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Research Article

One Health assessment of the antibiotic susceptibility patterns of *Escherichia coli* in poultry farms in Yaounde, Cameroon

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ABSTRACT

Antimicrobial resistance (AMR) has become an emerging threat worldwide, and developing countries such as Cameroon with poor hygienic and healthcare systems are considered to be at a greater risk of disseminating the resistant bacteria between the human-animal-environment interface. The aim of this study was to determine the epidemiology of antibiotic-resistant *Escherichia coli* (*E. coli*) strains isolated from some components of One-Health. A total of 162 samples (cloacal swabs = 54, handwash water =54, and vegetables = 54) were collected from poultry birds, poultry workers, and vegetable farms where poultry feces were used as manure, respectively. *E. coli* isolation, identification, and antimicrobial susceptibility testing were performed using culturing, biochemical techniques, and the disk diffusion method, respectively. Significance was set at a 5% P-value. The prevalence of *E. coli* from cloacal swabs, handwash water, and vegetables was 25(46.3%), 14(25.9%), and 10(18.5%), respectively. The prevalence of drug-resistant *E. coli* to Amoxicillin-Clavulanic Acid ($p=0.019$), as well as Levofloxacin ($p=0.001$) and Piperacillin ($p<0.0001$) was significantly different among the three components. Several factors, including the non-adherence to the veterinarian's prescription [OR= 1.14; 95% CI (0.20-6.46); p=0.88], were not associated with the distribution of antibiotic-resistant *E. coli*. The high level and similar patterns of antibiotic susceptibility of *E. coli* isolated in the study area indicate the possibility of strain transmission within the three components. Accurate intervention to curb the spread of antibiotic-resistant *E. coli*, as well as strain genotyping to link this transmission amongst the components of One Health is advocated.

Key words: Poultry farms, One Health, *E. coli*, antimicrobial resistance, Yaoundé.

RESUME

La résistance antimicrobienne (RAM) est devenue une menace émergente à l'échelle mondiale. Les pays en développement comme le Cameroun, dont les systèmes d'hygiène et de santé sont précaires, sont considérés comme présentant un risque accru de dissémination de bactéries résistantes à l'interface homme-animal-environnement. L'objectif de cette étude était de déterminer l'épidémiologie des souches d'*Escherichia coli* résistantes aux antibiotiques, isolées de certains composants d'« Une Santé ». Au total, 162 échantillons (écouvillons cloacaux = 54, eau issue du lavage des mains = 54 et légumes = 54) ont été prélevés respectivement sur des volailles, des ouvriers agricoles et des exploitations maraîchères où les excréments de volaille étaient utilisés comme fumier. L'isolement, l'identification et les tests de sensibilité aux antimicrobiens d'*E. coli* ont été réalisés par culture, par des techniques biochimiques et par la méthode de diffusion sur disque, respectivement. La significativité a été fixée à une valeur p de 5 %. La prévalence d'*E. coli* à partir d'écouvillons cloacaux, d'eau de lavage des mains et de légumes était respectivement de 25 (46,3 %), 14 (25,9 %) et 10 (18,5 %). La prévalence d' *E. coli* résistant aux médicaments tels l'Amoxicilline-Acide Clavulanique (p = 0,019), ainsi qu'à la Lévofloxacine (p = 0,001) et à la Pipéracilline (p < 0,0001) était significativement différente entre les trois composantes. Plusieurs facteurs dont la non-observance de la prescription vétérinaire [OR = 1,14 ; IC à 95

% (0,20-6,46) ; p = 0,88], n'étaient pas associés à la distribution d' *E. coli* résistant aux antibiotiques. Le niveau élevé et les profils similaires de sensibilité aux antibiotiques des *E. coli* isolés dans la zone d'étude indiquent la possibilité d'une transmission de la souche au sein des trois composantes. Une intervention ciblée pour endiguer la propagation des souches d'*E. coli* résistants aux antibiotiques ainsi qu'un génotypage des souches permettant de relier cette transmission aux composantes de l'approche « Une Santé » sont préconisés.

Mots clés : Elevages avicoles, « Une Santé », *E. coli*, résistance aux antimicrobiens, Yaoundé.

