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Original Research Article

Characterization of Enteric Bacteria, Antibiotic Susceptibility Profiles and Risk Factors in Children under Five in Kiandutu Slums in Thika, Kiambu County

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Abstract: ***Background:*** Infectious diarrhea remains a significant global health concern, especially in less developed regions. The disease's impact on children under five years old is particularly severe, causing a high mortality rates in Low- and Middle-income Countries (LMICs). ***Objectives:*** The study aimed to investigate to characterize bacterial causative agents of diarrhea among children below 5 years attending Kiandutu Health care center in Thika, Kiambu County. It also sought to determine the antibiotic susceptibility testing of the isolated bacteria among children below 5 years attending Kiandutu Health care center in Thika, Kiambu County. ***Materials and Methods:*** The study utilized an exploratory descriptive approach because it will look at the many aspects of the disease incidence, including the onset of disease and treatment for the children attending Kiandutu Health Centre. ***Results:*** In characterizing the bacterial causative agents of diarrhea, Escherichia coli was isolated in 45.1%. In the remaining cases, in 54.9%, there was no growth or no pathogen isolated. In addition, MDR, which was defined as resistance to at least one agent in three different antimicrobial categories, was highly prevalent; it was identified in 78.3% (36/46) of the isolates. By stratification according to their ESBL status, all the ESBL-positive isolates showed MDR at 100% (23/23), compared to 56.5% (13/23) among the ESBL-negative isolates. The most sensitive antibiotic was chloramphenicol: 40 isolates were found to be sensitive and 6 resistants, giving a 13% resistance rate. Second to this was Amoxyclav, with 37 sensitive and 8 resistant. moderately effective antibiotic was ciprofloxacin, with 28 sensitive, 13 resistant, and 5 intermediates, yielding a 28.3% resistance rate. ***Conclusions and Recommendations:*** Resistance is ubiquitous, even among infections acquired within communities. Empiric antibiotic treatment is increasingly ineffective, with most first-line drugs failing against common pathogens. Surveillance and preventive measures must take the place of reactionary treatment strategies to prevent perpetuating the resistance crisis.

Keywords: Bacterial diarrhea, Escherichia coli, Multidrug resistance (MDR), Children under 5 years, Antibiotic susceptibility, Kiandutu slums.

INTRODUCTION

Globally, low- and middle-income countries and low-income states have the highest incidence of bacterial diarrhea. 2,195 children die daily from diarrhea associated diseases and this can be approximated 801,000 child deaths from diarrhea every year worldwide with the highest mortality in poor sanitation areas (Mokomane *et al*., 2018). Although community health workers have played a significant role in ensuring that the slum dwellers are informed on the preventative steps to take to ensure that mothers are advised on the preventive measures, they still experience challenges in ensuring that the interventions are implemented (Pervin *et al*., 2020). The global disease burden has significantly reduced in the last twenty-five years and currently stands at 3.6% (Moyo *et al*., 2011). The factors that result in the incidence of diarrhea include social and economic factors, hygiene, sanitation, education level of

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caregivers, and nutrition (Abebe *et al*., 2018). Slum areas are predisposed to the risk factors associated with diarrhea because they have poor drainage facilities, poor access to medical facilities, and lower education levels (Saeed *et al*., 2015). Water-borne bacterial infections include Typhoid fever, Cholera, Shigellosis, Escherichia coli infection, Legionnaire's disease (Legionella pneumophilla) (Bandsma *et al*., 2019). Slum areas have a population of low-income earners who live on less than a dollar a day. According to global statistics, families in low-income areas are primarily single-family homes or women-led families (Black *et al*., 2016). The child may be left under the care of an older inexperienced sibling or put in affordable daycare facilities, but the hygiene level at such shared facilities is low (Bruzzese *et al*., 2018). Children in slum areas also have the disadvantage of access to proper healthcare facilities (WHO, 20120). Most parents in slum areas cannot afford medical coverage and rely on cash to pay for health services (Mekonnen, *et al*., 2019). The facilities present may not be well equipped to treat the children properly and may inadequately facilitate the management of the bacterial disease especially in cases of resistance (Chokshi *et al.,* 2019). In other cases, the parents cannot meet the cost of treatment, and diarrhea becomes chronic (Gray, 2013). In other cases, the antibiotics obtained from the local dispensaries are insufficient because the child has developed resistance so diarrhea persists (Mark *et al*., 2020). There are about 525, 000 children under five years killed by diarrheal disease each year (Assefa, & Girma, 2019). If the caregivers or mothers do not practice hand washing before meal preparation and after visiting the toilet, they expose children to bacterial infections through the oral-fecal route (Mbuthia, 2019). The poor drainage facilities and lack of piped water further complicate the hygiene challenges because water becomes a scarce resource and is only used sparingly (Zhou, 2018). Common bacterial diseases include dysentery (Shigellosis), cholera, botulism, typhoid fever, cryptosporidiosis, and salmonellosis associated with water contamination (Afum *et al*., 2022). Shiga toxin-producing E.coli causes foodborne disease and is associated with the hemolytic uremic syndrome (HUS) in young children because they have low immunity (Ahmed *et al*., 2024). Despite the burden caused by enteric bacteria, information is limited on characterization of bacterial diarrhea. Therefore, this study will characterize enteric bacteria in Kiandutu slums, Thika in Kiambu County, evaluate associated causative factors the prevalence of bacteria in the slums, identify the specific causative agents causing diarrhea in children under five attending Kindutu healthcare center.

