# Knowledge and Perception of HealthCare Workers on Antibiotic Resistance and Predictors of Antibiotic Prescription Pattern in Benue State, Nigeria.


## ABSTRACT

**Aim:** As the earth continues to warm, the emergence of antimicrobial resistant pathogens poses huge threats to global public health, especially in resource-poor countries such as Nigeria. The present study was aimed to access the knowledge gaps in healthcare professionals on antibiotic resistance and determine the predictors of antibiotic prescription in Benue State, Nigeria

**Study Design**: Using a facility-based cross-sectional study,

**Place and Duration of the Study**: Randomly selected three primary health care facilities, three secondary health care facilities and three Tertiary health care facilities in Benue State Nigeria from January 2023 to December, 2024

**Methods:** A total of 427 healthcare workers (HCW) were administered pre-tested, semi-structured questionnaires in this multi-stage descriptive cross-sectional study.

**Results:** The mean age of participants was 37.27±9.41 years, with majority (73.3%) having good knowledge on antibiotic prescription. About 55% of participants had good perception of antibiotic prescription, with 13.7% prescribing metronidazole. Participants agreed that safety (72.8%), severity of disease (86.7%), accessibility of antibiotic by patients (79.6%), standard treatment guidelines (77.8%), effectiveness of antibiotics (86.2%), and antibiotic resistance concerns (88.1%), respectively, influenced their choices of prescription. Physicians had the highest proportion of prescription of antibiotic (98%), and participants with negative perception of antibiotic resistance had the highest proportion (84.8%) of prescription of antibiotic. Furthermore, the logistic regression model was statistically significant ($p < 0.0001$), with physicians and participants who agreed that accessibility to antibiotic by patients being 2.57 times more likely to prescribe antibiotics.

**Conclusion:** The present study showed a good perception and knowledge by HCW on antibiotic prescription and resistance. With the hope of compliance to global best practices, we recommend that healthcare workers in Benue state should avoid indiscriminate prescription of antimicrobials,

and patients should only consult with trained HCW for drug prescription and dispensing.

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**Keywords:** Antibiotic resistance, pathogens, prescription, healthcare workers, cross sectional study, questionnaire, Benue state, Nigeria

## INTRODUCTION

Antibiotics have been used successfully to treat infection for many years and have made the management of infectious diseases easier, thereby decreasing morbidity and mortality among individuals infected with infectious bacterial diseases [Carlet *et al*.,2011]. Evidence indicates that there is development of antimicrobial resistance (AMR) in both hospital and community settings because of use and misuse of antibiotics [ Ashley et al.,2011, WHO 2012,ABCC, 2018]. Antibiotic resistance causes an estimated 700,000 death each year globally and if not adequately checked will constitute to over 10 million deaths per year and over 100 million USD in lost output globally in 2050 [ABCE, 2018]. According to CDC (2013), two million people coupled with about twenty-three million deaths occur because of antibiotic resistance globally [CDC, 2018]. According to O'Neil, (2018) projected that in 2025, about ten million peoples are expected to die because of antibiotic resistance [WEF, 2013] The recent trend has rendered treatment ineffective, complicating patient management, increase hospital stay, and increasing patient morbidity and mortality [Sabry *et al* ., 2014, WHO, 2015]. At the same time, the consequences of antibiotic resistance may be felt harder in a setting of scarce economical resources, because alternative antibacterial drugs tend to be unavailable or unaffordable. The inappropriate antimicrobial prescribing patterns among health care professionals, over-use of antibiotics in treating both animals and crops for better performance may ultimately increase the risk of antibiotic resistance, the ability of bacteria to adopt to environmental changes are significant contributory factors factor especially in low- and medium-income countries like Nigeria. [ O' Neil 2018, Cosgrove and Carmal 2003] Also, availability of antibiotics without prescription, use of poor-quality antibiotics and other factors, which promote the emergence of antibiotic resistance, may be more frequent in Nigeria. [Newton *et a*l.,2006, Kapp, 2002, Pillai *et al*., 1999] The high prevalence of human immune deficiency virus epidemic may also influence both the spectrum of bacteria causing infection, misuse of antibiotics in the treatment of opportunistic infection, and antibiotic resistance pattern [Amobi et al 2023, Abraham et al 2009, Paul, et al 2018, Mwambete and Eulambius2018 , Siegal et al., 2006]. With such postulation, it becomes worrisome as Benue State has the second highest prevalence of human immunodeficiency virus (HIV) disease in Nigeria, 4.9%, and an estimated burden of 184,745 people living with HIV (Jawanle*et al*., 2023). Also, Benue state has the highest reported prevalence of 16.0% of active tuberculosis cases and other opportunistic infection associated with HIV [Agide*et al*., 2020, Ragavan and Arunagirathan, 2018] The treatment of these opportunistic infection because of HIV epidemic and high prevalence of tuberculosis without good knowledge of antibiotic usage and positive perception on antibiotic resistance by health care professionals will lead to development of antibiotic resistance. It is essential for health care professionals to have up to date knowledge about antibiotics to enable its usage effectively and appropriately. This study aimed at accessing the

perception and knowledge of healthcare professionals on antibiotic resistance and predictors of antibiotic prescription and pattern in Benue State – Nigeria.

