Occurrence of *Escherichia coli* and Antimicrobial Resistance Associated with Antibiotic Use Practices in Poultry Farms in Gwagwalada, Abuja, Nigeria

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ABSTRACT

This study investigated the occurrence of *Escherichia coli* and antimicrobial resistance in relation to antibiotic use practices among poultry farmers in Gwagwalada Area Council, Abuja, Nigeria. A cross-sectional study design was employed. Fifty structured questionnaires were administered to small-scale poultry farmers to assess antibiotic use practices, while ninety cloacal swab samples were collected from poultry for the isolation and identification of *E. coli*. Antimicrobial susceptibility testing of the isolates was carried out using the Kirby–Bauer disc diffusion method. Most respondents were male (60%) and had tertiary education (90%), although 52% were engaged in occupations outside poultry farming. Broilers were the predominant poultry type reared (70%), and most farmers practiced intensive management systems (90%). Antibiotics were mainly administered through drinking water (83.3%), with cotrimoxazole (78.6%) and Augmentin (84.7%) being the most frequently used, while ciprofloxacin was the least used (10%). Although 80% of farmers were aware of the risks associated with indiscriminate antibiotic use, 30% did not observe recommended withdrawal periods before slaughter. *Escherichia coli* was isolated from 61 out of 90 cloacal swab samples, giving an overall prevalence of 67.7%. High resistance rates were observed among the isolates to cotrimoxazole (85%) and Augmentin (43%), while moderate resistance was recorded for amoxicillin, gentamicin, and streptomycin (25%). The isolates showed high susceptibility to ciprofloxacin (100%) and intermediate to sparfloxacin and ofloxacin. The findings indicate inappropriate antibiotic use practices among poultry farmers and confirm poultry production systems in the study area as potential reservoirs of antimicrobial-resistant *E. coli* isolates, posing significant public health concerns.

Keywords: Antibiotic use; antimicrobial resistance; poultry farming; *Escherichia coli*; public health

Introduction

Antibiotics have played a critical role in improving animal health and productivity by enabling effective treatment and control of bacterial infections in livestock production systems. In poultry production, antimicrobials are commonly used for therapeutic, prophylactic, and, in some settings, growth-promoting purposes. However, the widespread and often indiscriminate use of antibiotics in food-producing animals has contributed significantly to the global emergence and spread of antimicrobial resistance (AMR), which poses a serious threat to both animal and public health (World Health Organization, 2021; Manyi-Loh *et al*., 2018).

Antimicrobial resistance occurs when microorganisms survive or proliferate despite exposure to antimicrobial agents that were previously effective against them. The development of AMR is driven largely by selective pressure resulting from inappropriate or excessive antimicrobial use. Globally, antimicrobial resistance has been recognized as one of the most pressing public health challenges, leading to increased morbidity, mortality, and healthcare costs due to treatment failures and prolonged infections (WHO, 2021). Notably, a substantial proportion of antimicrobials produced worldwide are used in animal agriculture rather than in human medicine, with poultry production accounting for a significant share of this usage (Manyi-Loh *et al*., 2018).

In developing countries, including Nigeria, poultry farming represents an important source of animal protein and income for households. Small-scale poultry production systems are particularly common and are often characterized by limited biosecurity, inadequate veterinary oversight, and unrestricted access to antimicrobial drugs. These conditions promote the misuse of antibiotics and increase the risk of selecting and disseminating antimicrobial-resistant bacteria within poultry populations and the surrounding environment. Resistant bacteria originating from poultry may be transmitted to humans through direct contact, contaminated food products, or environmental pathways, thereby constituting a significant One Health challenge that links animal, human, and environmental health (Wall *et al*., 2016; WHO, 2021).

Escherichia coli is a commensal bacterium commonly found in the intestinal tract of humans and animals but is also an important indicator organism for monitoring antimicrobial resistance. Certain strains of *E. coli* are pathogenic and are responsible for colibacillosis in poultry, a disease associated with significant economic losses due to mortality, reduced productivity, and increased treatment costs (Pamar, 2007; Wibisono *et al*., 2020; Dziva & Stevens, 2008). The frequent exposure of *E. coli* to antimicrobial agents in poultry production systems facilitates the emergence of resistant strains, which may serve as reservoirs of resistance determinants transferable to other pathogenic bacteria (Hedman *et al.,* 2020).

Several studies conducted in Nigeria and other low-resource settings have reported varying levels of antimicrobial-resistant *Escherichia coli* in poultry, highlighting the growing challenge of antimicrobial resistance in animal agriculture (Eze *et al*., 2013; Ejeh *et al*., 2017; Hedman *et al*., 2020; Kariuki *et al*., 2023). However, there remains limited location-specific data linking poultry farmers' antibiotic use practices with resistance patterns in bacterial isolates, particularly in small-scale poultry production systems within the Federal

Capital Territory of Nigeria. Despite the growing importance of poultry production in the Federal Capital Territory, few studies have simultaneously examined poultry farmers' antimicrobial use practices and antimicrobial resistance profiles of bacterial isolates in Gwagwalada Area Council, creating an important evidence gap for local AMR surveillance and stewardship interventions.

