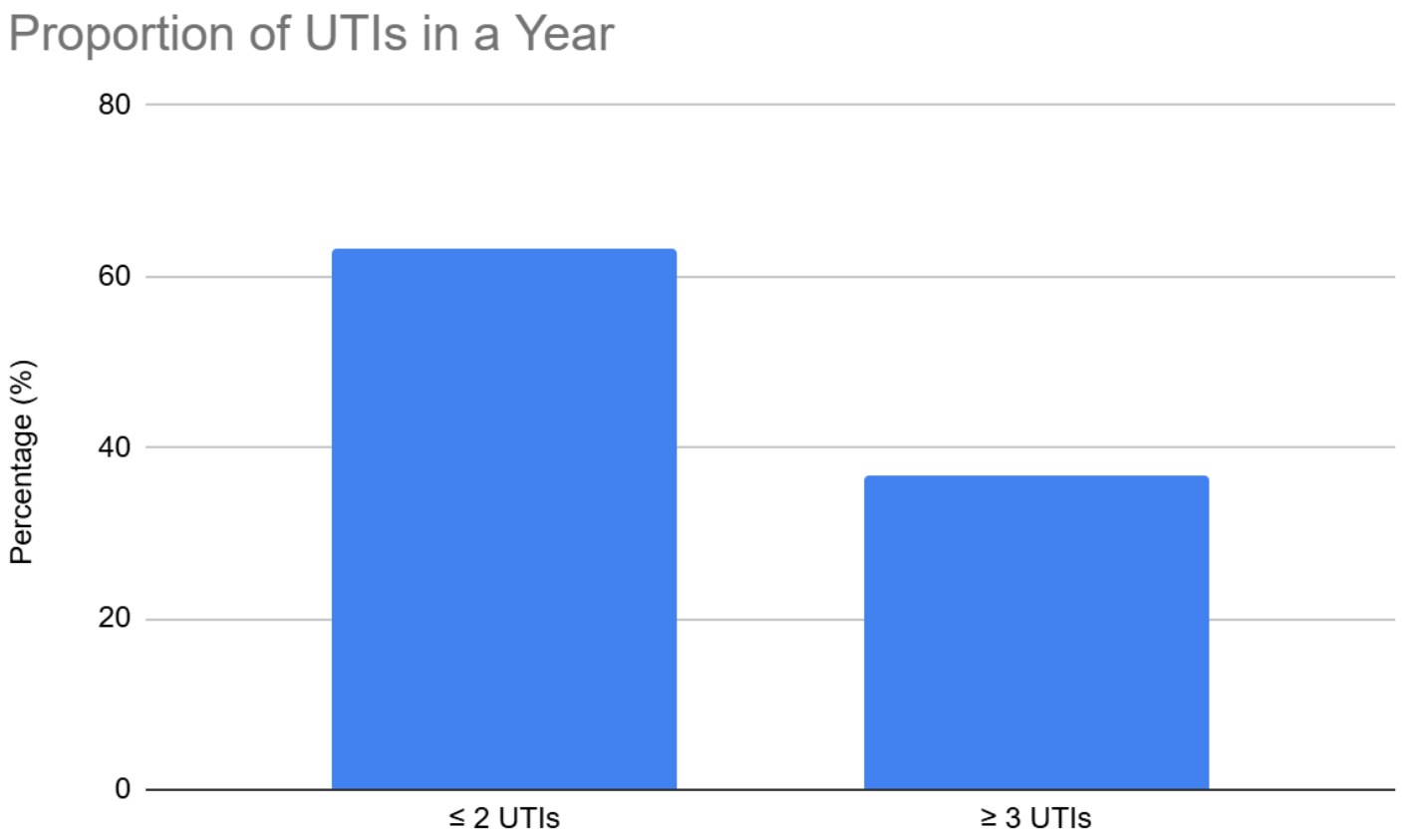

Figure 1

Figure 2: Proportion of UTIs in a Year