## 2. MATERIAL AND METHODS

### Study Area

The Benue State is one of the North-Central States in Nigeria with population of 4,253,641 according to the 2006 census, and a projected population of 6,787,706 in 2023. Its capital is Makurdi. Benue State lie within longitude $7^{o}47$, $10^{o}$E and Latitude $6^{o}21$, $8^{o}81^{o}$N. It shares boundaries with Nasarawa State to the North, Taraba State to the East, Cross River State to the South, Enugu and Ebonyi States to the South-West and Kogi State to the West. It also shares boundaries with Republic of Cameroon to the South-East. Benue state have three senatorial districts, twenty-three local government areas, and one thousand, four hundred and ten health facilities that cut across the three senatorial districts.

### Study Design

A descriptive cross-sectional study was designed using qualitative method to access the prescription pattern of antibiotics among healthcare professionals in Benue state.

### Study population

The study population were multidisciplinary healthcare workers such as doctors, nurses, pharmacist, medical laboratory scientist, physiotherapist, community health care extension workers, and allied health workers in the study area.

#### Inclusion Criteria

Inclusion criteria for the study were healthcare workers that was working with government owed health facilities in those randomly selected local government areas. Only healthcare professionals who were actively involved in clinical practice where included.

#### Exclusion Criteria.

The study excluded healthcare workers who practiced in private healthcare facilities and those in administrative positions. Also, veterinarians were not included in the study.

### Sample size determination

The minimum sample size required for the study was determined using Cochran's formula [Cochran ,1963]. The sample size calculated was 384 and adjusted for non-response (non-response rate of 10% was anticipated), giving a final sample size of 427.

### Sampling

Multistage sampling technique was used to recruit participants for the study. Stage 1 involved selection of participants from each senatorial district of Benue State, namely zones A, B and C. Stage 2 involved selection of local government areas to be sampled from each senatorial district using simple random sampling method. Stage 3 involved selection of primary, secondary, and tertiary healthcare facilities in each randomly selected local government area. The selected local government areas were Makurdi, Katsina-Ala and Otukpo. The process involved proportional allocation of participants to

each healthcare facility in the selected local government area in the different senatorial districts. Stage 4: It involved the random selection of different cadres of health care workers from the list of randomly selected primary, secondary and tertiary health care facilities through systematic random sampling method. Sample interval was calculated by dividing the sample frame by the sample size and multiplied by total population of participants.

### Data Collection Method

The questionnaires were administered to each health care professionals in the calculated samples. This collection process spanned about 12 weeks with average of 5-20 questionnaires per day.

**Data Measurement**

**Measurement of Variable**

The outcome variable was the antibiotic prescription knowledge, and the explanatory variables were categorized into five themes: Sociodemographic characteristics, antibiotic prescription knowledge, pattern of antibiotic prescription and factors influencing the prescription of antibiotics.

### Statistical Analysis

The Statistical Package for Social Science (SPSS) Version 23 was used in analyzing the data. The descriptive statistics were generated for each study variable such as frequencies and percentages for categorical variables, mean and standard deviation for continuous variables. The prevalence of knowledge of antibiotic prescription, pattern of antibiotic prescription, diseased condition that antibiotic was prescribed, and perception of antibiotic resistance were presented on pie chart and bar chart, respectively. Chi-square was used to test the association between socio-demographic, knowledge of antibiotic prescription, perception of antibiotic resistance and dependent variable (prescription of antibiotic) multivariable logistic regression was performed to identify variable predicting antibiotic prescription. The variable associated with a p-value < 0.001 in the bivariate analysis were considered eligible for inclusion into multiple logistic ratio analysis. Adjusted ratio estimated from logistic regression with 95% confidence interval (CL) were also used to measure the strength of association and level of statistical significance was set at p-value <0.05 in all the analysis.