Therefore, this study investigated the occurrence and antimicrobial susceptibility patterns of *Escherichia coli* isolated from poultry and assessed antibiotic use practices among poultry farmers in Gwagwalada Area Council, Abuja, Nigeria. Specifically, the study assessed poultry farmers' knowledge and practices regarding antibiotic use and determined the prevalence and antimicrobial susceptibility profiles of *E. coli* isolated from poultry. The findings are expected to provide evidence for antimicrobial stewardship programmes, strengthen AMR surveillance efforts, and support policy interventions aimed at reducing the emergence and spread of antimicrobial-resistant bacteria within poultry production systems in Nigeria.

Materials and Methods

Study Area

The study was conducted in Gwagwalada Area Council, one of the six Area Councils of the Federal Capital Territory (FCT), Abuja, Nigeria. Gwagwalada is located between latitudes 8°25′N and 9°20′N and longitudes 6°39′E and 7°06′E. The area is characterized by fertile agricultural land and supports numerous small-scale poultry farms. The climate is tropical, with temperatures ranging from 25°C to 35°C and seasonal rainfall patterns that favour agricultural and poultry production. According to the 2006 National Population Census, Gwagwalada has a population of approximately 157,770 people and is administratively divided into ten wards (Figure 1; NGPDR, 2020).

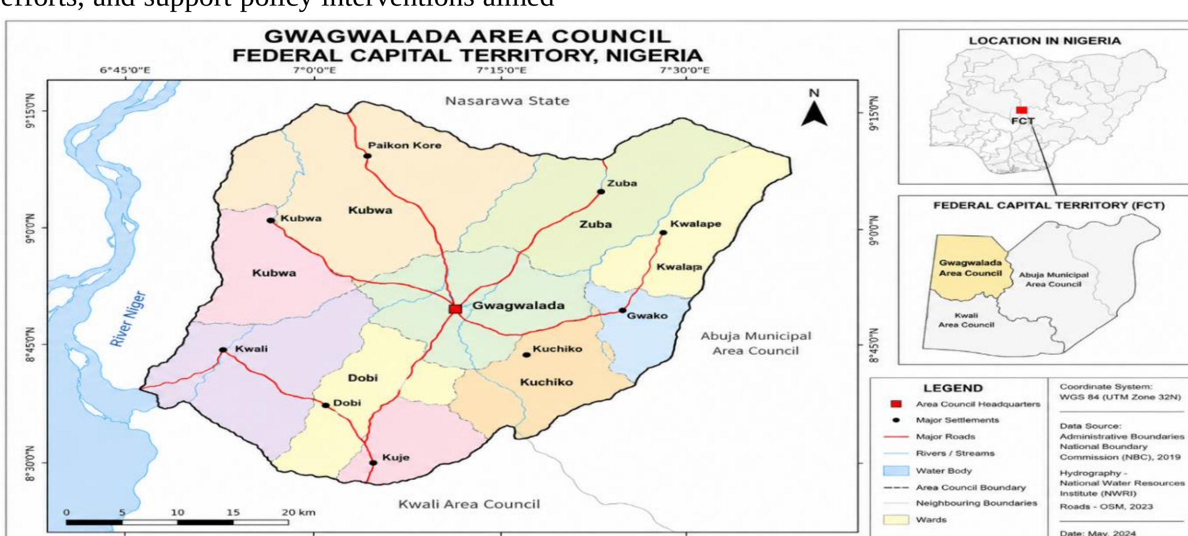


Figure 1: Map of Gwagwalada indicating the poultry farms

Study Design

A cross-sectional study was conducted between June and September 2021 to assess poultry farmers' antibiotic-use practices and to determine the occurrence and antimicrobial susceptibility patterns of *Escherichia coli* isolated from poultry. The study combined a questionnaire-based survey of poultry farmers with laboratory analysis of cloacal swab samples collected from poultry birds. Two wards, Gwagwalada Central and Kutunku, were purposively selected because of the high concentration of small-scale poultry farms and their proximity to the major poultry market in Gwagwalada. Poultry farmers within the selected wards were recruited using a multistage sampling approach.

Sample Size Determination for the Questionnaire and Cloacal Swab Sample

The minimum sample size for the questionnaire survey was estimated using the Raosoft online sample size calculator, assuming a 95% confidence level, 5% margin of error, 50% expected prevalence, and an estimated population of 100 small-scale poultry farmers. Although the calculated sample size was larger, a total of 50 poultry farmers were included in the study because of logistical and financial constraints encountered during field data collection. For the bacteriological component, 90 cloacal swab samples were collected from poultry birds to determine the occurrence and antimicrobial susceptibility profiles of *E. coli* isolates in line with previous poultry AMR studies in Nigeria (Ejeh *et al.,* 2017; Oluwasile *et al.,* 2014).

Study Population and sampling procedure

The study population comprised two categories: (i) small-scale poultry farmers operating within Gwagwalada Area Council, Federal Capital Territory (FCT), Nigeria, and (ii) apparently healthy poultry birds presented for slaughter at selected poultry slaughter points within the study area.

Selection of Poultry Farmers

A cross-sectional survey design was employed to collect information from poultry farmers. Fifty (50) small-scale poultry farmers were recruited using a convenience sampling technique. This non-probability sampling method was adopted because there was no comprehensive sampling frame of registered small-scale poultry farmers in the study area, and farmers who were readily accessible and willing to participate during the study period were included. Convenience sampling is considered appropriate for exploratory epidemiological studies where accessibility and participant availability are major considerations (Etikan, Musa, & Alkassim, 2016). Eligible participants were poultry farmers who had actively managed a poultry enterprise for at least six months before the commencement of the study and were aged 18 years or older. Farmers who declined participation or were unavailable during the study period were excluded. Participation was entirely voluntary. The objectives of the study were explained to each respondent in English or the local language where necessary, and oral informed consent was obtained before administering the questionnaire. Confidentiality and anonymity of respondents were maintained throughout the study.

