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Assessing Patterns of Antibiotic Prescriptions Practices Among the Geriatric Patients in Bauchi State, Nigeria

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Abstract:

- ***Background:***

Antibiotics are bacteriostatic or bactericidal agents that are most widely prescribe in the hospitals globally. This study is aimed at assessing patterns of antibiotic prescriptions practices among the geriatric patients in Bauchi State, Nigeria. The study employed a mixed methods research design. The respondents comprised 370 males and females' geriatric patients, aged 60-89 years, accessing medical care at the Out-patient, In-patient, and other relevant departments, of selected secondary and tertiary hospitals in the State; who were sampled using a multi-stage sampling procedure with appropriate techniques.

- ***Result:***

There mean age was 74.0 ± 7.0 and 50.5% were females. Respondents' demographics and antibiotics prescription pattern were collected using focused group discussion and questionnaire developed through the literature review. Pearson chi-square test was utilized to investigate associations between outcome variables with p< 0.05 considered statistically significant at 95% confidence level. There was a low level of antibiotics (15.9%) and among the respondents and protocols for prescription of antibiotics were followed. Ciprofloxacin 48(96%), males 23(46%), females 25(50%) was the most commonly prescribed antibiotics. There was no statistically significant association between gender and antibiotic prescription pattern (X^2_{cal} =1.604 < $X^2_{0.05(3)}$ =7.815, p-value= 0.658), among the respondents. Lack of clear communication by healthcare workers, males 100(27.0%), females 100(27.0%); lack of support system for patients, males 98(26.5%), females 104(28.1%); antibiotics resistance, and over prescription, males 98(26.5%), females 99(26,8%), were the major specific prescriber-related factors that could influence the antibiotic prescribing in general practice among the respondents.

- ***Conclusion:***

The study generally showed that there was no gender disparity in antibiotics prescription pattern, adherence, and misuse among the respondents; hence interventions to improve antibiotics adherence or address its misuse should focus on the overall geriatric patients need rather than targeting specific gender.

Keywords: *Antibiotic, Prescription, Practice, Pattern, Geriatric Patients.*

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I. INTRODUCTION

Antibiotics are drugs used to suppress or destroy the growth of pathogens (Ogbonna, et al., 2022). It has been identified that Antibiotics are crucial in the fight against infectious disease and preserving good health, particularly in underdeveloped countries where infectious diseases are still a major problem (Edessa, et al., 2024). Studies in Ethiopia on the inappropriate use of antibiotics revealed that the irrational use of antibiotics for outpatients prescribed was (33.1%) and (29.2%) in the urban and rural communities, respectively (Edessa, et al., 2024; Nicholas, et al., 2025).

One of the focuses of medical practice is to ensure the appropriate use of antimicrobial agents (Donkor, et al., 2022), It has been identified that in Africa, the irrational use of antibiotics could be self-medication to treat self-diagnosed conditions or symptoms, incomplete course medication, overuse of prescribed medicine for protracted and persistent ill conditions (Agoba, et al., 2023), These inappropriate prescriptions include (but are not limited to) the unnecessary use of antibiotics to treat non-responsive conditions and the suboptimal use of antibiotics for treating responsive conditions; incorrect use of drugs, their dosing and duration; excessive use of broad agents. In Bauchi State, it was observed that many doctors succumb to patient expectations and demand for an antibiotics prescription. Some patients demand specific antibiotics that were previously prescribed for them. Some others want a new class of drugs to be prescribed for them. Patients on a long queue for consultation were not satisfied with just paracetamol for fever without the addition of antibiotic. The widespread irrational use of antimicrobial agents has led to an emergence of antibiotics prescription factors (Fishbein, et al., 2023).

Study situation in South Africa, variable rates of purchasing antibiotics without a prescription were seen within African countries. Principal reasons for the variations seen included changing economic circumstances in the country, changes in the extent of monitoring of pharmacists' dispensing behaviour, the location, i.e., rural vs. urban, pharmacists' education and the infectious disease in question. As mentioned, there have been concerns with the appropriateness of antibiotic prescribing in ambulatory care in both the public and private healthcare sectors in South Africa, including for ARIs (Charani, et al., 2023). Irrational prescribing of antimicrobial agents is a global problem that has drawn the attention of health authorities in many countries including Nigeria and Bauchi state in particular, because of its adverse bearing on the development of resistance, increase in healthcare cost, morbidity, and mortality (Takedani, et al., 2021). This then presupposes that above prescriptions factors contribute greatly in antibiotic misuse genders.

Antibiotics and Gender In the United States of America (USA) analysis of the prescriptions from the IMS Health Xponent Database which captures more than (70%) of USA outpatient prescriptions showed females being at higher risk of antibiotics exposure than males, especially for people equal or more than 70 years. Female patients encountered antibiotics prescriptions per 1000 persons as opposed to males' encounter of 596 prescriptions per 1000 persons (pvalue<0.001) (Hicks, et al., 2025). Study from the tertiary health institution South-East Nigeria, that interrogated 802 National Health Insurance Scheme-NHIS prescriptions found that females (57.3%) encountered more antibiotics than males (Agoba, et al., 2023).

Studies have been carried out on prescription of antibiotics in different hospitals all around the world (Ogbona, et al., 2022, Zhou, et al., 2023; Tadesse, et al., 2023). In developing counties, regulating drug use is not as strict as in developed countries and this has given rise to inappropriate prescription and use of antibiotics with the emergence of antibiotics resistance (Nicholas, et al., 2025). To reduce antimicrobial prescription in hospitals, interventions should be put in place such as monitoring the use of antibiotics, evaluating prescription patterns, developing and implementing antimicrobial prescription to suit the peculiar needs of the hospital amongst others. This study, therefore, assess the patterns of antibiotic prescriptions practices among the geriatric patients in Bauchi State, Nigeria.

➢ *Research Questions*

- What are the patterns of antibiotic prescriptions practices among the geriatric patients in Bauchi State, Nigeria?
- What are the specific prescriber-related factors that can influence the antibiotic prescribing in general practice among the geriatric patients in Bauchi State?
- What are the influences of gender and other patient related factors on misuse of antibiotics prescription among the geriatric population in Bauchi State?

➢ *Hypotheses*

As a guide to the study, the following null hypotheses were put forward. All the null hypotheses were put to test at $p<0.05$ significant level at appropriate degree of freedom.

- There is no significant association between gender (male and female) and antibiotic prescription patterns among geriatric patients in Bauchi State.
- There is no significant association between gender of the respondents and to antibiotics prescription misuse among the geriatric patients in Bauchi State.

