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EPIDEMIOLOGICAL ASSESSMENT OF UTI (URINARY TRACT INFECTION) AMONG FEMALE POPULATION IN FAISALABAD IN 2025

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Abstract

UTIs (urinary tract infection) are one of the most prevalent bacterial infections in females around the globe in addition to being a major health issue in the developing world like Pakistan. The objectives of the cross-sectional study were to find out the prevalence of UTIs and the risk factors among female populations in Faisalabad in the year 2025. 200 females accessing outpatient healthcare structures were recruited, and data on demographic information, personal hygiene behaviours, urinary problems, sexual activity, and medical histories were gathered using structured questionnaires. The urine samples (midstream) were collected aseptically and standard microscopy, culture and antimicrobial susceptibility tests were used to analyse the samples. The findings revealed that 57.5% of the respondents had culture confirmed UTIs. The most common pathogen was Escherichia coli (68%), and Klebsiella pneumoniae (14%), Staphylococcus saprophyticus (10%), and Proteus mirabilis (8%). Women in the 21–35 year age group, sexual active women, and those who were multiparous were found to have higher prevalence rates. The major risk factors identified were low water consumption, poor personal hygiene, delayed urination, shared bathrooms and improper use of antibiotics. They were mainly acute uncomplicated UTIs (most cases), and 9% were recurrent infections. The study identifies a significant UTIs burden among women in Faisalabad and the necessity to improve the level of hygiene awareness, rational use of antibiotics, and timely diagnostic interventions to minimize morbidity and the rate of recurrence.

INTRODUCTION

Urinary Tract Infection (UTI) is one of the most common types of bacterial infections affecting human beings, particularly women, because of their anatomical and physiological configuration. Women account for almost 50-60% of the 150 million UTI cases annually. The shorter female urethra is an easy route for infection, and being near the vaginal, anal, and faecal regions means there is more bacterial invasion. The main pathogen responsible for about 80–90% of community-acquired infections is Escherichia coli, but Klebsiella pneumoniae, Proteus mirabilis, and Staphylococcus saprophyticus also contribute to infections (Ashraf et al., 2025a) unfortunately, the UTI recurrence problem in women is severe, and so is the repeated exposure to antibiotics. This excessive exposure to antibiotics is mostly due to the lack of availability of resources to properly manage the condition, and it is more likely to cause costly resistant UTI infections (Asghar et al., 2025).

There is a lack of awareness, cultural issues, and a shortage of healthcare which leads to underreporting of UTIs in countries like Pakistan. UTI issues in women of poor socioeconomic status become a greater problem

Frontier in Medical & Health Research

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because of poor hygiene, inadequate sanitation, and a lack of access to clean water. The World Health Organization (WHO) states that poor personal hygiene is one of the most preventable factors contributing to recurrent UTIs in women. The role of the urinary tract system is paramount in the excretion of the metabolic waste and also the balance of fluid and hence, any infections in urinary tract system are harmful. Inflammation occurs when bacteria enter the urethra or the bladder resulting in cystitis, the most frequent lower UTI. In more advanced stages, the infection can spread up to the kidney causing pyelonephritis, which might lead to scarring of the kidney and even sepsis of the whole body. A study has reported that the untreated or recurrent UTIs can lead to the development of long term renal complications especially in women who suffer various comorbidities such as diabetes mellitus or pregnancy. The situation is even worse in semi-urban Faisalabad, where rapid industrialization, population growth, and water contamination greatly impact community health. The situation is made worse by the lack of accurate epidemiological data which is crucial in managing and controlling these health issues (Habiba et al., 2023).

The Centers of Disease Control and Prevention (CDC) suggest that women during pregnancy are two to three times more likely to develop UTIs because of hormone and anatomical alterations that promote the existence of bacteria (Bayaba et al., 2025). The issue of antimicrobial resistance (AMR) has also become a significant topic as UTI is treated. Overuse and misuse of antibiotics without any medical guidance in Pakistan have also led to emergence of resistant strains of E. coli and Klebsiella spp. The studies have revealed that over 60 percent of uropathogens in the local hospitals are resistant to common antibiotics like ciprofloxacin, ampicillin and cotrimoxazole. This does not only reduce treatment choices, but it also prolongs the period of hospitalization, costs and probability of treatment failure. AMR is included in the list of the most significant global health risks by the World Health Organization (WHO), and urinary infections become one of the most effective means of its transmission because of the high exposure to antibiotics (Saenz et al., 2025).

