Prevalence And Antimicrobial Susceptibility Profile Of Pathogenic Bacteria Isolated From Poultry Farms In Umuahia, Abia State, Nigeria.

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Abstract- This study investigated the prevalence of pathogenic bacteria from poultry farms in Umuahia, Abia state and the antimicrobial susceptibility profile of the isolates using the disk diffusion method. A total of 92 isolates (comprising 32 Escherichia coli, 9 Klebsiella spp, 26 Salmonella spp, 13 Shigella spp and 12 Staphylococcus spp) were obtained. The isolates were completely (100%) resistant to Ceftazidime, Cefuroxime, Cefixime, Cotrimoxazole, Erythromycin, Streptomycin and Tetracycline but 48.9% were susceptible to Gentamicin, 67.5% to Ofloxacin, 9.8% to Augmentin, 68.8% to Nitrofurantoin, 68.8% to Ciprofloxacin, 16.7% to Cloxacillin and 33.3% to Chloramphenicol. Out of the 32 Escherichia coli isolates, 53.1% were susceptible to Gentamicin, 71.9% to Ofloxacin, 75.0% to Nitrofurantoin and 68.8% to Ciprofloxacin. Out of the 9 Klebsiella spp isolates, 22.2% were susceptible to Gentamicin, 33.3% to Ofloxacin, 33.3% to ciprofloxacin and 44.5% to Nitrofurantoin. Out of the 26 Salmonella spp isolates, 50.0% showed susceptibility to Gentamicin, 76.9% to Ofloxacin, 76.9% to ciprofloxacin and 73.1% to Nitrofurantoin. Out of the 13 Shigella spp isolates, 30.8% were susceptible to Gentamicin, 69.2% to Ofloxacin, 76.9% to ciprofloxacin and 76.9% to Nitrofurantoin. Out of the 12 Staphylococcus spp isolates, 83.3% were susceptible to Gentamicin, 75.0% to Augmentin, 16.7% to Cloxacillin and 33.3% to Chloramphenicol. The high rate of antimicrobial resistance of bacterial isolates from different poultry farms to some of the antibiotics used have major implications for human and animal health with adverse economic implications. The study therefore recommends that proper information should be made available to poultry farmers and poultry feeds producers on dangers of antibiotic resistant strains, judicious use of antibiotics by farmers, veterinarians and physicians, biosecurity plan and use of regulations to control poultry litter disposal.

Index Terms- Antibiotic, Pathogenic Bacteria, Poultry, Resistance, Susceptibility.

I. INTRODUCTION

During the past years, worldwide increase in the use of antibiotics as a necessary part of the poultry and livestock production industry to treat and prevent infectious bacterial diseases and as growth promoters at sub therapeutic levels in feeds has led to the problem of the development of bacterial antibiotic resistance (Apata, 2009). It has been shown in recent scientific evidence that resistance to antibiotics is not only caused by the natural ability of a tiny fraction of the bacteria with unusual traits to survive antibiotic' s attack, enabling resistant strains to multiply, but also stems from the transmissibility of acquired resistance to their progeny and across to other unrelated bacteria species through extra chromosomal DNA fragment called the plasmid which provide a slew of different resistances (Gould, 2008). The emergence and continuous spread of resistant bacterial strains like *Campylobacter* spp, *Escherichia coli*, *Salmonella* spp, *Shigella* spp, *Staphylococcus* spp from poultry products to consumers endangers humans with new strains of bacteria that resist antibiotic treatment. Resistant bacteria interfere with their mode of action of some antibiotics through a range of effectors' mechanisms, including, alteration in the configuration of cell wall, modification of membrane carrier systems and synthesis of inactivating enzymes or ribosome. These mechanisms are spectacular to the type of resistance developed. Due to the growing global concerns that animals can transmit resistance bacteria to humans, there is an increase in public and governmental interest in phasing out inappropriate

antibiotic use in animal husbandry. Improvement in the hygienic practice of handling raw animal products and adequate heat treatment to eliminate the possibility of antibiotic resistant bacteria surviving may play a role in preventing the spread.

Increasing antibiotic surveillance capacity to counter the spread of emerging resistances and on the alternative approach to sub-therapeutic antibiotics in poultry, especially the use of probiotic microorganisms that can positively influence poultry health and produce safe edible products should be given more attention. Since the introduction of these antimicrobial agents in human and veterinary medicine, acquired resistances against frequently used antibiotics have been observed (Smith, 1999). A major factor in emergence, selection and dissemination of antibiotic resistant microorganisms in both veterinary and human medicine is the use of antibiotics (Tollefson and Flynn, 2002). The has been many reports in the past years about the rise in antibiotics resistance but antibiotic resistance still remains a global problem till date. Antibiotics are administered for therapeutic purpose in intensively reared food animals, and as Antimicrobial growth promoters (AMGPs) to the whole flock rather than individuals (Van der Bogaard and Stobberingh, 1999). Resistance to antibiotics can occur naturally for a particular organism/drug combination or acquired resistance, where misuse of antimicrobials results in a population being exposed to an environment in which organisms that have genes conferring resistance (either spontaneously mutated or through DNA transfer from other resistant cells) have been able to flourish and spread. Hence, there is high antibiotic selection pressure for resistance in bacteria in poultry and consequently their fecal flora contains a relatively high proportion of resistant bacteria (Van der Bogaard and Stobberingh, 1999). Resistant strains from the poultry gut easily contaminate poultry carcasses and when consumed, they alter or affect human endogenous flora (Van der Bogaard and Stobberingh, 2001). Gene transfer occurs majorly *in vivo* between gastrointestinal tract bacteria of humans and pathogenic bacteria, as identical resistant genes are present in diverse bacterial species from different hosts (Scott, 2002). With respect to this, there is high probability that most pathogenic bacteria that threaten human health may soon be resistant to all known antibiotics (Scott, 2002).Certain antibiotics however are critical to human infections caused by multidrug resistant pathogens, or because alternative therapies are less effective or are associated with side effects (Akond *et al*,2008) It is very much important to determine the effectiveness of antimicrobial agents against specific pathogens-either human or animal source for proper therapy (Prescott *et al*,2005). The increase development of resistance to antimicrobial drugs is a serious problem worldwide, which is a menace to the ability to treat infections in animals and humans (Adeleke and Omafuvbe, 2011). More so, the use of antimicrobials in agriculture especially as growth promoters, chemotherapeutic and prophylactic agents in food animals' bacteria are of public health implication (Heuer and Smalla, 2007; Witte, 1998) which centers around problems related to prescribing inappropriate antibiotic treatment in cases of infection. The objectives of this research are to assess the prevalence of antimicrobial resistant bacteria in some poultry farms in Umuahia and to determine the antimicrobial susceptibility profile of the isolates.