II. METHODS

In order to achieve the purpose of the study, mixed methods research design was employed, because it was a research approach that combined quantitative and qualitative methods. According to Gemson and Kyamru (2013) mixed methods combine the strength of quantitative approaches, leading to more robust, nuanced and actionable results. Ogbonna, et al., (2022) study which described antibiotic prescription patterns in Delta State University Teaching Hospital, Delta State, Nigeria, hence it was deemed most appropriate for the present study.

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The study was carried out in selected tertiary and secondary hospitals in Bauchi, Bauchi State, Nigeria. Bauchi State is located in the north-eastern part of Nigeria. It has also many primary, secondary and tertiary health institutions. Notable among the tertiary health institutions are Abubarkar Tafawa Balewa University Teaching Hospital, Bauchi; Specialist Hospital, Bauchi; Federal College of Health Sciences Teaching Hospital (former federal medical centre) Azare; Nigerian Air Force hospital, Bauchi; and Vaseco Vaginal Fistula Centre, Ningi East, Bauchi; as well as a private specialist eye hospital. The study was carried out at the Out- patient Departments of the Abubakar Tafawa Balwa University Teaching Hospital, Bauchi, Specialist Hospital, Bauchi and other selected secondary hospitals in Bauchi. The out-patient clinics of the these hospitals were chosen because they have well established and functional unit such as Diabetic clinic, Geriatric clinic, Medical out-patient unit (MOPD), among others, that geriatrics patients come for consultations, with up-to-date clinical equipment, greater man power and patient in flow (turn-out). The tertiary hospitals also serve as referral centres for other primary and secondary health centres within the state.

The study population consisted of all the Eleven thousand, eight hundred and thirty three (11,833) respondents. These include; 10,100 geriatric patients, males and females aged greater than or equal to sixty years (≥ 60 years) old, accessing medical care services at the Out-patient, In-patient, and other relevant departments, of the selected secondary and tertiary hospitals in the State (Records of Ministry of health Bauchi State, 2025). Out of these numbers, 5,350 and 4,750 were geriatric patients who underwent diabetic, hypertension and other medical conditions tests in Out-Patient and In-Patient clinics respectively, and 1,733 were geriatric Health workers (Medical officers 233, Pharmacies 92, Nurses, 1,175 and Midwives 233) (Health workforce Profile, 2024). These brings the population of study to Eleven thousand eight hundred and thirty three (11,833). The minimum age bracket of 60 and above geriatrics was chosen for easy access of the respondents' consent, as they had reached the prime human suffrage and could stand in for themselves. They could also give less conflicting answers to the research question without an external assistance. The healthcare providers were chosen, because they were directly linked to the geriatrics as they provide the services.

The sample size for the study comprised of 370 geriatric patients and the geriatric health workers in the selected tertiary and secondary hospitals in Bauchi State (thus: geriatric health workers 121 and geriatric patients 249 disproportionately). It was computed using Cohen's formula (1988) for estimating sample size population proportion of a known population as follows:

n=(Z^2*p*(1-p))/E^2

N=11,833 x(0.05+0.20=0.25

0.25^2=0.0625)

0.05+0.20=0.25

0.25^2=0.0625

N=11,833*0.0625=739.5625

740/2= 370

n= 370

Where:

- P = estimated proportion of the outcome of the response assumed to be (50.0%) or 0.50 of the respondents' assessment to antibiotic prescription pattern, adherence, and misuse. (Since the proportion of the population with the characteristics was not known)
- D = maximum acceptable sampling error (degree of precision) = (5.0%) or 0.05 in decimal notation:
- Z = Normal deviation at the desired confidence interval. The value of the z-statistic at the (95%) confidence interval level = 1.96.
- N = minimum number of sample size (where target or total population > 11833).

Besides, the (10.0%) non-respondents rate =10/100 x 370 = 37 was not taken into consideration because the possibility of drop-outs and unforeseen circumstance were rare, as the respondents were accessed as they visit the clinics to access geriatric care until the required sample size was reached.

The sample size of the study were 249 geriatric patients aged 60 and above attending out- and in-patient department of the selected tertiary and secondary hospitals in Bauchi State and 121 geriatric Health workers (medical officers, Pharmacies, Nurses and Midwives) practicing in some of these selected healthcare facilities in the State. According to Ministry of Health Records (2025), there are twenty six (general hospitals) and six (tertiary hospitals) in Bauchi State. Any of the health workers that do not work in the approved area and were not accessing geriatric healthcare was excluded. The reason for choosing the tertiary and secondary public hospitals was that they had accurate records that could be accessed at any point in time and most of the cases of the geriatrics were managed at these levels of care.

Multi-stage sampling procedure with appropriate techniques was utilized to draw up the sample size for the study. In stage one; all the three Zones (Northern; Central, and Southern zones) which serves as clusters were sampled proportionately using simple random sampling technique of balloting without replacement to select (50%) of the zones. This was based on Nwana's Rule of thumb in Gemson and Kyamru (2013) that when the population is few, (50%) should be the sample size. Therefore, two zones would be selected (that is Central and Southern zones was selected). In the second Stage, the stratified simple random sampling

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technique was used to select the tertiary and secondary healthcare facilities respectively (since the hospitals are in stratum). Furthermore, Bauchi State has 20 LGAs. Every local government has at least one secondary hospital. However, Bauchi, Alkaleri and Katagum, Misau has 2 each totaling 26; therefore in the third stage, the same technique and procedure of stage two was used to select (50%) of the LGA in the two selected senatorial zones. There were 7 LGA in each of the selected senatorial zones (that is: Central and Southern zones), therefore, 4 LGAs were selected from each zone making a total of eight LGAs (4x2=8). The selected LGAS in the Central zone included: Ningi, Darazo, Ganjuwa, and Misau; while in the Southern zon, they were: Bauchi, Toro, Dass, and Alkaleri LGAs respectively. Also, all the tertiary hospitals in the two zones were selected without sampling. These included Federal Medical Center (FMC), Misau, and Vesico Virginal Fistula (VVF) Center, Ningi, in the Central zone; while Specialist hospital, Bauchi, Abubakar Tafawa Balewa University Teaching Hospital (ATBUTH), and Specialist hospital Bayara were from the Southern zone respectively.

In stage four, purposive sampling techniques was used to select geriatric healthcare workers that provides healthcare services to the geriatric patients among all the health workers working in the out-patient, in-patient, and other relevant departments that provide service to the geriatric. The purposive sampling technique was necessary because it is not every health worker that provides healthcare services to the geriatrics.