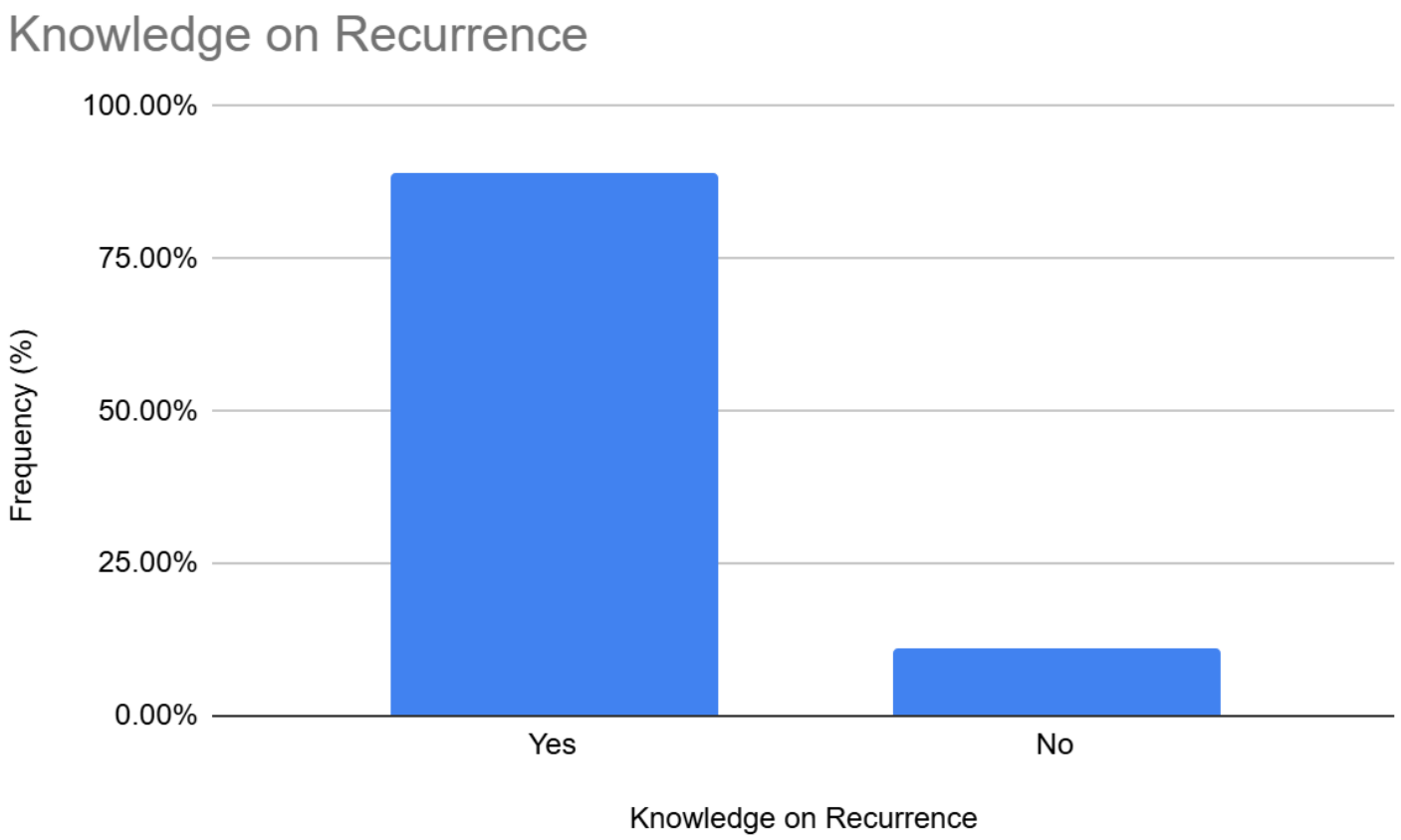

Figure 2

Figure 3: Knowledge on Recurrent UTIs in proportions

