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Antimicrobial resistance and persistent urinary tract infections among women aged 18-35 years at Entebbe Regional Referral Hospital, Wakiso District. A cross-sectional study.

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ABSTRACT

Background:

Antimicrobial resistance (AMR) stands as the 21st century's silent pandemic, a global crisis, threatening to render vital medicines obsolete. Most alarming impacts are seen in UTIs, where the rise in multidrug-resistant strains is turning common infections into threatening complications. This study assessed factors contributing to antimicrobial resistance among young women aged 18-35 years with persistent urinary tract infections at Entebbe Regional Referral Hospital in Wakiso district.

Method:

A cross-sectional study design was employed. Simple random sampling was used to obtain 80 participants. The questionnaire method was used for data collection, and urine samples were analyzed using standard microbiological techniques, including Gram staining, culture, and sensitivity. Data was entered into Microsoft Excel and analyzed using descriptive statistics, and the results were presented in tables, graphs, and charts for easy interpretation.

Results:

Most participants, 22.5%(18) were aged 18-25 years, 57.5%(46) had 26-30 years, and 20%(16) had 31-35 years. In addition, 51.25%(41) had attained tertiary, 30%(24) attained secondary, and 18.8%(15) had attained Primary education. The prevalence of AMR was 45%, with higher rates cited among those aged 26 -30years (58.3%), those who attained tertiary/university (47.2%), and females who changed their knickers once (52.8%). Participants who used leftover antibiotics or over-the-counter drugs also exhibited higher (55.6%) AMR rates, just as those with chronic conditions (55.6%).

Conclusion:

The study established that the overall prevalence of antimicrobial resistance was high. AMR was prevalent among those aged 25-30 years. Poor hygiene and irrational use of antibiotics have contributed to the AMR.

Recommendation:

Health workers, with the support of the Ministry of Health, should engage the community in intensive discussions on the causes of antimicrobial resistance, hygiene, risk factors of persistent urinary tract infections, and infection prevention and control measures.

Keywords: *Anti-microbial resistance, Gram Positive, Gram negative, Culture and sensitivity, Susceptibility, Entebbe regional referral hospital.*
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BACKGROUND

A urinary tract infection is an infection found in the urinary system and can be caused by bacteria (Flores-Mireles *et al*., 2015). Antimicrobial resistance (AMR) occurs when bacteria are not susceptible to antimicrobial agents and cannot be destroyed by them (WHO, 2019). Urinary tract infections (UTIs) are among the most frequent bacterial infections worldwide, affecting approximately 150 million people each year (Flores-Mireles *et al*., 2015). These infections are more common in women than men, primarily due to anatomical and physiological differences. Specifically, the vaginal cavity and rectal opening, which harbor potential uropathogens, are closer to the urethral opening in females. Additionally, the shorter length of the female urethra allows easier bacterial ascension to the bladder (Gupta *et al*., 2019).

UTIs can be categorized into two main types: lower UTIs, such as cystitis, and upper UTIs, such as pyelonephritis. Uncomplicated UTIs typically occur in individuals with healthy urinary systems, while complicated UTIs are associated with structural or functional abnormalities of the urinary tract, including those using medical devices like catheters (Hooton, 2012). Escherichia coli is the most common causative agent of community-acquired UTIs, accounting for approximately 70–80% of cases, followed by other bacteria such as Klebsiella pneumoniae, Proteus mirabilis, Enterococcus faecalis, Pseudomonas aeruginosa,

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Staphylococcus saprophyticus, Staphylococcus aureus, and Streptococcus agalactiae (Silva, A. *et al*., 2017).

The threat of antimicrobial resistance (AMR) is a growing global health crisis, particularly in developing countries where misuse of antibiotics is widespread (Ayukekbong *et al*., 2017). Misuse includes the availability of antibiotics without prescriptions, poor patient adherence to prescribed regimens, and self- medication, which are prevalent in these regions (Godman *et al*., 2022). In such environments, patients may also seek treatment from traditional healers, whose herbal remedies of unknown composition can further contribute to resistance development (Ayukekbong *et al*., 2017).