II. MATERIALS AND METHODS

Five (5) poultry farms in Umuahia, Abia state, Nigeria were visited and a total of 50 samples were collected, which includes 30 faecal samples, 20 drinking water samples. A quantity of faecal sample was aseptically collected and transferred into a sterile universal sample container. The drinking water samples were collected aseptically using the sterile universal sample container. The samples were collected in batches and a total of 10 samples which includes 6 fecal samples and 4 drinking water samples were collected in each of the poultry farms visited. The samples were taken to the laboratory upon collection for inoculation on the appropriate medium.

The culture media used were Nutrient agar, *Salmonella Shigella* agar and MacConkey agar. The culture media were prepared according to the manufacturer' s instructions. The required amount of culture media was weighed and dissolved in appropriate volume of distilled water in a conical flask. Dissolved media was autoclaved at 121°C for 15 minutes (but the *Salmonella Shigella* agar was boiled to 100°C with frequent agitation). The culture media were allowed to cool to about 45°C before aseptically dispensed into sterile Petri dishes and allowed to solidify.

III. CULTURING ON AGAR MEDIA AND IDENTIFICATION OF BACTERIAL ISOLATES

After collections of samples, 1g of the faecal sample was inoculated into peptone broth for primary enrichment, and then incubated at 24 hours at 37°C

For the drinking water sample, 1ml was inoculated into peptone broth for primary enrichment, and then incubated for 24 hours at 37°C. Using a sterile wire loop, a loopful of sample from the peptone water broth containing the samples, was streaked on the different media used. The culture plates were incubated for 24 hours at 37°C. After the initial reading of the primary plates, isolates were sub cultured to obtain pure colonies (single colony growth). From these pure cultures, appropriate

microbiological procedures for identification of the isolates were carried out. Pure colonies of all the isolates were identified using colony morphology on agar plates, Gram staining and Biochemical tests.

IV. GRAM STAINING

A colony of each of the organism was emulsified in a drop of sterile distilled water on a glass slide using a wire loop sterilized by flaming. The emulsions were allowed to air dry completely, and then fixed by passing over the Bunsen burner flame three times. The slides were placed on a staining rack, and then flooded with crystal violet. The Stain was allowed to stay 30-60 seconds, after which the stain was washed off with clean water. Lugol' s iodine solution was added and allowed to stay for a minute, then washed off with water. The slides were decolorized for five seconds with acid-alcohol solution, and then washed off with water. The slides were finally counterstained with safranin solution for 2 minutes and also washed off with water. These slides were air dried and viewed microscopically using 100 x objective (oil immersion) and the Gram' s reaction of the organisms was recorded. The method used was that described by Cheesbrough (2006)

V. BIOCHEMICAL TESTS

CATALASE TEST- Using a small sterile applicator stick, several colonies of the test organism was immersed in 2ml of freshly prepared 3% H_2O_2 solution in a test tube. Immediate bubbling indicates a positive test and no bubbling indicates a negative test.

METHYL RED TEST- MR-VP broth was prepared by mixing one (1) g of peptone water powder and one (1) g of K_2HPO_4 with 200ml of distilled water. This mixture was dispensed into 5ml volume bijou bottles and sterilized. After sterilization, 0.25ml of glucose solution sterilized by steaming was added into each of the bijou bottles. The test organisms were then inoculated into the various bottles and appropriately labeled. The bottles were incubated for five days. After incubation, five drops of methyl red were added to the bottles for methyl red test. A positive test was indicated by appearance of red color. Negative test was indicated by a yellow coloration of the media.

VOGES- PROSKAUER TEST – MR-VP broth was prepared by mixing one (1) g of peptone water powder and one (1) g of K_2HPO_4 with 200ml of distilled water. This mixture was dispensed into 5ml volume bijou bottles and sterilized. After sterilization, 0.25ml of glucose solution sterilized by steaming was added into each of the bijou bottles. The test organisms were then inoculated into the various bottles and appropriately labeled. The bottles were incubated for five days. After incubation, 1ml of the MR-VP broth with test organisms was transferred to sterile test tubes. Fifteen (15) drops of VP reagent A was added to the test tubes followed by 5 drops of VP reagent B. A positive test was indicated by appearance of pink-red color. Negative test was indicated by a light-yellow coloration of the media.