Questionnaire Development and Administration

A structured questionnaire was developed after reviewing relevant literature on antimicrobial use, poultry production practices, and antimicrobial resistance surveillance in poultry production systems (WHO, 2017; FAO, 2019; OIE, 2021). The questionnaire consisted mainly of closed-ended questions with a few open-ended questions to obtain additional information where necessary. The questionnaire was divided into five sections:

1. Socio-demographic characteristics of respondents (age, sex, educational level, farming experience, and flock size);
2. Poultry production and management practices;
3. Antibiotic usage practices, including sources of antibiotics, indications for use, frequency of administration, dosage determination, and withdrawal period compliance;
4. Biosecurity and disease prevention measures; and
5. Knowledge and awareness of antimicrobial resistance and antibiotic stewardship.

To ensure content validity, the questionnaire was reviewed independently by experts in veterinary public health, epidemiology, microbiology, and rural sociology. Their recommendations were incorporated into the final version. Prior to the main survey, the questionnaire was pretested among ten poultry farmers in a neighboring Area Council who were not included in the final study. The pretest evaluated clarity, relevance, sequencing of questions, and average completion time. Ambiguous and repetitive questions were revised accordingly to improve reliability and ease of administration. The questionnaires were administered through face-to-face interviews by the researcher and trained research assistants to minimize non-response and ensure accurate interpretation of questions.

Sampling of Poultry Birds

For the microbiological investigation, ninety (90) cloacal swab samples were collected from apparently healthy broiler and layer chickens presented for slaughter at selected poultry slaughter points within Gwagwalada Area Council. Birds were selected using convenience sampling based on availability at the slaughter points during each sampling visit. Only apparently healthy birds without visible clinical signs of disease were sampled to evaluate the carriage of *Escherichia coli* among healthy poultry entering the food chain. Each bird constituted one sampling unit. Sterile cotton-tipped swabs were gently inserted approximately 2–3 cm into the cloaca and rotated several times to obtain sufficient faecal material. Immediately after collection, each swab was placed into a sterile tube containing Amies transport medium and labelled with a unique identification code indicating the sampling location, bird type (broiler or layer), and sample number. Samples were maintained in an insulated cool box containing ice packs (4–8°C) during transportation and delivered to the microbiology laboratory within 4–6 hours of collection. Where immediate processing was not possible, samples were refrigerated at 4°C and processed within 24 hours to preserve bacterial viability. Strict aseptic procedures were observed throughout sample collection to prevent cross-contamination. Sterile gloves were changed between sampling locations, and sterile swabs were used for each bird. All laboratory procedures were conducted in accordance with standard microbiological methods for the isolation and characterization of *Escherichia coli* (ISO 16649-2:2001; CLSI, 2024).

Isolation and Identification of *Escherichia coli*

Cloacal swab samples were aseptically collected and transported to the laboratory for bacteriological examination. Each sample was inoculated onto MacConkey agar and incubated aerobically at 37°C for 24 hours. Lactose-ferwasing colonies showing characteristic pink coloration were subcultured onto Eosin Methylene Blue (EMB) agar and incubated at 37°C for 24 hours. Colonies exhibiting a characteristic green metallic sheen on EMB agar were presumptively identified as *E. coli*. Presumptive isolates were further subjected to Gram staining and standard biochemical tests, including indole production, methyl red, Voges–Proskauer, citrate utilization, triple sugar iron (TSI) agar reaction, and carbohydrate fermentation tests following standard microbiological procedures (Cappuccino and Sherman, 2010).

Antimicrobial Susceptibility Testing

Antimicrobial susceptibility testing of confirmed *E. coli* isolates was performed using the Kirby–Bauer disc diffusion method on Mueller–Hinton agar following the guidelines of the Clinical and Laboratory Standards Institute (CLSI, 2021).

The antimicrobial agents tested were Cotrimoxazole (30 µg), Chloramphenicol (30 µg), Sparfloxacin (30 µg), Ciprofloxacin (30 µg), Amoxicillin (30 µg), Augmentin (30 µg), Gentamicin (30 µg), Pefloxacin (30 µg), Ofloxacin (30 µg), and Sreptomycin (30 µg). Bacterial suspensions were adjusted to a turbidity equivalent to a 0.5 McFarland standard before inoculation onto Mueller–Hinton agar plates. Following application of antibiotic discs, the plates were incubated aerobically at 37°C for 16–18 hours. Zones of inhibition were measured in millimetres and interpreted as susceptible, intermediate, or resistant according to CLSI (2021) breakpoints.

Data analysis

Data obtained from the questionnaire survey and laboratory analyses were entered into Microsoft Excel and analysed using the Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics, including frequencies and percentages, were used to summarize the data. Pearson's Chi-square (χ^2) test was used to assess associations between categorical variables. Statistical significance was set at $p < 0.05$. Missing responses were excluded from the analysis.