Additionally, accidental sampling technique was utilized in the final stage (fifth stage) for administering questionnaires to the available 121 healthcare workers at various respective shift duties after obtaining their consent. Besides, the any of the 249 geriatric patients who would be present at the time of the visit would be given the questionnaire also after obtaining their consent. This process continued until the sample size of 370 was reached.

In the Focus Group Discussion (PAMFGD), for the Antibiotics Prescription Pattern, 50 respondents were drawn. Simple random sampling technique of balloting without replacement was utilized to draw a sample of 15 geriatric patients from one tertiary hospital and one secondary hospital (total 30); and the same technique was use to select 10 healthcare workers from one tertiary hospital and one secondary hospital (total 20) respectively. The results were transcribed and generalized.

Two instruments were utilized for the study. Firstly, a pretested, structured, self-administered questionnaire developed based on the literature review was used to assess the respondents' antibiotics prescription pattern among Geriatric Population (AAPAM-GP), and Interview Guide (Focus Group Discussion-FGD) for drug (Prescription) among Geriatrics (Health Workers) (IGDPAM) respectively.

The validity (face and content) of the instruments (questionnaires, checklist and interview guides) was established by submitting the draft instrument, that is, the research questions and hypotheses to three research experts, who critically reviewed it. Their observations, corrections and language used, were used for the final draft of the instrument.

The reliability of the instrument was measured by using the test re-test method. The instruments were administered twice on fifty (50) hospital workers and geriatric patients from Federal College of Health Sciences Teaching Hospital (former Federal Medical Centre), Azare, Bauchi State, who had the similar characteristics with the study population. This was done within the interval of two weeks, the workers and geriatric patients were not part of the sample for the study. The scores (i.e., questionnaire, and In-depth interview guide) that were obtained from the sampled respondents on the two separate administrations were subjected to Pearson's Product Moment Correlation coefficient, which yielded coefficient of 0.78(r=0.78), 0.76, (r=0.75) and 0.77 (r=0.77) respectively were deemed reliable. However, Cronbach's alpha statistics were further used to ascertain the internal consistency of the instrument which yielded coefficient values of 0.832, 0.81, and 0.82 respectively were considered reliable. This statistics was used because it is a form of reliability method that measures internal consistency of the instruments with multi-scale items. Both coefficient values were high enough and were considered reliable for used in the study.

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 23. The results were calculated in mean, frequencies, and percentages. Tables, pie-chart, and bar charts were used to present the results for easy appraisal. Descriptive statistics were used to compute the proportion of Antibiotic Prescription pattern among the geriatric Patients. Pearson chi-square (X^2) test was used to assess the significant associations between the outcome variables at appropriate degree of freedom and $P < 0.05$ will be considered statistically significant at (95%) confidence level. The interview guide responses were also transcribed and were used for the study discussions.

Permission for the study was obtained from the Ethics and Research Committee of the Bauchi State Ministry of Health, and ATBUTH, Bauchi, respectively. Informed consent was obtained from all the respondents before the study commenced and the aims of the study were explained to them. Confidentiality and anonymity were ensured with records and the information collected from the respondents and they were used solely for the purpose of the study. The study was also conducted in accordance with the tenets of the Declaration of Helsinki, 2013.

III. RESULTS

The data analysis and findings of the study were presented in accordance with the research questions and hypotheses. It began with the demographic data, followed by the data from the questionnaire. The results were presented in frequencies, percentages, tables, pie-chart, and bar charts.

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Table 1 Gender Distribution of the Respondents (n=370)