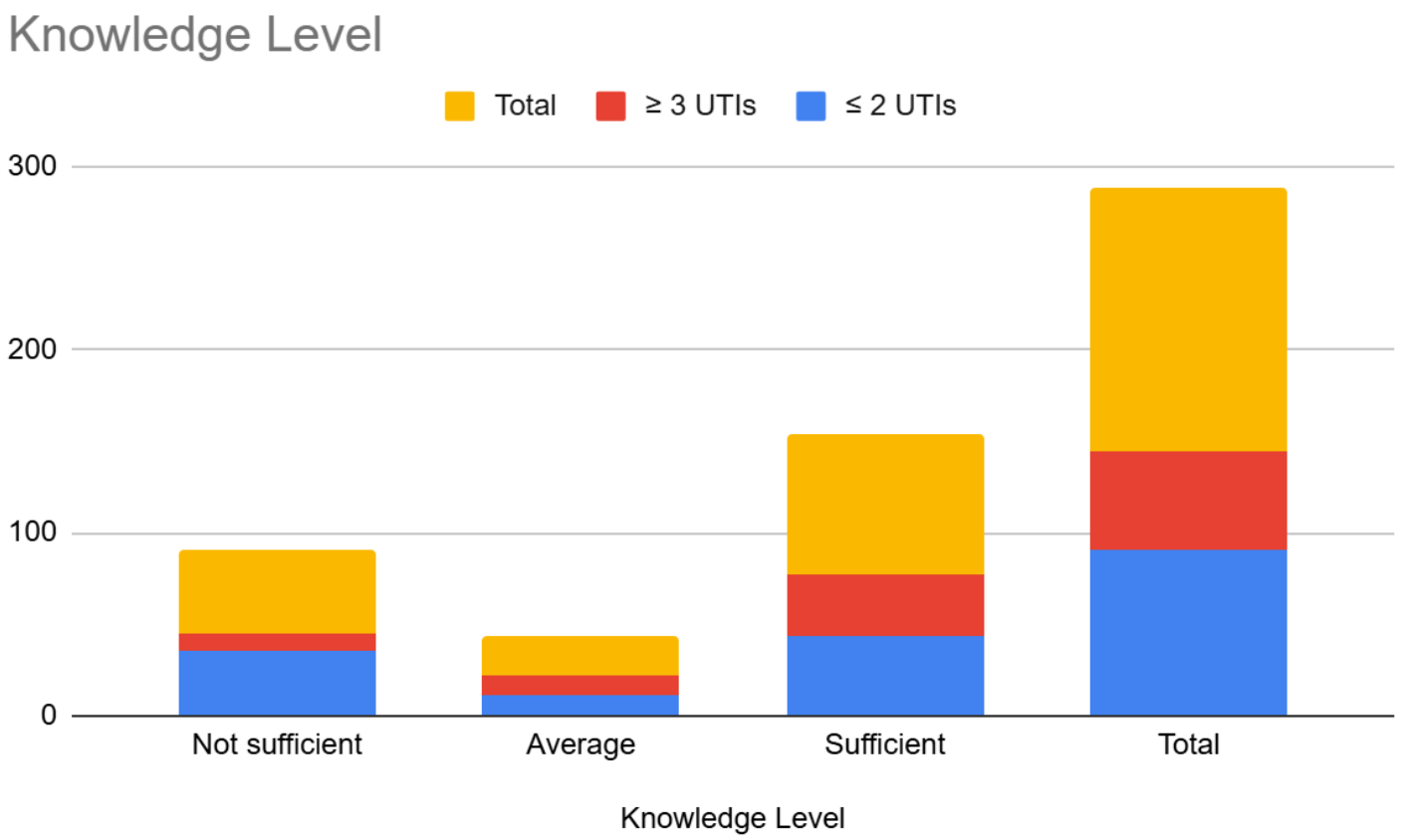

Figure 3

Figure 4: Knowledge level

