PREVALENCE AND ANTIMICROBIAL RESISTANT ESCHERICHIA COLI AND KLEBSIELLA SP AMONG INDIVIDUALS WITH URINARY TRACT INFECTION FROM HOSPITAL AND COMMUNITY SETTINGS IN ADO-EKITI, NIGERIA

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ABSTRACT
The antibiotic resistance of urinary pathogens has been varying over the period of years, in community and healthcare-associated infections. The study provided the current prevalence and antimicrobial-resistant Escherichia coli and Klebsiella sp among individuals with urinary tract infections from hospital and community settings in Ado-Ekiti, Nigeria. Midstream urine samples were collected and studied using standard microbiological techniques. Information for the factors associated with UTIs was obtained using questionnaires. An agar disc diffusion technique was used to test for antibiotic susceptibility. The chi-square test and Poisson regression was used to express associations among descriptive variables of UTI. The study revealed females are more susceptible to UTIs than males. Bacterial isolates showed a low prevalence of UTI with 122(8.5%). The age-wise distribution shows that the incidence is more common in age bracket 51-60 and 21 to 30 years. Gender and risk factors among the individuals had a significant relationship with UTIs. Overall, the bacterial strains showed the highest resistance to amoxicillin-clavulinate 43(91.5%) and most susceptible to imipenem 40(85.1%). The bacteria isolates also showed high multiple resistance with 0.6 MAR index. Appropriate diagnosis and management of UTI are aimed at treating the acute occurrence as well as preventing recurrences of this infection.

Keywords: Urinary tract infection (UTI), Escherichia coli, Klebsiella sp, Antimicrobial Resistant, Prevalence.

INTRODUCTION
The E. coli and Klebsiella sp is a type of Gram-negative bacteria that can cause different types of healthcare-associated infections including pneumonia, urinary tract infection, bloodstream infections, wound or surgical site infections, and meningitis (Gharavi et al., 2021). Increasingly, E. coli and Klebsiella sp bacteria have developed antimicrobial resistance, most recently to the class of antibiotics known as carbapenems (Mahony et al., 2020). The bacteria can be spread through person-to-person contact or, less commonly, by contamination of the environment (Guo et al., 2023). These bacteria may affect humans and animals, and the infections they cause are more complex to treat than those caused by non-resistant bacteria (Lee et al., 2020). Antibiotic resistance leads to higher medical costs, abiding hospital stays, and increased mortality. The world needs to change the way antibiotics are prescribed and uses. Despite the development of newer antibiotics, antibiotic resistance is still a global threat. The problem is basically carbapenemase and ESBL producing E. coli and Klebsiella sp that causes infection that are difficult to treat (Seid et al., 2023). Excessive consumption of antibiotics mainly leads to the development of antibiotics resistance. African especially Nigeria consumes larger amount of antibiotics with a prescription rate twice that recommended by the World Health Organization (WHO) (WHO, 2017) usually seen in both rural areas and urban areas of the country. The majority of people living in Nigeria country are subjected to abject poverty where they cannot afford primary care services. Most physicians in the rural areas have non-degree training yet are allowed to prescribe antibiotics due to personnel shortages. Recent studies in Nigeria have reported a high irrational antibiotics prescription use among primary care physicians and emergence of multidrug-resistant bacterial infections (Abubakar and Tangiisuran, 2020; Ajayi, 2023). The prevalence of MDR (multiple drug-resistant) gram-negative bacilli has impressed practice in every field of medicine. The most gram-negative severe infections occur in healthcare and community settings and are most commonly caused by Enterobacteriaceae (mostly E. coli), Klebsiella pneumoniae, Pseudomonas aeruginosa, and Acinetobacter. MDR gram-negative pathogens are also becoming instantly prevalent in the community (Islam et al., 2022). The use of antibiotics in the community as risk for development of drug-resistant pathogens. Other studies in Southwestern part of Nigeria, revealed ESBL and carbapenemase producing E. coli and K. pneumoniae with multiple resistance to antibiotics (Adekamibi et al., 2020; Odewale et al., 2023; Olalekan et al., 2023). It is important to understand the antibiotic susceptibility profile of E. coli and Klebsiella sp which shows inconsistency in different geographical locations, to implement current control actions to prevent the rapid spread of antibiotic resistance in communities. Thus, the study was carried out to provide the current prevalence and antimicrobial-resistant Escherichia coli and Klebsiella sp among individuals with urinary tract infections from hospital and community settings in Ado-Ekiti, Nigeria.