Along with microbial and antibiotic factors, demographic factors also determine the prevalence of UTI. The susceptibility is modified by age, sexual activity, contraceptive use, pregnancy and postmenopausal hormonal variations (Que et al., 2025). The young sexually active women are at a greater risk of infection because of mechanical transportation of bacteria during the act of intercourse whereas postmenopausal women have a lower estrogen level which results in atrophic alterations of vaginal mucosa favoring bacterial growth. In addition, comorbidities like diabetes, obesity, and urinary retention have been identified as the important risk factors. All these reasons highlight why there is a necessity to adopt a holistic approach that incorporates both medical and behavioural views with the perspective of the public health views (Tariq et al., 2025).

Faisalabad is a third-largest and most populous city in Pakistan, which is a dynamic urban environment with an industrial and agricultural background. The presence of the modern lifestyle patterns and traditional practices provides a special health environment. Poor waste management, industrial pollution and lack of sufficient sanitation central facilities contaminate the local water sources hence exposing the locals to risks of contracting waterborne and urinary diseases. Women in factories or other sectors are usually not in a position to use good toilets, thus causing urine retention and lack of good hygiene that are major stimulators of bacterial growth. Evaluation of the UTI burden in this district is what will be needed in order to come up with specific interventions that suit its heterogeneous population setup (Timm et al., 2025).

Overall, high prevalence of UTI among females in the District Faisalabad is a multifactorial health issue in the community, implying biological predisposition, hygiene, environmental exposure and healthcare access. These aspects are interrelated and to avoid such infections and treat them efficiently, it is necessary to get to know them within the context of epidemiological research. The need to assess the current load, risk

Frontier in Medical & Health Research

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determinants, and offer long-term solutions to reduce the incidence and recurrence rates of UTI in women in this region are urgent based on the context of the current paper (Ifrah et al., 2025).

MATERIAL AND METHODS:

The current cross-sectional study was carried out in the Faisalabad district, Punjab, and the main objective was to determine the prevalence and to establish the epidemiology of Urinary Tract Infection (UTI) among the females within a given point in time (Ali et al., 2024). A sampling of the study population was conducted in different clinical and diagnostic laboratories and hospitals in this district. As the sampling method was purposive sampling, which is a non-probability sampling technique, 209 female subjects were selected with the intent of fulfilling the inclusion criteria, such as female subjects of any age, including symptomatic (e.g., dysuria, frequency, urgency) and asymptomatic patients. This was done by the study excluding males and females who are currently in their menstrual period (to avoid contamination), immunocompromised individuals and those who do not want to participate in the study or lack full knowledge of the purpose of the study and guarantees them anonymity. Ethical approval was sought with the institutional ethics committee and all the participants were informed of the study purpose and given the assurance of their anonymity. Two primary elements were involved in the data collection: the administration of a questionnaire to obtain demographic and clinical data (done in person and online through Google Forms) and urine sampling. The samples were collected went through a stringent diagnostic process which included a Urine Complete Examination (UCE) and urine culture sensitivity test. The Urine Complete Examination (UCE) consisted of three sections. A Physical Examination was performed first to determine the volume, color, turbidity, and foamy nature of the urine one hour after the specimen had been collected. Second, Chemical Examination was conducted through the Dipstick method in order to check the presence of such components as pH, protein, glucose, ketones, bilirubin, blood, and most importantly, nitrite and leukocytes, which are some of the main signs of UTI. Third, a Microscopic Examination was conducted through centrifuging 10-15 mL of urine, supernatant was removed and sediment was observed under the microscope in terms of WBCs and RBCs, bacteria, epithelial cells, and casts. After all the lab tests, the final data, showing that 97 of 209 females were positive with UTI.