Gender	Frequency	Percentage (%)
Male	183	49.5
Female	187	50.5
Total	370	100

Source: Researcher's Questionnaire 2025

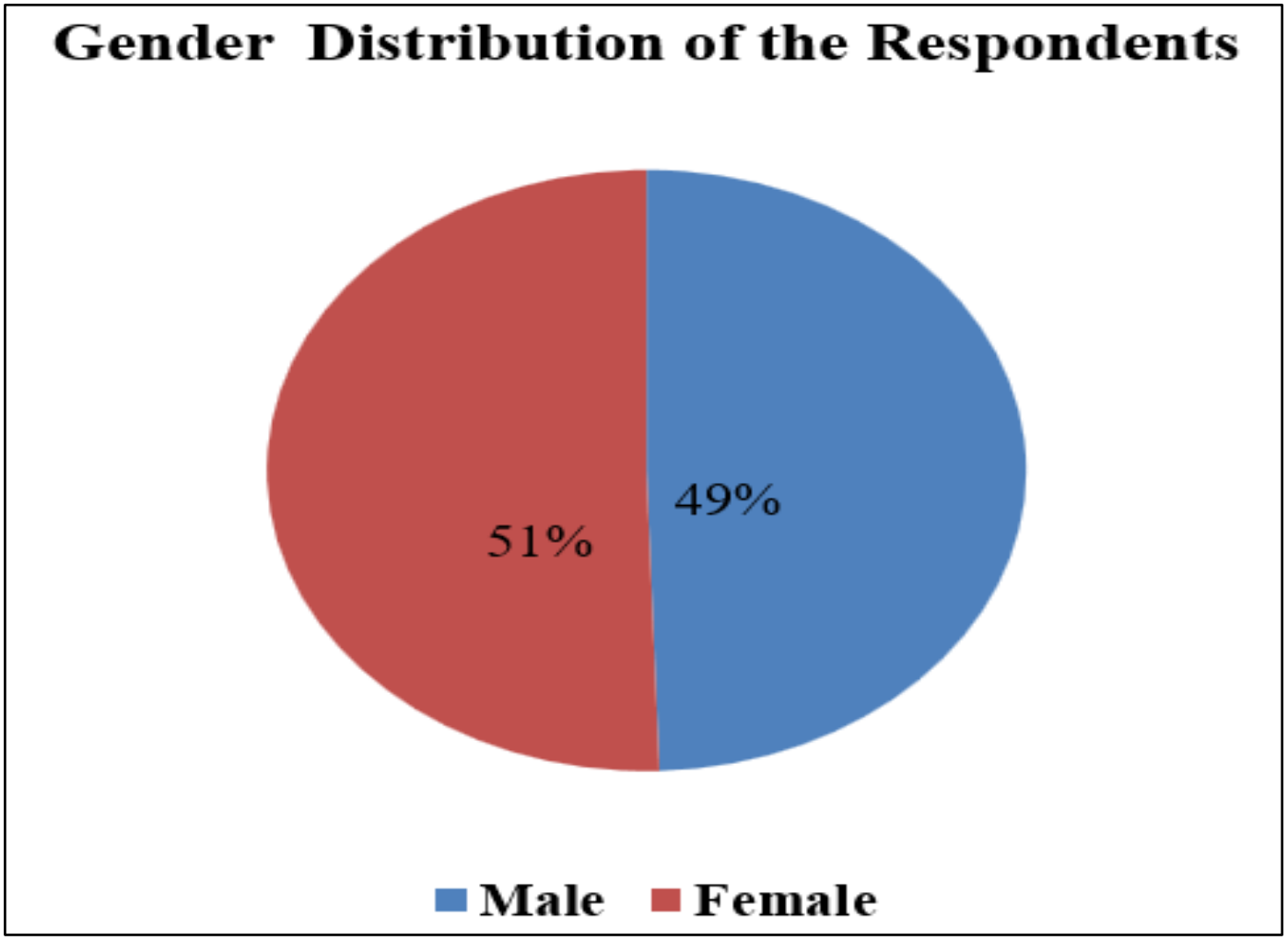

Fig 1 Pie-Chart Showing Gender Distribution of the Respondents

Three hundred and seventy (370) respondents took part in the study. There were one hundred and eighty-three (183, 49.5%) males and one hundred and eighty-seven (187, 50.5%) females, with age ranging from 60-89years (mean age: 74.0 ± 7.0). There were slight higher numbers of female respondents than males.

Table 2 Cross Tabulation of the Age and Gender Distribution of the Respondents (n=370).

Age (years)	Male f (%)	Female f (%)	Total f (%)
60-69	66(17.8)	75(20.3)	141(38.1)
70-79	62(16.7)	56(15.1)	118(31.9)
80-89	55(14.9)	56(15.1)	111(30.0)
Total	**183(49.5)**	**187(50.5)**	**370(100.0)**

Source: Researcher's Questionnaire 2025

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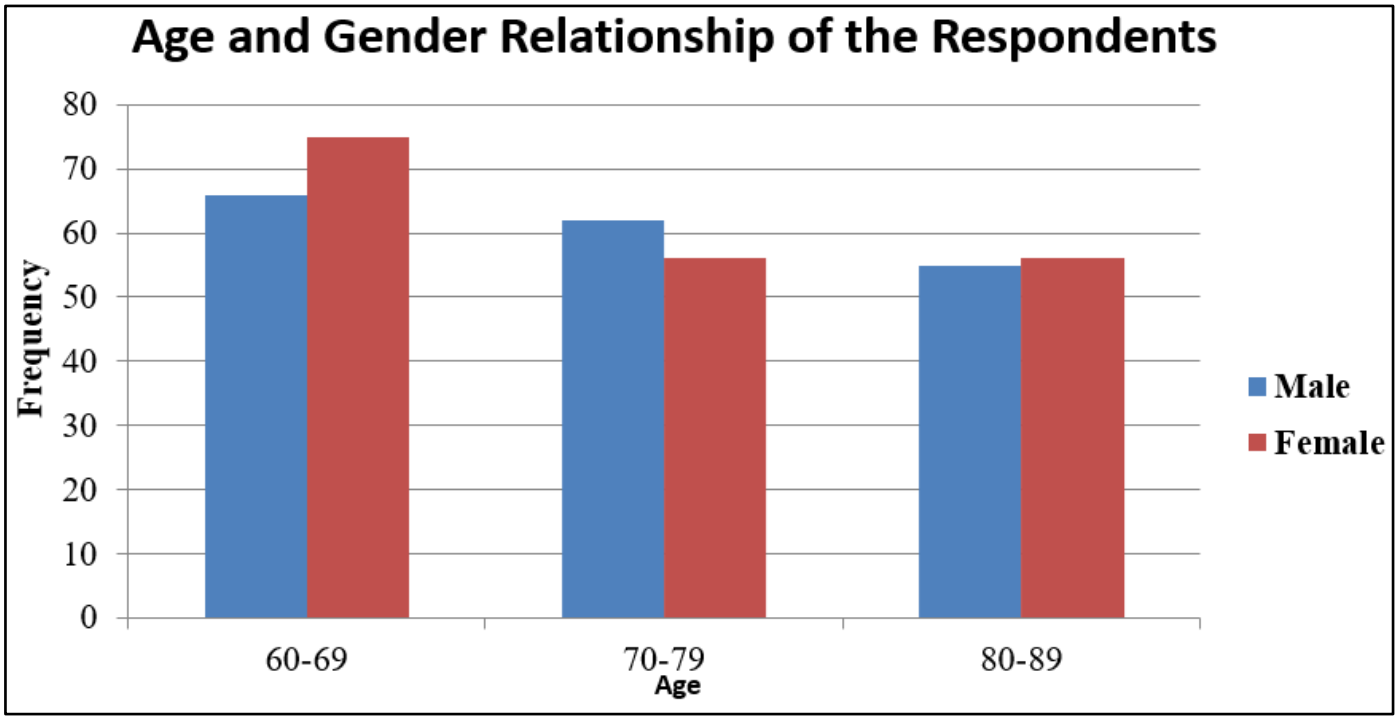

Fig 2 Bar Chart Showing Age and Gender Relationship of the Respondents

The respondents' ages and gender distributions were as presented in Table 2 and Figure 2. The males and females mean ages were 73.9± 6.8 and 73.5± 7.2 respectively. The age range of 60-69 (38.1%) had the highest number of respondents followed by age range of 70-79 (31.9%), while the age range of 80-89 (30.0%) had the least. However, the difference between the age range of 70-79 and 80-89 was quite insignificant.

Table 3 Pattern of Antibiotic Prescription Among the Geriatric Patients in Bauchi State (n=370)

Statement	**ST**	**RL**	**NE**	**AL**
How often have you been prescribed Antibiotics	**f (%)**	**f (%)**	**f (%)**	**f (%)**
Frequency of antibiotic prescription				
Male	53(14.3)	45(12.2)	44(11.9)	41(11.1)
Female	58(15.7)	43(11.6)	45(12.2)	41(11.1)
Types of antibiotics prescribed				
Male	46(12.4)	47(12.7)	50(13.5)	40(10.8)
Female	49(13.2)	46(12.4)	50(13.5)	42(11.4)
Indications for antibiotics use				
Male	52(14.1)	45(12.2)	44(11.9)	42(11.4)
Female	53(14.3)	48(13.0)	43(11.6)	43(11.6)
Guidelines and protocols				
Male	52(14.1)	45(12.2)	44(11.9)	42(11.4)
Female	50(13.5)	48(13.0)	45(12.2)	44(11.9)
Patient decision to prescribe antibiotics				
Male	51(13.8)	49(13.2)	42(11.4)	41(11.1)
Female	50(13.5)	53(14.3)	44(11.9)	40(10.8)
Colleague influence				
Male	50(13.5)	50(13.5)	43(11.6)	40(10.8)
Female	56(15.1)	49(13.2)	42(11.4)	40(10.8)
Awareness of antibiotic resistance				
Male	53(14.3)	49(13.2)	40(10.8)	41(11.1)
Female	56(15.1)	48(13.0)	41(11.1)	42(11.4)
Strategies for promoting antibiotic stewardship				
Male	54(14.6)	49(13.2)	40(10.8)	40(10.8)
Female	53(14.3)	48(13.0)	42(11.4)	44(11.9)
Education and training				
Male	56(15.1)	43(11.6)	42(11.4)	42(11.4)
Female	59(15.9)	47(12.7)	40(10.8)	41(11.1)
Cluster %	**14.3**	**12.8**	**11.7**	**11.2**