MATERIALS AND METHODS

Study Design
In the cohort study performed from February to November 2021, to determine the prevalence and antimicrobial resistant Escherichia coli and Klebsiella species obtained from urine sample hospital and community settings in Ado-Ekiti, Ekiti State Nigeria. Volunteer
subjects were picked from four locations in Ado-Ekiti environ. Standardized questionnaires were used to collect relevant information such as their age, sex, level of education and medical data. Ethical permission was obtained before samples were collected.

Inclusion and exclusion criteria for UTI screening
Individual who gave their informed consent and all age group were included in the study. Those without given consent were not included in the study.

Isolation and identification of bacterial isolates
The midstream urine samples were collected into a clean urine container and sent to the research laboratory for analysis. A sterile wire loop were used to pick 0.01 ml of the mid-stream urine sample and streaked in Cystine Lactose Electrolyte Deficient Agar (CLED), incubated at 37°C in aerobic condition for 24 hours in confirmation for significant bacterial number. The urinary tract infection was defined as positive urine culture with the significant growth of ≥ 10^5 CFU/mL or more (Bilsen et al., 2003). After incubation, the cultures were sub-cultured on MacConkey agar and Eosin Methylene Blue agar (EMB) for observation and recording. E. coli and Klebsiella sp isolates were identified with the use of microscopic appearance, gram reaction, and biochemical testing and the isolates were stored at -70 °C in 40 % glycerol broth medium for further analysis (Cheesborough, 2006).

Antimicrobial susceptibility testing
Antibiotics susceptibility test was carried out on all bacterial isolates according to the CLSI protocol specified by the disk diffusion method (Anosike et al., 2020). The bacteria were grown overnight on sterile Mueller Hinton agar plates. Few colonies were inoculated onto sterile normal saline adjusted to match the 0.5 McFarland turbidity standards, with the help of a sterile swab stick, test strains were streaked as a lawn on the MHA. The desired antibiotic was aseptically pressed gently down on the surface of the media, ensuring proper lap with the media. The plates were incubated at 37 °C for 24 hours. The zones of inhibition were then measured and recorded (CLSI, 2020). The antimicrobial agents tested were: cefoxime (5 µg), cefazidime (30 µg), cefotaxime (25 µg), imipenem (10 µg), ofloxacin (5 µg), tetracycline (30 µg), amikacin (30 µg), Levofloxacin (5 µg), ciprofloxacin (5µg), ampiclox (µg), amoxicillin clavulanate (20/10 µg), nalidixic acid (30 µg), meropenem (10 µg), cotrimoxazole (µg) and gentamycin (10 µg) (Oxoid, England). The multiple antibiotic resistance (MAR) bacteria were resistant to at least two antibiotics from each of the following classes: carbapenem cephalosporins, fluoroquinolones, macrolides, penicillin, tetracycline and aminoglycosides (Sharma, 2011).

Determination of Multiple Antibiotic Resistance Index
The multiple antibiotic resistance index were calculated according to the method described by Osumdya et al. (2013) in which the ratio of the number of antibiotics to which the isolates were resistant to the total number of antibiotics against which the isolates were tested (a/b).

Statistical analysis
Qualitative data were described as numbers and percentages using descriptive statistics. The Chi-square test and Poisson Regression was used to show differences on distribution of resistant determinants. Results with p < 0.05 were considered significant.