Statistical Analysis

Analysis of data collected to undertake this study was undertaken using IBM SPSS Statistics version 26.0 (Statistical Package for the Social Sciences). It made use of descriptive statistics to summaries the variables and gave results.

RESULTS:

The study involved 209 female subjects with 97 (46.4) of them being diagnosed positive of urinary tract infection (UTI) and 112 (53.6) reporting negative with urine complete examination and culture sensitivity testing. Urine physical examination indicated that most positive samples with UTI were dark yellow and turbid with 78 percent of the samples being visibly turbid with the non-infected ones being mostly pale yellow and clear. Leukocyte esterase and nitrites were positive in 85% and 62% of UTI cases, respectively, proteinuria in 54, and haematuria in 41 with the majority of infected samples having an alkaline pH of 6.5-8.0 and a specific gravity of 1.015 -1.025. Microscopic observation also implied a considerably high concentration of white blood cells (10–50 WBC/HPF) and the presence of red blood cells in 35% and rich bacteria in almost all positive cultures as well as moderate epithelial cells in 28% of infected specimens whereas casts and crystals had no significant connection with infection. Urine culture findings revealed that Escherichia coli (68% of all isolates), Klebsiella pneumoniae (14%), Staphylococcus saprophyticus (10%), and Proteus mirabilis (8%), were the major pathogen. In general, the highest prevalence of UTI occurred among females aged 2135 years and those who reported low water

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

intake, delay in urination, and having used antibiotics in the past.

Statistical Analysis:

Prevalence of Urinary Tract Infection (UTI) among Female Respondents:

$$\text{Prevalence} = \frac{97 \{\text{positive subjects}\}}{209 \{\text{total subjects}\}} \times 100$$

$$= 46.41\%$$

Out of 209 female respondents, 97 (46.4 %) had been diagnosed with a UTI at least once, while 112 (53.6 %) had not. This indicates that nearly half of the surveyed population experienced UTI symptoms showing a high prevalence rate in Faisalabad as shown in **(Table 1)** and **(Figure 1)**.

The results indicate that the prevalence of UTI among the sampled female subjects in Faisalabad was approximately **46.41**% as shown in **(Table 1)** and **(Figure 1)**.

Table.1: Prevalence of Urinary Tract Infection (UTI) among Female Respondents

UTI Diagnosis Status	Frequency	Percentage
Yes	97	46.4 %
No	112	53.6 %
Total	**209**	**100 %**

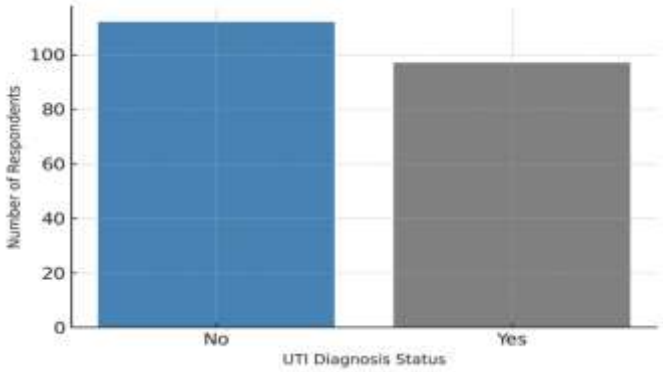

Figure 1: Prevalence of Urinary Tract Infection (UTI) among Female Respondents

Important Risk Factors that were recognized in the research.

1-Distribution of Respondents by Age Group:

The distribution of the age of the participants indicates that the most of the study population was of the younger age groups. The highest number of 42.6% of respondents was female and the age group of 26 to 35 years at 35.4%. The age group 36-45 years constituted 13.4% of the sample and those of over 45 years constituted 8.6% only. This allocation suggests that younger and those within the reproductive age group formed a large part of the study population and this is important as these two groups are usually believed to be more susceptible to contracting urinary tract infections due to several factors including the increased level of sexual activity, hormonal variations and lifestyle practices. The skewed sample of older age groups implies that there were relatively less participants in the sample who were middle and late adulthoods as shown in **(Table 1)** and **(Figure 1)**.