Results

Socio-demographic Characteristics of Poultry Farmers

The socio-demographic characteristics of the poultry farmers are presented in Table 1. Out of the 50 respondents surveyed, 60% were male while 40% were female. The majority (90%) had attained tertiary education, whereas only 10% had secondary education. More than half of the respondents (54%) had between 5 and 10 years of poultry farming experience, while 30% had less than 5 years of experience and 16% had more than 10 years of experience. Intensive poultry production was the predominant husbandry system practiced by the farmers (90%), whereas only 4% and 6% practiced semi-intensive and extensive systems, respectively.

Table 1: Socio-demographic characteristics of small-scale poultry farmers in Gwagwalada Area Council, Abuja, Nigeria.

Variables	Frequency (n)	Percentage (%)
Sex		
Male	30	60.0
Female	20	40.0
Educational Level		
No formal education	0	0.0
Primary education	0	0.0
Secondary education	5	10.0
Tertiary education	45	90.0
Poultry Farming Experience		
< 5 years	15	30.0
5–10 years	27	54.0
> 10 years	8	16.0
Husbandry System		
Intensive	45	90.0
Semi-intensive	2	4.0
Extensive	3	6.0

n = 50 respondents. Values are presented as frequency (n) and percentage (%).

Antibiotic Use Practices among Poultry Farmers

All respondents (100%) reported using one or more antibiotics in their poultry farms. The major reasons for antibiotic use were disease control (35%), treatment (30%), disease prevention (20%), growth promotion (10%), and environmental sanitation (5%) (Table 2).

Table 2: Reasons for antibiotic use among poultry farmers in Gwagwalada Area Council.

Reason for Use	Percentage (%)
Disease control	35
Treatment	30
Disease prevention	20
Growth promotion	10
Environmental sanitation	5
Total	**100**

n = 50 respondents. Values represent the percentage distribution of reported reasons for antibiotic use.

Antibiotics were predominantly administered through drinking water (83.3%). The antibiotics used varied considerably and were marketed under different trade names. The frequency of antibiotic use among poultry farmers is presented in Figure 2. Augmentin was the most frequently used antibiotic, reported by 84.7% of respondents, followed by Cotrimoxazole (78.6%) and Tetracycline (56.0%). Streptomycin and Gentamicin were used by 45.0% and 35.0% of farmers, respectively. Lower levels of use were reported for Erythromycin (25.0%), Levofloxacin (10.0%), and Ciprofloxacin (10.0%), while Chloramphenicol was the least utilized antibiotic (5.0%). The predominance of Augmentin, Cotrimoxazole, and Tetracycline suggests extensive reliance on broad-spectrum antimicrobials for disease prevention and treatment in poultry production systems within the study area (Figure 2). Furthermore, most respondents (80%) were aware of the risks associated with indiscriminate antibiotic use. However, 30% reported that they did not observe the recommended withdrawal period before slaughter.

Table 3: Frequency of Antibiotics Used by Poultry Farmers in Gwagwalada Area Council, Abuja, Nigeria

Antibiotic	Percentage of Farmers Using Antibiotic (%)
Augmentin	84.7
Cotrimoxazole	78.6
Tetracycline	56.0
Streptomycin	45.0
Gentamicin	35.0
Erythromycin	25.0
Levofloxacin	10.0
Ciprofloxacin	10.0
Chloramphenicol	5.0

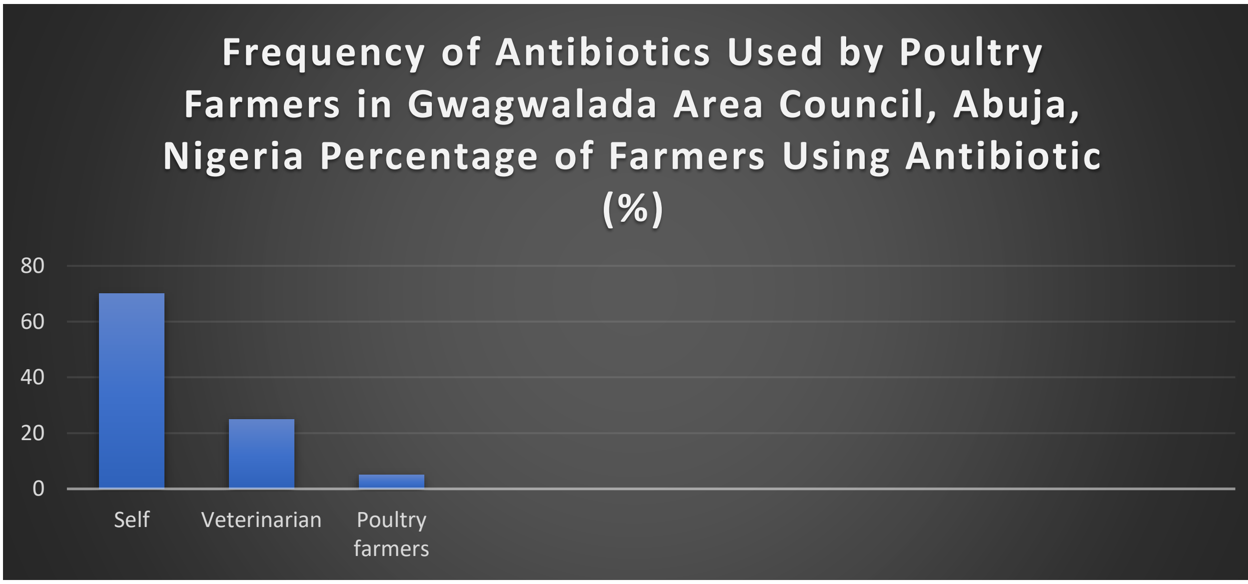


Figure 2. Frequency of antibiotics used by poultry farmers in Gwagwalada Area Council, Abuja, Nigeria. The X-axis represents the antibiotic types, while the Y-axis represents the percentage of respondents reporting the use of each antibiotic.