RESULTS
One hundred and twenty-two bacterial isolates were acquired from different locations used in the study. Escherichia coli was the most prevalent bacterial uropathogen with 75(61.5%) and Klebsiella sp 47(38.5%) are shown in Figure 1. Clinical samples has the highest number of bacterial isolates 87(71.3%) with UTI while community setting that recorded low number of bacterial isolates 35(28.7%) Figure 2. The prevalence of bacterial UTI was highest in age group 51-60 with 40(32.8%) as compared to the lowest value 2(1.6%) in the children age group of 0-10 years in hospital settings. Likewise, in community setting, bacteria UTI was highest in age group 21-30 25(34.7%) with lowest prevalence seen in the children and elderly groups of 0-10 years and 71 above respectively (Table 1). UTI was highest in females with 75(61.5%) and 42(55.3%) as compared to 47(38.5%) and 30(41.7%) in men for hospital and community settings respectively. The study observed the highest prevalence of UTI from the respondents in tertiary level of education 63(51.6%) and 44(61.1%) while respondents in the elementary level of education 10(8.2%) and 0(0%) showed lowest prevalent of UTI in both hospital and community settings in that order. Highest percentage of UTI was found among the civil servants with 38(31.1%) for clinical setting. Likewise, students recorded highest percentage of UTI with 27(37.5%) in community setting (Table 1).

The observation on medical history of the respondents and exposures to the risk factors associated with the colonization of UTI were more on ‘No answered’ than the ‘Yes answered’ as shown in the Figure 3. The antibiotics susceptibility tests that were carried out on all isolates shown a high resistant to 115 (94.3%) amoxicillin-clavulanate, 98(80.3%) to ampiclox, 87(71.3%) to cotrimoxazole, 83(68.0%) to nitrofurantoin, 82(67.2%) to tetracycline and 62(50.8%) to amikacin (Table 2). The bacterial strains were most susceptible to impenom 93(76.2%), meropenem 84(68.9%), ceftazidime 73(59.8%), levofloxacin 67(54.9%), cefixime 61(50.0%), cefotaxime 53(43.4%) and gentamycin 50(40.9%). E. coli strains showed high resistant to 72(59.0%) amoxicillin-clavulanate, 68(55.7%) to ampiclox, 64(52.5%) to nitrofurantoin, 58(47.5%) to tetracycline and 50(41.0%) to cotrimoxazole as shown in Fig 4. Similarly, Klebsiella sp. strains were resistant to 43(35.2%) amoxicillin-clavulanate, 37(30.2%) to cotrimoxazole, 30(24.6%) to ampiclox, 24(19.7%) to tetracycline and 22(18.0%) to levofloxacin (Figure 5). The study revealed that highest multidrug resistance occurred in e. coli with MAR index of 0.8. The MAR index of Klebsiella sp.as shown in Figure 6.

The variables for UTI were subjected to Poisson regression analysis, the following regression values were indicated: Age (Age Group 0-30 and 51-60: Estimate= 1.792e+00, Std. Error= 2.887e-01, z value= 6.207, p < 5.41e-10); Gender (male and female: Estimate=3.5835, Std. Error= 0.1179, z value=30.407, p < 2e-16); Educational level ( elementary level: Estimate=2.639e+00, Std. Error=1.890e-01, z value=13.965, p < 2e-16; no education: Estimate=1.211e+00, Std. Error=2.153e-01, z value=5.625, p <1.85e-08); secondary level: Estimate= 1.211e+00, Std. Error= 2.153e-01, z value=5.625, p < 1.85e-08) Occupation (entrepreneur: Estimate=0.9555, Std. Error= 0.3038, z value= 3.145, p < 0.00166; farmer: Estimate= 0.8755, Std. Error= 0.3073, z value= 2.849, p < 0.00439; pensioner: Estimate=1.2432, Std. Error=0.2931 4.242 p < 2.22e-05; students: Estimate=0.6931, Std.
Prevalence and Antimicrobial Resistant Escherichia coli and Klebsiella sp among Individuals with Urinary Tract Infection from Hospital and Community Settings in Ado-Ekiti, Nigeria