1. INTRODUCTION

Antibiotics are humans' greatest weapon used to fight pathogenic bacteria. Despite these valuable benefits, their impact is almost not the same again, as most bacteria, especially *Escherichia coli* (*E. coli*) and other Gram-negative bacteria, have become resistant to some of these antibiotics (Bazerra & Silva 2016). The recent emergence of antimicrobial resistance (AMR) both in the field of human and veterinary medicine has become a significant public health concern worldwide (Ferri *et al.* 2017). AMR is an urgent global threat. It is so devastating that in 2021, AMR led directly to 1.14 million deaths worldwide (IHME 2024). The use of antibiotics in agriculture (both in the rearing of animals and growing of crops) is routinely a major contributor to the clinical problem of resistant disease in human medicine (Kennedy 2013). The continuous use of low-dose antibiotics throughout the lifetime of farm animals has also greatly increased the speed of resistance development by bacteria to drugs. In fact, about 80% of antibiotics made are being used in agriculture (Kennedy 2013). In intensively reared animals such as poultry, where antibiotics are often administered as growth promoters to whole flocks, the antibiotic selection pressure in bacteria is high, resulting in a high concentration of resistant bacteria in their fecal flora (Marshall & Levy 2011). *E. coli* being an essential part of the endogenous microflora, can easily gain resistance against antibiotics that are consumed by poultry birds (Hussain *et al.* 2017).

One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of humans, animals, and the environment in the ecosystem. It is common that these components may share a common problem that is caused by infectious pathogens. As a result, One Health aims at calling for collaborative efforts of multiple disciplines working locally, nationally, and internationally to attain optimal health for people, animals, and the environment as defined by the One Health Initiative Task Force (OHITF) (OHITF 2020). The usage of antibiotics, the presence of antibiotic residues, and the presence of resistant bacteria in the human-animal-environment niches are associated with the One Health Triad due to the interdependence of these pillars in the food chain and the environment. As a result, the transmission of antibiotic-resistant strains of bacteria is almost inevitable among these components (Antunes *et al.* 2020). In humans, antibiotics are mostly used as prophylaxis or to treat bacterial infections, while in food-producing animals, they can be given as prophylaxis, treatment against bacterial infections, or wrongly used as feed additives for growth promotion, usually without prescription (McEwen & Collignon 2020). Furthermore, some antibiotics such as streptomycin, tetracyclines, etc., are used in horticulture as prophylactic treatments or to treat bacterial infections, such as fire blight of pears and apples (Vidaver 2002). Since humans, animals, and the environment are interconnected, it is certain that resistant strains of microbes can be easily transmitted from one component to another. *E. coli*, being one of the most common bacteria in animals, humans, and the environment, its ability to become resistant to antibiotics is well known (Rasheed *et al.* 2014).

In Cameroon, poultry farming activities are gradually increasing, and the sector contributes a market share of 42% of the domestic meat production in the country (Peter *et al.* 2018). Nowadays, the poultry sector accounts for 4% of Cameroon's Gross Domestic Product (GDP) and plays an important role in both food security and employment (Peter *et al.* 2018). With the considerable expansion of poultry farming, farmers are more subjected to use antibiotics at sub-therapeutic doses for infection prevention and growth promotion (Islam *et al.* 2016). This tendency is worsening the scene of AMR by increasing the selection of resistant bacteria (Ayukekbong *et al.* 2017).

Food animals, especially poultry as well as poultry houses, serve as an important reservoir of *E. coli* and thus a potential source of human infection by its pathogenic strain (Stromberg *et al.* 2017). Antimicrobial-resistant *E. coli* can be directly transmitted from poultry to humans, through food, and from poultry to vegetables in farms where poultry feces is used as manure. These resistant bacteria may colonize the human gastrointestinal tract and can also contribute to the transmission of resistance genes to human endogenous microflora. Several studies have reported the spread of antimicrobial-resistant *E. coli* from chickens to humans in various countries (Amir *et al*. 2019). The possibility of transmission of antimicrobial-resistant *E. coli* among humans, animals, and the environment is a crucial threat to public health (Moffo *et al*. 2021). Hence, more focus should be given to the people who are involved in poultry farming to reduce the risk of transmission of AMR. Amazingly, there is a noticeable scarcity of data related to AMR considered in a One Health approach in Cameroon (Matakone *et al*. 2024). Therefore, the aim of this study was to determine the prevalence of *E. coli* isolated from the poultry birds, poultry workers, and vegetable leaves in vegetable farms where poultry feces are used as manure. This study also aimed at determining and comparing the antibiotic susceptibility patterns of *E. coli* isolated from these three components, as well as identifying the risk factors that promote the dissemination of resistant strains of *E. coli* among these components.

