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Epidemiology Of Urinary Tract Infections In Franceville (Southeast, Gabon): Prevalence And Determinants Among Patients At The Urban Health Center Of Franceville, Southeastern Gabon

Bibiane-Océane Rogondjault Igala [1], Thiéry Ndong Mba [1,2*], Blandine Behang O'byang épouse Edzang[3], Arnaud Brice PAMBO-PAMBO[1], Assane Ndiaye [1], Hilaire Moundounga Kenguele[2]

[1]Laboratory of Molecular and Cellular Biology (LABMC) University of Science and Technology of Masuku (USTM), Franceville, Gabon

[2]Biochemistry Research Laboratory (LAREBIO), University of Science and Technology of Masuku (USTM) Franceville, Gabon

[3]Franceville's Urban Health Center, Franceville Gabon

Corresponding author: Dr Thiéry Ndong Mba, Laboratory of Molecular and Cellular Biology (LABMC), Research Laboratory in Biochemistry (LAREBIO) University of Sciences and Techniques of Masuku (USTM), Franceville, Gabon

Abstract:

Background: Urinary tract infections (UTIs) represent a major public health issue, particularly in low-resource settings. This study aimed to determine the prevalence and associated determinants of UTIs among patients attending the Urban Health Center of Franceville, Gabon, between January 3, 2022, and December 28, 2024.

Materials and Methods: A retrospective analysis was conducted using medical records of 260 outpatient consultations. Data collection focused on sociodemographic and clinical characteristics. Statistical analysis included descriptive statistics, Fisher's exact test, and multivariate logistic regression to identify independent factors associated with UTIs.

Results: The overall prevalence of UTIs was 25.77 % (95 % CI). Female sex (adjusted OR = 2.89 [95 % CI: 1.08–7.60]; p = 0.03), urban residence (adjusted OR = 6.05 [95 % CI: 2.40–15.20]; p < 0.001), and lack of access to safe drinking water (adjusted OR = 2.39 [95 % CI: 1.01–5.64]; p = 0.047) were significantly associated with an increased risk of urinary tract infections.

Conclusion: Female sex, urban residence, and limited access to clean drinking water were identified as independent determinants of UTIs in Franceville. These findings highlight the need to strengthen awareness campaigns, improve sanitation infrastructure, and promote early screening in urban areas

Keywords: Prevalence, Determinants, Urinary tract infections, Urban Health Center Franceville (CSUF), Gabon.

INTRODUCTION

Urinary tract infections (UTIs) are among the most common bacterial infections worldwide and represent a major cause of outpatient medical consultations, particularly in urban areas where high population density, risk behaviors, and unequal access to healthcare

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services facilitate their spread [1]. According to recent global estimates, nearly 150 million people are affected by UTIs annually, with the associated healthcare costs reaching billions of dollars [2]. In sub-Saharan Africa, UTIs have become an increasingly significant public health concern, affecting not only women of reproductive age but also men and individuals living with comorbidities such as diabetes or HIV [3]. Recent studies have reported prevalence rates ranging from 15% to 40% depending on the healthcare setting—hospital-based versus community-based—highlighting the epidemiological diversity of UTIs across the region [4]. In Gabon, UTIs are also highly prevalent, often underdiagnosed, and inadequately managed [5]. A survey conducted in the capital city, Libreville, revealed a prevalence of 28% among women seeking care for urinary symptoms [6], underscoring the significant burden of this condition within the national health landscape. In Franceville, located in southeastern Gabon, where sanitation infrastructure remains limited and access to healthcare professionals is unevenly distributed, UTIs represent a major public health challenge. However, local epidemiological data remain scarce, limiting the understanding of the true magnitude of the problem in this region. The pathogens responsible for UTIs are predominantly *Escherichia coli*, which accounts for approximately 70–80% of cases, followed by *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, and other opportunistic microorganisms [7]. However, these bacteria are increasingly developing resistance to commonly used antibiotics, complicating therapeutic management and increasing the risk of complications [8]. This growing antimicrobial resistance is further exacerbated by widespread self-medication, unregulated antibiotic availability, and inadequate healthcare infrastructure, all of which contribute to the spread of multidrug-resistant strains. Despite their significant impact on patients' quality of life and the economic burden they impose, epidemiological data on UTIs in Franceville remain very limited, especially in urban settings. This lack of information hampers the development of targeted and effective prevention and control strategies. It is within this context that this study was conducted, with the main objective of evaluating the prevalence of urinary tract infections among patients attending the Urban Health Center of Franceville over a one-year period, while identifying the key associated factors. These findings will help inform local health policies and contribute to improved patient management in the region.