Globally, it was estimated that bacterial AMR was responsible for 1.27 million deaths in 2019, with the highest burden in Western sub-Saharan Africa (Murray *et al*., 2022). The COVID-19 pandemic has further intensified the challenge by increasing antibiotic use and disrupting healthcare services in many low-resource settings (Godman *et al*., 2022).

In sub-Saharan Africa, the high rate of inappropriate antibiotic prescribing, poor diagnostic capabilities, and weak implementation of regulations on antibiotic dispensing have exacerbated the AMR crisis. Recent studies in East Africa report that multidrug-resistant (MDR) uropathogens are found in 51% of UTI cases (Maldonado-Barragan *et al*., 2024).

In a related study conducted at Jinja Regional Referral Hospital in Uganda, the prevalence of UTIs was reported at 29.6% among women with established preterm labor, with Escherichia coli being the most frequently isolated organism (Ifrah *et al*., 2025). This study highlighted significant variability in antibiotic effectiveness, with ceftriaxone being the most effective agent (81% susceptibility), while azithromycin and erythromycin were the least effective (34% and 28%, respectively) (Ifrah *et al*., 2025). This study assessed factors contributing to antimicrobial resistance among young women aged 18-35 years with persistent urinary tract infections at Entebbe Regional Referral Hospital in Wakiso district.

METHODOLOGY

Study Design

A cross-sectional study design was employed. This design was chosen due to its efficiency, co-effectiveness, and the rapid data collection process.

Study Area

The study was conducted at Entebbe Regional Referral Hospital, located in central Uganda in Katabi sub-county, Division A, Busiro sub-county, Wakiso district, 44km along Kampala –Entebbe Highway in Entebbe Municipality. The hospital serves patients from various sub-counties, villages, and surrounding areas. It provides a range of services, including laboratory, surgical, and maternity services, and has about 100 beds that can accommodate patients.

Study Population

The study targeted young women aged 18-35 years attending ERRH for medical services. This group was chosen because young women are at higher risk of urinary tract infections and are more likely to use antibiotics, making them a critical group for studying antimicrobial resistance.

Inclusion Criteria

Young women aged 18-35 years attending ERRH who provided informed consent were included, and those with a history of recurring urinary tract infections (at least two episodes in the last six months).

Exclusion Criteria

Young women without a history of recurring UTI, pregnant women, and those with known immunosuppression conditions.

Sample Size Determination

This was calculated using the Kish and Lisle formula (1967), $N = (Z^2 * p * q)/d^2$

N = required sample size

Z = standard normal deviation at 95% confidence (1.96)

p = estimated prevalence of antimicrobial resistance (30%) (Bategeka *et al*.,2021).

q = 1 - p, d = margin of error (5%), $n = (1.96)^2 \times 0.3 \times (1 - 0.3)/ (0.5)^2$

N = 323 respondents.

Adjusting the population under study, since the target population is 106, which is less than 384, using the Mugenda and Mugenda formula, $nf = \frac{N}{1+N/e}$, where e=the target population.

nf =(323)/1+(323/106)), =79.8

Therefore, a population size of 80 was used.

Sampling Technique

A simple random sampling technique was used, ensuring that each eligible participant had an equal chance of being selected. A lottery method was then employed, where participants picked numbered papers, and those who picked odd numbers were included in the study.

Sampling Procedure

Participants were approached and informed about the study. After obtaining written consent, they were guided to the laboratory for urine sample collection, after random selection, using a lottery method for fairness and to avoid bias.

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Sample Collection and Analysis

Sample Collection

Midstream urine samples were collected using sterile containers. Participants were carefully guided on how to collect the samples to prevent contamination. Each sample was labeled with a unique identifier to ensure accurate tracking.

Laboratory Examination

Urine samples were analyzed using standard microbiological techniques, including Gram staining, culture, and sensitivity.

Gram Staining Technique: It differentiated Gram-positive organisms from Gram-negative organisms.

Principle

Gram-positive bacteria have a thick peptidoglycan layer in their cell wall, which retains the crystal violet- iodine complex even after decolorization with alcohol or acetone. As a result, they appear purple under the microscope. Gram-negative bacteria have a thin peptidoglycan layer and an outer membrane. The alcohol or acetone dissolves the outer membrane and allows the crystal violet- iodine complex to wash out. These cells are then counterstained with Safranin, appearing pink or red under the microscope.