INDOLE TEST- was performed on the bacterial isolates to determine the ability of the organisms to convert tryptophan into the indole. The test organism was inoculated into a bijou bottle containing 3ml of sterile peptone water and incubated at 35-37°C for 48 hours. Indole was tested by adding 0.5ml of Kovac' s reagent and examined for a ring of red color in the surface layer within 10 minutes. A ring of red layer indicates positive test. Absence of a ring of red layer indicates a negative test.

CITRATE UTILIZATION TEST- was used to detect the ability of an organism to use citrate as its sole source of carbon and energy. Slopes of Simmons citrate agar were prepared in bijou bottles as recommended by manufacturer. Using a sterile wire loop, the slope was first streaked with a saline suspension of the organism and then the butt was stabbed and incubated at 35°C for 48 hours. A bright blue color is a positive test.

VI. ANTIMICROBIAL SUSCEPTIBILITY TESTING

Bacterial isolates were tested for antibiotics susceptibility by the Kirby Bauer disc agar diffusion technique. Muller Hinton agar plates were prepared as recommended by the manufacturer. A suspension of the isolates was prepared by picking the colonies with the aid of a sterile wire loop and mixing with normal saline in sterile bijou bottles and this was matched with the turbidity of 0.5 McFarland standard. Sterile swab sticks were dipped into the suspension and spread evenly onto the surface of the Muller Hinton agar plates. The antibiotics discs were aseptically placed on the surface of the Muller Hinton agar plates with the aid of a sterile forceps. Plates were incubated at 35°C for 16-18 hours. The antibiotics used were Gram negative and Gram-positive disk from Abtek Biologicals, UK Ltd containing ceftazidime (30µg/mL), cefuroxime (30µg/mL), gentamicin (10µg/mL), cefixime (5µg/mL), ofloxacin (5µg/mL), augumentin (30µg/mL), nitrofurantoin (300µg/mL), ciprofloxacin

(5µg/mL), cotrimoxazole (25µg/mL), cloxacillin (5µg/mL), erythromycin (5µg/mL), streptomycin (10µg/mL), tetracycline (10µg/mL) and chloramphenicol (10µg/mL).

VII. RESULTS

In this study, a total of 92 bacterial isolates were obtained from the faecal and drinking water samples of poultry farms in Umuahia (Table 1). These include *E. coli* (32), *Klebsiella* spp (9), *Salmonella* spp. (26), *Shigella* spp (13) and *Staphylococcus* spp (12) (Table 2). Out of the 92 bacterial isolates, 61 were obtained from the faecal samples (Table 3) and 31 were obtained from the drinking water samples (Table 4). The antimicrobial susceptibility patterns of the isolates are presented in table five and six. Out of the 32 *Escherichia coli* isolates, 53.1% showed susceptibility to Gentamicin, 71.9% to Ofloxacin, 75.0% to Nitrofurantoin and 68.8% to Ciprofloxacin (Table 5). 22.2% of *Klebsiella* spp were susceptible to Gentamicin, 33.3% to Ofloxacin, 33.3% to ciprofloxacin and 44.5% to Nitrofurantoin (Table 5). The rate of *Salmonella* spp. susceptibility to the tested antimicrobial agents was as follows: 50.0% were susceptible to Gentamicin, 76.9% to Ofloxacin, 76.9% to ciprofloxacin, and 73.1% to Nitrofurantoin (Table 5). 30.8% of *Shigella* spp were susceptible to Gentamicin, 69.2% to Ofloxacin, 76.9% to ciprofloxacin and 76.9% to Nitrofurantoin (Table 5). 83.3% of *Staphylococcus* spp were susceptible to Gentamicin, 75.0% to Augmentin, 16.7% to Cloxacillin and 33.3% to Chloramphenicol (Table 5).

There was a high rate of multidrug resistance (resistance to three or more antimicrobials agents) among the isolates. All the 92 isolates showed complete resistance to seven antimicrobial agents namely Ceftazidime, Cefuroxime, Cefixime, Cotrimoxazole, Erythromycin, Streptomycin and Tetracycline (Table 6). Overall, 48.9% of the isolates were susceptible to Gentamicin, 67.5% to Ofloxacin, 9.8% to Augmentin, 68.8% to Nitrofurantoin, 68.8% to Ciprofloxacin, 16.7% to Cloxacillin and 33.3% to Chloramphenicol (Table 7).

TABLE 1: NUMBER, PERCENTAGE AND SOURCE OF ISOLATED ORGANISMS.

SAMPLE TYPE	P 1	P 2	P 3	P 4	P 5	TOTAL
FS	14	12	9	13	13	61 (66.3%)
DWS	7	5	6	6	7	31 (33.7%)
TOTAL	21	17	15	19	20	92

FS (faecal sample): DWS (drinking water sample); P (poultry)

P 1 (Precious poultry farm)

P 2 (Iwuchukwu poultry farm) P 3 (MOUAU poultry farm 1) P 4 (Cecelia poultry farm)
P 5 (MOUAU poultry farm 2).

TABLE 2: NUMBER AND PERCENTAGE PREVALENCE OF DIFFERENT ISOLATED ORGANISMS.

ISOLATES	P 1	P 2	P 3	P 4	P 5	TOTAL
E coli	7	5	5	8	7	32 (34.8%)
Staphylococcus spp	2	3	1	2	4	12(13.0%)
Shigella spp	2	3	2	3	3	13 (14.1%)
Salmonella spp	6	4	5	5	6	26 (28.3%)
Klebsiella spp	4	2	2	1	-	9 (9.8%)
TOTAL	21	17	15	19	20	92

P (poultry)

P 1 (Precious poultry farm)

P 2 (Iwuchukwu poultry farm) P 3 (MOUAU poultry farm 1) P 4 (Cecelia poultry farm)
P 5 (MOUAU poultry farm 2)

TABLE 3: PREVALENCE OF DIFFERENT ISOLATED ORGANISMS FROM FAECAL SAMPLES.