II. MATERIALS AND METHODS

II.1. Study Setting

The study was conducted at an urban health center located in Franceville, a city in southeastern Gabon. Franceville is characterized by a dense urban population and a variety of healthcare infrastructures, including public hospitals, private clinics, and medical laboratories. The selected health center is a first-line healthcare facility that manages urinary tract infections (UTIs) and related conditions.

II.1.A. Description of the Urban Health Center in Franceville

The Urban Health Center, located in the commercial district of Ngoungoulou in Franceville, southeastern Gabon, is a key facility for primary care, particularly for the diagnosis and management of urinary tract infections (UTIs), which are common in urban settings. It serves a diverse population including adults, elderly individuals, and pregnant women who are especially vulnerable to UTIs. The center is equipped with a laboratory capable of performing urine cytobacteriological exams (ECBU), biochemical analyses, and antibiotic sensitivity testing. Awareness campaigns on hygiene and UTI prevention are also regularly organized. Patients requiring more specialized care are referred to facilities such as the Amissa Bongo University Hospital Center. This health center was selected for the study entitled "Epidemiology of Urinary Tract Infections in Franceville" due to its accessibility, sociodemographic representativeness, and diagnostic capabilities. Despite challenges such as limited resources and high workload, it provides a relevant setting for investigating the sociodemographic, behavioral, and microbiological determinants of UTIs in an urban Gabonese context.

II.2. Type, Period, and Target Population

This descriptive and analytical retrospective study was conducted from May 11 to July 11, 2025, and was based on medical records and results of urine cytobacteriological examinations (ECBU) performed on patients aged 18 years and older who consulted for urinary symptoms between January 3, 2022, and December 28, 2024. Data were extracted from the database of the health

information management system of the Urban Health Center of Franceville. The main objective of this study was to assess the prevalence of urinary tract infections (UTIs) and identify associated determinants among these patients.

II.2.1. Inclusion and Exclusion Criteria

Only medical records of patients aged 18 years or older who consulted for urinary symptoms at the Urban Health Center of Franceville between January 3, 2022, and December 28, 2024, were included in the study. These records had to contain sufficient sociodemographic data and valid ECBU results available in the medical system. Records with incomplete or uninterpretable ECBU results (e.g, excessive sample contamination), missing essential sociodemographic or clinical data, or those concerning patients who had received antibiotic treatment prior to ECBU (risk of false negatives) were excluded from the study.

II.3. Sampling Method

To ensure data representativeness and minimize bias, a census sampling method was used. This means that all medical records of patients meeting the inclusion criteria between January 3, 2022, and December 28, 2024 , were included in the study.

II.4. Data Collection

During the study, data were extracted from medical records and laboratory registers using a standardized protocol. The following variables were collected:

a) Sociodemographic Variables: Age, Gender, Level of education, Marital status, Occupation, Access to clean drinking water

b) Biological Variables: ECBU results: presence of leukocytes, nitrites, and significant bacteriuria ($>10^5$ CFU/mL)

II.5. Ethical Considerations

To ensure confidentiality, the data provided did not include any patient identifiers or personal information. Only researchers involved in the study had access to the extracted data.

II.6. Statistical Analysis

Data were entered into a Microsoft Excel 2016 format and subsequently analyzed using R software version 4.2.1. A descriptive analysis was performed to calculate frequencies, means, standard deviations, and confidence intervals. The Fisher's exact test was used to compare characteristics between groups with and without urinary tract infections in univariate analysis. Odds ratios (OR) and their 95% confidence intervals (CI) were calculated. Results were considered statistically significant when $p \leq 0.05$

III. RESULTS

III.1. Overall Prevalence of Urinary Tract Infections (UTIs) Among Study Patients (N = 260)

A total of 260 patient records were collected for this study. The patients had a mean age of 30 ± 7.38 years and had consulted the Urban Health Center of Franceville between January 2022 and December 2024. Out of these, 67 cases tested positive on urine cytobacteriological examination (ECBU), indicating an overall prevalence of UTIs of 25.77% (67/260; 95% CI [0.21–0.32]). The remaining 193 cases tested negative, representing 74.23% of the sample.