Source: Researcher's Questionnaire 2025 Note: ST=Sometimes, RL=Rarely, NE=Never and AL=Always

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Table 3 showed that 14.3% of the respondents were 'Sometimes' prescribed with antibiotics while 12.8% were 'Rarely' prescribed with antibiotics. In addition, 11.7% of the respondents were 'Never' prescribed with antibiotics while and 11.2% of the respondents were 'Always' prescribed with antibiotics. Specifically, the table showed that 111(30.0%) of the respondents were 'Sometimes' frequently prescribed with antibiotic with the females 58(15.7%) respondents higher than the males 53(14.3%). However, 81(22.2%) of the respondents were 'Always' frequently prescribed with antibiotics in equal proportion between the males 41(11.1%) and the females 41(11.1%).

Besides, in the interview guide for drug prescription consisting of fifty (50) respondents, males 23(46.0%) and females 27(54%); the respondents indicated that 'patient's medical history' 44(88%), males 19(38%), females 25(50%), and 'current symptoms' 27(54%), males 14(28%), females 13(26%) influenced their decision to prescribe a particular medication respectively (See appendix 5). Also, 44(88%) of the respondents, males 22(44%), females 22(44%) responded that their need for medication were accessed through laboratory result; and the most appropriate medication for the patient was selected through microscopy culture and sensitivity (MCS) result 37(74%), males 15(30%), females 22(44%).

Table 4 Specific Prescriber-Related Factors that Can Influence the Antibiotic Prescribing in General Practice Among Geriatric Patients in Bauchi State (n=370)

Statement **Which of the following have you experienced?**	**Agreed f (%)**	**Disagreed f (%)**
Lack of support system for patients		
Male	98(26.5)	85(23.0)
Female	104(28.1)	83(22.4)
Antibiotics resistance		
Male	99(26.8)	84(22.7)
Female	100(27.0)	87(23.5)
Side effects		
Male	100(27.0)	83(22.4)
Female	98(26.5)	89(24.1)
Self-medication		
Male	96(25.9)	87(23.5)
Female	97(26.2)	90(24.3)
Duration of treatment		
Male	95(25.7)	88(23.8)
Female	102(27.6)	85(23.0)
Sharing antibiotics		
Male	97(26.2)	86(23.2)
Female	98(26.5)	89(24.1)
Lack of follow-up by healthcare provider		
Male	95(25.7)	88(23.8)
Female	93(25.1)	94(25.4)
Lack of understanding patient		
Male	97(26.2)	86(23.2)
Female	98(26.5)	89(24.1)
Lack of understanding proper use of antibiotics		
Male	99(26.8)	84(22.7)
Female	98(26.5)	89(24.1)
Forgetfulness		
Male	99(26.8)	84(22.7)
Female	96(25.9)	91(24.6)
Over prescription		
Male	98(26.5)	85(23.0)
Female	99(26.8)	88(23.8)
Lack of education		
Male	96(25.9)	87(23.5)
Female	102(27.6)	85(23.0)
Pressure from patients		
Male	99(26.8)	84(22.7)
Female	97(26.2)	90(24.3)
Cost of medication		
Male	98(26.5)	85(23.0)
Female	102(27.6)	85(23.0)
Lack of clear communication by healthcare provider		
Male	100(27.0)	83(22.4)
Female	100(27.0)	87(23.5)
Cluster %	**26.6**	**23.4**

Source: Researcher's Questionnaire 2025

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Table 4 showed that (26.6%) and (23.4%) of the respondents 'Agreed' or 'Disagreed' respectively that the above specific prescriber-related factors or non-adherence to antibiotics prescription check list can influence the antibiotic prescribing in general practice among the geriatric patients in Bauchi State. The proportion of the females' respondents that 'Agreed' to have experienced it was higher than that of the males, while the proportion of the males and females respondents that 'Disagreed' was almost the same. Besides, 198(53.5%), males 96(25.9%), females 102(27.6%) of the respondents 'Agreed' that they had experienced lack of education concerning antibiotics from the prescribers with the females respondents in higher number than their males' counterpart, while 172(46.5%), males 87(23.5%), females 85(23.0%) of the respondents 'Disagreed', with both gender having almost equal number of respondents. Furthermore, 200(54.1%), males 100(27.0%), females 100(27.0%) of the respondents 'Agreed' that they had experienced lack of clear communication by healthcare providers prescribing their antibiotics, with both gender having equal proportions of respondents, while 170(45.9%), males 83(22.4%), females 87(23.5%) of the respondents 'Disagreed', with the females respondents having higher respondents than the males counterpart.

➢ *Testing of Hypotheses*

- Hypothesis 1. There is no significant association between gender (male and female) and antibiotic prescription patterns among geriatric patients in Bauchi State.