ISOLATES	P 1	P 2	P 3	P 4	P 5	TOTAL
E coli	5	3	2	5	4	19 (31.2%)
Staphylococcus spp	-	1	-	-	2	3 (4.9%)
Shigella spp	2	3	2	3	3	13 (21.3%)
Salmonella spp	4	3	3	4	4	18 (29.5%)
Klebsiella spp	3	2	2	1	-	8 (13.1%)
TOTAL	14	12	9	13	13	61

P (poultry)

P 1 (Precious poultry farm)

P 2 (Iwuchukwu poultry farm) P 3 (MOUAU poultry farm 1) P 4 (Cecelia poultry farm)
P 5 (MOUAU poultry farm 2).

TABLE 4: PREVALENCE OF DIFFERENT ISOLATED ORGANISMS FROM DRINKING WATER SAMPLE.

ISOLATES	P 1	P 2	P 3	P 4	P 5	TOTAL
E coli	2	2	3	3	3	13 (41.9%)
Staphylococcus spp	2	2	1	2	2	9 (29.0%)
Shigella spp	-	-	-	-	-	-
Salmonella spp	2	1	2	1	2	8 (25.6%)
Klebsiella spp	1	-	-	-	-	1 (3.2%)
TOTAL	7	5	6	6	7	31

P (poultry)

P 1 (Precious poultry farm)

P 2 (Iwuchukwu poultry farm) P 3 (MOUAU poultry farm 1) P 4 (Cecelia poultry farm)
P 5 (MOUAU poultry farm 2).

TABLE 5: SENSITIVITY PATTERN OF ISOLATED ORGANISMS

ISOLATES					**ANTIBIOTICS**									
	CAZ	CRX	GEN	CXM	OFL	AUG	NIT	CPR	COT	CXC	ERY	STR	TET	CHL
E.coli (32)	0 (0)	0(0)	17 (53.1%)	0(0)	23 (71.9%)	0(0)	24(75%)	22(68.8%)	NA	NA	NA	NA	NA	NA
Staphylococcus spp (12)	NA	NA	10(83.3%)	NA	NA	9(75%)	NA	NA	0(0)	2(16.7%)	0(0)	0(0)	0(0)	4(33.3%)
Shigella spp (13)	0(0)	0(0)	4(30.8%)	0(0)	9(69.2%)	0(0)	10(76.9%)	10(76.9%)	NA	NA	NA	NA	NA	NA
Salmonella spp (26)	0(0)	0(0)	13(50%)	0(0)	20(76.9%)	0(0)	19(73.1%)	20(76.9%)	NA	NA	NA	NA	NA	NA
Klebsiella spp (9)	0(0)	0(0)	2(22.2%)	0(0)	3(33.3%)	0(0)	4(44.4%)	3(33.3%)	NA	NA	NA	NA	NA	NA

CAZ-ceftazidime, CRX-cefuroxime, GEN-gentamicin, CXM-cefixime, OFL-ofloxacin, AUG-augmentin, NIT-nitrofurantoin, CPR- ciprofloxacin, COT-cotrimoxazole, CXC-cloxacillin, ERY-erythromycin, STR-streptomycin, TET-tetracycline, CHL-chloramphenicol and NA – Not applied.

TABLE 6: RESISTANCE PATTERN OF ISOLATED ORGANISMS

ISOLATES				**ANTIBIOTICS**										
	CAZ	CRX	GEN	CXM	OFL	AUG	NIT	CPR	COT	CXC	ERY	STR	TET	CHL
E.coli (32)	32 (100%)	32 (100%)	15 (46.9%)	32 (100%)	9 (28.1%)	32 (100%)	8 (25%)	10 (31.2%)	NA	NA	NA	NA	NA	NA
Staphylococcus spp (12)	NA	NA	2 (16.7%)	NA	NA	3 (25%)	NA	NA	12 (100%)	10 (83.3%)	12 (100%)	12 (100%)	12 (100%)	8(66.7%)
Shigella spp (13)	13 (100%)	13 (100%)	9 (69.2%)	13 (100%)	4 (30.8%)	13 (100%)	3 (23.1%)	3 (23.1%)	NA	NA	NA	NA	NA	NA
Salmonella spp (26)	26 (100%)	26 (100%)	13 (50%)	26 (100%)	6 (23.1%)	26 (100%)	7 (26.9%)	6 (23.1%)	NA	NA	NA	NA	NA	NA
Klebsiella spp (9)	9 (100%)	9 (100%)	7 (77.8%)	9 (100%)	6 (66.7%)	9 (100%)	5 (55.6%)	6 (66.7%)	NA	NA	NA	NA	NA	NA

CAZ-ceftazidime, CRX-cefuroxime, GEN-gentamicin, CXM-cefixime, OFL-ofloxacin, AUG-augmentin, NIT-nitrofurantoin, CPR- ciprofloxacin, COT-cotrimoxazole, CXC-cloxacillin, ERY-erythromycin, STR-streptomycin, TET-tetracycline, CHL-chloramphenicol and NA – Not applied.