III.2. Overall Prevalence of Urinary Tract Infections (UTIs) According to Sociodemographic Characteristics Among Study Patients (N = 260)

In a univariate analysis of UTI prevalence according to patients' sociodemographic characteristics, it was found that females (Crude Odds Ratio = 2.09; 95% CI [1.10–4.11], p = 0.02), women aged 26–45 years (Odds Ratio = 3.29; 95% CI [1.8–6.17], $p \leq 0.001$), married individuals (Crude Odds Ratio = 6.08; 95% CI [3.03–12.99], $p \leq 0.001$), urban residents (Crude Odds Ratio = 4.37; 95% CI [1.93–11.2], $p \leq 0.001$), and those without access to clean drinking water (Crude Odds Ratio = 2.54; 95% CI [1.3–5.05], p = 0.0048) were significantly associated with higher risk of UTIs. See Table 1.

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Table 1: Univariate Analysis of the Prevalence of Urinary Tract Infections (UTIs) According to Sociodemographic Characteristics Among Study Patients (N = 260)

Variables	**Number of Participants *N* (%)**	**UTI Prevalence**		**Univariate Analysis**	
		Positive N (%)	**Negative N (%)**	**Crude OR 95% CI**	**p-values**
Gender					
Female	158 (60.77)	49 (31.01)	109 (68.99)	2.09 [1.10 ; 4.11]	**0.02***
Male	104 (39.23)	18 (17.31)	84 (82.69)	Reference	-
Age groups (years)					
18–25	26(10)	1(3.85)	25(96.15)	Reference	
26–45	107 (41,15)	42(39.25)	65(60.75)	3.29 [1.8 ; 6.17]	**<0.001***
46–60	82 (31,54)	16 (19.51)	66 (80.49)	0.60 [0.3 ; 1.18]	0.13
61 and over	45(17.31)	8 (17.78)	37 (82.22)	0.57 [0.22 ; 1.35]	0.2
Marital status					
Single	83(31.92)	6(7.23)	77 (92.77)	Reference	-
Married	132 (50.77)	54(40.90)	78 (59.1)	6.08 [3.03 ; 12.99]	**≤0.001***
Widowed/Divorced	45(17.31)	7(15.56)	38(84.44)	0.48 [0.2 ; 1.16]	0.09
Education level					

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No education	40 (15.38)	14 (35)	26 (65)	Reference	
Primary	70 (26.92)	15 (21.43)	55 (78.57)	0.48 [0.2 ; 1.13]	0.42
Secondary	102 (39.23)	28 (27,45)	74 (72,55)	1,15 [0,63 ; 2,11]	0,66
Higher	48 (18.47)	10 (20.83)	38 (79.17)	0.74 [0.31 ; 1.64]	0.47
Occupational status					
Informal Worker	90 (34.62)	24 (26.67)	66 (73.33)	Reference	-
Formal sector employee	60 (23.08)	15 (25)	45 75)	0.77 [0.37 ; 1.54]	0.51
Student/School-going	80 (30.77)	19 (26.25)	61 (73.75)	0.86 [0.43 ; 1.63]	0.65
Unemployed	17 (6.54)	7 (23.33)	10 (76.67)	2.13 [0.66 ; 6.51]	0.15
Retired	13 (18.68)	2 (23.91)	11 (76.09)	0.51 [0.06 ; 2.48]	0.52
Residence Type					
Urban	180 (69.23)	59 (32.77)	121(77.56)	4.37 [1.93 ; 11.2]	**≤0.001***
Semi-urban	57(20)	6 (10.53)	51(89.47)	0.28 [0.09 ; 0.69]	0.003
Rural	23(10)	2 (38.18)	21(61.82)	Reference	-

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Access to Clean Drinking Water					
Yes	179 (68.85)	43 (17.91)	136 (82.09)	Reference	-
No	53 (20.38)	22 (41.51)	31 (58 .49)	2.54 [1.3 ; 5.05]	**0.0048***
Not specified	28 (10.77)	2 (7.14)	26 (81.86)	0.2 [0.02 ; 0.83]	0.02

OR = Odds Ratio ; CI = Confidence Interval ; * = Significant Test

III-3. Identification of Factors Associated with Urinary Tract Infections Using a Multinomial Logistic Regression Model Among Study Patients (N = 260)

Based on the univariate analysis and their epidemiological relevance, the following variables were included in the model shown in Table 2 : Sex (female vs male), Residence Type (urban vs non-urban) , and Access to Clean Drinking Water (yes vs no) . The results show that 79.1% of urinary tract infection cases involved female patients, with an adjusted OR of 2.89 (95% CI : 1.08–7.60) . Urban residents had an adjusted OR of 6.05 (95% CI : 2.40–15.20), while lack of access to clean drinking water was associated with an adjusted OR of 2.39 (95% CI : 1.01–5.64)