Reagents for Gram staining

Gentian/Crystal violent, Basic stain Lugol's Iodine –Mordant,50% Acetone alcohol–Decolorizer, 0.5% Neutral red –Counter stain

A smear of the clinical specimen was prepared on a clean glass slide, air-dried, and heat fixed.

Crystal violet stain was applied for 1 minute, then rinsed with water.

Lugol's Iodine solution was then added for 1 minute to fix the dye, then rinsed.

The latter was decolorized with acetone/alcohol for 10–15 seconds and rinsed immediately. Counter-staining with safranin for 1 minute, followed by rinsing and air drying.

It was then observed under a microscope using an oil immersion objective (100x).

Results Interpretation

Gram-positive bacteria appear purple/blue (due to retention of crystal violet).

Gram-negative bacteria appear pink/red (due to safranin counterstain).

Morphology (cocci, bacilli) and arrangement (clusters, chains) guide preliminary identification.

Figure 1: Showing the morphology of gram organism

Culture on Selected Media

Inoculation:

A sterile loop was used to streak the clinical specimen on MacConkey agar (selective for Gram-negative bacteria

Incubation:

Plates were incubated at 35–37°C for 18–24 hours under aerobic conditions.

MacConkey Agar

Lactose fermenters (e.g., *Escherichia coli*) produce pink/red colonies. Non-lactose fermenters (e.g., *Proteus*, *Salmonella*) appear colorless/pale.

Helped in the differentiation of Enterobacteriaceae and other Gram-negative rods.

Figure 2: Showing lactulose fermenters

Sensitivity Testing (Kirby-Bauer Disk Diffusion Method)

A bacterial suspension equivalent to a 0.5 McFarland turbidity standard was prepared.

Using a sterile swab, the entire surface of Mueller-Hinton agar was evenly inoculated.

Selected antibiotic-impregnated discs were placed on the agar surface using sterile forceps.

It was then incubated at 35–37°C for 16–18 hours.

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The diameter of inhibition zones was measured around each antibiotic disc in millimeters. **Antibiotic Sensitivity Testing**

Inhibition zones were measured and compared to the Clinical and Laboratory Standards Institute.

Each organism-antibiotic pair was interpreted as:

Sensitive (S): effective treatment expected.

Intermediate (I): possible clinical efficacy at higher doses or in specific body sites.

Resistant (R): not recommended for treatment.

Antibiotic resistance patterns were identified as Extended-spectrum β-lactamase (ESBL) production, Methicillin-resistant *Staphylococcus aureus* (MRSA), and Multi-drug-resistant (MDR) organisms.

Figure 3: Showing a plate with an organism-antibiotic pair for sensitivity testing.

Table 1: Showing antibiotic resistance patterns against Staphylococcus aureus

Antimicrobial agent	Symbols	Disc content (μg)	Inhibition zone diameter (mm) R	I	S
Ampicillin	AM	10	≤11	12-13	≥14
Amoxacillin	AX	25	≤13	14-16	≥17
Cephradine	CE	30	≤14	15-17	≥18
Cefuroxime	CXM	30	≤14	15-17	≥18
Cefoperazone	CEP	75	≤15	16-20	≥21
Cefepime	FEP	30	≤14	15-17	≥18
Imipenem	IMP	10	≤13	14-15	≥16
Amikacin	AK	30	≤14	15-16	≥17
Gentamicin	CN	10	≤12	13-14	≥15
Ciprofloxacin	CIP	5	≤15	16-20	≥21
Levofloxacin	LEV	5	≤12	13-15	≥16

R: Resistant, I: intermediate, S: sensitive.

Data Collection Methods

Data were collected using structured interviewer-administered questionnaires and laboratory request forms. The questionnaire captured socio-demographic data, history of UTIs, antibiotic use, and awareness of antimicrobial resistance.

Data Collection Tools

The study utilized a combination of biological, clinical, and laboratory tools for comprehensive data collection to ensure accuracy in the diagnosis of recurrent UTIs and identification of antimicrobial resistance.