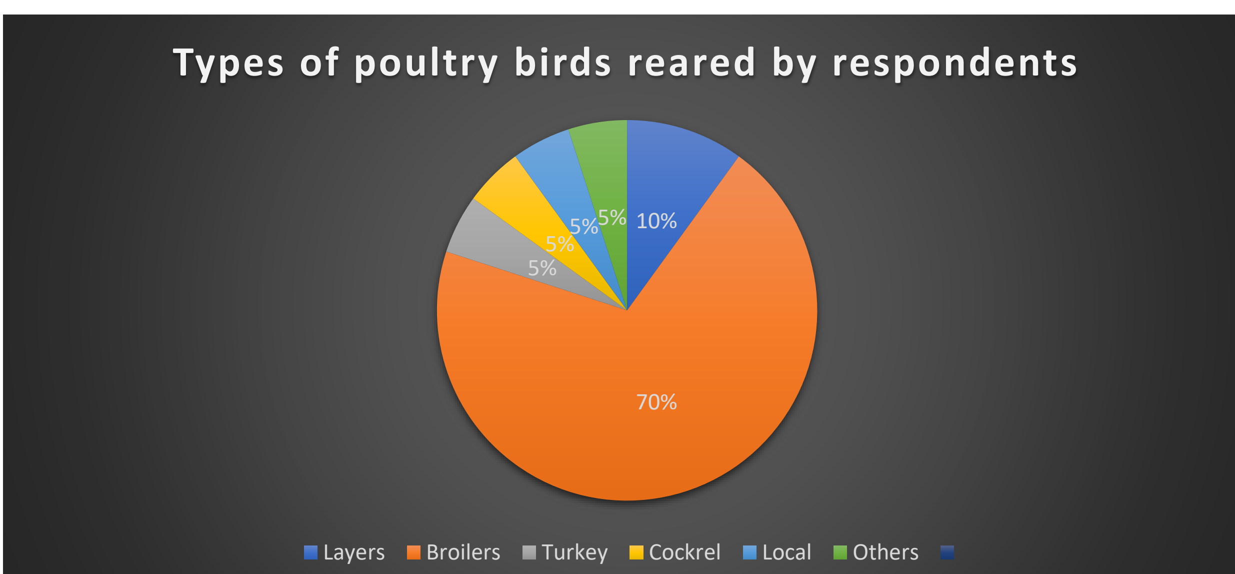


Figure 3 shows the types of poultry birds reared by respondents. This graphs shows that of the poultry reared were boilers chicken, Layers accounted for 10% of the poultry birds raised, while turkeys, cockerels, local chickens, and other poultry species each constituted 5% of the respondents' enterprises.

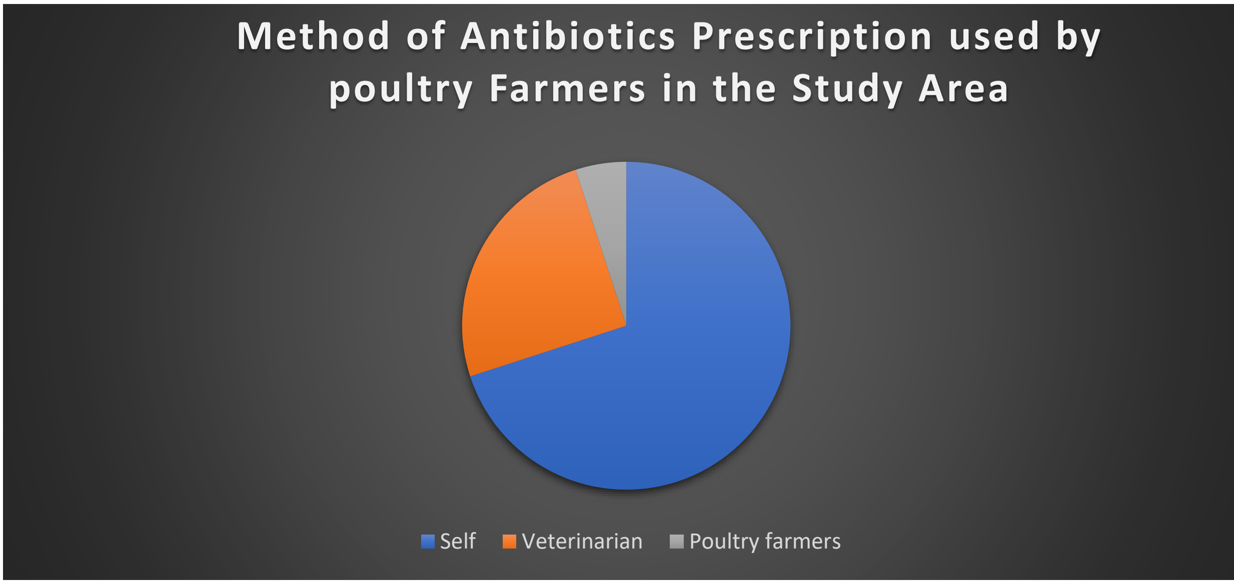


Figure 4 shows the sources of antibiotic prescription among poultry farmers. 70% of the respondents reported self-prescribing antibiotics for their poultry without professional consultation. Only 25% obtained antibiotic prescriptions from veterinarians, while 5% relied on advice from fellow poultry farmers.