Error = 0.3162, z value = 2.192, p < 0.02839; trader: Estimate = 1.2040, Std. Error = 0.2944, p < 4.32e-06; Medical history (catheter usage: Estimate = 4.70048, Std. Error = 0.06742, z value = 69.719, p < 2e-16; Hospitalized for above 2 days: Estimate = -0.62294, Std. Error = 0.11410, z value = -5.459, p < 4.78e-08; Pregnancy: Estimate = -0.28768, Std. Error = 0.10299, z value = -2.793, p < 0.00522; Used Diaphragm/Birth Control: Estimate = -0.91629, Std. Error = 0.12613, z value = -7.265, p < 3.74e-13) were found to be statistically significant relations (p< 0.05) with UTI.

![Figure 1: Prevalence of bacterial species](image1)

Table 1: UTI prevalence on gender, age, level of education and occupation

<table>
<thead>
<tr>
<th>Factors</th>
<th>Hospital Settings (%)</th>
<th>Community Settings (%)</th>
</tr>
</thead>
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<tr>
<td></td>
<td>+ UTI</td>
<td>- UTI</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
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<tr>
<td>Male</td>
<td>47(38.5)</td>
<td>28(22.1)</td>
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<tr>
<td>Female</td>
<td>75(61.5)</td>
<td>330(63.9)</td>
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<tr>
<td>Age</td>
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<td></td>
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<tr>
<td>0-10</td>
<td>2(1.6)</td>
<td>48(7.8)</td>
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<td>11-20</td>
<td>10(8.2)</td>
<td>72(11.8)</td>
</tr>
<tr>
<td>21-30</td>
<td>13(10.7)</td>
<td>140(22.9)</td>
</tr>
<tr>
<td>31-40</td>
<td>18(14.6)</td>
<td>145(23.7)</td>
</tr>
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<td>41-50</td>
<td>26(21.3)</td>
<td>49(8.0)</td>
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<tr>
<td>51-60</td>
<td>40(32.0)</td>
<td>80(13.1)</td>
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<tr>
<td>61-70</td>
<td>8(6.8)</td>
<td>35(6.7)</td>
</tr>
<tr>
<td>71-Above</td>
<td>5(4.1)</td>
<td>43(7.0)</td>
</tr>
<tr>
<td>Level of Education</td>
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<td></td>
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<tr>
<td>E Level</td>
<td>10(8.2)</td>
<td>40(6.5)</td>
</tr>
<tr>
<td>S Level</td>
<td>16(14.6)</td>
<td>74(12.1)</td>
</tr>
<tr>
<td>T Level</td>
<td>63(51.6)</td>
<td>249(40.7)</td>
</tr>
<tr>
<td>No level</td>
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<td>249(40.7)</td>
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<tr>
<td>Occupation Level</td>
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<tr>
<td>Farmers</td>
<td>9(7.4)</td>
<td>46(7.5)</td>
</tr>
<tr>
<td>Trader</td>
<td>27(22.1)</td>
<td>94(15.4)</td>
</tr>
<tr>
<td>Students</td>
<td>12(9.8)</td>
<td>99(16.2)</td>
</tr>
<tr>
<td>Civil Servants</td>
<td>38(31.1)</td>
<td>122(19.9)</td>
</tr>
<tr>
<td>Entrepreneur</td>
<td>14(11.6)</td>
<td>72(11.8)</td>
</tr>
<tr>
<td>Pensioner</td>
<td>18(13.1)</td>
<td>62(9.5)</td>
</tr>
<tr>
<td>Health Worker</td>
<td>6(4.7)</td>
<td>37(6.0)</td>
</tr>
<tr>
<td>Total</td>
<td>122</td>
<td>612</td>
</tr>
</tbody>
</table>

![Figure 2: Frequency of bacterial isolates according to Hospital and Community Settings](image2)
Prevalence and Antimicrobial Resistant Escherichia coli and Klebsiella sp among Individuals with Urinary Tract Infection from Hospital and Community Settings in Ado-Ekiti, Nigeria
Prevalence and Antimicrobial Resistant Escherichia coli and Klebsiella sp among Individuals with Urinary Tract Infection from Hospital and Community Settings in Ado-Ekiti, Nigeria