2. MATERIALS AND METHODS

2.1. Study Design, Area, and Period

A cross-sectional study was conducted in three commercial poultry farms and three vegetable farms where poultry feces were used as manure. The study took place from February to April 2024 in the Mfoundi division located in the Centre region of Cameroon.

2.2. Sample Collection

A total of 162 samples were included in the study. Cloaca swabs were collected from the poultry birds (n=54), handwash water was collected from the poultry workers after having contact with the birds (n=54), and vegetable leaves were collected from vegetable plants grown with poultry feces from the farms (n=54).

The cloaca swabs were collected using sterile swab sticks and put into 2 ml Brain Heart Infusion (BHI) broth that served as an enrichment medium. To obtain the handwash water samples, the hands of the workers were washed with 50 ml of sterile distilled water and collected into sterile cups and sealed. Lastly, the vegetable leaves on the farms were equally collected into sterile cups following aseptic measures. The samples were directly kept in a cooling box (at 2-8 °C) and transported to the laboratory for immediate analysis, or stored at 2-8 °C if delay was anticipated. However, samples were analyzed within 24 hours after collection.

2.3. Data Collection

A structured questionnaire was used to collect the demographic data of the farmers, flock data, along with data on antibiotic usage and biosecurity measures through face-to-face interviews with the farmers.

2.4. *E. coli* Isolation and Identification

E. coli was isolated and identified based on standard bacteriological procedures. Samples were enriched with 2 ml sterile BHI broth and incubated at 37 ◦C for 24 h. The culture was then streaked onto Eosine Methylene Blue (EMB) agar and incubated at 37 ◦C for 24 h. Four presumptive *E. coli* colonies were then sub-cultured to obtain pure culture, and identification was performed using Gram staining and biochemical tests based on the Analytical Profile Index (API) 20E system (bioMérieux -France), capable of generating unique numerical profiles that correspond to a specific bacterial species. Briefly, 50 µl of the suspension of a pure suspected colony of *E. coli* in a sterile saline solution was transferred into each well of the API 20E using a micropipette. The API test kit was then covered with the cap and incubated at 37°C for 18-24 hours. The kit was read by identifying color changes and comparing them to the API chart. The numerical values obtained based on the chart were combined and used to identify the bacteria species that match the value in the API database. The identification and differentiation of Enterobacteriaceae species is based on the fact that different species have distinct metabolic characteristics, which can be detected through their ability to utilize or produce specific substrates or enzymes.

2.5. Antimicrobial Susceptibility Testing (AST)

Antimicrobial susceptibility of *E. coli* was performed by the disk diffusion test on eight antibiotics belonging to five different classes and including: Penicillin, Cephalosporin, Carbapenem, Fluoroquinolone, and Aminoside. The turbidity of the bacterial suspension was adjusted using the 0.5 McFarland standard, and 150 µl test suspension was inoculated onto Mueller–Hinton agar plates, and the antibiotic disks were placed and incubated at 37 ◦C for 18–24 h. The antibiotics (Liofilchem, Italy) included Piperacillin (PRL, 100 µg), Amoxicillin-Clavulanic acid (AUG, 30 µg), Cefoxitin (FOX, 30 µg), Ceftazidime (CAZ, 10 µg), Cefotaxime (CTX, 5 µg), Ertapenem (ETP, 10 µg), Levofloxacin (LEV, 5 µg), and Amikacin (AK, 30 µg). The results of the AST were interpreted based on the guidelines of the Clinical and Laboratory Standards Institute (CLSI 2018) with some slight modifications. Though CLSI considers interpreting AST results in order of resistant, intermediate, and non-resistant, this study considered only the resistant and non-resistant classifications.