Biosecurity Practices Adopted by Poultry Farmers

The biosecurity measures adopted by poultry farmers are presented in Figure 5. Regular vaccination against endemic poultry diseases was the most implemented biosecurity practice, reported by 78% of respondents, while 22% did not routinely vaccinate their birds. Traffic control within and around the farm premises was practiced by 69% of farmers, whereas 31% reported no traffic control measures. Farm fencing was observed in 67% of the farms, while 33% were not fenced. The use of protective clothing by farmers and farm workers was reported by 55% of respondents, whereas 45% did not use protective clothing. Protective netting around poultry houses was present in 45% of farms but absent in 55%. Quarantine of newly introduced birds was practiced by only 32% of farmers, with 68% reporting no quarantine procedures. Similarly, adoption of an all-in, all-out replacement system was low, with only 35% of respondents implementing the practice and 65% not adopting it.

Table 4: Biosecurity Practices Adopted by Poultry Farmers in the Study Area

Biosecurity Measure	**Yes (%)**	**No (%)**
Regular vaccination	78	22
Traffic control within the farm	69	31
Farm fenced	67	33
Use of protective clothing	55	45
Protective netting around poultry houses	45	55
All-in-all-out replacement system	35	65
Quarantine of newly introduced birds	32	68

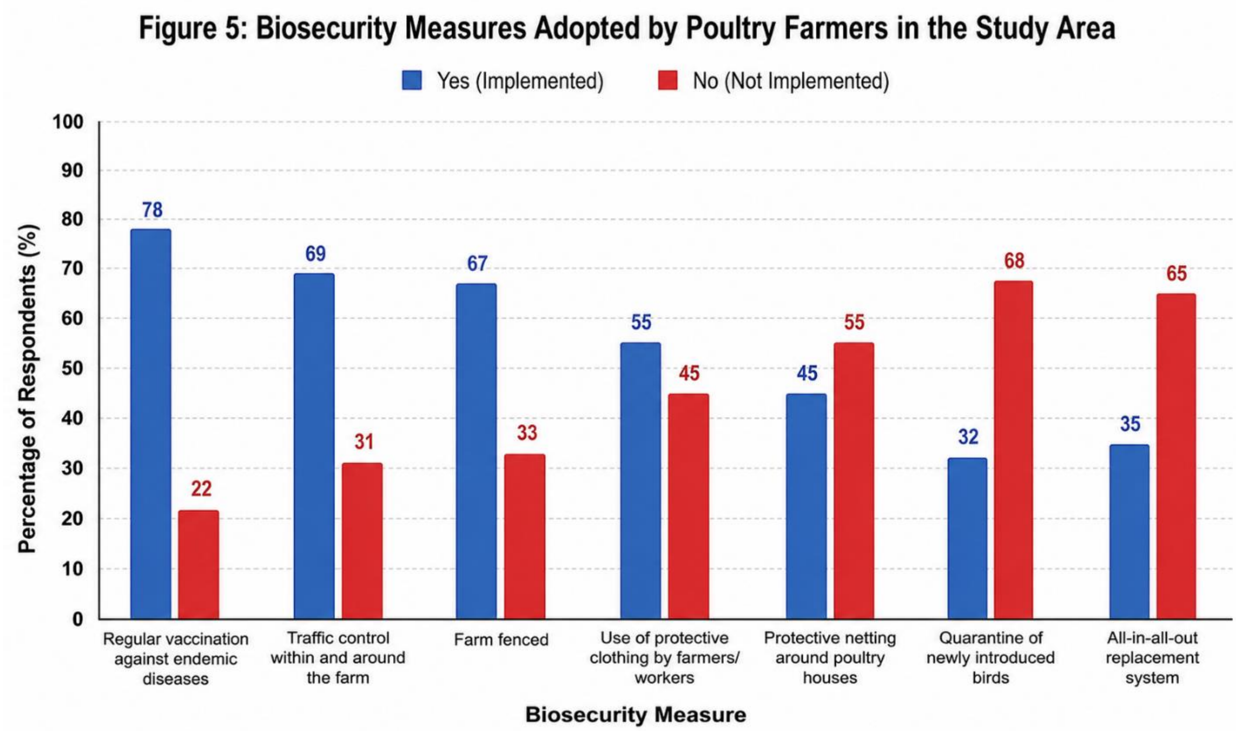


Figure 5. Biosecurity measures adopted by poultry farmers in Gwagwalada Area Council, Abuja, Nigeria. The chart presents the percentages of respondents who reported implementing (Yes) or not implementing (No) selected biosecurity practices, including farm fencing, traffic control, protective netting, use of protective clothing, regular vaccination, quarantine of newly introduced birds, and adoption of an all-in, all-out replacement system.

Occurrence of *Escherichia coli* in Poultry Cloacal Swabs

A total of 90 cloacal swab samples were analyzed for the presence of *Escherichia coli*. Overall, 61 samples were positive, giving an occurrence of 67.7%. The occurrence of *E. coli* was 64.4% (29/45) in Gwagwalada Central ward and 71.1% (32/45) in Kutunku ward. Although a higher occurrence was observed in Kutunku ward, Pearson's Chi-square analysis showed that the difference was not statistically significant ($\chi^2 = 0.458$, $p = 0.499$) (Table 5).