## 3. Results and Discussion

A total of 427 Health care workers were recruited for the study. The age range of participant was 20 to 60 years, and their mean age was 37.27±9.41 years. Health care workers aged 31-41years had the highest frequency (39.3%) and majority of participants are female (59%). Above one third of the participants were nurses 35.1% and almost all the participants, were Christians (96.7%). Most of the participants are from secondary healthcare facilities (49.2%). and from Zone B senatorial district of Benue State Nigeria (41.9%). The health care workers play an important role in preventing global crises of

antibiotic resistance. The cross-sectional study showed that the highest age range of healthcare workers 31-40 years which was within the active civil service age group required for optimum clinical services delivery was similar to the study by Bai *et al.* 2016. (31-40 years). Most of the health care workers were female because majority of the health care workers were nurses which were mostly dominated by female health care workers and was similar to the study of European Centre for Disease Control and Prevention [ECDC, 2019]. Professionally, the highest proportion among the health care workers were nurses and was similar by the study of Asante *et al*. 2017. Majority of the health care workers were Christians because most practiced religion among the resident of Benue State were Christianity. Also, majority of health care workers were from Zone B senatorial district because this is where the State capital and Federal Medical Centre were located

A greater proportion of participants (13.7%) prescribed metronidazole and the least (2.1%) was meropenem.

A higher proportion (13.7%) of the disease condition was typhoid fever, closely followed by pneumonia with (12.7%) and the least condition was head rashes with (2.4%) respectively that antibiotic was prescribed.

On knowledge of antibiotic prescription among participants, majority of the participants had good knowledge on antibiotic prescription, (73.3%) while greater proportion of participants (13.7%) prescribed metronidazole. The greater proportion of participants (13.7%) prescribed antibiotics for typhoid fever.

On perception of antibiotic resistance among participants, above half of the participants (55.1%) had positive perception to antibiotic resistance while (44.9%) had negative perception to antibiotic resistance. Most of the health care workers have good knowledge on antibiotic prescription because this study involved mostly physicians, nurses and pharmacist working with tertiary health care facilities which was similar to the study by Akodu*et al*. 2022. Other studies by Marzan *et al.,* 2021and Gunte*et al*., 2019 also lend credence on this study regarding the inappropriate use of antibiotics. Again, above half of the health care worker (56%) working with tertiary health faculties had positive perception on antibiotic resistance when compared to the health care workers working with primary and secondary health care facilities (44%) that had negative perception about antibiotic resistance was in contrast with the study by Akedo-Alex *et al*., 2019 (78.3%) This could be explained that in this study it involved an experienced health worker. In contrast this research study was similar to the study by Abbo *et al.*, 2011 in Florida. In the pattern of prescription of antibiotics among health care workers in this study shows that metronidazole, ciprofloxacin, and Augmentin have the highest proportion, [13.7%, 11.4% and 9.9%] respectively, while typhoid fever, pneumonia, skin infection and acute diarrhoea were the highest that antibiotic and being prescribed. These disease conditions which antibiotic are being prescribed were mainly symptoms of illness that results in inappropriate use of antibiotics was similar to the study Chem *et al*., 2018 and Hodosan*et al.,* 2023 in Cameroon, and Romania. The clinical diagnosis of typhoid fever, cough, and diarrhea have been associated with risks for antibiotic resistance [Tarrant *et al* 2021, Wasihume*et al* 2015, Onyekwe 2007, Shakalagbe*et al*., 2014]. The findings here and other studies showed that healthcare care workers use broad spectrum antibiotics as their first option in the management of infectious disease

The higher frequency (72.8%) of the participants agreed that safety of the antibiotic to the patients influence their prescription while (86.7%) agreed that severity of infectious disease condition influences their prescription of antibiotics. Again, (79.6%) agreed that accessibility of antibiotic by the patients influence their prescription. Also (77.8%) agreed that standard treatment guideline influence then choice of antibiotic prescription while (86.2%) agreed that effectiveness of antibiotics influences their choice of antibiotic prescription. In this study, the finding on the factors influencing the antibiotic prescription showed that safety of the antibiotic, 72.8%, severity of the infection's disease condition, 86.7%, Accessibility of the antibiotics, Standard treatment guidelines 77.8%, Antibiotic resistance concern ,74.5%, affordability

of antibiotics ,78.2%, were major factors that influences the prescription of antibiotic by the participants and these behavioral practices as revealed in several studies have positive impact on prudent antibiotic prescription.[Vander steen*et al*., 2014, Livorsi *et al*., 2015] These findings was also similar to the study by van Bull *et al*., 2014 and Kokani*et al*., 2010 in Netherland and New Delhi.