TABLE 7: OVERALL SUSCEPTIBILITY

ANTIBIOTICS	NUMBER TESTED	% SUSCEPTIBLE
GENTAMICIN	92	48.9
OFLOXACIN	80	67.5
AUGMENTIN	92	9.8
NITROFURANTOIN	80	68.8
CIPROFLOXACIN	80	68.8
CLOXACILLIN	12	16.7
CHLORAMPHENICOL	12	33.3

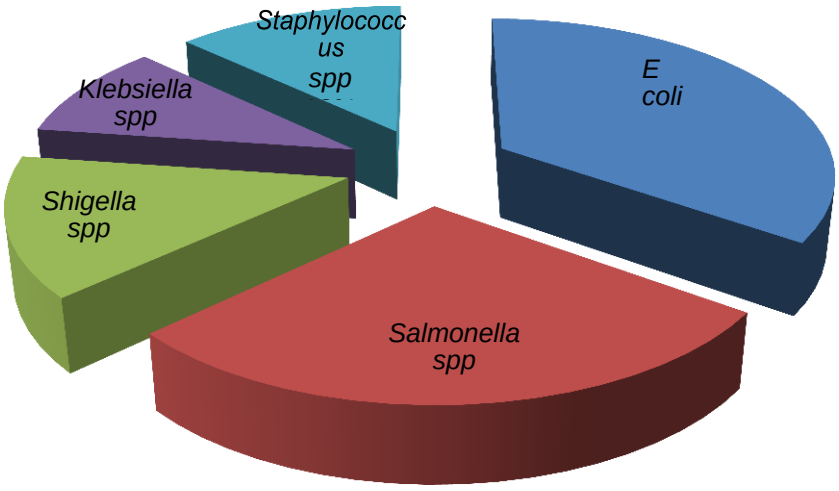
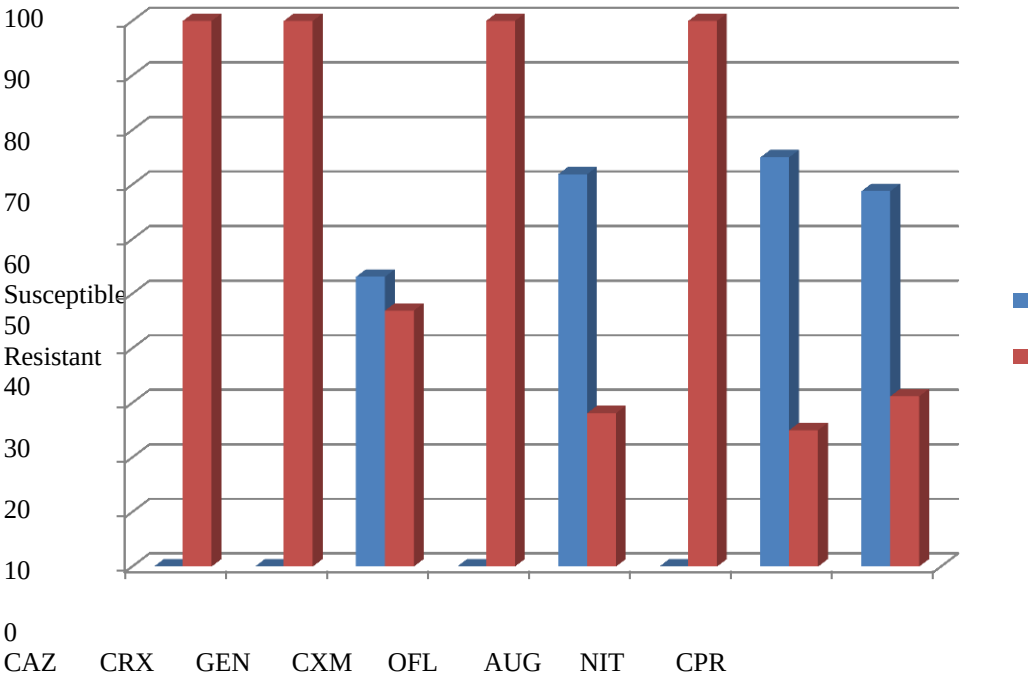


FIG 1 – Percentage prevalence of different isolates.



CAZ-ceftazidime, CRX-cefuroxime, GEN-gentamicin, CXM-cefixime, OFL-ofloxacin, AUG- augmentin, NIT-nitrofurantoin and CPR-ciprofloxacin.