MATERIALS AND METHODS

Study Area

Kiandutu area slums that are distributed within the locality of Thika. Kiandutu slum is located 40km from Nairobi City, in Thika Town, with a population of about 17000 people and 9800 households. The informal settlement has an issue with access to clean water and sanitation. Most households live hand to mouth. The health clinics are affordable to the slum dwellers and receive the most patients, especially when an infant suffers from diarrhea. The clinics represent the type of treatment infants receive and will be the site for collecting data from the parents on the disease incidence.

Study Design

The study will utilize an exploratory descriptive approach because it will look at the many aspects of the disease incidence, including the onset of disease and treatment for the children attending Kiandutu Health Centre.

Study Population

Inclusion Criteria

The study will include infants who have come for treatment for diarrhea in the past year. Fecal samples of infants evaluate the pathogenesis and etiology of the disease. The study will include clinic records, clinician notes, and the treatment history of the patients. Children who have used antibiotics within the previous two week will be included if they have the identification for the antibiotic that was used.

Exclusion Criteria

The sampling will not include infants treated for parasitic or viral causes of diarrhea only unless where a co-infection with the bacterial disease is established.

Sample Size Determination

According to relative precision described by Daniel (1999), the equation for approximating the population proportion with a specific characteristic is as follows:

Simple formula is as follows:

$$n = \frac{Z^2 P(1-P)}{d^2} = \frac{1.96^2 0.2(1-0.2)}{0.05}$$

P will be the expected proportion. For instance, in 30% P= 0.3 and d at in proportion such that if at 4%, d= 0.04. Z statistic (Z) for the level of confidence of 95% with a conventional Z value of 1.96. The results will be presented the result with a 95% confidence interval (CI). Setting the α at 0.05 and a detection rate of 12.1% for children below five years infected with diarrheal disease in Kiandutu Slums County, a total of 175 children will be recruited to achieve 0.95 power.

Data Management and Analysis

Samples were be matched by age under five years, time of enrollment, and sex. Demographic and socioeconomic factors will be recorded in the

standardized questionnaire administered by the clinician. Since the study is cross- sectional, descriptive statistics will be sued to determine the prevalence of the bacteria. The researcher will conduct logistic regression to analyze the agents and isolated specimen. To assess the connection between pathogen load and clinical symptoms, odds ratios were computed for each pathogen, considering a ten-fold increase in copy numbers, beginning from 100 copies of detection. Negative results were used as the reference group in this analysis (Griffiths *et al*., 2014).

The samples will undergo aerobic incubation at 37°C for samples that require 24 hours and 48 hours for samples that require reincubation. Recommended streaking techniques will be applied to the specific agar plates (Arsenopoulos *et al.*, 2017). MacConkey agar will best be applied for enteric bacteria and coliforms. Gram-negative rods will; also grow on MacConkey, while Cysteine Lactose Electrolyte Deficient agar will be used to support the growth of other gut bacteria. Lactose fermenters will have yellow colonies, while non-lactose fermenters will appear blue. Culture will be directly on Xylose Lysine Desoxycholate (XLD), MacConkey and then 1 gram of each inoculated into Selenite Broth(10ml) overnight. The subculture will then be placed onto XLD agar and MacConkey agar and incubation for 24 hours (18 hours minimum) before examination for colony morphology. Salmonella will appear colorless but with a darker pigment centrally placed while Shigella colonies will be transparent white and red but lacking the black center. Isolated Shigella and Salmonella will be picked and inoculated in biochemical media. They will undergo biochemical test TSI, hydrogen sulfide test, sulfide Indole motility, Simmon's Citrate Medium, Motility (SIM), and Urea reaction.

Ethical Consideration

Kenyatta University Ethical Review Committee (KUERC) will provide an ethical review and approve the study if all requirements are met. Permission from Kiandutu Health Centre and Thika Level Five General Hospital administration board will be sought. Research permit will be obtained from NACOSTI. Data research materials and patients will be identified using unique codes assigned to maintain confidentiality.