Antimicrobial Susceptibility Patterns of *Escherichia coli* Isolates

The antimicrobial susceptibility profiles of the *Escherichia coli* isolates are presented in Figure 6. High levels of resistance were observed against Cotrimoxazole (85%) and Augmentin (43%). Moderate resistance was recorded against Amoxicillin, Gentamicin, and Streptomycin, each at 25%. The isolates showed moderate susceptibility to Sparfloxacin and Ofloxacin (Tarivid), with 50% classified as susceptible to each antimicrobial. Ciprofloxacin demonstrated the highest antimicrobial activity, with all *E. coli* isolates (100%) being susceptible (Table 6).

Table 5: Occurrence of *Escherichia coli* in poultry cloacal swab samples from Gwagwalada Central and Kutunku wards.

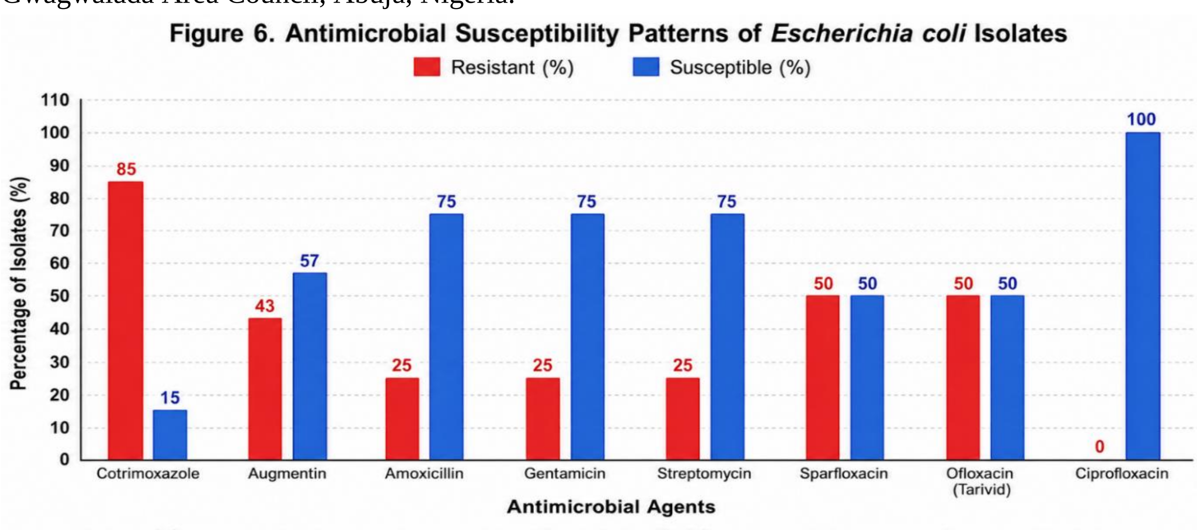
Ward	Total Samples Analyzed	Positive Samples	Occurrence (%)	χ^2	p-value
Gwagwalada Central	45	29	64.4		
Kutunku	45	32	71.1	0.458	0.499
Total	**90**	**61**	**67.7**		

χ^2 = Pearson Chi-square statistic; $p > 0.05$ indicates no statistically significant difference between wards.

Table 6: Antimicrobial Susceptibility Patterns of *Escherichia coli* Isolates

Antimicrobial Agent	Resistant (%)	Susceptible (%)
Cotrimoxazole	85	15
Augmentin	43	57
Amoxicillin	25	75
Gentamicin	25	75
Streptomycin	25	75
Sparfloxacin	50	50
Ofloxacin (Tarivid)	50	50
Ciprofloxacin	0	100

Figure 6. Antimicrobial susceptibility patterns of *Escherichia coli* isolates recovered from poultry in Gwagwalada Area Council, Abuja, Nigeria.



Discussion

This study investigated antibiotic use practices among poultry farmers, biosecurity measures, the occurrence of *Escherichia coli*, and antimicrobial susceptibility patterns of *E. coli* isolates recovered from poultry in Gwagwalada Area Council, Abuja, Nigeria.

The socio-demographic characteristics of the respondents revealed that most poultry farmers possessed tertiary education and practiced intensive poultry production. The high level of formal education observed among respondents may facilitate access to information on poultry health management and disease prevention. However, despite the relatively high educational status of the farmers, widespread antibiotic use was observed across farms. Similar observations have been reported among poultry farmers in Nigeria and other low- and middle-income countries, where educational attainment does not necessarily translate into prudent antimicrobial use practices due to easy access to veterinary drugs and limited professional veterinary supervision (Adebowale *et al*., 2016; Kariuki *et al*., 2023).

The findings demonstrated extensive use of antimicrobial agents among poultry farmers, with Augmentin, Cotrimoxazole, and Tetracycline being the most frequently used antibiotics. Antibiotics were primarily administered for disease control, therapeutic purposes, and disease prevention. These findings are consistent with previous studies conducted in Nigeria, which reported widespread and often indiscriminate use of antibiotics in poultry production systems (Oluwasile *et al*., 2014; Adebowale *et al*., 2016). Frequent antimicrobial use in poultry production may create selective pressure that favors the emergence and persistence of resistant bacterial strains, thereby contributing to the growing burden of antimicrobial resistance (Manyi-Loh *et al*., 2018).