Structured Questionnaire

A pre-tested questionnaire was employed, exploring demographics, medical history, antibiotic use, knowledge of AMR, hygiene & healthcare access.

Urine Sample Collection Kit

Each participant was given a sterile urine container (prevents contamination), with clear midstream collection and unique ID labels (ensures correct sample tracking).

Bacterial Culture Media

MacConkey Agar, which filters out non-urinary bacteria and highlights lactose fermenters.

Antibiotic Sensitivity Testing (Mueller-Hinton Agar)

The gold-standard method (Kirby-Bauer test), which checks the action of antibiotics.

Measurement of "zones of inhibition" (clear rings = bacteria are killed) and comparable results.

Data Collection Procedure

The data collection procedure was executed in two major phases: questionnaire administration and laboratory sample analysis.

Inclusion criteria

Women (18-35 years with recurrent UTIs) who provided clear consent.

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Quality Control

Trained staff, interviewed the respondents about: UTI history, antibiotic use, habits, hygiene practices.
Standard Operating Procedures (SOPs) were strictly followed.

LAB Testing of Urine Samples

Midstream urine was collected in sterile, properly labeled containers, with participant codes.
Microscopy was used to identify bacteria/WBCs, under the Gram staining technique, to identify Gram-positive (purple) and Gram-negative (pink) bacteria.
The culture method, where urine is grown on special plates (MacConkey agar) to detect infection-causing bacteria, was used.
Antibiotic Test, which uses Mueller-Hinton agar to identify the action of drugs against bacteria, was used.
Laboratory results were verified by a senior laboratory technician to ensure accuracy.

Piloting Study

Before the main study, the questionnaire was pre-tested at a similar healthcare facility to identify any unclear questions. Feedback from this pilot study was used to refine the tool, ensuring clarity and relevance.

Data Analysis and Presentation

Data was entered into Microsoft Excel and analyzed using descriptive statistics. Frequencies and percentages were calculated, and results were presented in tables, graphs, and charts for easy interpretation.

Ethical Considerations

Ethical approval was obtained from the relevant ethics committee.
Informed consent was obtained from all participants, and their confidentiality was maintained.
Participants were assured of their right to withdraw from the study at any time without consequences.

RESULTS

Socio-demographic characteristics of respondents.

Table 2: Showing socio-demographic characteristics of the respondents

Variable	Category	Frequency (n)	Percentage (%)
Age	18- 25 years	18	22.5%
	26– 30 years	46	57.5%
	31- 35 years	16	20%
Education level	Primary	15	18.8%
	Secondary	24	30%
	Tertiary /University	41	51.2%
Occupation	Students	29	36.3%
	Unemployed	13	16.3%
	Self-employed	21	26.3%
	Employed	17	21.3%
Religion	Catholics	22	27.3%
	Moslems	14	17.5%
	Protestants	31	38.8%
	Pentecostal	13	16.3%

Findings in Table 2 show that out of the 80 participants enrolled in this study, most of the participants, 22.5%(18), had 18-25 years, 57.5%(46) had 26-30 years, and 20%(16) had 31-35 years.
In addition, 51.25%(41) had attained tertiary, 30%(24) attained secondary, and 18.8%(15) had attained primary education. Furthermore, most participants, 36.3%(29), were students, 26.3%(21) were self-employed, 21.3% (17) were employed, and 16.3% (13) were unemployed.
Additionally, the most, 38.8%(31) were muslims, 27.5%(22) were Catholics, 17.5%(14) were protestants and hence 16.3%(13) were of Pentecostal denomination.

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Table 3: Showing individual risk factors contributing to antimicrobial resistance among young women aged 18-35 years with persistent urinary tract infections.