Table 5 Pearson Chi-Square Results of the Association Between Gender (Male and Female) and Antibiotic Prescription Pattern Among the Geriatric Patients in Bauchi State. (n=370), DF = 3

Statement How often have you been prescribed antibiotics?	X^2	*P*-value	**Decision**
Frequency of antibiotic prescription	0.241	0.9707**	Accepted
Types of antibiotics prescribed	0.092	0.9928**	Accepted
Indications for antibiotics use	0.088	0.9932**	Accepted
Guidelines and protocols	0.156	0.9844**	Accepted
Patient decision to prescribe antibiotics	0.169	0.9824**	Accepted
Colleague influence	0.312	0.9578**	Accepted
Awareness of antibiotic resistance	0.071	0.9951**	Accepted
Strategies for promoting antibiotic stewardship	0.213	0.9755**	Accepted
Education and training	0.262	0.9670**	Accepted
Grand value	**1.604**	**0.6585****	**Accepted**

Source: Researcher's Questionnaire 2025. X^2_{Cal} =1.604; $X^2_{0.05(3)}$ = 7.815; *P*-value =0.6585; Hypothesis Accepted.
*Significant
**Not significant

Table 5 showed the grand calculated Pearson chi-square value of 1.604 with a corresponding table value of 7.815, and a *P*-value of 0.658. The hypothesis was accepted because the X^2_{cal} =1.604 < $X^2_{0.05(3)}$ =7.815. This implied that there was no statistically significant association between gender (male and female) and antibiotic prescription pattern among geriatric patients in Bauchi State. Furthermore, the result showed that antibiotic prescriptions pattern were similar for both male and female patients, suggesting that gender might not be a determining factor in antibiotic prescription pattern or decisions. The lack of significant association implied that healthcare providers in Bauchi State might not be exhibiting gender bias in their antibiotics prescription pattern. However, the antibiotics prescription pattern might be influenced by other factors like type of infection or disease, patient's age, weight, medical history, healthcare provider's professional judgment, and hospital/clinics policies. In addition, it revealed that antibiotics prescription guideline might not be gender specific, and efforts to promote rational antibiotic prescription pattern could focus on other factors other than gender. The table also showed the calculated Pearson chi-square values for the components of the respondents' (patients') other related factors on antibiotics prescription pattern and their corresponding P-values that were not significant.

- Hypothesis 2. There is no significant association between gender (male and female) and antibiotic misuse among geriatric patients in Bauchi State.

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Table 6 Pearson Chi-Square Result of the Association Between Gender (Male and Female) and Antibiotic Misuse Among Geriatric Patients in Bauchi State (n=370), DF=3

Statement Which of the following have you experienced	X^2	*P*-value	Decision
Availability of antibiotics	1.100	0.7771**	Accepted
Poor infection control	0.191	0.9790**	Accepted
Poverty	0.300	0.9600**	Accepted
Lack of access to healthcare	1.790	0.6171**	Accepted
Cultural beliefs	0.001	1.0000**	Accepted
Antibiotic resistance	0.099	0.9920**	Accepted
Misinformation spread through social media	0.485	0.9222**	Accepted
Accessibility to antibiotics	0.636	0.8881**	Accepted
Cost of antibiotics	0.173	0.9818**	Accepted
Grand value	**4.774**	**0.1891****	**Accepted**

Source: Researcher's Questionnaire 2025. X^2_{Cal} =4.774; $X^2_{0.05(3)}$ = 7.815; *P*-value =0.1871; Hypothesis accepted.
*Significant
**Not significant

Table 6 showed the grand calculated Pearson chi-square value of 4.774 with a corresponding table value of 7.815, and a *P*-value of 0.1871. The hypothesis was accepted because the X^2_{cal} =4.774 < $X^2_{0.05(3)}$ =7.815. This implied that there was no statistically significant association between gender (male and female) and antibiotics misuse among geriatric patients in Bauchi State. This means that antibiotics misuse pattern were similar for both male and female geriatric patients, suggesting that gender might not be a determining factor in antibiotics misuse among geriatric patients in Bauchi State. However, antibiotics misuse might be driven by common factors such lack of awareness about antibiotics use, inadequate healthcare provider-patient communication, and self-medication practices. The lack of statistically significant association might imply that interventions to address antibiotics misuse could be designed to target geriatric patients as a whole, rather than paying emphasis on gender-specific strategies. This means that improving patient education and awareness, enhancing healthcare provider training, and promoting proper prescribing practices could greatly reduce antibiotics misuse among the geriatric patients in Bauchi State. The table also showed the calculated Pearson chi-square values for the components of the respondents' (patients') other related factors on antibiotics misuse and their corresponding P-values that were not significant.

IV. DISCUSSION

The finding of the study was discussed under the following heading:

- *Demographic Status of the Respondents*

Three hundred and seventy (370) patients responded to the study which sought to elicit their responses to assessment of antibiotic prescription, in geriatric patients: comparison of males and females in Bauchi State, Nigeria. Out of this number, one hundred and eighty-three (183, 49.5%) were males and one hundred and eighty-seven (187, 50.5%) were females. The study revealed that the genders of the respondents were almost on equal distribution. However, the slight difference in the male to female ratio (1.00:1.02) might be related to chance as a result of the purposive and accidental sampling of the respondents. The age of the respondents range from 60-89years (mean age: 74 ± 7.0). The mean ages of the males and the females were 73.9± 6.8 and 73.5± 7.2 respectively.

- *Antibiotics Prescription Pattern Among the Geriatric Patients in Bauchi State.*

The study showed that (14.3%), (12.8%), (11.7%), and (11.2%) of the respondents were 'Sometimes', 'Rarely', 'Never', or 'Always' prescribed with antibiotics respectively. However, 82(22.2%) of the respondents were 'Always' prescribed with antibiotics, with equal numbers of males 41(11.1%) and females 41(11.1%); while 111(30.0%) of the respondents were 'Sometimes' prescribed with antibiotics with higher numbers of females 58(15.7%) than males 53(14.3%). In overall, the pattern of antibiotic prescription was that both genders were always prescribed with antibiotics equally without bias. This outcome tends to suggest that gender might not be a determining factor in antibiotic prescription pattern or decisions. This was in tandem with Ekwoaba, (2021) study in which there was no differences between genders with respect to antibiotics prescription. The slight difference between the males and females in the 'Sometimes' responses might likely be associated with sample size which could also be contributory to the study not showing gender difference as the two previous studies (Hicks et al, (2025) which showed females at higher risk of antibiotics encounter had sample size more than 800. This

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showed that enough effort needs to be exerted on the area of awareness on strategies for promoting antibiotics strategies for efficient prescribing policies. Furthermore, in the interview guide for drug prescription comprising fifty (50) of the respondents, males 23(46.0%) and females 27(54%), the study showed that patients' medical history 44(88%), males 19(38%), females 25(50%); and current symptoms 27(54%), males 14(28%), females 13(26%) influenced the decision to prescribe a particular medication respectively. This outcome was in agreement with Agyepong, et al., (2025), where the use of medical history, laboratory results, patient turnout and Performance Based Financing (PBF) were significantly associated with antibiotic prescribing rates ($p < 0.05$), and 240 (81.4%) of the study respondents purchased antibiotics based on symptoms respectively. However, this study outcome was in disagreement with Al Masud, et al, (2025), and Ogbonna, et al., (2022) in which Azithromycin; and Cephalosporin 149(23.8%), Nitroimidazole 150(23.93%), and Penicillin 134(21.36%) respectively were the most commonly prescribed antibiotics.