Figure 4: Susceptibility pattern to different antibiotics on E. coli isolates (n=75)

Figure 5: Susceptibility pattern to different antibiotics of Klebsiella sp. isolates (n=47)

Figure 6: Multiple resistance profile with MAR index
DISCUSSION

The study established that prevalence of bacterial species among UTI patients was fairly low (8.9%). The most common prevalent pathogens in the urine samples were E. coli(51.6%) followed by Klebsiella sp 47(38.5%). The results of the present study are roughly consistent with a study in Iraq, showing that the most prevalent bacteria were E. coli 82(68.3%) and K. pneumonia 38(31.7%), respectively (Jalil, and Naji Al Atbee, 2022). The study shows more number of bacterial isolates 87(71.3%) in clinical samples compared with other related studies. In a previous study conducted in patients attending private clinics in Basrah Iraq by Jalil and Naji Al Atbee, a significantly high prevalence of E. coli 68.3% and Klebsiella pneumoniae 31.7% was reported (Jalil, & Naji Al Atbee, 2022). Likewise, previous related studies from Hospitals in Busheniyi Uganda and Dhaka Bangladesh showed a higher prevalence of E. coli 41.9%, Klebsiella pneumoniae11.6% and E. coli 51.6%. Klebsiella sp 12.1% respectively (Odoki et al., 2019; Isalm et al., 2022). Furthermore, community samples showed low number of bacterial isolates 35(28.7%) compared with other related studies which E. coli and Klebsiella sp were the predominant pathogen isolated from patients with community acquired UTI (Manges et al., 2006; Isalm et al., 2022; Guo et al., 2023). The prevalence of this study was low compared with the previous studies possibly due to significant differences in the sample sizes and population variation. It is also possible that with time, tremendous improvements in management of UTIs and community hygiene could have contributed to reduction of the prevalence of E. coli and Klebsiella sp organisms (Odongo et al., 2020). The members of Enterobacteriaceae family especially E. coli and Klebsiella sp. are identified as vital causative agents of UTIs as they possess a number of factors including adhesion, pili, and fimbrae which contribute to the attachment of bacteria to the urothelium (Shrestha et al., 2016).

The study observed that the infection rates in females (61.5%) were higher than in males (38.5%) in clinical and community environment. The findings are similar to the findings reported in hospitals at Bangladesh, Nigeria, and Ethiopia (Isalm et al., 2022; Anosike et al., 2020; Fenta et al., 2020). The higher frequency in females has been attributed to the shorter female urethra and the proximity of the gastrointestinal outlet, hence making it easier for enteric flora to colonize the area (Odongo et al., 2020). Other contributory factors may include the use of contraceptives, childbirth and menopause (Gharavi et al., 2021). The intercept represents the estimated log rate of positive UTI for females through the exponentiation of the intercept that gives the baseline rate for females. Males are estimated to have a rate approximately exp (3.5835) times higher than females. Therefore, the results suggest that there is a significant difference in the rate of positive UTI between males and females, with males having a higher estimated rate.