2.6. Statistical Analysis

R programming language version 3.2.3 was used for statistical analysis. Categorical variables such as sex, age, and type of antibiotics used were summarized using counts and percentages, and some were presented using histograms and bar charts. Univariate logistic regression analysis was performed to demonstrate associations using a threshold P-value of 0.05 and a confidence level of 95%.

3. RESULTS

3.1. Demographic, Biosecurity, and Management Practices

This study was carried out in three poultry farms and three vegetable farms, with a total of 162 samples collected: 54 from poultry workers, 54 from poultry birds, and 54 from the vegetables. The ages of the 54 poultry farm workers ranged between 25 to 48 years, with a mean ±SD age of 35.7 ±9.5 years. Twenty-four (46.3%) farm workers had a primary level of education, 38(70.4%) had less than 5 years of working experience, and 49(90.7%) had a flock size of less than or equal to 1000 birds, of which 44(81.5%) were mostly broilers. Moreover, 40(74.1%) of the 54 poultry workers had no knowledge of *E. coli,* and 52(96.3%) of them gave antibiotics to their birds. Also, 30(55.5%) of these poultry workers gave antibiotics for therapeutic purposes, and 45(83.3%) didn't give antibiotics to their birds based on the veterinarian's prescription, although 9(16.7%) of them did follow the veterinarian's prescription (Table 1).

Table 1. Demographic, Biosecurity, and Management Data in Poultry Farms in Yaounde, Cameroon.

Variables	Classification	Number (%) (N=54)
Farmer's Age (years)	25- 40 41- 60	31 (57.4) 23 (42.6)
Level of Education	Primary Secondary Tertiary No Formal Education	25 (46.3) 15 (27.8) 10 (18.5) 4 (7.4)
Farming Experience (years)	≤ 5 > 5	38 (70.4) 16 (29.6)
Flock Size (number of birds)	≤ 500 501 – 1000 > 1000	30 (55.5) 19 (35.2) 5 (9.3)
Type of bird raised	Broilers only Layers only Both layers and broilers	44 (81.5) 6 (11.1) 4 (7.4)
Disposal of Poultry Litter	Compost Incineration Sold out as manure Biogas	4 (7.4) 0 (0) 50 (82.6) 0 (0)
Separation of Sick Birds	Yes No	51 (94.4) 3 (5.6)
Gloves for Poultry Farm Workers to Work with	Yes No	26 (48.1) 28 (51.8)
Movement of People and Vehicles inside the Farm	Restricted Not Restricted	13 (24.1) 41(75.9)
Awareness of *E. coli*	Aware Not Aware	14 (25.9) 40 (74.1)
Use of Antibiotics	Yes No	52 (96.3) 2 (3.7)
Purpose of Antibiotics	Therapeutic Preventive and Therapeutic Growth enhancer	30 (55.5) 23 (42.6) 1 (1.8)
Prescription from Veterinarian	Yes No	9 (16.7) 45(83.3)

N= Total number of poultry workers investigated.

3.2. Prevalence of *E. coli* from the three Sample Sources

The overall *E. coli* prevalence for the 162 samples collected was 49 (30.2%). Cloacal swabs represented 25/54 (46.3%), followed by handwash water with a prevalence of 14/54 (25.9%), and vegetable leaves with 10/54 (18.5%) (Figure 1).