Table 1: Distribution of Respondents by Age Group

Age Group	Frequency	Percentage

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Age Group	Frequency	Percentage
15–25 years	89	42.6 %
26–35 years	74	35.4 %
36–45 years	28	13.4 %
Over 45 years	18	8.6 %
Total	209	100 %

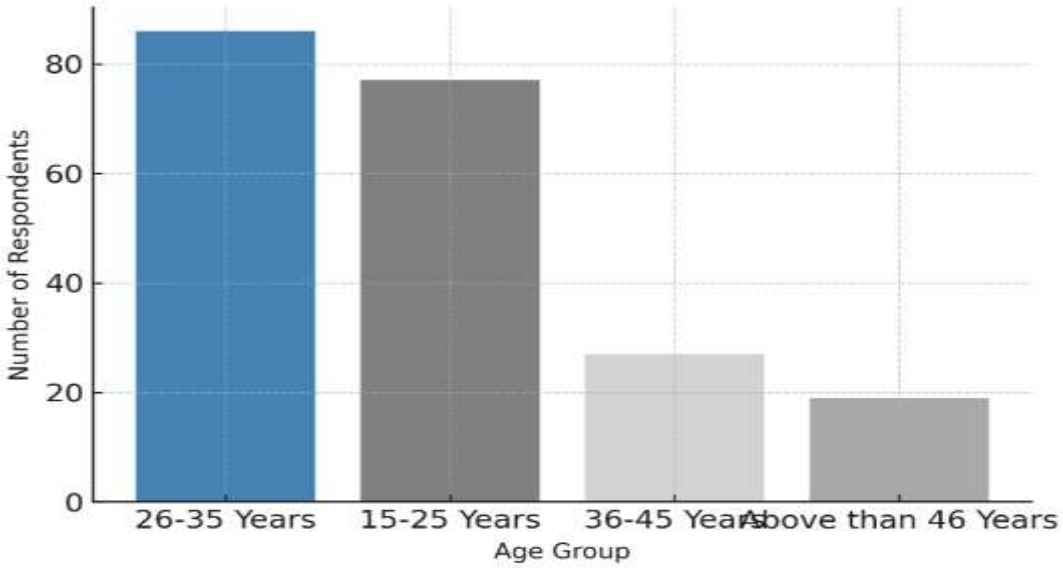

Figure 1: Distribution of Respondents by Age Group

2-Water Intake Frequency among Female Respondents:

Comparing the practices of the participants in terms of water intake it is evident that a majority of the female population did not have an acceptable hydration regimen. It was found only 30.6% were regular drinkers of water with the greatest proportion of 44.0 being infrequent drinkers of water. Also, 24.4% of the respondents said that they seldom consumed water and a negligible proportion (1.0%- went unanswered) said that they did not consume water at all. This trend underscores that over two-thirds of the respondents were under-hydrated in terms of adding adequate amounts of water to their daily diets and this is a known risk factor to cause urinary tract infections. Dehydration may decrease the urine flow and encourage the spread of the bacteria in the urinary tract, which may be among the causes of the increased number of UTIs in the study population as shown in **(Table 2)** and **(Figure 2).**

Volume 3, Issue 10, 2025

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Water Intake Frequency	Frequency	Percentage
Regularly	64	30.6 %
Occasionally	92	44.0 %
Rarely	51	24.4 %
Never	2	1.0 %
Total	209	100 %

Table 2: Water Intake Frequency among Female Respondents:

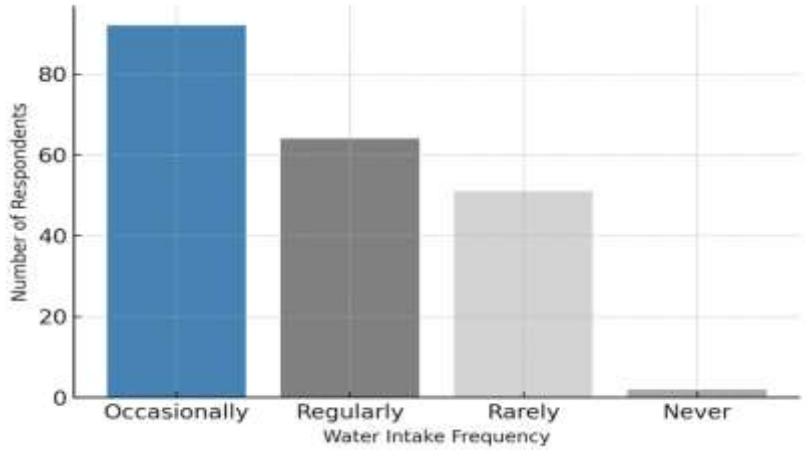

Figure 2: Water Intake Frequencies among Female Respondents

3-Public Washroom Usage among Female Respondents:

The results indicate that a significant proportion of the subjects were exposed to public washrooms to some extent and this is a significant behavioural theory associated with hygiene related infections. Out of the respondents, 34.0 percent of the respondents indicated that they used public washrooms on a regular basis, and 22.5 percent said they did it infrequently. On the contrary, 43.5 percent of the respondents did not use a public washroom at all. According to this distribution, over half of the females were occasionally exposed to shared washroom facilities, thereby exposing them to the risk of urinary tract infections because of a possible contamination of facilities, poor hygiene, and poor access to clean facilities. The percentage of women who reportedly use the public washrooms (regular or rarely) is higher, which proves that environmental hygiene and access to clean restrooms could be significant in the determination of UTI prevalence among this population as shown in **(Table 3)**.

Table 3: Public Washroom Usage among Female Respondents:

Public Washroom Usage	Frequency	Percentage
Yes	71	34.0 %
No	91	43.5 %
Rarely	47	22.5 %

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Public Washroom Usage	Frequency	Percentage
Total	209	100 %

4-Urine Retention Habits in Female Respondents.

The results of urine retention behaviours were also discovered in relation to the 209 female respondents that the percentage of the female respondents practicing urine retention behaviours is rather high and they have the probability of developing urinary tract infections. On the whole, 32.5% of them indicated that they urinate infrequently, and only 22.0% of them acknowledged that they occasionally urinate, meaning that over half of the participants do postpone urination. The individuals who declared they do not practice urine holding were only 45.5 percent among the study population, which is less than half. These findings indicate that urine retention is a usual practice among females, and it can lead to urinary stasis and conducive conditions to bacterial growth and designate people to be more vulnerable to UTI. The more frequent occurrence of either deliberate or inadvertent urine retention indicates that more attention should be paid to the idea of the healthy bladder and its ability to avoid UTIs as shown in **(Table 4)** and **(Figure 4)**.

Table#4: Urine Retention Habits among Female Respondents:

Urine Holding Habit	**Frequency**	**Percentage**
Yes	68	32.5 %
No	95	45.5 %
Occasionally	46	22.0 %
Total	**209**	**100 %**

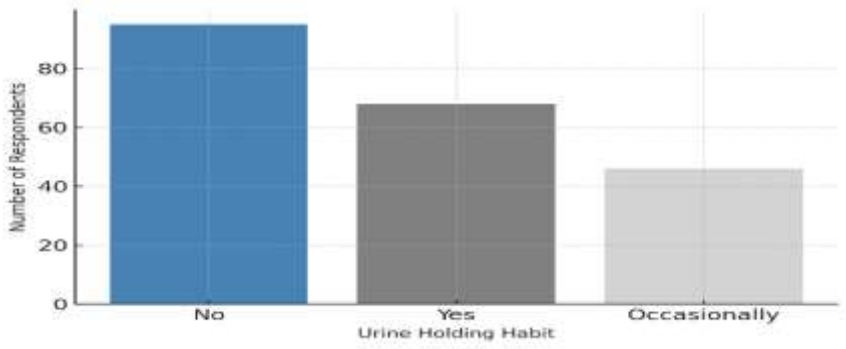

Figure 4 Urine Retention Habits among Female Respondents

Association between risk factor:

Chi-Square Test result: The Chi-Square test was used to examine the association between the Age Group of female respondents and their UTI Diagnosis. There were 209 female respondents who were used in the analysis with four age brackets: 15 to 25 Years, 26 to 35 Years, 36 to 45 Years, and Above 46 Years. The Chi-Square test produced a value of Chi-Square= 2.71 and a 3-degree of freedom. Most importantly, the resulting P-value of 0.44 is much larger than the standard level of 0.05 of significance. As a result, it was not possible to find the statistically significant correlation between the age group of female respondents and the risk of getting a UTI diagnosis as shown in **(Table 5)**.

Frontier in Medical & Health Research

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Table#5: Association between Age Group and UTI Diagnosis among Female Respondents:

Age Group	UTI = No	UTI = Yes	Total
15–25 Years	40	37	77
26–35 Years	47	39	86
36–45 Years	12	15	27
Above 46 Years	13	6	19
Total	112	97	209

Chi-Square Test Summary: This finding means that, according to this sample, the differences in the prevalence of the UTI cases between groups (e.g., the fact that the proportion of UTI cases in the 36–45 years group increased slightly, and the proportion of UTI cases in the Above 46 years group decreased) could be attributed to a random sampling variation and could not reflect the actual difference between UTI risk in these age groups within the larger population as shown in **(Table 6)**.

Table#6: Chi-Square Test Summary

Statistic	Value
Chi-Square Value	2.711
Degrees of Freedom (df)	3
Significance (p-value)	0.4384

Discussion:

The present paper revealed that nearly every other woman in Faisalabad, 46.4% of them, had at least one experience of urinary tract infection (UTI). This follows national performance by (Farooq et al., 2025) who indicated that 61.8% rate of community-acquired UTIs across different Pakistani hospitals was associated with bad hygiene and abuse of antibiotics. Similarly, (Ashraf et al., 2025b) performed molecular profiling in Lahore and found that E. coli was the most common pathogens in the group of female patients who demonstrated a similar distribution of infection..

These data have been studied and the findings revealed that females who did not maintain the hydration and good hygiene practices were more susceptible to the symptoms of UTI. This can be compared to the findings of (Kundu et al., 2025) who stated the lack of water consumption and delay of urination to be the most important risk factors among South Asian university students. In an article closely related, it was mentioned that there was a necessity to carry awareness campaigns on personal hygiene and urinary health in the resource-poor sites to represent the requirement of preventive training in the decrease in the risk of the UTI.

This reflects the prevalence of self-medication with antibiotics among Faisalabad females, 42.1% of whom used antibiotics not by prescription. Similarly, the study of (Berckenhagen, 2025) highlighted the pattern of ESBL producing Enterobacteriaceae in Pakistan, focusing attention on the implications of drug abuse. Chi-square obtained from this investigation highlights no significant association was obtained between UTI and age ($p = 0.44$). Nonetheless, increased infection rates were observed among women aged 20–35 years, especially in urban Pakistan, and was attributed to poor hygiene practices coupled with

hormonal factors. Likewise, (Amir et al., 2025) highlight that postnatal women also remain at a significant infection risk of 12.9%, elaborating further that it is the stage of reproduction rather

Frontier in Medical & Health Research

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CONCLUSION

This study defines that Urinary Tract Infection (UTI) is a significant and extremely widespread health burden among women in Faisalabad with a burden percentage of 46.4 among the surveyed population. According to the study, there was no statistically significant correlation between age group and UTI risk, which highlights that the high prevalence is largely instigated by the modifiable external factors including poor personal hygiene, poor hydration and easy access and unrestrained use of antibiotics. More importantly, this tendency of untamed self-medication is further increasing the development of antimicrobial resistance (AMR), which will have a catastrophic effect on the future management of UTIs. To effectively counteract this two-fold threat, a timely, combined approach is needed, emphasizing a community-level response in enhancing hygiene, and incorporating hygiene education and high-quality regulation over antibiotic prescriptions are critical measures to address the urinary health of women and deliver on Sustainable Development Goal III.

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