- *Specific Prescriber-Related Factors that Can Influence the Antibiotic Prescribing in General Practice Among the Geriatric Patients in Bauchi State.*

The findings in table 9 showed that (26.6%) of the respondents agreed that the named specific prescriber-related factors in the table can influence the antibiotic prescribing in general practice among the geriatric patients in Bauchi State. However, on a specific note, 202(54.6%), males 98(26.5%), females 104(28.1%) of the respondents 'Agreed' that lack of support system for patients from the prescribers could influence antibiotic prescribing among the geriatric patients, with the proportion of the females respondents higher than that of the males. This result was in tandem with Altaye, et al., (2024), study in Ethiopia where patient load, inadequate man-power capacity, and lack of patient support system were the system-related factors, but there were no gender related distinction. The slight difference between the males and females in this study could be related to the sampling techniques applied. Therefore, in this context, appropriate interventions should be designed and implemented to address the identified factors and improve the prescribing practice.

- *Effects of Gender on Antibiotics Prescription Pattern Among the Geriatric Patients in Bauchi State*

The finding showed that the hypothesis was accepted because the $X^2_{cal} = 1.604 < X^2_{0.05(3)} = 7.815$, P=0.658. This implied that there was no statistically significant association between gender (males and females) and antibiotic prescription pattern among geriatric patients in Bauchi State (P<0.05). Furthermore, the result showed that antibiotic prescriptions pattern was similar for both males and females patients, suggesting that gender might not be a determining factor in antibiotic prescription pattern or decisions. The lack of significant association implied that healthcare providers in Bauchi State might not be exhibiting gender bias in their antibiotics prescription pattern. This study outcome was in tandem with Ekwoaba, (2021), in Lagos, Nigeria, who reported that the differences between genders with respect to antibiotics prescription pattern were not statistically significant. Sample size could be contributory to the study not showing gender difference as the two previous studies Hicks et al (2015) which showed females at higher risk of antibiotics encounter had sample size more than 800. However, in order to elicit the influence of gender of the respondents on antibiotics prescription pattern among the geriatric patients in Bauchi State, psychosocial statements were put across to the 370 respondents; and the detailed results were as presented in table. Person Chi-square analysis showed that all the component statements were all statistically insignificant.

- *Effects of Gender and Other Patient Related Factors on Misuse of Prescribed Antibiotics Among the Geriatric Patients in Bauchi State.*

The findings showed that the hypothesis was accepted because the $X^2_{cal} = 4.774 < X^2_{0.05(3)} = 7.815$, P=0-1871. This implied that there was no statistically significant association between gender (males and females) and antibiotics misuse among geriatric patients in Bauchi State (P<0.05). This means that antibiotics misuse pattern were similar for both males and females' geriatric patients, suggesting that gender might not be a determining factor in antibiotics misuse among geriatric patients in Bauchi State. This result was in tandem with Agyepong, et al, (2025), study in Ghana which summarily reported that the frequency and number of antibiotics abused showed no significant association with gender, marital status, or age. Despite this, in overall, frequency and number of antibiotics abused showed no significant association with sex, or marital status. Similarly, the factor of poor infection control and antibiotics resistance respectively due to antibiotics misuse, with insignificant difference between the males and the females in both cases, was supported by Agyepong, et al., (2025), where 188 respondents (63.9%) agreed that frequent use of antibiotics is linked to a higher risk of spreading antimicrobial infection and resistance respectively, with no gender bias while 199 respondents (67.5%) were unaware of how antibiotic resistance spreads. This calls for urgent enlightenment to the public as constant misuse of antibiotics decreases individuals immunity and exposes one to poor infection control and antibiotics resistance in the long run.

- *Implications of the Study*

The outcome of this study may likely have the following implications on the geriatric population in Bauchi State and Nigeria in general:

- The study outcome will enable healthcare providers gain insights into current gaps in antibiotics prescribing patterns and patient adherence, enabling them to adopt more comprehensive patient-centered approaches and evidence-based practices in geriatric patient management.
- It will enable policy makers to formulate and enforce strict prescription-only regulations and antimicrobial stewardship programs to promote responsible antibiotic use.
- The findings will aid showcase that gender may not be a determining factor in antibiotic prescription pattern or decisions, guidelines, adherence, and misuses among the geriatric patients in Bauchi State and efforts to promote rational antibiotic prescription pattern, adherence, and

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misuses could be designed to target common challenges faced by geriatric patients as a whole, than paying emphasis on gender-specific strategies.

- The findings will highlight the need for further research on antimicrobial stewardship programs tailored to the needs of the geriatric population in Bauchi State and Nigeria at large.

V. CONCLUSION

In accordance with the study findings, discussions, research questions, and hypotheses, the following conclusions were drawn:

- The study generally showed that there was no gender disparity in antibiotics prescription pattern among geriatric patients in Bauchi State; and protocols for prescription of antibiotics were followed.
- There was no statistically significant association between gender and antibiotic prescription pattern among geriatric patients in Bauchi State.
- Medical history and current symptoms of the respondents were common factors that influenced the decision to prescribe a particular antibiotic medication.

VI. RECOMMENDATIONS

In light of the findings, discussions, and conclusion thereof, the following recommendations were put forth:

- Pharmaco-vigilance agency of the government should formulate a policy intervention through stricter enforcement of prescription-only regulations and digital health tools which would support informed decision-making and proper antibiotics use among the geriatrics.
- Public health organizations should design community-based initiatives that would address specific issues in antibiotic prescription pattern, adherence, and misuse as well as raise awareness about antimicrobial resistance.
- Guidance and counseling programs should be organized for geriatric caregivers and family members to equip them with relevant and up-to-date knowledge on best ways of supporting the geriatrics in the management of their medications to avoid misuse, non-adherence, and antibiotic resistance.
- Since there was no significant association between gender and antibiotics prescription pattern interventions to improve adherence or address misuse should focus on the overall geriatric patients need rather than targeting specific gender.

REFERENCES

[1]. Agyepong, N., Fordjour, F., Osei-Boakye, F., Danquah, M., Apenteng, J. A., & Mensah, S. S. G. (2025). Assessment of antibiotic abuse among patients visiting out-patient department in a teaching hospital in Ghana. *African Journal of Microbiology Research*. 19(5): 93-101.