Question	Category	Frequency (n)	Positive, N=36	Negative, N=44
Do you complete medication?	Yes	37 (46.3%)	15 (41.7%)	22(50%)
	No	43(53.8%)	21 (58.3%)	22(50%)
Have you ever used leftover or over-the-counter drugs?	Yes	45(56.3 %)	20(55.6%)	25(56.82%)
	No	35(43.8%)	16(44.4%)	19(43.18%)
Where do you acquire antibiotics?	Health facility	28 (35.0%)	11 (30.6%)	17(38.64%)
	Pharmacy	21 (26.3%)	9 (25%)	12(27.27%)
	Drug shop	20(25%)	13(36.1%)	7(15.91%)
	Friends/relatives	11(13.8%)	3 (8.3%)	8(18.18%)
Cessation of antibiotics when you feel better	Yes	57 (71.3%)	24 (66.7%)	33(75%)
	No	23 (28.8%)	12 (33.3%)	11(25%)
Change your underwears	Once	31 (38.8%)	19 (52.8%)	12(27.27%)
	Twice	28(35%)	14(38.9%)	14(31.82)
	More than twice	21(26.2%)	3(8.3%)	18(40.91%)
How do you usually wipe after using the toilet?	Front to back	51(63.8%)	15(41.7%)	36(81.82%)
	Back to front	29(36.3%)	21(58.3%)	8(18.18%)
Frequently wear tight-fitting undergarments or trousers.	Yes	58(72.5%)	28(77.8%)	30(68.18%)
	No	22(27.5%)	8(22.2%)	14(31.82%)
Used a urinary catheter before	Yes	38(47.5%)	10(27.8%)	28(63.64%)
	No	42(52.5%)	26(72.2%)	16(36.36%)
Any chronic condition(e.g, diabetes)?	Yes	36(45%)	20(55.6%)	16(36.36%)
	No	44(55%)	16(44.4%)	28(63.64%)

Findings in Table 3 show that the most, 46.25%(37) of the respondents had completed the full course of antibiotics prescribed for previous UTI, whereas 53.75%(43) did not complete.

Those that change their knickers once, twice, and more than twice were 38.8%(31), 35.0%(28), and 26.2%(21), respectively. Furthermore, the majority, 56.3%(45), have ever used leftover or over-the-counter antibiotics, and 43.8%(35) do not use leftover antibiotics.

Most respondents obtain their drugs from health facility, 35%(28), pharmacy, 26.3%(21), drug shops, 25.0%(20), and friends/relatives 13.8%(11). The most, 71.25%(57), stopped taking antibiotics once they felt better, while 28.75%(23) finished their antibiotics as prescribed. The majority, 63.8%(51), wiped from front to back after using the toilet, 36.3%(29) wiped from back-to-front, 72.5%(58) frequently wear tight-fitting, while 27.5%(22) do not. Most respondents, 52.5%(42), have never used a urinary catheter, whereas 47.5%(38) have ever used one.

In terms of positivity (positive cases for AMR due to individual factors), 58.25%(21), who had not fully completed their medication, turned positive for AMR. Additionally, AMR was prevalent among those who changed their knickers once, 52.8%(19), as compared to 8.3%(3) who changed 3 times a day. AMR was also prevalent, 55.6%(20) among those who had ever used leftover or over-the-counter antibiotics, compared to those who did not, 44.4% (16). AMR was further prevalent, 36.1%(13) among those who obtained their antibiotics from drug shops and 66.7%(24) among those who stopped taking antibiotics when they felt somewhat better. Furthermore, AMR was more prevalent, 77.8%(28) among those who frequently wore tight-fitting clothes/jeans and 55.6%(20) among those who had chronic conditions.

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Health facility-related factors contributing to AMR among young women aged 18-35 years with persistent UTIs.

Table 4: Showing health facility-related factors contributing to AMR among young women aged 18-35 years with persistent UTIs.