FIG 2 - Susceptibility pattern of *E coli.*

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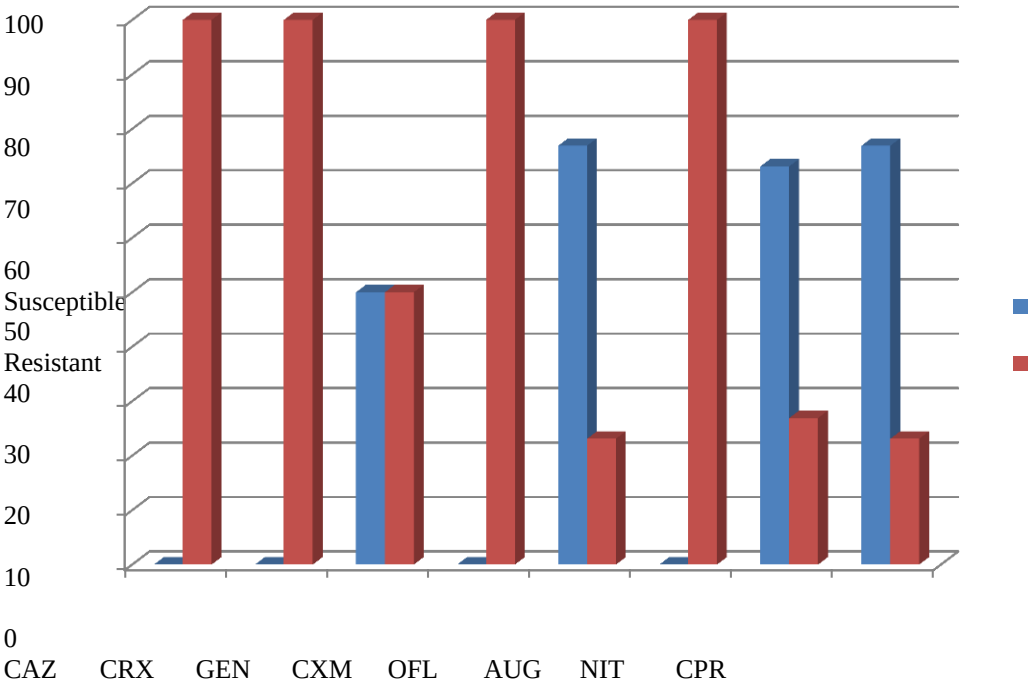
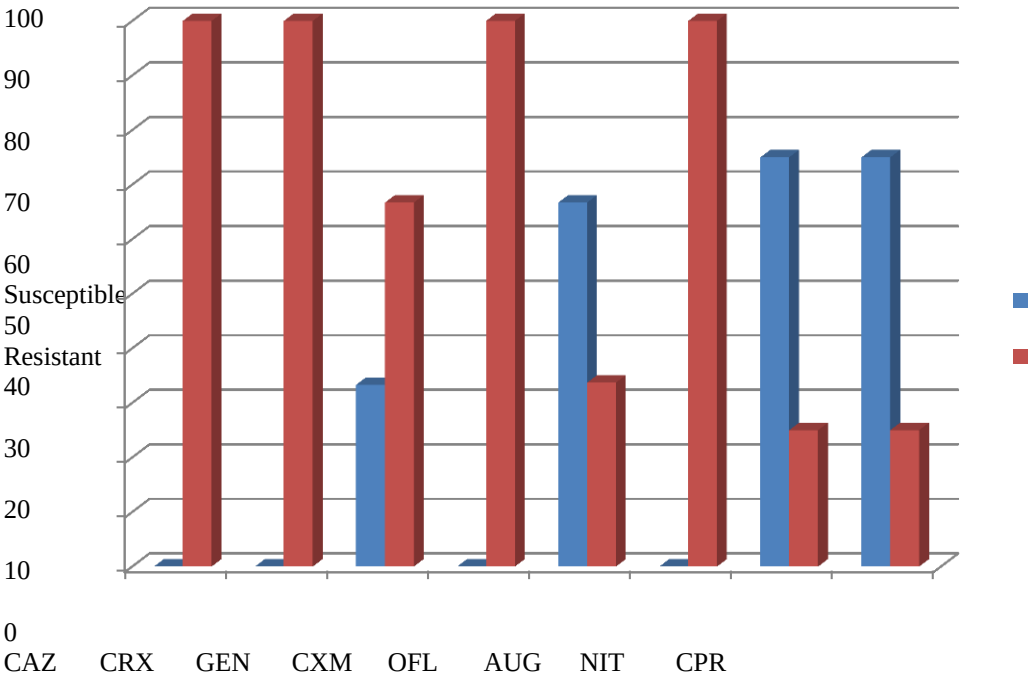


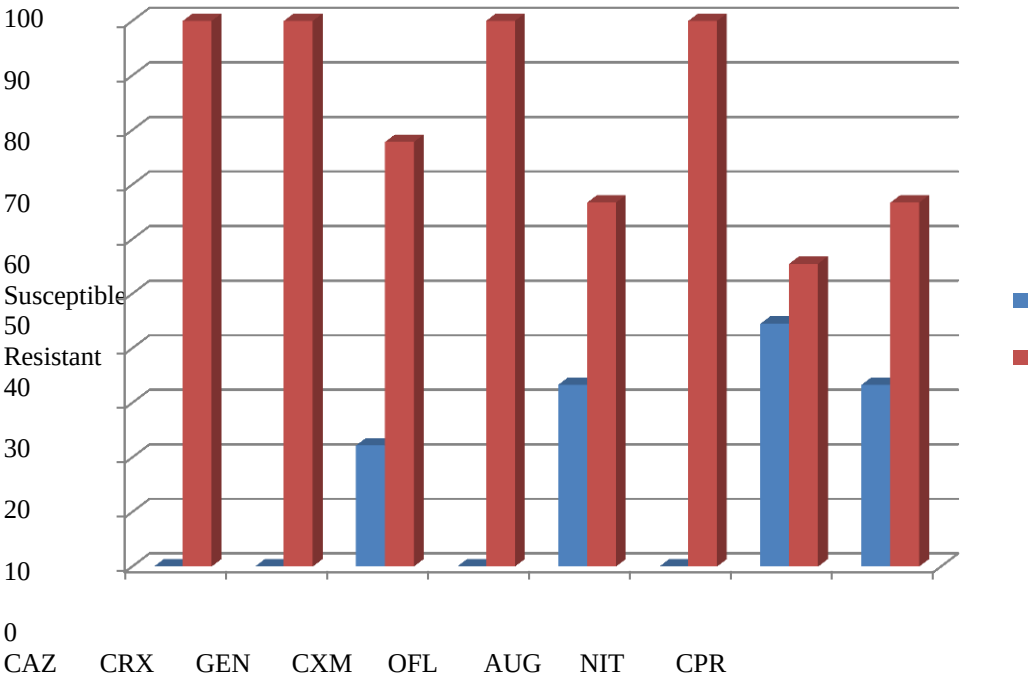
CAZ-ceftazidime, CRX-cefuroxime, GEN-gentamicin, CXM-cefixime, OFL-ofloxacin, AUG- augmentin, NIT-nitrofurantoin and CPR-ciprofloxacin.