The participants with good knowledge about antibiotic prescription had the higher prevalence of antibiotic prescription (86.3%) when compared to those with good knowledge but do not prescribe antibiotics (13.7%). This was statistically significant ($p<0.05$.) Again, participants with poor knowledge of antibiotic prescription (78.1%) had higher proportion of prescription of antibiotics when compared to those with poor knowledge and does not prescribe antibiotics (21.9%).The participants with negative perception of antibiotic resistance slightly had the higher proportion of prescription of antibiotic (84.8%) when compared to those who had negative perception and does not prescribe antibiotics (15.2%) However, this was statistically significant($p<0.05$). Most of participants with positive perception of antibiotic resistance slightly had the higher prevalence of prescription of antibiotic (83.8%) when compared to those who had positive perception and does not prescribe antibiotics (16.2%) and this was not statistically significant ($p>0.05$). In this study, there was a significantly associations between the knowledge of antibiotic, perception of antibiotic resistance and prescription of antibiotic. The health care workers with good knowledge about antibiotics use also had higher prevalence in prescription of antibiotics, when compared to those participants with poor knowledge on antibiotic usage. This implies that only those health care workers with higher education have good knowledge about the antibiotic usage and prescribes more antibiotics. Physicians were highly educated and even engaged in additional trainings that expose them on proper use of antibiotics. This findins was similar to the study by Belkina et al.,2014 in Yemen, Saudi Arabia, and pakistan. Again, health care worker who had negative perception on antibiotic resistance slightly had higher prevalence of prescription of antibiotic when compared to those who had positive perception on antibiotic resistance. This simply implies that those health care workers who had poor knowledge on antibiotics use, and resistance may be working with primary and secondary health care facilities had negative perception on antibiotic resistance because of their low level of qualification engaged in misuse of antibiotic that may results in antibiotic resistance. In this study, there was a statistically association between profession, health care facilities, number of years in practice and knowledge of antibiotic use. Therefore, physicians working with tertiary healthcare facilities had higher prevalence to antibiotic prescription because they had best knowledge on antibiotic use since there was more opportunities that expose them trainings on an antibiotic use and resistance when compared to those physicians working with secondary and primary health care facilities. The findings

were similar to the study by Chukwu *et al*., 2021 in Nigeria. It is also similar by the study on antibiotic prescribing behaviour among general practitioners- questionnaire based study in Germany [Flonan et al., 2018] This is because physicians are highly trained in the field of clinical practice than any other health care professionals. This study also showed a statistically association between that health care facilities and the knowledge on antibiotic use and resistance. The tertiary health care facilities are well equipped with both modern facilities and qualified health care workers that includes the medical doctors, nurses, medical laboratory scientist pharmacist etc. Meanwhile the secondary and primary health care facilities are faced with lack of modern facilities and enough qualified health care workers. Again, the primary health care facilities are mainly managed by community health extension workers (CHEWs) and other allied health care professionals such as pharmacist technicians, medical laboratory technicians and these inadequacies poses a lot of threat as it regards antibiotic resistance. These findings concurred with the studies by Ogonia*et al*., 2021, Gwimile*et a*l., 2012, Hulscher *et al*., 2010a, Hulscher *et al*., 2010b Grossman *et al*.,2012, Brookes-Howell et al 2012 and Bjmsdottir and Hamser., 2002.

A logistic regression was performed to ascertain the effects of sex, profession, knowledge of antibiotic, safety of antibiotic, accessibility of the antibiotic by the patients, standard treatment guideline, antibiotic resistance concern, affordability of the antibiotic by the patients, effectiveness of the antibiotic and tolerability of the antibiotic by the patients on the likelihood that participants will prescribe or dispense antibiotic. Variables that were eligible to be entered into the logistics regression model were those that were statistically significant (P <0.05) on bivariate analysis. The logistic regression model was statistically significant, ($\chi^2_{(16)}$ =79.07, $p$ <0.0001). The model explained 29% (Nagelkerke $R^2$) of the variance in prescription of antibiotic and correctly classified (84.1%) of cases. Only physician participants and participants who agreed that accessibility to antibiotic by patient were 29.80 and 2.57 times more likely to prescribe or dispense antibiotic. This was statistically significant (p<0.05) respectively.

At bivariant level, the multivariant such as sex, profession, knowledge of antibiotic, safety of antibiotic, accessibility of the antibiotic by the patients, standard treatment guideline, antibiotic resistance concern, affordability of the antibiotic by the patients, effectiveness of the antibiotic and tolerability of the antibiotic by the patients were subjected to logistic regression to determine the indicator for antibiotic prescription. The variables were statistically significant p<0.05 on bivariate analysis and the only physician participants and participants who agreed that accessibility to antibiotic by patient were 29.80 and 2.57 times more likely to prescribe or dispense antibiotic. This was statistically significant (p<0.05)

respectively. This is true because physicians who were well trained have good knowledge about antibiotic prescription and availability of antibiotic when prescribed by physicians are major key factors for patients to be treated.