Variable	Category	Frequency n=80	Positive n=36	Negative n=44
Test done before prescription.	Yes	60(75%)	16(44.44%)	44(100%)
	No	20(25%)	20(55.56%)	0(0.00%)
If yes, explain the test results before giving medications	Yes	49(81.7%)	5(31.25%)	0(0.00%)
	No	11(18.3%)	11(68.75%)	0(0.00%)
Availability of all prescribed antibiotics at the facility	Yes	30(37.5%)	12(33.33%)	18(40.91%)
	No	50(62.5%)	24(66.67%)	26(59.09%)
Were you explained how and when to take your medication?	Yes	70(87.5%)	28(61.11%)	42(95.45%)
	No	10(12.5%)	8(38.89%)	2(4.55%)
Advised on return for follow-up if persistence?	Yes	71(88.75%)	28(77.78%)	43(97.73%)
	No	9(11.24%)	8(22.22%)	1(2.27%)
Prescribed antibiotics without a laboratory test	Yes	16(20%)	13(36.11%)	3(6.82%)
	No	64(80%)	23(63.89%)	41(93.18%)
Prescribed same antibiotics prescribed for repeated UTI episodes?	Yes	58(72.5%)	25(69.44%)	33(75%)
	No	42(27.5%)	11(30.56%)	11(25%)

Findings show that the majority of the respondents, 75%(60), said urine tests/culture were done before they prescribed antibiotics, whereas 25%(20) did not do so. 37.5%(30) of the respondents said that the prescribed antibiotics were all available, whereas 62.5%(50) said that they were not there, 87.5%(70) were told how and when to take the antibiotics, while 12.5%(10) were not told by the health worker.

Furthermore, 88.75 %(71) were advised to return for follow-up if symptoms persisted, while 11.25%(9) were not advised, 20%(16) were prescribed antibiotics without a lab test, while 80%(64) were not prescribed antibiotics without laboratory tests. In addition, the majority of the respondents, 72.5% (58), were given the same antibiotics for repeated UTI episodes, whereas 27.5%(42) were not given the same antibiotics for repeated UTI episodes. Finally, 78.8% (63) have ever been told that the facility ran out of antibiotics, while 21.3% (17) were not.

DISCUSSION

Socio-demographic characteristics contributing to antimicrobial resistance among young women aged 18-35 years with persistent urinary tract infections.

Findings revealed that the overall prevalence of AMR was 45%, where AMR was most prevalent at 21(58.3%) among those aged 26 -30years. This was because the age group is typically the most sexually active, that is, high frequency of sexual intercourse and also having multiple sexual partners, which increases exposure to different bacterial strains, some of which may already be resistant to antibiotics. The latter increases the risk of recurrent UTIs due to the introduction of uropathogens.

AMR was 17(47.2%) among those who attained tertiary/university, because many university students purchase antibiotics over-the-counter or share drugs with peers, often taking incomplete or incorrect courses. Students exhibited a high prevalence, 16(44.4%) followed by 10(27.8%) among the self-employed and among protestants, 15(41.7%). Many young women assume that antibiotics are harmless and thus could be reused for any infection. The belief that antibiotics treat all infections was found to encourage misuse for viral illnesses or menstrual pain. The findings were in agreement with studies by (Hossain et al., 2021), (Kapatsa et al. (2025), (Gebretensaie et al., 2023), and (Mlugu et al., 2023), where the prevalence of infection increased with age, 51% among those aged 24-25 years. This could possibly be due to increased sexual activity in this specific age group.

Individual factors contributing to antimicrobial resistance among young women aged 18-35 years with persistent urinary tract infections

Data analysis revealed that overall, the prevalence of AMR increased among females aged 26-30 years. This was because of female reproductive physiology and anatomy, poor personal hygiene, and frequency of sexual intercourse, predisposing them to recurrence of urinary candidiasis. Further, the prevalence increased among those who changed

their knickers once, 19(52.8%). This suggests poor personal hygiene as under-wears inhabit micro-organisms and are favorable for bacterial and fungal growth. These become more competitive with normal flora in the body's surroundings. AMR increased more among those who did not complete their medication as prescribed at 21(58.3%). This could be because some respondents do not understand the importance of completing the antibiotic course, or the risks of antimicrobial resistance and adverse effects, such as nausea, diarrhea, or allergic reactions, may cause patients to discontinue treatment. Furthermore, AMR was more prevalent among those who used leftover antibiotics or over-the-counter medications at 20(55.6%), 13(36.1%) among those who obtained drugs from drug shops, and 20(55.6%) among those who had chronic conditions. This is probably because patients may be unable to afford the full course, especially where antibiotics are purchased out-of-pocket. Some believe that antibiotics are harmful, addictive, or unnecessary for mild infections, and patients may have difficulty accessing medication refills or returning for follow-up care.