RESULTS

The dataset comprised clinical and microbiological information derived from children below 5 years old presenting with diarrheal illness at Kiandutu Healthcare Center in Thika, Kiambu County. The prevalence of key symptoms showed that acute watery diarrhea was the major symptom, 95.1%, followed by acute mucous diarrhea, 68.6%, and vomiting, 67.6%. Other symptoms were abdominal pain, 10.8%; nausea, 2.9%; and acute bloody diarrhea, 1%. Regarding environmental factors, it was observed that 78.4% used piped water and 95.1% used a water-sealed latrine.

Characterization of Bacterial Causative Agents

In characterizing the bacterial causative agents of diarrhea, mainly E.coli was isolated in 46 cases, constituting 45.1%. In the remaining cases, 54.9%, there was no growth or no pathogen isolated which rules out bacterial infection.

Table 1: Study Population

Variable	Category	Frequency	%
Age Category	<12 months	55	53.9
	12-23 months	34	33.3
	24-59 months	13	12.7
Sex	Female	54	52.9
	Male	48	47.1
Source of Drinking Water	Piped Water	80	78.4
	Distilled	15	14.7
	Well	2	2
	Borehole	2	2
	Piped Water + Boiled Water	1	1
	Dam	1	1
	Drilled	1	1
Type of Latrine	Water Sealed	97	95.1
	Traditional Latrine	5	4.9

The sample included 52.9% females and 47.1% males. While all participants fell within the <5-year age range, the age distribution showed that the majority were infants: 53.9% (55 cases) were <12 months, 33.3% (34 cases) were 12–23 months, and 12.7% (13 cases) were 24–59 months. Clinically, children averaged 3.67 diarrheal episodes per day (standard deviation of 2.09).

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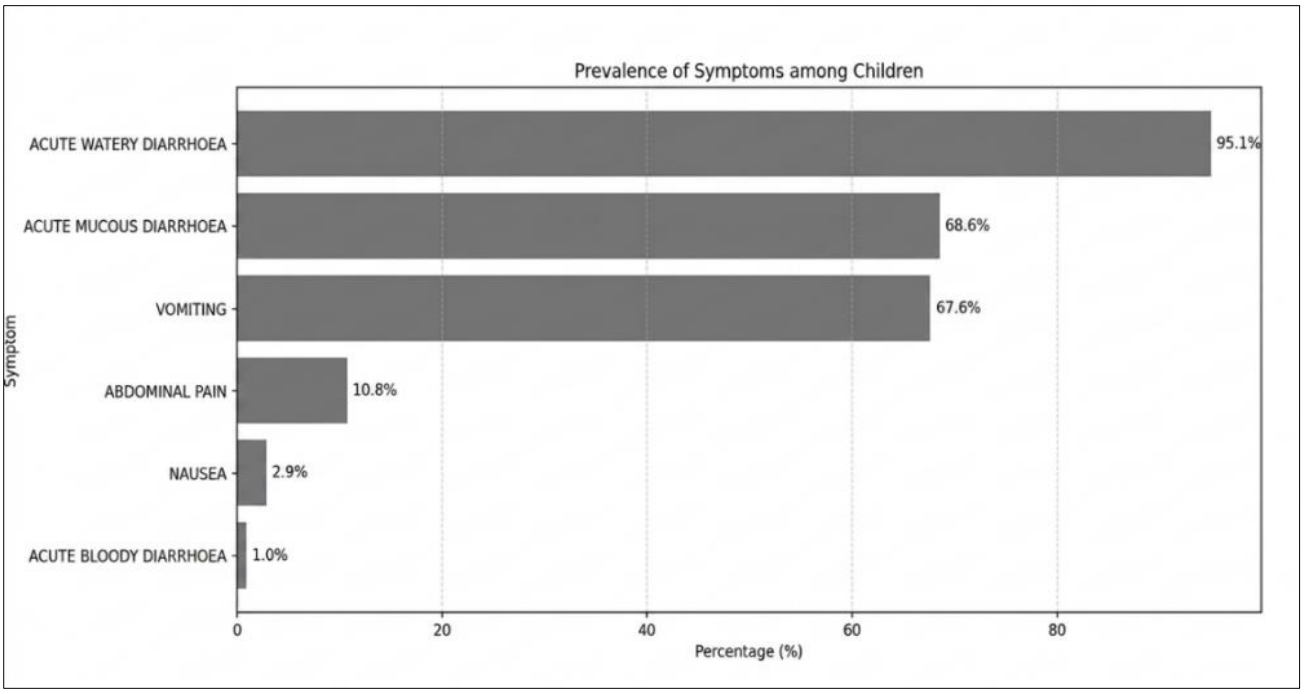


Figure 1: Prevalence of Symptoms among Children

Table 2: Antibiotic Susceptibility Profiles

The most sensitive antibiotic was chloramphenicol: 40 isolates were found to be sensitive and 6 resistant, giving a 13% resistance rate. Second to this was Amoxiclav, with 37 sensitive and 8 resistant. A moderately effective antibiotic was ciprofloxacin, with 28 sensitive, 13 resistant, and 5 intermediates, yielding a 28.3% resistance rate.