In clinically setting, the prevalence was revealed to be high in the age group of 51 to 60 years, 40(32.8%) compared with other age groups though it was not statistically significant. The findings are similar to the findings reported in Nigeria (Anosike et al., 2020; Erinle et al., 2022). The majority of people in this group are believed to have impaired immunity with conditions such as diabetes mellitus, catheter usage, chronic diseases and other health conditions. In community settings, the study shows that people between the ages of 20 to 30 years old 25(34.7%) are the most infected with UTI. These outcomes agree with previous studies in which the incidence of UTIs was higher among students (Erinle et al., 2022; Vati and Prabhakaran, 2020; Jelly et al., 2022). In a previous study conducted in India shows more cases of UTIs were recorded among young and middle aged patients (20-49 years, 51.04%) (Akrum et al., 2007). Like-wise, a study conducted in Accra reported more cases of community acquired UTI among adults less than 50 years (70%) (Donkor et al., 2019). The majority of people in this group is adolescence and young adult attributable to risk factor such as toileting practices etc. It is well-known facts that the accumulated residue from sweating, urine or feces, causes irritation and promotes bacterial growth. The direction of cleaning of perineum area from front to back is a correct method that reduces the risk of UTI among female students. Majority of the students practices wrong techniques of perineal wash (Ruiz et al., 2019). The frequency of changing underwears also considered as a part of hygiene practices, as continue wearing same dampened cloth favors the growth of bacteria and increase the risk of infection. Habitual delaying in urination is unhealthy toileting behaviors that are practice by most students (Yaliwal et al., 2020). The results suggest that the rates of positive UTI are significantly different for the “11-20”, “21-30”, “51-60” and “61-70” age groups. For the other age groups such as “31-40” and “41-50”, there is no evidence of a significant difference in UTI prevalence rates. The results suggest that there is a significant difference in the prevalence rate of UTI between different education levels, with individuals having No Level and Secondary Level of education showing higher estimated rates compared to individuals with Elementary Level of education. The results suggest that there are significant differences in the prevalent rate of UTI between different occupations, with individuals in certain occupations having higher estimated rates compared to individuals in the reference occupation.

The medical history categories such as catheter usage, diagnosed UTI, undergone surgery, diabetes, personal hygiene and regular sexual activity were not statistically significant, as their p-values are higher than the common significance level of 0.05. In the study, 100 patients have catheter usage as compare to Center for disease control reports on 75% of UTIs in the hospital setting are associated with a urinary catheter (CDC, 2015). This is because bacteria can enter the urinary tract when the catheter is being put in or while the catheter remains in the bladder. The study recorded hospitalization of 120 patients, seen to be common among aged people. Long hospital stay can increase the risk of hospital associated infections (HAI) (Osakwe et al., 2019). The study recorded 33 pregnancies among the female patient with suspected UTI. Other finding shows that one in 11 women had a UTI in pregnancy, and half of the cases were asymptomatic (Lee et al., 2020). Urinary tract infections are a common cause of serious infection in pregnant women. In a previous study, 3.5% of ante partum admissions were due to UTI (Storme et al., 2019). The increased size and weight of the uterus may prevent the completely drainage of urine from the bladder, which can make pregnant women more UTI prone. Patients that suffered from kidney disease or diabetes have weakened body’s ability to fend off bacteria because these conditions block the normal flow of urine and encourage bacterial growth. Ahmad et al. (2020) recorded high significant difference in sub-optimal glycemic control group in diabetics’ patients. Sexual activity is one of the most common lifestyle risk factors for UTIs, particularly for young women who are at the adolescence and adult age. An earlier study

Prevalence and Antimicrobial Resistant Escherichia coli and Klebsiella sp among Individuals with Urinary Tract Infection from Hospital and Community Settings in Ado-Ekiti, Nigeria

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revealed that recent sexual intercourse and frequency of sex more than three times per week (p=0.001) were independent predictors of UTIs (Seid et al., 2023). It is believed that sexual intercourse may transport bacteria from the genitals and anus into the urethra and in turn, lead to infection. For men, unprotected sexual activity involving women with a vaginal infection may increase risk of UTIs. The use of birth control (such as diaphragms and spermicides) raises UTI risk in women. A study revealed a high prevalence of UTI (35.3%) amongst the contraceptive users (Lo et al., 2023). Some personal hygiene habits are considered risk factors for UTIs. These habits include use of douches and feminine hygiene sprays or powders, wiping from back to front after urinating or having a bowel movement especially for women, and retaining urine for an abnormally prolonged period. A study revealed that bad sexual health hygiene were the most strongly associated with UTI (Badran et al., 2015). The results suggest that there are significant differences in the rate of exposures to these risk factors associated with the colonization of UTI as shown in medical histories, such as catheter usage, hospitalization for more than 2 days, pregnancy, and the use of diaphragm/birth control.