Findings were in line with similar studies by Liu *et al*. (2018), Martinez *et al*. (2019), Zhang *et al*. (2020), Okeke *et al*. (2019), Mwangi *et al*. (2021), and Singh *et al*. (2019), where the most common individual factors for antimicrobial resistance observed were self- medication among females because of delayed healthcare access, leftover antibiotic use, thus promoting resistant strains of *E. coli* and *K. pneumoniae.* Purchase of antibiotics without prescriptions, often using the wrong drug for their condition, which generally fosters the development of resistance.

Health facility factors contributing to antimicrobial resistance among young women aged 18-35 years with persistent urinary tract infections.

Data analysis revealed that 60(75%) said urine tests/culture were done before they were prescribed antibiotics. The most, 30(37.5%) mentioned that the prescribed antibiotics were available, 70 (87.5%) were explained to how and when to take the antibiotics, 58(72.5%) were given the same antibiotics for repeated UTI episode, which could be probably because clinicians often rely on empiric treatment, local practice norms, or past patient response rather than culture data or up-to-date local antibiograms. In some settings, prescribers default to fluoroquinolones or broader agents. Finally, the most, 63(78.75%) of the respondents have ever been told that the facility ran out of antibiotics. This could be due to the unavailability of first- line, narrow-spectrum antibiotics at facility pharmacies. Stock-outs push prescribers to use sub-optimal or broad-spectrum alternatives, or patients to buy drugs from informal sources. However, findings correspond to the literature by Ogunleye *et al*. (2022), which highlight that inadequate follow-up care further exacerbates the AMR, making resistant infections more difficult to manage effectively.

LIMITATIONS

Non-response from some participants.

The study was limited to a single facility (ERRH), which affected generalizability.

Potential recall bias due to self-reported data.

CONCLUSION

The study established that the overall prevalence of antimicrobial resistance was high. Age between 25 and 30 years, having a tertiary level of education, being a student, and being self-employed individually exacerbated AMR. Additionally, failure to complete prescribed medication, infrequent change of knickers, use of leftover or over-the-counter antibiotics, obtaining antibiotics from drug shops, frequently wearing tight-fitting clothes/jeans, and having co-morbidness positively influenced AMR.

RECOMMENDATION

Health workers with support from the Ministry of Health should engage in intensive community health education on the causes of antimicrobial resistance and risk factors contributing to persistent urinary tract infections.

Infection Prevention and Control and device care practices (catheter protocols, hand hygiene, environmental cleaning) should be adequately adhered to.

Early identification of UTI cases, proper treatment, and follow-up by the health workers can help reduce the drug resistance of antibiotics.

Increase urine culture/AST access and implementation of on-scale antimicrobial stewardship that includes outpatient clinics (guidelines, audit & feedback, facility antibiograms, CME/prescriber education) through stabilizing antibiotic supply chains and ensuring availability of recommended first-line agents**.**

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List of abbreviations

AMR	Antimicrobial Resistance
CLED Agar	Cystine Lactose Electrolyte-Deficient Agar (used for urine culture)
COVID-19	Coronavirus Disease 2019
E. coli	Escherichia coli
ERRH	Entebbe Regional Referral Hospital
HIV	Human Immunodeficiency Virus
MDR	Multidrug-Resistant
rUTI	Recurrent Urinary Tract Infection
SOPs	Standard Operating Procedures
SOPs	Standard Operating Procedures
SPSS	Statistical Package for the Social Sciences (software for data analysis)
WHO:	World Health Organization

Source of funding

The study was not funded.

Conflict of interest

The author declares that there was no conflict of interest.

Author contributions

JN- Developed and investigated the study
AIS- Supervised the Study.
HN- Supervised the Study.
FS-Supervised the Study.
JFN-Supervised the Study.

Data availability

Data is available upon request.

Informed consent

There was full disclosure; full comprehension, and respondents voluntarily consented to participate in the study.

Author biography

Janet Naluyima is a student at Mildmay Institute of Health Sciences, pursuing a diploma in Medical Laboratory Technology.
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