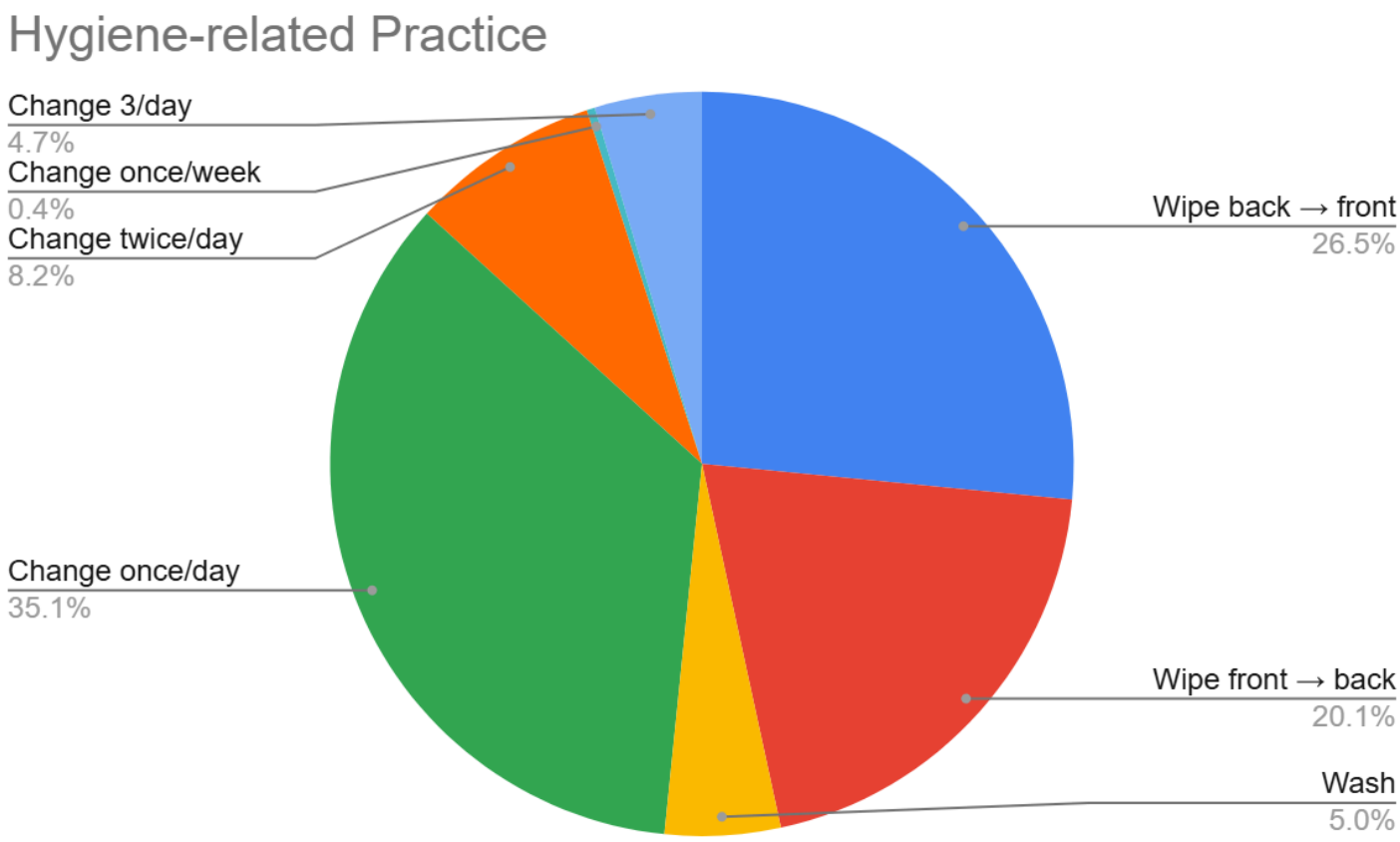

Figure 4

Figure 5: Hygiene-related Practices