The study revealed the high resistance rates of bacteria stains to overall susceptibility against commonly used antibiotics: Amoxicillin-clavulanate (94.3%), ampiclox (80.3%), cotrimoxazole (71.3%), nitrofurantoin (68.0%) and tetracycline (67.2%) in community and clinical settings; these findings is similar to other studies in Bangladesh, Iran and Uganda (Islam et al., 2022; Gharavi et al., 2021; Odongo et al., 2020). A study conducted in Nigeria showed an increase in the rates of ceftazidime, cefuroxime, ciprofloxacin and Nalidixic acid. However, the bacterial strains showed susceptibility to imipenem, meropenem, cefazidime, levofloxacin and cefexime in the both settings used in this study. The susceptibility patterns are similar to those observed by Nahala et al. (2018) and Ayandele et al. (2020). The intercept (1.669e+00) represents log of the expected count when all other predictors are zero. The positive coefficient (which include amoxicillin-clavulanate, ampiclox, and cotrimoxazole) are highly significantly (p-value <2e-16) in hospital and community isolates for resistant category. The positive coefficient (imipenem, meropenem ceftazidime, and levofloxacin) are highly significant in hospital and community isolates for sensitive category. E. coli isolates showed high resistant to 72(59.0%) amoxicillin-clavulanate, 66(55.7%) to ampiclox, 64(52.5%) to nitrofurantoin, 59(47.5%) to tetracycline and 50(41.0%) to cotrimoxazole. Lesani et al. (2020) in Iran indicated that ampicillin and nitrofurantoin had the highest and lowest resistance rates, whereas in Uganda reported cefuroxime and ciprofloxacin with the highest and lowest resistance rates (Odongo et al., 2020). Klebsiella sp. strains were resistant to 43(35.2%) amoxicillin-clavulanate, 37(30.2%) to cotrimoxazole, 30(24.6%) to ampiclox, 24(19.7%) to tetracycline and 22(18.0%) to levofloxacin. A similar study showed high resistance rates against ampiclox (93.3%), sulphamethaxzol + trimethoprim (93.3%), cefotaxime (86.6%), and ceftazidime (86.6%), and tetracycline (73.3%) for Klebsiella pneumoniae (Gebremedhin et al., 2023). The emergence of multi-resistant uropathogens makes the treatment of these infections challenging. In a previous review, emphasize that multi-drug resistant infections are increasingly common in individuals with no history of hospitalization or prior hospitalization (Mahony et al., 2020). The study detected many MDR E. coli strains and K. sp. The MDR results are similar to those observed by (Ayandele et al., 2020). E. coli showed highest MAR index of 0.8 while the MAR index of Klebsiella sp. was 0.6.this differs from that of another work (Ayandele et al., 2020) that reported an index of 0.93.

Conclusion
The results indicated that prevalence of bacterial strains among UTI patients was fairly low (6.9%) and the most common prevalent pathogens in the urine isolate was E. coli. The female gender are more susceptible to Urinary infection. This study has demonstrated that hospitalization, catheter usage, age, pregnancy, use of birth control and gender are the most important factors associated with UTI. Risk factors need to be considered when accessing patients with UTIs and appropriate preventive measures are the best way to reduce the problem of UTIs. The data showed that bacterial isolates were highly resistant to commonly used antibiotics, except for imipenem, meropenem, cefazidime, levofloxacin and cefexime with high prevalence of MDR in E. coli and K. sp isolates from both hospital and community settings. A continuous UTI screening of patients with catheter usage, birth control usage, pregnancy, hospitalized and patients with age group of children, young adult and elderly are recommended. Additional research to identify the genes responsible for resistance in these organisms should be done for easy treatment and control of these infections.

REFERENCES
Definitions of Urinary Tract Infection.


Prevalence and Antimicrobial Resistant Escherichia coli and Klebsiella sp among Individuals with Urinary Tract Infection from Hospital and Community Settings in Ado-Ekiti, Nigeria