## 4. CONCLUSION

The knowledge of antibiotics prescription was high among physicians in tertiary health care facilities. The good knowledge on antibiotic usage and positive perception about antibiotic resistance contributed to the high prevalence of prescription among physicians in tertiary facilities in Benue State. Again, primary, and secondary health care facilities were faced with inadequate number of physicians and pharmacists that results in the engagement of nurses, and community health extension workers for the management of patients with infectious disease that result in poor knowledge of antibiotic usage and negative perception of antibiotic resistance recorded in this study. With the hope of compliance to global best practices, we recommend that healthcare workers in Benue state should avoid indiscriminate prescription of antimicrobials, and patients should only consult with trained HCW for drug prescription and dispensing

## CONSENT

A written consent was obtained from all the health workers during the research

## ETHICAL APPROVAL

The ethical approval for this research were obtained from research and ethics committee of Benue State Ministry of Health [MOH/STA/204/VOL.1/218], Benue State Hospital Management Board [HMB/OFF/215/VOL.III/625], Benue State Primary health care Management Board [PHC/OFF/456/1/2] and Federal Medical Centre. Makurdi [FMH/FMC/HREC/108/VOL.1].

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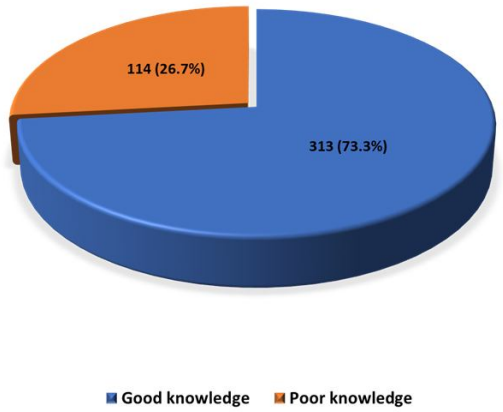