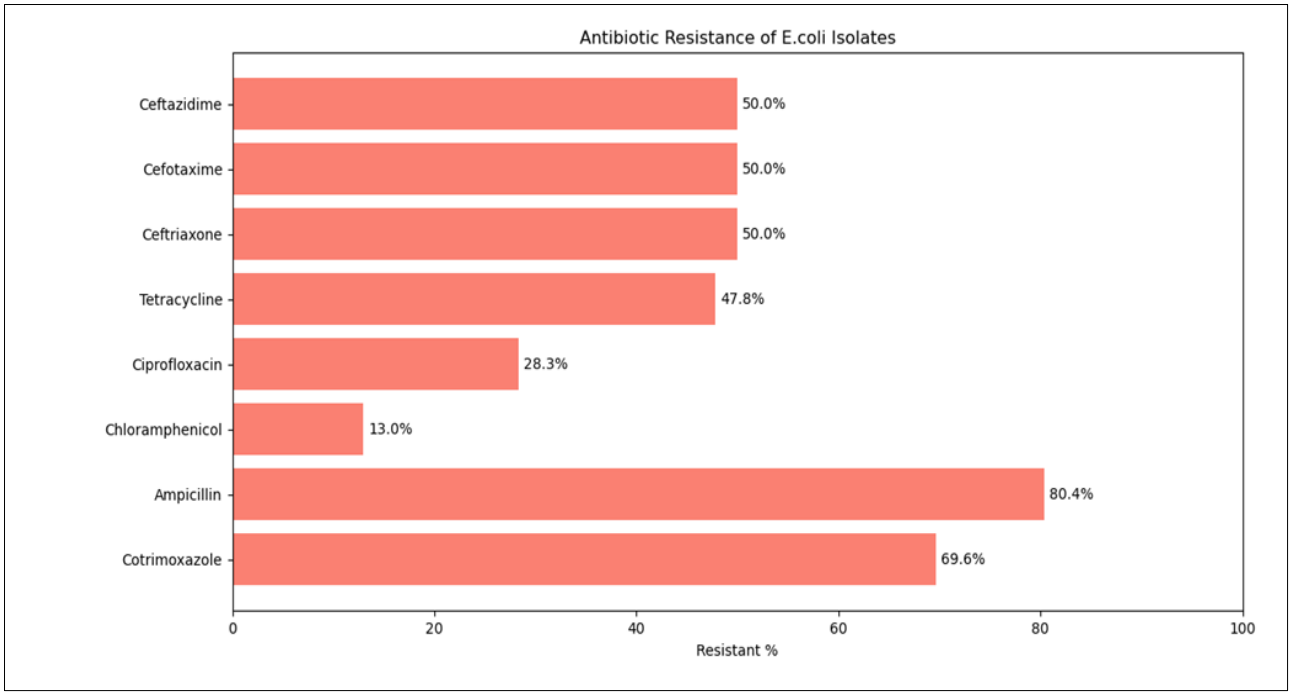
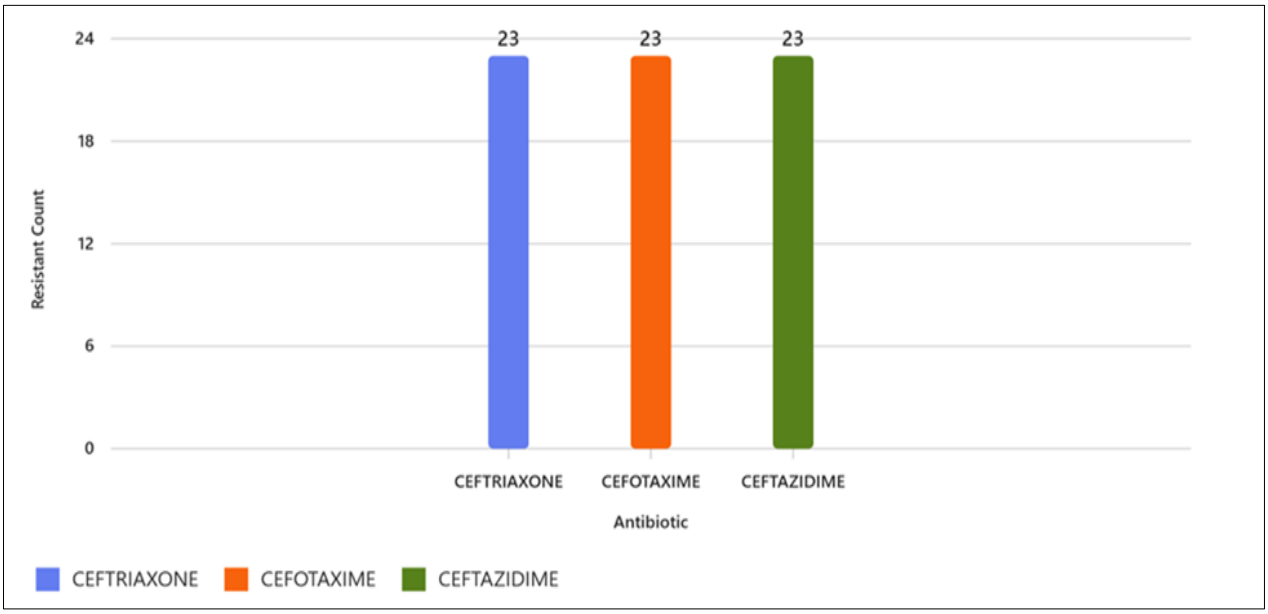