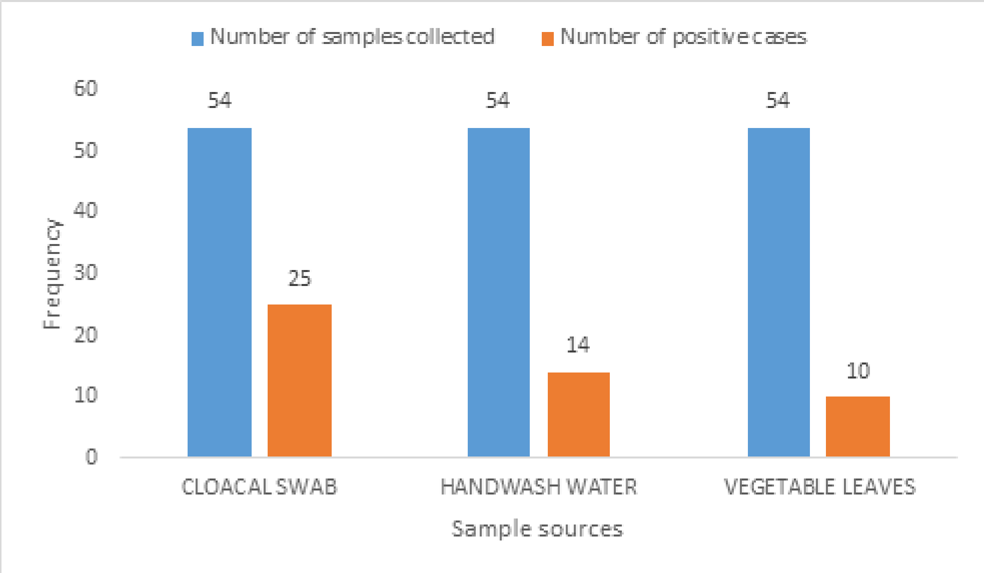

Figure 1. Prevalence of *E. coli* from Three Sample Sources in Poultry Farms in Yaounde, Cameroon.

3.3. Antibiotic Susceptibility and Resistance Profile of *E. coli*

Of the 8 antibiotics used to perform AST on the 49 positive cases, *E. coli* was highly susceptible to Amikacin (AK) with 23 (92%) of the 25 positive cases for the cloacal swab, 10 (74%) of the 14 positive for handwash water and 8(80%) of the 10 positive for vegetable leaves. However, *E. coli* showed high resistance to Amoxicillin-Clavulanic acid with 23/25 (92%) for cloacal swab, 8/14 (57%) for handwash water, and 6/10 (60%) for vegetable leaves. *E. coli* isolated from the cloacal swabs were 100% resistant to Piperacillin (PRL) (Table 2).

Table 2. Antibiotic Susceptibility and Resistance Patterns of *E. coli* from Three Sample Sources in Poultry Farms in Yaounde, Cameroon.

Antibiotics	Cloacal Swab (n=25)		Handwash Water (n=14)		Vegetable Leaves (n=10)	
	Susceptible n(%)	Resistant n(%)	Susceptible n(%)	Resistant n(%)	Susceptible n(%)	Resistant n(%)
Amoxicillin-Clavulanic acid	2(8)	23(92)	6(43)	8(57)	4(40)	6(60)
Amikacin	23(92)	2(8)	10(71)	4(29)	8(80)	2(20)
Ceftazidime	23(92)	2(8)	9(64)	5(36)	8(80)	2(20)
Cefotaxime	21(84)	4(16)	11(79)	3(21)	8(80)	2(20)
Ertapenem	22(88)	3(12)	11(79)	3(21)	7(70)	3(30)
Cefoxitin	22(88)	3(12)	9(64)	5(36)	6(60)	4(40)
Levofloacin	3(12)	22(88)	7(50)	7(50)	7(70)	3(30)
Piperacillin	0(0)	25(100)	8(57)	6(43)	6(60)	4(40)

n = Number of *E. coli* isolates.

3.4. Frequently Used Antibiotics in Poultry Farms

Of the 52/54 (96.3%) poultry farm workers who agreed to use antibiotics in raising their birds, Amoxicillin 48/54 (88.9%) followed by Neomycin 45/54 (83.3%), were the most commonly used. Metronidazole was the least used [5/54 (9.3%)] drug (Figure 2).