FIG 3 - Susceptibility pattern of *Salmonella* spp.



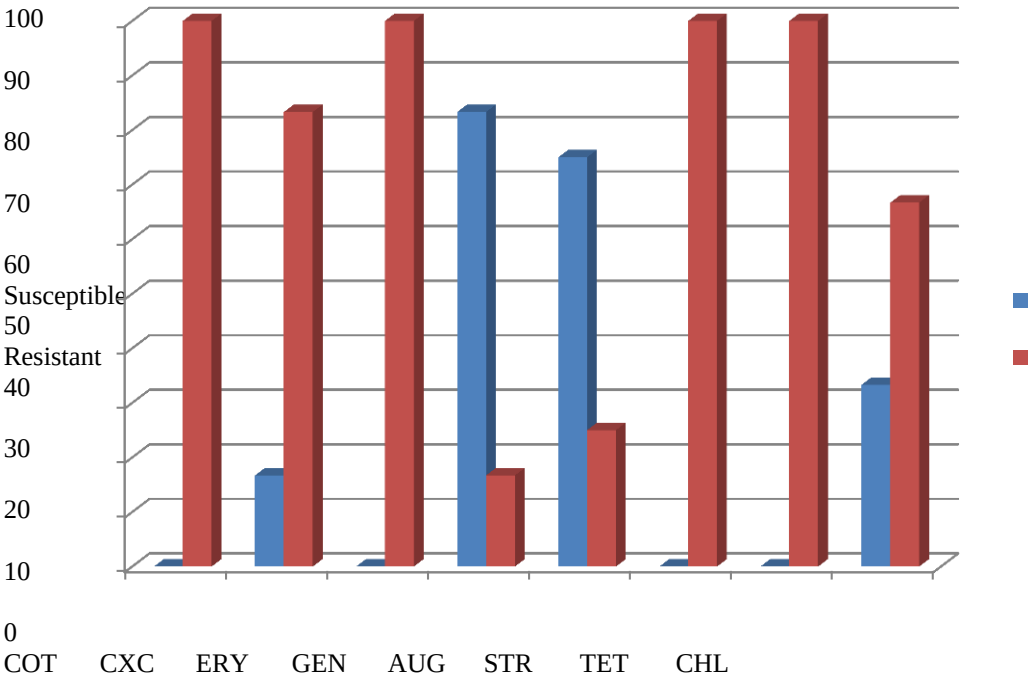
CAZ-ceftazidime, CRX-cefuroxime, GEN-gentamicin, CXM-cefixime, OFL-ofloxacin, AUG- augmentin, NIT-nitrofurantoin and CPR-ciprofloxacin.

FIG 4 - Susceptibility pattern of *Shigella* spp.

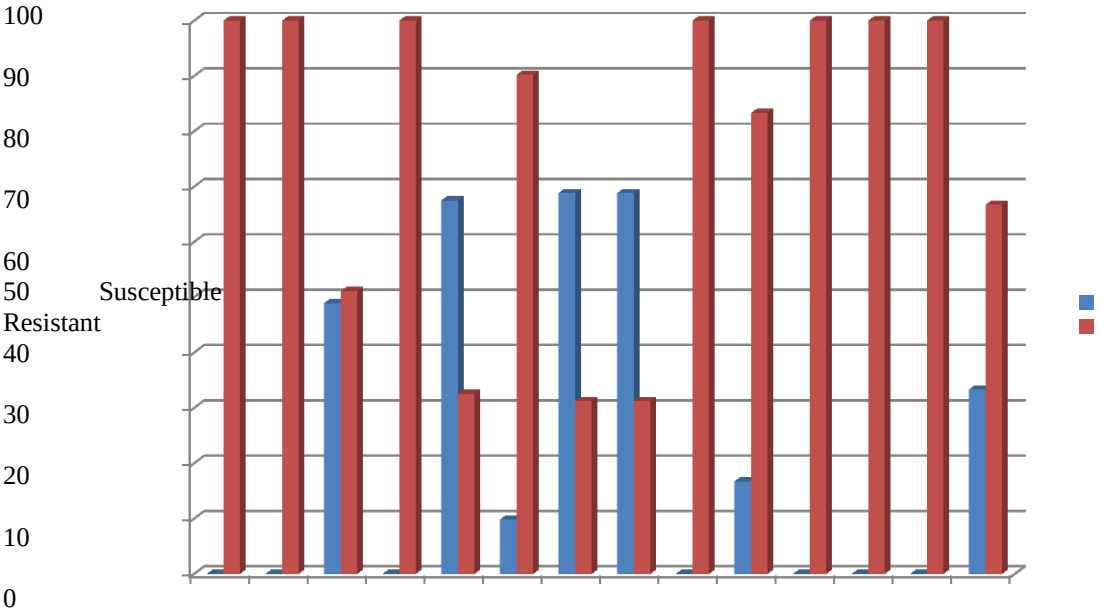


CAZ-ceftazidime, CRX-cefuroxime, GEN-gentamicin, CXM-cefixime, OFL-ofloxacin, AUG- augmentin, NIT-nitrofurantoin and CPR-ciprofloxacin.

FIG 5 - Susceptibility pattern of *Klebsiella* spp.