Figure 4: Antibiotic Resistance of E. coli Isolates

Tetracycline demonstrated moderate sensitivity, with 23 sensitive isolates giving a resistance rate of 47.8%, while each of the third-generation cephalosporins, namely ceftriaxone, cefotaxime, and ceftazidime, exhibited identical results of 23 sensitive and 23 resistant isolates, representing a 50% resistance rate for the mentioned agents. The poorest performers were ampicillin and cotrimoxazole. Resistance to ampicillin was the highest at 80.4% (37 resistant, 9 sensitive), while that of cotrimoxazole was 69.6% (32 resistant, 14 sensitive). It suggests that chloramphenicol and amoxycillin remain effective for the population surveyed, but ampicillin and cotrimoxazole are ineffective.



Antimicrobial Resistance Mechanisms and Multi-Drug Resistance

Evaluation of the specific resistance genes indicated a high prevalence of beta-lactam resistance; 50% of the culture-positive cases had ESBL-producing bacteria, reflecting significant resistance to beta-lactam antibiotics. The 50% ESBL positivity rate corresponded to resistance against the third-generation cephalosporins. Indeed, the three third-generation cephalosporins tested, namely ceftriaxone, cefotaxime, and ceftazidime, showed resistance in 23 E. coli-positive isolates.

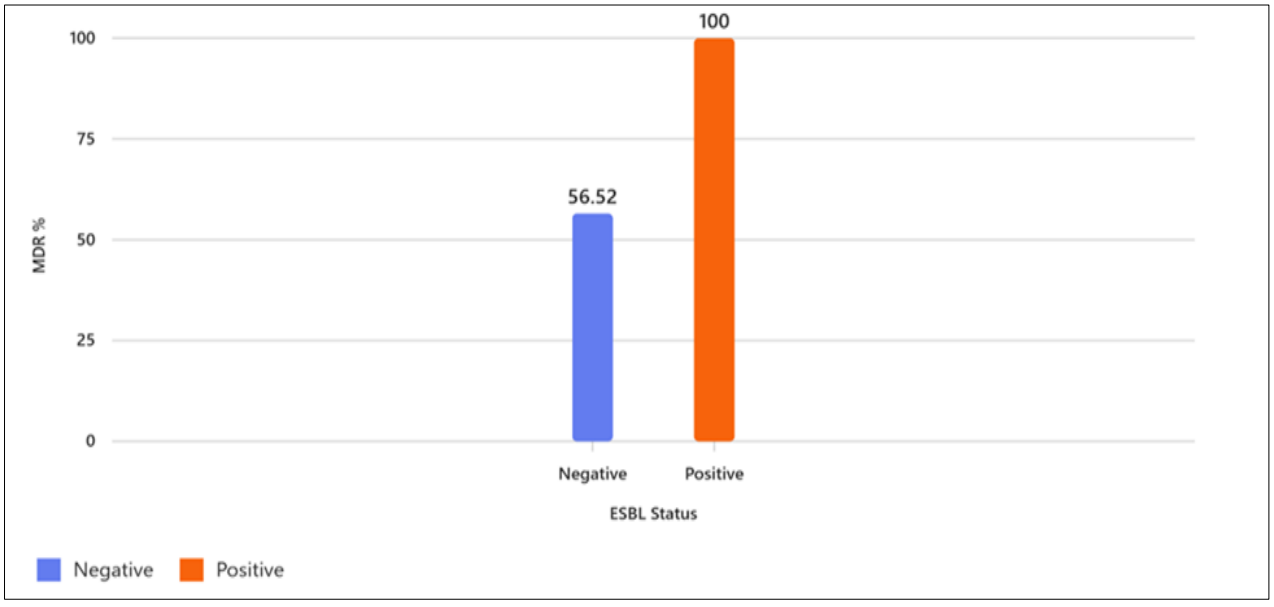


Figure 5: ESBL Status

In addition, MDR, which was defined as resistance to at least one agent in three different antimicrobial categories, was highly prevalent; it was identified in 78.3% (36/46) of the isolates. By stratification according to their ESBL status, all the ESBL-positive isolates showed MDR at 100% (23/23), compared to 56.5% (13/23) among the ESBL-negative isolates.