**Figure 1: Pie chart showing knowledge of antibiotic prescription among participants**

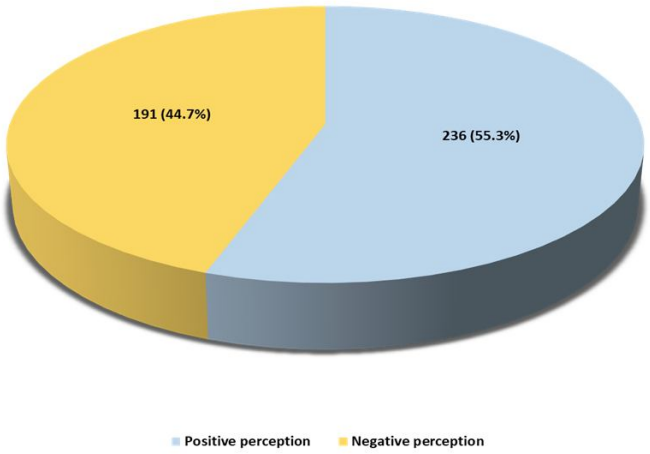


**Figure 2: Pie chart showing perception of antibiotic resistance among participants**

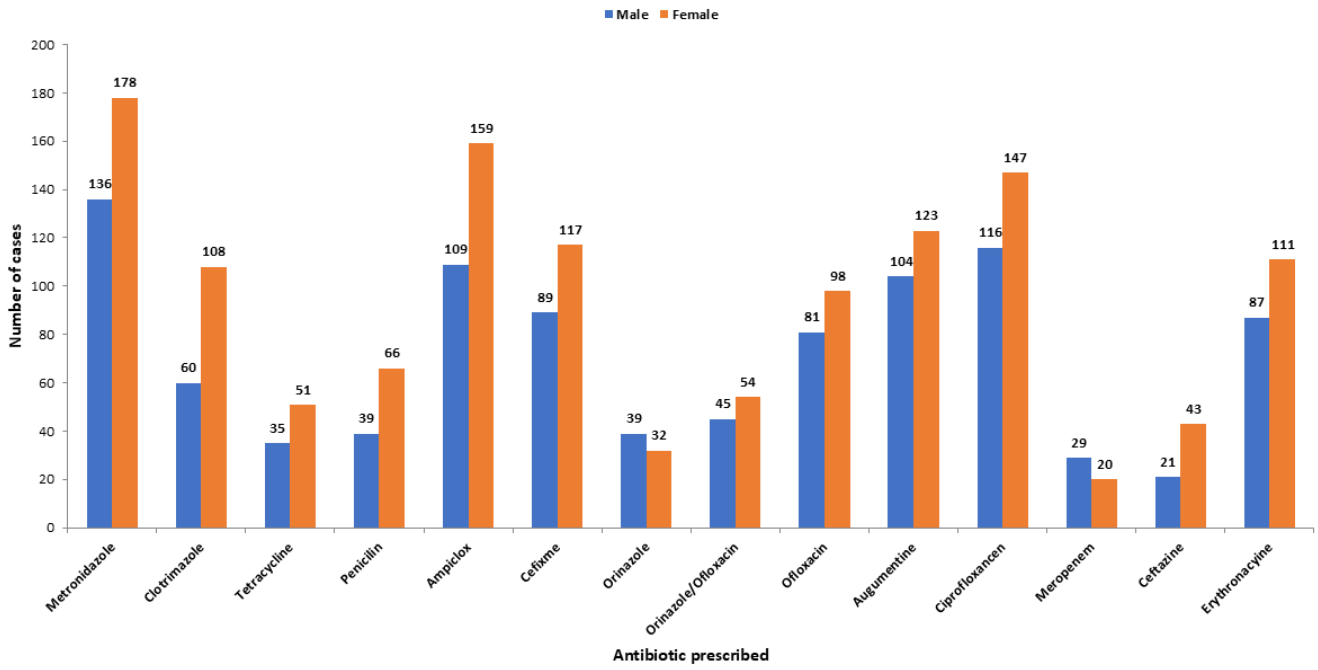


Figure 3: Bar chart showing antibiotic prescribed among participants.