COT-cotrimoxazole, CXC-cloxacillin, ERY-erythromycin, GEN-gentamicin, AUG-augmentin, STR-streptomycin, TET-tetracycline and CHL-chloramphenicol.
FIG 6 - Susceptibility pattern of *staphylococcus* spp.



CAZ-ceftazidime, CRX-cefuroxime, GEN-gentamicin, CXM-cefixime, OFL-ofloxacin, AUG- augmentin, NIT-nitrofurantoin, CPR-ciprofloxacin, COT-cotrimoxazole, CXC-cloxacillin, ERY- erythromycin, STR-streptomycin, TET-tetracycline and CHL-chloramphenicol.

FIG 7 - Susceptibility pattern of all isolates.

VIII. DISCUSSION

This study investigated the antimicrobial susceptibility profile of pathogenic bacteria isolated from poultry farms in Umuahia, Abia state, Nigeria. A total of 50 samples were collected, which includes 30 faecal samples, 20 drinking water samples. Appropriate microbiological procedures were carried and a total of 92 isolates were obtained. Findings from the present study show that poultry farms harbor pathogenic bacteria. There was high prevalence of *E coli* (34.8%). *E coli* are commonly used as the indicator for the surveillance and monitoring of the emergence of antimicrobial resistance (Kijima-Tanaka *et al*, 2003). From the present study, 48.9% of the isolates were susceptible to Gentamicin, 67.5% to Ofloxacin, 9.8% to Augmentin, 68.8% to Nitrofurantoin, 68.8% to Ciprofloxacin, 16.7% to Cloxacillin and 33.3% to Chloramphenicol but showed complete resistance to Ceftazidime, Cefuroxime, Cefixime, Cotrimoxazole, Erythromycin, Streptomycin and Tetracycline. Generally, the isolates showed higher susceptibility to Nitrofurantoin (68.8%), Ciprofloxacin (68.8%) and Ofloxacin (67.5%). The reason for the higher susceptibility to these antibiotics could be because they are broad spectrum antibiotics and they are hardly used by poultry farmers' thus minimal room for antibiotic resistance by these isolates. The rise in antibiotics resistance had been reported in the past years and still remains a global problem today. In intensively reared food animals, antibiotics are administered for therapeutic purpose and as Antimicrobial growth promoters (AMGPs) to the whole flock rather than individuals (Van der Bogaard and Stobberingh, 1999). Resistance to antibiotics can either be naturally occurring for a particular organism/drug combination or acquired resistance, where misuse of antimicrobials results in a population being exposed to an environment in which organisms that have genes conferring resistance (either spontaneously mutated or through DNA transfer from other resistant cells) have been able to flourish and spread. The resistance to some antibiotics may be attributed to constant contact between feed, poultry birds and faecal dropping as also reported by Vellinga and Van-loock (2002). The bacterial isolates showed high level of antibiotic resistance against most used antibiotics. The result is in agreement with Muhammad *et al* (2010) who reported that the abuse and misuse of antimicrobial agents for growth promotion and prevention of diseases has impressed a selective pressure that causes discovery of more resistant bacteria. This is true with the bacteria associated with poultry litter in this study. Thus, the antibiotic selection pressure for resistance by bacteria in poultry is high and as a result their faecal floor contains higher proportion of resistant bacteria (Van der Bogaard and Stobberingh, 1999).

In the light of this, there is probability that most pathogenic bacteria that threaten human health may soon be resistant to all known antibiotics (Scott, 2002). Certain antibiotics however are critical to human infections caused by multidrug resistant pathogens, or because alternative therapies are less effective or are associated with side effects (Akond *et al*, 2008). The determination of the effectiveness of antimicrobial agents against specific pathogens-either human or animal source is essential for proper therapy (Prescott *et al*, 2005). The development of resistance to antimicrobial drugs is a serious problem worldwide, which threatens the ability to treat infections in animals and humans (Adeleke and Omafuvbe, 2011). Most resistance problem probably arose from inappropriate use of antibiotics which exposes infectious agents to sub therapeutic doses of antimicrobial agents.

More so, the use of antimicrobials in agriculture especially as growth promoters, chemotherapeutic and prophylactic agents in food animal' s bacteria are of public health implication (Witte, 1998). Thus, it became imperative to provide information on the susceptibility profile of pathogenic bacteria isolated from poultry farms in Umuahia. Furthermore, in developing countries, including Nigeria, there is easy access to antimicrobials and owners of poultry farms may administer antimicrobial preparations to sick animals without recourse to professional advice. Chickens may also be directly exposed to antimicrobials through improper disposal of the containers of used antimicrobial agents. Contamination of the environment by resistant bacteria from poultry farms constitutes a public health hazard because of the possible transmission of these potential pathogens to humans through contact and consumption of contaminated food substances (Aubry-Damon *et al*., 2004).

IX. CONCLUSION

In conclusion, the present results provide evidence that poultry faecal materials and drinking water samples can serve as an environmental reservoirs of multiple antibiotics resistant bacteria and hence as potential route for the entry of multidrug resistant zoonotic pathogens into human population. These have very important implications for human health, as multidrug resistant infections are difficult to treat and often require expensive antibiotics and long-term therapy. This can substantially increase the cost of treatment and even mortality.

X. RECOMMENDATIONS

1. Proper information dissemination to poultry farmers and poultry feeds producers on dangers of antibiotic resistant strains and indiscriminate use of antibiotics.
2. Improved feeding and keen health management practices involving prudent usage of antibiotics under professional advice.
3. Biosecurity plan should be employed in the poultry industry.

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