DISCUSSION

Resistance to antimicrobials (AMR) is still one of the biggest public health issues globally, especially in low- and middle-income nations where infectious diseases are a main cause of childhood morbidity and mortality. The findings provide valuable insights regarding the bacterial aetiology of diarrhoeal illness in children below five years and the associated resistance profiles of isolated organisms. This discussion interprets the results in light of the study objectives and contextualizes the findings in terms of microbial prevalence, antibiotic resistance patterns, and the identified risk factors for bacterial diarrhea.

Bacterial Causative Agents of Diarrhea

The first objective sought to identify the bacterial causative agents of diarrhoea among children under the age of five years attending Kiandutu Health Care Centre. The results revealed that *Escherichia coli* (E. coli) was the most common bacterial pathogen, detected in 46 of 175 samples (26.2.1%), whereas no growth of bacteria was obtained in samples (73.7 .9%; Figure 2). The high prevalence of *E. coli* is consistent with international and regional records indicating E. coli as one of the most frequent bacterial causes of diarrheal illness among paediatric populations (Okumu *et al*., 2025). The high rate of isolation of *E. coli* among children in this research shows high faecal contamination, which may result from environmental factors like unsafe water sources and poor sanitation.

The predominance of *E. coli* among diarrhoeal causes also shows the vulnerability of young children to enteric pathogens (Okumu *et al*., 2023). All participants in the study were below 12 months old (52.9% were female, 47.1% were male), which represents an age of immune maturation and greater exposure to contaminated weaning foods and water sources. This is an age when children are supposed to wean away from exclusive breastfeeding to complementary feeding, a scenario that increases the possibility of ingesting pathogens in inadequately handled foods or contaminated water.

Further, the study found that *E. coli* was detected in all of the samples taken from drilled points, boiled piped water, and dams (100%), and the lowest rate (43.8%) was detected in piped water (Figure 5). Such a distribution pattern shows the role played by water quality in determining the risk of exposure. It also indicates that even "treated" or "boiled" sources of drinking water can be re-contaminated during handling or storage, as reflected by the persistence of *E. coli* in these samples. These findings once more reaffirm that the bacterial aetiology of diarrhoea in low-resource settings is largely influenced by water hygiene behavior and environmental sanitation conditions (Mokomane *et al*., 2018).

Antibiotic Susceptibility Patterns

The second goal of the research was to identify antibiotic susceptibility of bacteria isolated from children under the age of five. Nine commonly used antibiotics were tested for susceptibility: Cotrimoxazole, Ampicillin, Chloramphenicol, Ciprofloxacin, Tetracycline, Ceftriaxone, Cefotaxime, Ceftazidime, and Amoxyclav (Table 2). The data indicates widespread fluctuation in resistance among antibiotics with glaring trends revealing wanton misuse of antimicrobials and the development of multi-drug resistant (MDR) strains.

Resistance was highest to Ampicillin (80.4%) and Cotrimoxazole (69.6%), with the lowest resistance rate reported to Ciprofloxacin (28.3%) and Chloramphenicol (13%) (Figure 3). It fits the trends observed in Sub-Saharan Africa from multiple studies, including one done in Western Kenya by Brander *et al*., (2017) and a pediatric study in Iran done by Abbasi *et al*., (2020). The results show that most of the first-line antibiotics, especially β-lactams and sulphonamides, have lost substantial efficacy in this population. Ampicillin and Cotrimoxazole are among the most commonly prescribed antibiotics in treating children's infections in Kenya due to affordability and wide availability. However, their widespread and mostly unchecked use within the hospital and community environments is most likely to be the cause of the observed resistance patterns.

The drugs that were most sensitive were Chloramphenicol and Amoxyclav with 40 and 37 isolates susceptible, respectively, and only 6 and 8 resistant. This means that the drugs remain fairly effective empirical therapies for bacterial diarrhea in this setting. Nonetheless, caution is warranted, as excessive use without monitoring might hasten resistance development. Ciprofloxacin, a fluoroquinolone, likewise showed moderate efficacy (28 sensitive, 13 resistant, 5 intermediate), indicative of partial retention of activity against enteric pathogens. However, its use in pediatric patients must be limited due to potential adverse effects on cartilage and bone development.