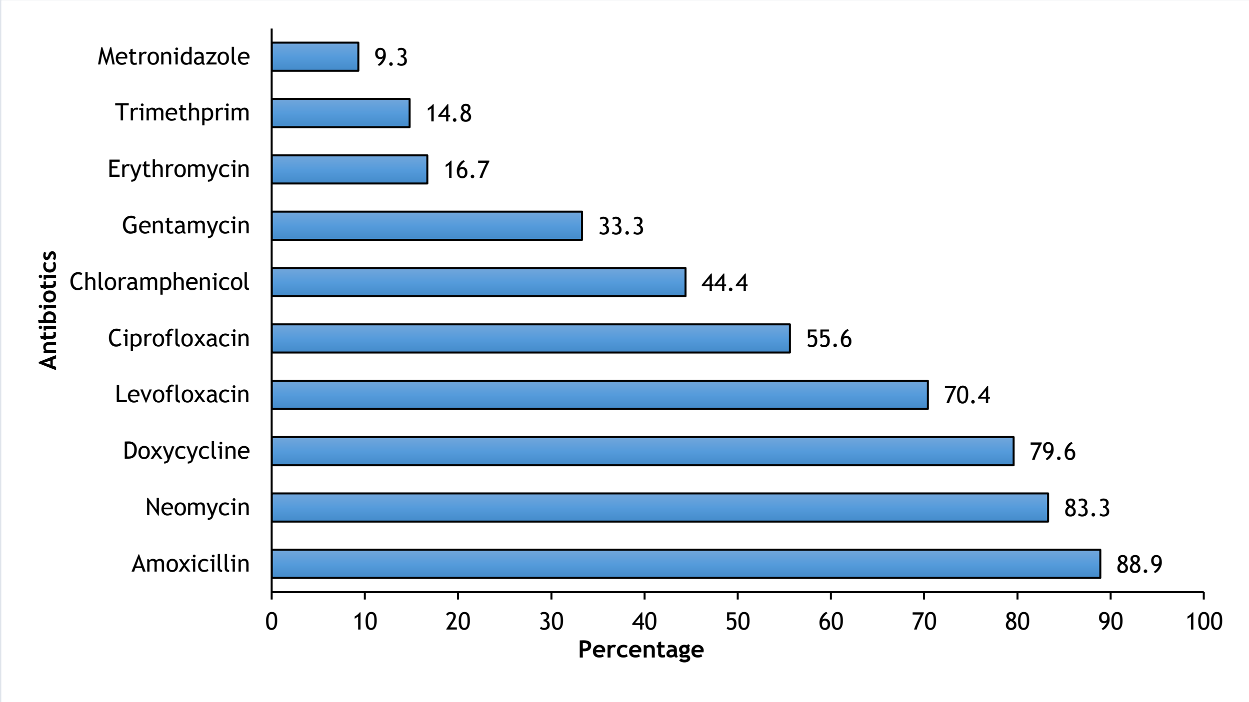

Figure 2. Frequently used antibiotics in poultry farms in Yaounde, Cameroon.

3.5. Comparison of the Antibiotic Susceptibility Patterns of *E. coli* Isolated from the Three Sample Sources

The antibiotic susceptibility patterns of *E. coli* isolated from the three sample sources were analyzed to determine any significant difference between the three components. Amoxicillin-Clavulanic acid (p=0.019), Levofloxacin (p=0.001), and Piperacillin (p<0.0001) showed significant drug resistance between the sample sources (Table 3).

Table 3. Comparison of the Antibiotic Susceptibility Profile of *E. coli* Isolated from Three Different Sample Sources in Poultry Farms in Yaounde, Cameroon.

Antibiotics	Outcome	Cloacal Swab	Handwash Water	Vegetable	P-value
		n(%)	n(%)	n(%)	
Amoxicillin-Clavulanic Acid	Susceptible Resistant	2(8) 23(92)	6(43) 8(57)	4(40) 6(60)	0.019*
Amikacin	Susceptible Resistant	23(92) 2(8)	10(71) 4(29)	8(80) 2(20)	0.231
Ceftazidime	Susceptible Resistant	23(92) 2(8)	9(64) 5(36)	8(80) 2(20)	0.104
Cefotaxime	Susceptible Resistant	21(84) 4(16)	11(79) 3(21)	8(80) 2(20)	0.894
Ertapenem	Susceptible Resistant	22(88) 3(12)	11(79) 3(21)	7(70) 3(30)	0.387
Cefoxitin	Susceptible Resistant	22(88) 3(12)	9(64) 5(36)	6(60) 4(40)	0.100
Levofloxacin	Susceptible Resistant	3(12) 22(88)	7(50) 7(50)	7(70) 3(30)	0.001*
Piperacillin	Susceptible Resistant	0(0) 25(100)	8(57) 6(43)	6(60) 4(40)	<0.0001*

*Significance at 5% level, logistic regression test.