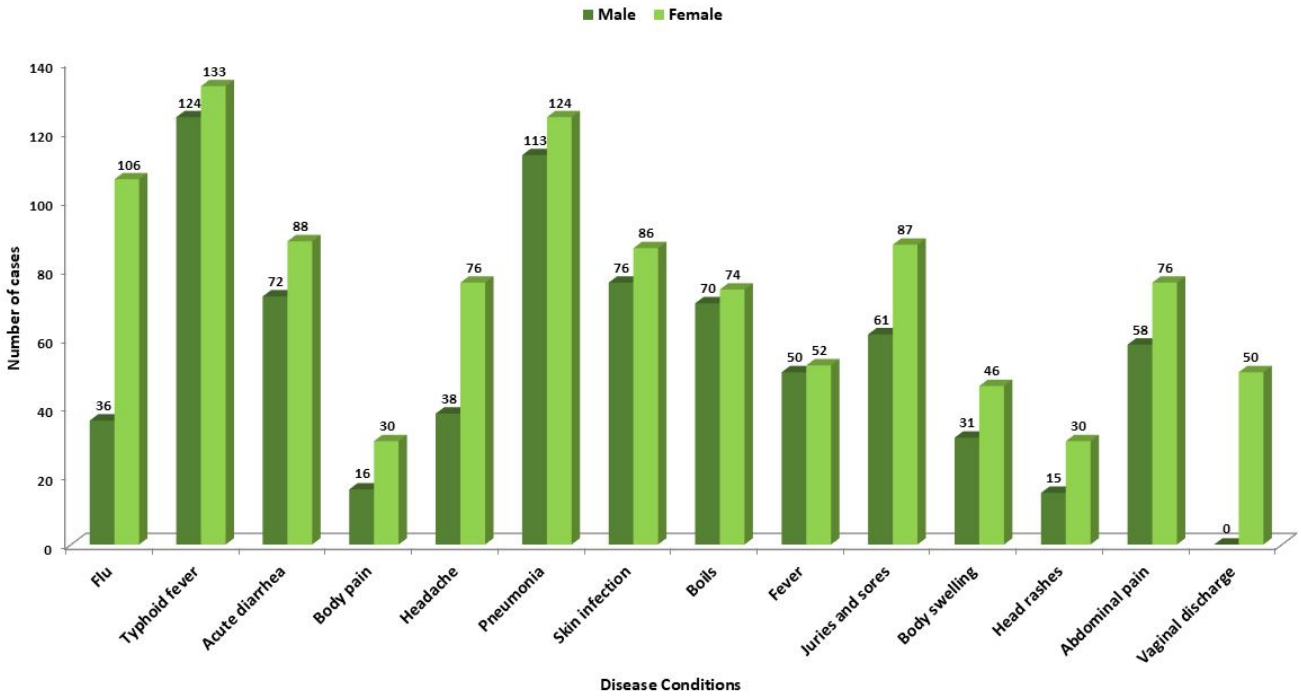


Figure 4: Bar chart showing disease condition that antibiotic was prescribed

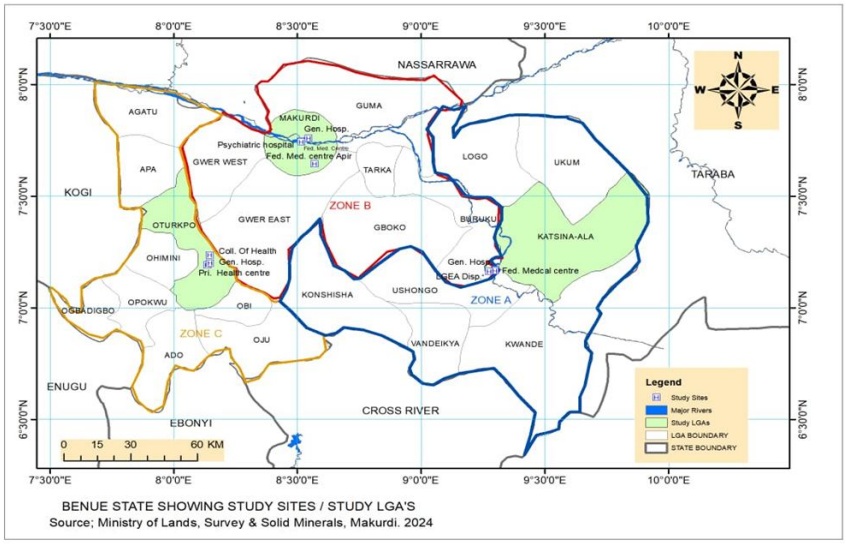


Figure 5: Map of study Area

**Table 1- Socio-demographic characteristics of participants.**

| Socio-demographic | Frequency | Percent |
|---|---|---|
| **Age (in years)** | | |
| 20-30 | 119 | 27.9 |
| 31-40 | 168 | 39.3 |
| 41-50 | 102 | 23.9 |
| >50 | 38 | 8.9 |
| **Mean=37.27±9.41** | | |
| **Sex** | | |
| Male | 175 | 41.0 |
| Female | 252 | 59.0 |
| **Marital status** | | |
| Single | 120 | 28.1 |
| Married | 291 | 68.2 |
| Separated | 3 | 0.7 |
| Divorced | 3 | 0.7 |
| Widowed | 10 | 2.3 |
| **Professions** | | |
| Physicians | 99 | 23.2 |
| Nurses | 150 | 35.1 |
| Community health extension worker | 89 | 20.8 |
| Pharmacist | 40 | 9.4 |
| Medical laboratory scientist | 35 | 8.2 |
| Physiotherapist | 12 | 2.8 |
| Others (allied health professional | 2 | 0.5 |
| **Religion** | | |
| Christianity | 413 | 96.7 |
| Islam | 13 | 3.1 |
| Others | 1 | 0.2 |
| **Ethnicity** | | |
| Tiv | 219 | 51.3 |
| Idoma | 135 | 31.6 |
| Igede | 17 | 4.0 |
| Others* | 56 | 13.1 |
| **Health care facility** | | |
| Primary health care | 95 | 22.2 |
| Secondary healthcare | 210 | 49.2 |
| Tertiary healthcare | 122 | 28.6 |
| **Number of years in practice** | | |
| 1-5 | 128 | 30.0 |
| 6-10 | 113 | 26.5 |
| 11-15 | 99 | 23.2 |
| 16-20 | 36 | 8.4 |
| >20 | 51 | 11.9 |
| **Mean=10.67±7.66** | | |
| **Senatorial district** | | |
| Zone A | 126 | 29.5 |
| Zone B | 179 | 41.9 |
| Zone C | 122 | 28.6 |
| *=others include Yoruba, Hausa, Igbo | | |

| **Table 2: The perceived factors that influence antibiotic prescription among participants.** | | |
|---|---|---|
| **Variables** | **Frequency** | **Percent** |
| **Safety of the antibiotic to the patient** | | |
| Agree | 311 | 72.8 |

| | | |
|---|---|---|
| Disagree | 116 | 27.2 |
| **Severity of the infectious disease condition** | | |
| Agree | 370 | 86.7 |
| Disagree | 57 | 13.3 |
| **Accessibility of the antibiotics by the patients** | | |
| Agree | 340 | 79.6 |
| Disagree | 87 | 20.4 |
| **Patient satisfaction** | | |
| Agree | 259 | 60.7 |
| Disagree | 168 | 39.3 |
| **Treatment uncertainty** | | |
| Agree | 243 | 56.9 |
| Disagree | 184 | 43.1 |
| **Standard treatment guidelines** | | |
| Agree | 332 | 77.8 |
| Disagree | 95 | 22.2 |
| **Drug promotion by pharmaceutical sales representative** | | |
| Agree | 265 | 62.1 |
| Disagree | 162 | 37.9 |
| **Antibiotic resistance concerns** | | |
| Agree | 318 | 74.5 |
| Disagree | 109 | 25.5 |
| **To prevent serious complications** | | |
| Agree | 359 | 84.1 |
| Disagree | 68 | 15.9 |
| **Affordability of the antibiotic by the patients** | | |
| Agree | 334 | 78.2 |
| Disagree | 93 | 21.8 |
| **Effectiveness of the antibiotics** | | |
| Agree | 368 | 86.2 |
| Disagree | 59 | 13.8 |
| **Tolerability of the antibiotics by the patients** | | |
| Agree | 362 | 84.8 |
| Disagree | 65 | 15.2 |
| **The level of immune status of the patients** | | |
| Agree | 304 | 71.2 |
| Disagree | 123 | 28.8 |
| **Uncertainty of the diagnosis** | | |
| Agree | 198 | 46.4 |
| Disagree | 229 | 53.6 |