Results Interpretation: Female sex : The risk of urinary tract infections was approximately three times higher among women (adjusted OR = 2.89 ; p = 0.03). Urban residence : Being an urban resident was strongly linked to an increased risk of UTIs (adjusted OR = 6.05 ; $p < 0.001$). Lack of access to clean drinking water : The absence of access to safe drinking water also increased the risk of UTIs (adjusted OR = 2.39 ; p = 0.047). These three factors (female sex, urban residence, and lack of access to clean drinking water) were identified as independent determinants of urinary tract infections in this study.

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Table 2: Risk Factors Associated with Urinary Tract Infections (UTIs) Among Study Patients (N = 260)

Variables	**Number of Participants *N* (%)**	**UTI Prevalence**		**Multivariate analysis**	
		Positive N (%)	**Negative N (%)**	**Ajusted OR 95% CI**	**p-values**
Gender					
Female	158 (60.77)	49 (31.01)	109 (68.99)	**2.89 [1.08 ; 7.60]**	**0.03***
Male	104 (39.23) ‘	18 (17.31)	84 (82.69)	1	-
Age groups (years)					
18–25	26 (10)	1(3.85)	25(96.15)	1	
26–45	107 (41.15)	42(39.25)	65(60.75)	-	-
46–60	82 (31.54)	16 (19.51)	66 (80.49)	-	-
61 and over	45(17,31)	8 (17.78)	37 (82.22)	-	-
Marital status					
Single	83(31.92)	6(7.23)	77 (92.77)	1	-
Married	132 (50.77)	54(40.90)	78 (59.1)	-	-
Widowed/Divorced	45(17.31)	7(15.56)	38(84.44)	-	-
Residence type					
Urban	180 (69.23)	59 (32.77)	121(77.56)	**6.05 [2.40 ;15.20]**	**<0.001***

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Semi-urban	57(20)	6 (10.53)	51(89.47)		**0,003***
Rural	23(10)	2 (38.18)	21(61.82)	1	**-**
Access to drinking water					
Yes	179 (68,85)	43 (17.91)	136 (82.09)	1	-
No	53 (20.38)	22 (41.51)	31 (58 .49)	**2.39 [1.01; 5.64]**	**0.047***
Not specified	28 (10.77)	2 (7.14)	26 (81.86)	-	-

OR = Odds Ratio ; CI = Confidence Interval ; * = Significant Test

IV. DISCUSSION

Urinary tract infections (UTIs) are common bacterial infections affecting various parts of the urinary system, including the urethra, bladder, ureters, and kidneys. They represent a global public health concern due to their high frequency, impact on quality of life, and associated healthcare costs. In this context, understanding the determinants of UTI persistence within populations is essential for designing targeted and effective interventions. In this study, the overall prevalence of urinary tract infections (UTIs) was found to be 25.77% (95% CI), making it a significant public health issue in the urban setting of Franceville. This rate is lower than the 28% reported in Cameroon [9], the 30% observed by Khan et al. In 2022 [10], the 32% found in Nigeria [11], the 46% reported by Przydacz et al [12], and the 50% reported by Hooton et al [13]. However, it is higher than prevalence rates observed in some developed countries, where rates generally range between 15–20% [14], as well as in sub-Saharan Africa, with 18% in Senegal [15], 20% in Tunisia [16], 22.4% in Cameroon [17], and an average European prevalence of 17.2% [18]. Nevertheless, this prevalence is comparable to those reported in other African studies, such as 27.1% in Côte d'Ivoire [19], and 26% in Kenya [20]. The variations in UTI prevalence across studies may be attributed to several factors, including geographic context, where urban areas generally show higher prevalence due to population density and inadequate sanitation infrastructure [21]. Regarding target populations, pregnant women, elderly individuals, and immunocompromised patients are more vulnerable to UTIs [22]. Moreover, lack of access to clean drinking water indicates that use of contaminated water significantly increases UTI risk [23]. Finally, differences in screening techniques (i.e ECBU vs. urine dipstick) can also influence results [24]. These findings highlight the importance of considering local contexts when planning public health interventions to reduce the burden of UTIs. Unlike many studies that have indicated that male sex could be considered an independent factor associated with UTIs [25 ; 26], the results of this study showed a significant overrepresentation of women among UTI cases, with a rate of 29.1% compared to 17.9% in men. Statistical analysis confirmed that female sex was an independent factor associated with UTIs, with an adjusted OR of 2.89 [1.10–7.60]. This observation aligns with global literature and can first be explained by the anatomy of the female urinary tract (shorter urethra close to the anus), which facilitates bacterial ascent in Iran [27]. Additionally, factors such as frequent sexual intercourse, menopause, and use of certain contraceptives may further explain this increased vulnerability [13 **;** 28]. Similarly, female has been well established as a major risk factor for urinary tract infections (UTIs), due to anatomical, hormonal, and behavioral differences 10] Studies have also shown that women, especially those with prior UTI history, are at increased risk, confirming female sex as an independent risk factor [29 **;** 30]. These findings underscore the importance of considering female sex as an independent risk factor in the assessment and management of urinary tract infections [31]. Consistent with the findings of [30 **;** 32], this study showed a significant association between UTIs and urban settings, with a risk more than six times higher in urban residents compared to non-urban areas (adjusted OR = 6.05 [2.40–15.20]. This result contrasts with a study conducted in India that found a high concentration of UTI cases in rural areas [30]., and another reporting high UTI prevalence in rural and semi-urban zones, highlighting challenges related to limited access to healthcare and poor hygiene practices, which exacerbate infection risks in these populations [33]. At