Although a considerable proportion of respondents reported awareness of the risks associated with indiscriminate antibiotic use, some farmers did not observe recommended withdrawal periods before slaughter. Failure to comply with withdrawal periods may result in antimicrobial residues in poultry products and increase the risk of human exposure to antimicrobial-resistant bacteria through the food chain (Wall *et al*., 2016). Similar concerns have been documented in poultry production systems across sub-Saharan Africa, where unrestricted access to antibiotics and self-prescription practices remain common (Kariuki *et al*., 2023; Ngunguni *et al*., 2024).

The assessment of farm biosecurity practices revealed moderate adoption of some important biosecurity measures. Most farms reported routine vaccination, traffic control, and farm fencing. However, substantial gaps were observed in quarantine practices, use of protective netting, and adoption of all-in, all-out replacement systems. These deficiencies may facilitate pathogen introduction and transmission within poultry populations, thereby increasing reliance on antimicrobial agents for disease management. Similar biosecurity shortcomings have been reported among small-scale poultry farms in Nigeria and other African countries and have been associated with increased disease occurrence and antimicrobial use (Adebowale *et al*., 2016; Hedman *et al*., 2020).

The overall occurrence of *Escherichia coli* in cloacal swab samples was 67.7%, indicating widespread carriage of the organism among poultry birds in the study area. This finding is comparable to reports from previous studies conducted in poultry populations in Nigeria and elsewhere, which documented high isolation rates of *E. coli* from apparently healthy birds (Eze *et al*., 2013; Ejeh *et al*., 2017; Stella *et al*., 2016). The occurrence of *E. coli* was slightly higher in Kutunku ward (71.1%) than in Gwagwalada Central ward (64.4%). However, the difference was not statistically significant ($\chi^2 = 0.458$, $p = 0.499$), suggesting that poultry farms in both wards may be exposed to similar environmental, management, and husbandry-related factors that favor colonization by *E. coli*.

The widespread occurrence of *E. coli* is important because, although many strains are commensal, pathogenic strains can cause avian colibacillosis, one of the most important bacterial diseases affecting poultry worldwide. Colibacillosis is associated with mortality, reduced productivity, carcass condemnation, and increased treatment costs, resulting in substantial economic losses to poultry producers (Dziva & Stevens, 2008).

Antimicrobial susceptibility testing revealed high levels of resistance among *E. coli* isolates, particularly against Cotrimoxazole (85%) and Augmentin (43%). Moderate resistance was observed against Amoxicillin, Gentamicin, and Streptomycin. These findings are consistent with reports from Nigeria and other low-resource settings, where resistance to commonly used antimicrobials among poultry-associated *E. coli* isolates has become increasingly prevalent (Ejeh *et al*., 2017; Hedman *et al*., 2020). The high resistance observed against frequently used antibiotics may reflect prolonged exposure of bacterial populations to these drugs, resulting in the selection and maintenance of resistant strains within poultry production systems.

In contrast, Ciprofloxacin demonstrated complete efficacy against all isolates, with 100% susceptibility recorded. Similarly, Sparfloxacin and Ofloxacin exhibited comparatively favorable susceptibility profiles. The high susceptibility observed among fluoroquinolones may be attributable to their relatively lower use among poultry farmers in the study area. Nevertheless, prudent use of these antimicrobials remains essential to preserve their effectiveness and prevent the emergence of resistance. Previous studies have shown that increasing use of critically important antimicrobials in animal production can rapidly compromise their effectiveness in both veterinary and human medicine (Manyi-Loh *et al*., 2018; World Health Organization, 2021).

From a One Health perspective, the occurrence of antimicrobial-resistant *E. coli* in poultry represents a potential public health concern. Resistant bacteria and resistance genes may spread from poultry to humans through direct contact, contaminated poultry products, or environmental pathways. Therefore, strengthening antimicrobial stewardship, improving veterinary oversight, enhancing farm biosecurity, and promoting farmer education are critical interventions for reducing antimicrobial resistance within poultry production systems and protecting animal, human, and environmental health.

Conclusion

This study demonstrated a high occurrence (67.7%) of *Escherichia coli* among poultry birds sampled in Gwagwalada Area Council, Abuja, Nigeria. The findings also revealed widespread use of antimicrobial agents among poultry farmers, particularly Augmentin, Cotrimoxazole, and Tetracycline, mainly for disease control, treatment, and preventive purposes.

The antimicrobial susceptibility profiles showed high resistance to Cotrimoxazole and Augmentin, while Ciprofloxacin remained highly effective against all *E. coli* isolates tested. The observed resistance patterns may be associated with the frequent use of commonly available antibiotics in poultry production systems.

Although some biosecurity measures were implemented by poultry farmers, important gaps remained in quarantine practices, protective netting, and all-in, all-out management systems. These shortcomings may contribute to increased disease transmission and dependence on antimicrobial agents.

The findings highlight the need for strengthened antimicrobial stewardship programmes, improved veterinary supervision, enforcement of regulations governing antimicrobial use, and continuous farmer education on prudent antibiotic use and withdrawal periods. Enhancing farm-level biosecurity and promoting responsible antimicrobial use are essential strategies for mitigating antimicrobial resistance and safeguarding animal, human, and environmental health within a One Health framework.

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