3.6 Risk Factors Promoting the Distribution of Drug-Resistant *E. coli*

Several risks factors such as movement of people and vehicles inside the farm [OR=0.81; 95% CI (0.18-3.63); p= 0.78] as well as purpose of antibiotics use [OR=0.66; 95% CI (0.17-2.58); p=0.55) or non -adherence to veterinarian's prescription [OR= 1.14; 95% CI (0.20-6.46); p=0.88] were not associated with the distribution of drug resistant *E. coli* in the study area (Table 4).

Table 4. Risk Factors Promoting the Distribution of Drug-Resistant *E. coli* Strains in Poultry Farms in Yaounde, Cameroon

Variables	Category	Number of workers	Number of Workers positive to drug-resistant *E. coli* (%)	Odds Ratio (95% Confidence Interval)	P-value
Farming Experience (years)	≤ 5	38	7(18.42)	1	Reference
	> 5	16	4(25.00)	0.68(0.17-2.74)	0.59
Flock Size	≤ 2000	49	11(22.45)	1	Reference
	> 2000	5	0(0.00)	-	0.24
Gloves for Poultry Farm workers to work with.	Yes	26	5(19.23)	1	Reference
	No	28	6(21.43)	0.87(0.23-3.30)	0.84
Movement of People and Vehicles inside the Farm	Restricted	41	8(19.51)	1	Reference
	Not Restricted	13	3(23.08)	0.81(0.18-3.63)	0.78
Use of antibiotics	Yes	52	11(21.15)	1	Reference
	No	2	0(0.00)	-	0.47
Purpose of Antibiotics Use	Treatment	24	4(16.67)	1	Reference
	Others	30	7(23.33)	0.66(0.17-2.58)	0.55
Follow Veterinarian's Prescription	Yes	9	2(22.22)	1	Reference
	No	45	9(20.00)	1.14(0.20-6.46)	0.88

4. DISCUSSION

The participants included in this study were mostly adults aged between 25 and 40. The majority had a primary level of education and less than 5 years of experience in breeding. Moreover, it can be noticed that the majority of participants sold poultry litter as manure, which fortifies the One Health concern with the bacterial flora of chicken. Almost all participants were using antibiotics, and most of them were practicing self-medication. These latter characteristics are proven risk factors for antibiotic resistance (Ayukekbong *et al*. 2017).

The overall prevalence of *E. coli* was 30.2%, which is lower than a recent study carried out in Bangladesh (Mandal *et al*. 2022). This could be related to the variation of geographical contexts with different microbiological patterns influenced by several environmental conditions. Among the three sample sources, the highest prevalence was observed in cloaca swabs (46.3%), which is actually lower than a study carried out in Cameroon (Moffo *et al*. 2022) but higher than a similar study carried out in India (Hussain *et al*.2017). Handwash water followed with a prevalence of 25.9%, and lastly, vegetable leaves had an *E. coli* prevalence of 18.5%. These results are lower compared to a study carried out in Bangladesh (Mandal *et al*. 2022). Knowing the variation in bacterial patterns depending on geographical areas, these differences could be ascribed to sample collection techniques, bacterial identification methods, sampling equipment, and the season when the research was carried out.