first glance, this appears surprising, as one would expect better hygiene and greater access to care in urban areas. However, several African studies have shown that poorly planned urban settlements common in many developing cities are often confronted with overcrowding, insufficient wastewater management, and close living conditions, all of which increase the risk of bacterial contamination [34]. Furthermore, inappropriate antibiotic use leading to the emergence of resistant strains and cross-transmission in crowded urban spaces, coupled with unhygienic public toilets and poor hygiene practices [35], are environmental, sociodemographic, and behavioral factors influencing the occurrence of UTIs. Finally, lack of access to clean drinking water was identified as an independent determinant of UTIs, with an adjusted OR of 2.39 [1.01–5.64]. This finding, consistent with similar studies in West and Central Africa, shows that communities without regular access to clean water experience high rates of both community-acquired and nosocomial infections, including UTIs [36]. These data reinforce the hypothesis that inadequate sanitation conditions favor bacterial transmission, particularly by *Escherichia coli*, the primary causative agent of UTIs.

Limitations of the study

This retrospective study, based on medical records, mean that some important data such as specific symptoms, microbiologically confirmed diagnoses, or administered treatments were not always available. Although the sample is representative of the urban population of Franceville, expanding the modest sample size to include other urban and rural centers would allow for broader generalization of the findings. Additionally, in this study, it was not possible to identify the bacterial species involved or their antibiotic resistance profiles, which would have provided valuable insights for guiding local therapeutic policies.

Strengths of the study

This is the first epidemiological study focused on urinary tract infections in an urban setting in Franceville. The research adopted a combined descriptive and analytical approach , integrating sociodemographic distribution and statistical analysis, allowing for the identification of independent associated factors that are crucial for guiding public health interventions.

Public health implications

The findings of this study suggest the need to: Enhance awareness campaigns targeting women regarding proper genitourinary hygiene practices.

Improve access to clean drinking water and sanitation facilities in underserved neighborhoods.

Implement active screening programs in urban settings, particularly among young and female populations.

Promote systematic microbiological diagnosis to guide empirical treatment strategies and monitor antimicrobial resistance trends.

CONCLUSION

This study conducted in Franceville revealed a high prevalence of urinary tract infections (25.77%) among urban-dwelling patients. Key variables associated with UTIs included female sex, urban residence, and lack of access to clean drinking water. These findings emphasize the importance of strengthening awareness measures, improving sanitation infrastructure, and promoting early detection, particularly among vulnerable populations. Despite its limitations, this research provides useful baseline data to inform local public health policies toward improved prevention and management of urinary tract infections.

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Author Contribution Statement

We, the authors of this study, declare the following contributions: BORI: Study design, data collection, and manuscript writing, TNM: Data analysis and interpretation of results. BBO épouse Edzang: Contribution to methodology and critical revision of the manuscript. AB P-P: Study supervision and validation of results. A N: Contribution to data collection and statistical analysis. H M K: Study coordination and writing of the final sections of the manuscript. All authors have read and approved the final version of the manuscript.

Conflicts of Interest

The authors declare that they have no competing interests related to this study. No external funding was received for the conduct of this research, and none of the authors have any affiliations or financial interests that could influence the results or interpretation of the data.

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