The third-generation cephalosporins: Ceftriaxone, Cefotaxime, and Ceftazidime, had an

identical pattern of resistance and sensitivity with 23 isolates resistant and 23 sensitive (50% resistance rate). The pattern is clinically relevant as these antibiotics are frequently used as second-line or reserve agents in severe paediatric infections (Nayeem *et al*., 2024). The high rate of resistance to these antibiotics can be explained best by the existence of extended-spectrum beta-lactamase (ESBL)-producing *E. coli* strains, which make bacteria resistant to β-lactam antibiotics such as cephalosporins (Abbasi *et al*., 2020; Pinto *et al*., 2014).

Extended-Spectrum Beta-Lactamase (ESBL) Production

The ESBL-producing bacteria were found to be present in 50% of the culture-positive samples. ESBL positivity rate directly correlates with that of third-generation cephalosporins resistance, as seen where all 23 Ceftriaxone, Cefotaxime, and Ceftazidime-resistant strains were ESBL-positive. This implies that β-lactamase enzymes capable of hydrolyzing cephalosporins are prevalent among the isolates (Akpaka *et al*., 2021).

Notably, all the ESBL-positive isolates (100%, 23/23) exhibited multidrug resistance (MDR), while only 56.5% (13/23) of ESBL-negative isolates were MDR. This straightforward correlation between ESBL production and multidrug resistance (Table of regression results) highlights the synergistic role played by β-lactamase mechanisms in promoting cross-resistance to multiple antimicrobial classes. The concomitant coexistence of ESBL genes with resistance determinants for other classes of antibiotics like aminoglycosides, tetracyclines, and fluoroquinolones has been amply documented and is consistent with these results (Tacão *et al*., 2014).

The findings present a significant clinical challenge: infections caused by ESBL-producing organisms significantly restrict treatment options, and often clinicians are left with little choice but to resort to carbapenems or other reserve antibiotics that may not be readily available or affordable in local health facilities (Rodríguez-Baño *et al*., 2018). This has the potential to cause prolonged illness, higher rates of treatment failure, and mortality among children with bacterial diarrhoea in resource-limited settings like Kiandutu.

Multidrug Resistance (MDR) Patterns

Multidrug resistance (MDR) prevalence observed in this study is alarmingly high. Out of the 46 bacterial isolates, 36 (78.3%) were identified as MDR, while only 10 (21.7%) were non-MDR. This means that nearly four out of every five isolates were resistant to one or more than one antibiotic in three or more antimicrobial groups. The very high level of correlation between ESBL positivity and MDR status further compounds the problem; all (100%, 23/23) ESBL-positive isolates were multidrug resistant, while just over half (56.5%, 13/23) of ESBL-negative isolates showed MDR characteristics.

These findings reflect a trend of antimicrobial resistance with disturbing implications, echoing trends reported across sub-Saharan Africa, where absence of antibiotic regulation and limited diagnostic capability fuel the evolution of resistance (Totaro *et al*., 2025). In the Kiandutu population, where over-the-counter accessibility and empirical prescription of antibiotics are common, bacterial pathogens have most likely acquired multiple mechanisms of resistance, including enzymatic degradation, efflux pump activation, and target modification.

The high MDR prevalence is also consistent with the poor efficacy of traditional first-line antibiotics such as Ampicillin and Cotrimoxazole (Chuchu *et al*., 2025). The rate of *E. coli* resistance to both drugs is over 69%, rendering them ineffective for empirical management of childhood diarrheal infections in this setting. The sustained susceptibility to Chloramphenicol and Amoxyclav, though encouraging, could represent a temporary advantage. When these medications are permitted to become new first-line options without stewardship oversight, resistance will develop at an accelerated pace.

Furthermore, the observation that all third-generation cephalosporin-resistant isolates were also MDR is in accord with the postulate that multiple resistance genes are often co-located on the same plasmids (Abbasi, 2020). This genetic linkage facilitates horizontal gene transfer, allowing resistance traits to disseminate quickly within microbial communities (Michaelis & Grohmann, 2023). Such mechanisms show the usefulness of molecular surveillance to detect and monitor resistance genes beyond phenotypic testing.

Resistance to Third-Generation Cephalosporins

Resistance to third-generation cephalosporins-Ceftriaxone, Cefotaxime, and Ceftazidime, was found in exactly 23 isolates (50%). This indicates that half of the *E. coli* strains circulating among children in Kiandutu are resistant to some of the most critical antibiotics in pediatric care. Since cephalosporins are usually reserved for severe or hospital-acquired infections, their resistance in community-acquired diarrhoeal isolates is a sign of a major public health threat (Adesoji *et al*., 2016).