[2]. Al Masud, A., Walpola, R. L., Sarker, M., Kabir, A., Asaduzzaman, A., Islam, M. S., Mostafa, A. T., Akhtar, Z., & Seale, H. (2025). Assessing community antibiotic usage and adherence as per standard treatment guidelines: A potential area to enhance awareness at community pharmacy settings *Exploratory Research in Clinical and Social Pharmacy*. 17, 1-9. 100552

[3]. Altaye, F, W., Thupayagale-Tshweneagae, G., & Mfidi, F. H. (2024). Qualitative enquiry on factors affecting antibiotic prescribing at primary healthcare facilities in Addis Ababa, Ethiopia. *Frontiers in Medicine.* 11:1308699. doi: 10.3389/fmed.2024.1308699

[4]. Agoba, E. E, Adu, F., Agyare, C., Boamah, V. E, & Boakye, Y. D. (2017). Antibiotic resistance patterns of bacterial isolates from hatcheries and selected fish farms in the Ashanti region of Ghana. *Journal of Microbiology and Antimicrobials* 9:35-46.

[5]. Agyepong N, Fordjour F, & Owusu-Ofori A (2023). Multidrug-resistant Acinetobacter baumannii in healthcare settings in Africa. *Frontiers in Tropical Diseases* 4:1110125.

[6]. Charani, E.; Mendelson, M.; Pallett, S.J.C.; Ahmad, R.; Mpundu, M.; Mbamalu, O.; Bonaconsa, C.; Nampoothiri, V.; Singh, S.; &Peiffer-Smadja, N. (2023). An analysis of existing national action plans for antimicrobial resistance-gaps and opportunities in strategies optimising antibiotic use in human populations. *Lancet Global Health*, 11, e466–e474. [CrossRef] [PubMed].

[7]. Donkor, G.Y., Dontoh, E., & Owusu-Ofori, A. (2019). A cross-sectional study on the prevalence of antibiotic use prior to laboratory tests at two Ghanaian hospitals. PloS one 14: e0210716.

[8]. Ehsan, H (2025). Antibiotic Resistance in Developing Countries: Emerging Threats and Policy Responses. Public Health Challenges 4: e70034.

[9]. Eggermont, D., Smit, M. A. M., Kwestroo, G. A., Verheij, R. A., Hek, K., & Kunst., A, E. (2018). The influence of gender concordance between general practitioner and patient on antibiotic prescribing for sore throat symptoms: a retrospective study. *BMC Family Practice*. 19:175

[10]. Ekwoaba, D. I. (2021). Socio-Demographics of Patients and Antibiotic Prescription Pattern in a Community Health Facility in Lagos. *UJMR,* Volume 6 Number 1,, pp 201 - 207 ISSN: 2616 - 06 https://doi.org/10.47430/ujmr.2161.027

[11]. Fishbein, S. R. S, Mahmud, B, & Dantas, G. (2023). Antibiotic perturbations to the gut microbiome. *Nat Rev Microbiol*;21(12):772–88.

[12]. Gemson, G. S. &Kyamru, J. I. (2013) *Theory and Practice of Research Methods in for the Health and Social Sciences. Jalingo: Livingstone Publishers.*

[13]. Health Ministry Health Workforce Profile (*2024). Bauchi State Government of Nigeria, Ministry of Health Bauchi*

[14]. Hicks, L, A., Bartoces, M. G., Roberts, R. M., Suda, K. J., Hunkler, R. J., Taylor, T. H. & Schrag, S. J. (2025). US Outpatient Antibiotic Prescribing Variation According to Geography, Patient

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan161

Population, and Provider Specialty in 2011, *Clinical Infectious Diseases*, 60 (9), 1308–1316. https://doi.org/10.1093/cid/civ076

[15]. Nicholas, A., Francis, F.,, Felix, O.,, Mark, D., John, Antwi, A., & Mensah, S. S. G., (2025).

[16]. Assessment of antibiotic abuse among patients visiting out-patient department in a Teaching Hospital in Ghana. *African Journal of Microbiology Research*, Vol. 19(5), pp. 93-101, DOI: 10.5897/AJMR2025.9800.

[17]. Ogbonna, B., Ovwighose, S, Okpalanma, N., Mmaduekwe, H., Okeke, A., Anetoh, M., Adenola, U., Umeh, I., Ejieh, L., & Nduka, J. (2022). Pattern of antibiotics prescription in a tertiary hospital in delta state, Nigeria. *Afrimedic Journal*; 8(1): 1-11.

[18]. Tadesse, Y. B., Kassaw, A. T, & Belachew, E. A. (2023). Evaluating selfmedication practices in Ethiopia. *Journal of Pharmaceutical Policy and Practice* 16:47

[19]. Takedani Y, Nakamura T, Fukiwake N, Imada T, Mashino J, & Morimoto T. (2021). Clinical characteristics and factors related to antibiotic-associated diarrhea in elderly patients with pneumonia: a retrospective cohort study. *BMC Geriatr* 2021;21(1): 317.

[20]. Zhou, X. (2023). Antibiotic culture: a history of antibiotic use in the second half of the 20th and early 21st century in the People's Republic of China. *Antibiotics* 12:510.

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APPENDIX: ETHICAL CLEARANCE

MOH/GEN/S/1409/I

11th April 2025

PROTOCOL REG. N0: BSMOH/REC/0134/2025

PROTOCOL APPROVAL N0: NHREC/TR/BAU-HREC/28/8/2023

PROTOCOL APPROVAL DATE N0: April 2025 TO March 2026

Adamu Babayo

Department of Public Health, Post Graduate School Maryam Abacha American University Kano, P.M.B 05, Kano Kano State, Nigeria

ETHICAL CLEARANCE FOR SUBMITTED PROTOCOL:

"Assessment of Antibiotic Prescription, Adherence and Misuse in Geriatric Population: Comparison of Males and females in Bauchi State, Nigeria"

The Bauchi State Health Research Ethics Committee (HREC) under the State Ministry of Health has received the above-named protocol for Ethical Clearance and approval in line with the guidelines set by the Committee. The protocol was reviewed and the Committee noted that the research falls under the Low-Risk Category which does not entails clinical trials or any invasive procedures.

Consequently, the Committee has granted expedited approval for the research to be conducted within the stipulated timeframe above. However, you should share with us your workplan clearly indicating the start date, where and when to visit the research site(s) and also the final results of your findings

The Committee requires you to comply with all Institutional Guidelines, Rules and Regulations and with the Tenets and Code of the National Health Research Ethics Committee including that all adverse events are reported promptly to the Committee. No changes are permitted in the research without prior approval by the Committee except in circumstances outlined in the Code. The Committee reserves the right to conduct compliance visit to your research site at short notice.

(Nuru Yakubu Umar)

DPRS-SMOH

For: Hon. Commissioner