**Table 3: Association between knowledge of antibiotic, perception of antibiotic resistance and prescription of antibiotic**

| **Variables** | **Prescribe or dispense antibiotic** | | **Test statistics** | **Df** | **p-value** |
|---|---|---|---|---|---|
| | **Yes n=359 n (%)** | **No n=68 n (%)** | | | |
| **Knowledge on antibiotic prescription** | | | $\chi^2$=4.18 | 1 | 0.041* |
| Poor knowledge | 89(78.1) | 25(21.9) | | | |
| Good knowledge | 270(86.3) | 43(13.7) | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Perception of antibiotic resistance** | | | $\chi^2$=0.14 | 1 | 0.706 |
| Negative | 162(84.8) | 29(15.2) | | | |
| Positive | 197(83.5) | 39(16.5) | | | |

**Table 4: Logistic regression model of independent variable predicting prescription of antibiotic**

| **Predicting Variables** | **Adjusted odds ratio (aOR)** | **95% confidence Interval (CI)** | **p-value** |
|---|---|---|---|
| **Sex** | | | |
| Male | 1.84 | 0.90 – 3.75 | 0.090 |
| Female | Reference | | |
| **Professions** | | | |
| Physicians | 29.80 | 1.11 – 796.31 | 0.043* |
| Nurses | 6.13 | 0.29 – 127.46 | 0.241 |
| Community health extension worker | 2.88 | 0.14 – 57.86 | 0.489 |
| Pharmacist | 1.34 | 0.06 – 28.58 | 0.850 |
| Medical laboratory scientist | 1.03 | 0.04 – 22.12 | 0.985 |
| Physiotherapist | 3.48 | 0.11 – 106.70 | 0.474 |
| Others (allied health professional | Reference | | |
| **Knowledge on antibiotic prescription** | | | |
| Poor knowledge | Reference | | |
| Good knowledge | 0.78 | 0.38 – 1.60 | 0.503 |
| **Safety of the antibiotic to the patient** | | | |
| Agree | 1.55 | 0.70 – 3.41 | 0.273 |
| Disagree | Reference | | |
| **Severity of the infectious disease condition** | | | |
| Agree | 1.44 | 0.51 – 4.11 | 0.486 |
| Disagree | Reference | | |
| **Accessibility of the antibiotics by the patients** | | | |
| Agree | 2.57 | 1.17 – 5.64 | 0.018* |
| Disagree | Reference | | |
| **Standard treatment guidelines** | | | |
| Agree | 1.24 | 0.55 – 2.78 | 0.589 |
| Disagree | Reference | | |
| **Antibiotic resistance concerns** | | | |
| Agree | 1.18 | 0.55 – 2.52 | 0.667 |
| Disagree | Reference | | |
| **Affordability of the antibiotic by the patients** | | | |
| Agree | 0.80 | 0.35 -1.81 | 0.595 |
| Disagree | Reference | | |
| **Effectiveness of the antibiotics** | | | |
| Agree | 2.27 | 0.88 – 5.85 | 0.088 |
| Disagree | Reference | | |
| **Tolerability of the antibiotics by the patients** | | | |
| Agree | 0.80 | 0.33 – 1.98 | 0.643 |
| Disagree | Reference | | |

Note: *p<0.05; Omnibus good of fit test: $\chi^2$=79.07, df=16, p=0.000; Homsmer-Lemeshow test: $\chi^2$=12.27, df=16, p=0.092; Nagelkerke $R^2$=0.290; Dependent Variable: Prescription of Antibiotics

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| Others (allied health professional | Reference | | |
| **Knowledge on antibiotic prescription** | | | |
| Poor knowledge | Reference | | |
| Good knowledge | 0.78 | 0.38 – 1.60 | 0.503 |
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| Note: *p<0.05; Omnibus good of fit test: $\chi^2$=79.07, df=16, p=0.000; Homsmer-Lemeshow test: $\chi^2$=12.27, df=16, p=0.092; Nagelkerke $R^2$=0.290; Dependent Variable: Prescription of Antibiotics | | | |