These antibiotics act by inhibiting the synthesis of the bacterial cell wall, but ESBL enzymes produced by resistant bacteria hydrolyze their β-lactam ring, rendering them ineffective (Akpaka *et al*., 2021). The fact that ESBL-positive isolates are present in exactly 50% of samples confirms this mechanism. The ideal

correlation between cephalosporin resistance and ESBL positivity (23 resistant isolates = 23 ESBL-positive isolates) is that β-lactamase production is the dominant mechanism of resistance to these drugs.

The implications are severe. On a daily basis in facilities such as Kiandutu Health Care Centre, the frequent occurrence of cephalosporin resistance reduces therapeutic choices for clinicians (Allwell-Brown *et al*., 2021). With no access to strong antibiotics like carbapenems or piperacillin–tazobactam, treatment failures are likely, with the potential to lead to prolonged illness, dehydration, or death among affected children (Tigoi *et al*., 2025).

Study Limitations

While the results are compelling, some limitations must be mentioned. The sample size (n=175) may have decreased the statistical power of regression analysis to an extent where it became challenging to find significant associations. The cross-sectional nature of the study also does not allow for causality, with seen patterns therefore being correlations and not cause-and-effect relationships. Bacterial causes of diarrhoea alone were examined while viral and parasitic agents, which are also common in this age group, were not assessed.

Laboratory testing was limited to phenotypic resistance testing without any molecular identification of resistance genes. Although ESBL status was determined, specific gene variants such as blaCTX-M, blaTEM, or blaSHV were not identified, which may have provided a deeper insight into resistance mechanisms (Tsobeng *et al*., 2025). Finally, potential recall bias in self-reported data such as sources of water or frequency of symptoms cannot be excluded.

CONCLUSION AND RECOMMENDATIONS

The incidence and patterns of antimicrobial resistance among bacterial pathogens isolated from children under five years with diarrhoeal disease at Kiandutu Health Care Centre, Thika, Kiambu County, was the concern of this research. This was prompted by rising global interest in antimicrobial resistance (AMR), particularly among children, where diarrhoeal disease is a major cause of morbidity and mortality (Dash *et al*., 2025). The study aimed at describing the aetiological bacterial agents, antibiotic resistance patterns, and ESBL-producing strains' presence and investigate potential risk factors for bacterial diarrhoea in children aged less than five years.

The study population comprised of children aged less than five years, with the majority (<12 months) representing 53.9% of the participants. The females consisted of 52.9% of the sample, while the males comprised 47.1%. Most of the children experienced approximately four diarrhoeal stools daily with an average rate of 3.67 (SD 2.09), highlighting the severe clinical effect of diarrhoeal disease in this community. Environmental determinants such as source of drinking water and latrine category were assessed and found piped water to be the most common drinking water source (78.4%) and water-sealed latrines were predominant (95.1%).

Laboratory analysis identified *Escherichia coli* as the most prevalent bacterial pathogen in 45.1% of infections, while 54.9% had no bacterial growth. Antibiotic susceptibility showed substantial variation in patterns of resistance. Ampicillin (80.4%) and Cotrimoxazole (69.6%) were found to be highly resistant, and this is consistent with the limited clinical application of these drugs among this group of patients (Paitan, 2018). Moderate resistance was observed for Tetracycline (47.8%) and third-generation cephalosporins, Ceftriaxone, Cefotaxime, and Ceftazidime, all with 50% resistance. In contrast, Chloramphenicol and Amoxyclav remained the most suitable antibiotics, with sensitivity rates of 87% and 82.2%, respectively, while Ciprofloxacin was of intermediate susceptibility (28.3% resistance, 10.9% intermediate).

Extended-spectrum beta-lactamase (ESBL) screening revealed that 50% of culture-positive isolates were ESBL producers, and all ESBL-positive isolates were found to exhibit multidrug resistance. In all, multidrug resistance was observed in 78.3% of positive isolates, reflecting the extensive spread of resistance and the grave danger it poses to effective therapy in children (Azanaw *et al*., 2024). Logistic regression modeling and chi-square tests indicated that demographic and environmental factors like age, sex, latrine type, and source of drinking water were not statistically significantly associated with bacterial diarrhoea, suggesting community-wide exposure to resistant pathogens.

In conclusion, the study highlights the frequent prevalence of multidrug-resistant and ESBL-producing *E. coli* among children in Kiandutu with high resistance levels to first-line antibiotics commonly employed in clinical use. The findings prove the urgent need for strengthened antimicrobial stewardship, active surveillance, and improved water, sanitation, and hygiene infrastructure in order to avoid paediatric diarrhoeal disease burden and ensure the effectiveness of essential antibiotics in the population.

Conflict of Interest: The authors would love to declare that there was no conflict of interest in the development of this paper.

Author Contribution

Nellyvonne Makena Njeru wrote the original draft, secured funding and managed the project. Dr. Muturi M and Dr. Menza N, critically reviewed and edited the manuscript.

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