We used 8 antibiotics from 5 different classes to perform the susceptibility tests. It is worth noting that some of the antibiotics used in this study (Levofloxacin, Ceftazidime, and Cefotaxime) are classified as highly important antibiotics by the WHO (WHO 2017). The highest resistance was seen in Amoxicillin-clavulanic acid with 92% for cloacal swab, 57% for handwash water, and 60% for vegetable leaves. This could be due to the high prevalence of *E. coli* in the cloaca swabs and the fact that Amoxicillin was the most frequently given antibiotic to poultry birds. *E. coli* isolated from the cloacal swabs demonstrated a 100% resistance to Piperacillin (PRL). These resistant patterns are comparable to a study carried out by Bashar *et al*. (2011). Again, *E. coli* from the three different sample sources was highly susceptible to Amikacin (AK), with 92% for cloacal swab, 74% for handwash water, and 80% for vegetable leaves. This data is similar to a study carried out by Talukdar *et al*. (2013). The antimicrobial susceptibility patterns of *E. coli* were compared among the three sample sources included in this study. Amoxicillin-clavulanic acid, Levofloxacin, and Piperacillin showed significantly different antibiotic susceptibility patterns. Hence, the similarities shown by the others indicate a possible inter-sectoral transmission of drug-resistant *E. coli* among the three different sample sources. The transmission of drug-resistant *E. coli* across the human and animal interface in Yaounde, Cameroon, was recently proven genetically (Matakone 2024).

Inferential statistics revealed that none of the studied factors significantly influenced the distribution of resistant isolates of *E. coli*. This may be due to the complex interactions between humans, animals, and the environment, which made it difficult to identify the risk factors that promote resistant *E. coli* strain dissemination. This result is nevertheless similar to a study carried out earlier (Fletcher 2015). Conversely, Moffo *et al*. (2021) identified experience in poultry farming as a determinant of drug-resistant *E. coli*. This may be attributed to the relatively lower sample size in our study, which reduces the precision of estimates.

5. CONCLUSION

The overall prevalence of *E. coli* in poultry farms in Yaounde, Cameroon, was 30.2%, and the highest prevalence amongst the three sample sources was observed in cloacal swabs. The isolated *E. coli* was susceptible to Amikacin and Ceftazidime, while highly resistant to Amoxicillin-clavulanic acid and Piperacillin. The data obtained could be useful in formulating accurate interventions to curb the spread of antibiotic-resistant *E. coli* in the study area. Moreover, strain genotyping to link the transmission amongst the components of One Health will be insightful.

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CONFLICTS OF INTEREST: The authors declare that they have no conflicts of interest to disclose.

ETHICS APPROVAL: No animal experimentation was done in this study. However, cloacal swabs were collected very softly to avoid any discomfort or cause any injury to the broiler chickens.

INFORMED CONSENT: All subjects provided written informed consent for inclusion before they participated in the study and for permission to publish this report. Also, participants' confidentiality was observed.

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AUTHORS' CONTRIBUTION: Conceptualization (Pokam Thumamo B., Amambua Collins H.), Methodology (Pokam Thumamo B., Amambua Collins H.), Software (Pokam Thumamo B., Amambua Collins H.), Validation (Pokam Thumamo B., Amambua Collins H.), Formal Analysis (Pokam Thumamo B., Amambua Collins H.), Investigation (Pokam Thumamo B., Amambua Collins H., Guemdjom Wabo Prisca), Ressources (Pokam Thumamo B., Amambua Collins H.), Data curation (Pokam Thumamo B., Amambua Collins H., Guemdjom Wabo Prisca, Cedric Seugnou Nana, Cecile Ingrid Djuikoue); Writing the original draft (Pokam Thumamo B., Amambua Collins H., Guemdjom Wabo Prisca, Cedric Seugnou Nana, Cecile Ingrid Djuikoue), Review and Editing (Pokam Thumamo B., Amambua Collins H., Guemdjom Wabo Prisca, Cedric Seugnou Nana, Cecile Ingrid Djuikoue); Visualization (Pokam Thumamo B., Guemdjom Wabo Prisca, Cecile Ingrid Djuikoue), Supervision (Pokam Thumamo B., Guemdjom Wabo Prisca,); Project administration (Pokam Thumamo B., Guemdjom Wabo Prisca, Cecile Ingrid Djuikoue) and final approval of the version of the article to be published (Pokam Thumamo B., Amambua Collins H., Guemdjom Wabo Prisca, Cedric Seugnou Nana, Cecile Ingrid Djuikoue).

DATA AVAILABILITY STATEMENT: The datasets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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