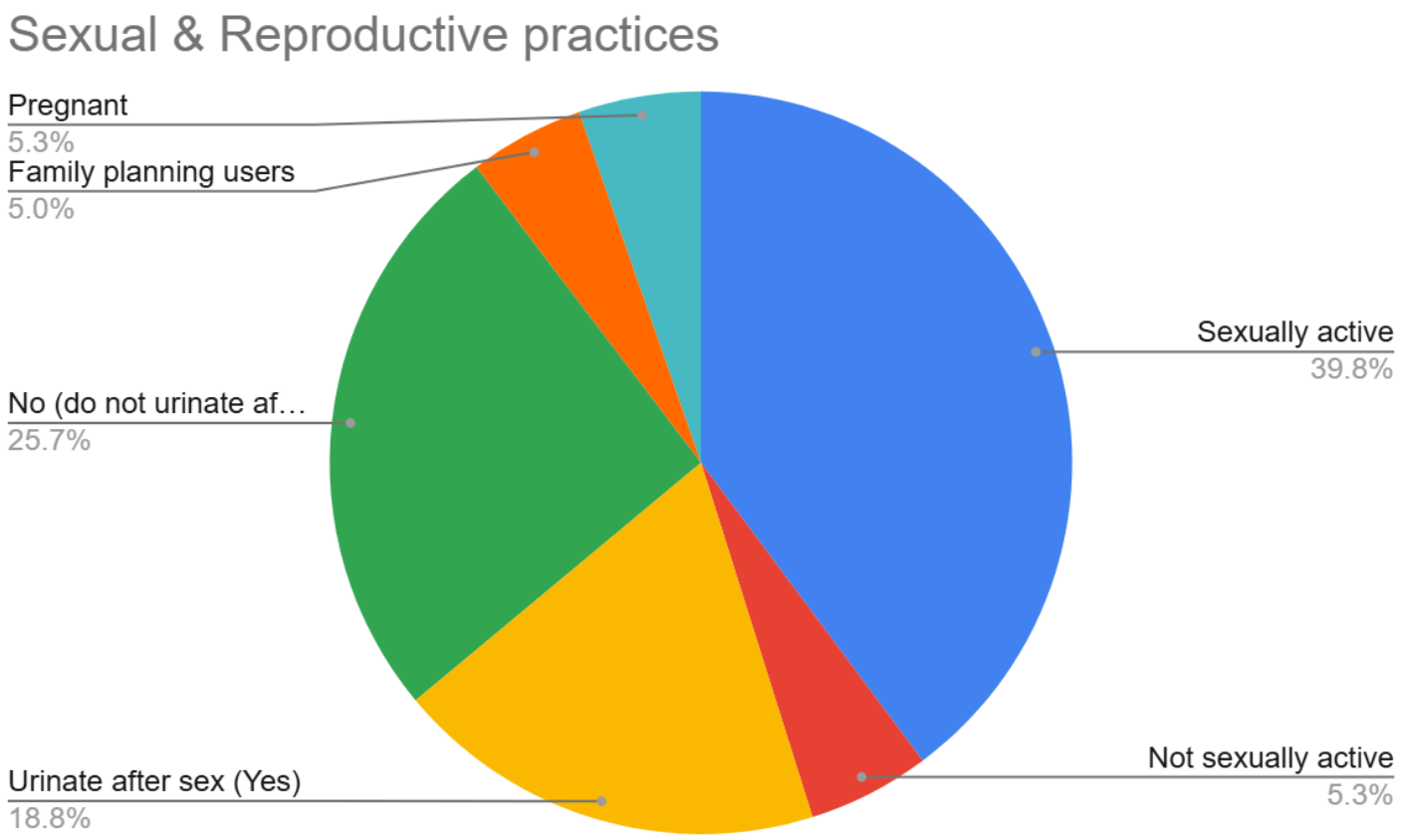

Figure 5

Figure 6: Sexual and reproductive practices