

Community-based Assessment of Awareness and Behaviour Towards Antibiotic Use and Resistance in Osun State: Implications for Infection Prevention and Control in Nigeria

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**COMMUNITY-BASED ASSESSMENT OF AWARENESS AND BEHAVIOUR TOWARDS
ANTIBIOTIC USE AND RESISTANCE IN OSUN STATE: IMPLICATIONS FOR
INFECTION PREVENTION AND CONTROL IN NIGERIA**

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ABSTRACT

Background: Antimicrobial resistance (AMR) poses a major public health challenge with implications for infection prevention and control. Public awareness and behavioural practices regarding antibiotic use are important determinants of AMR control. Understanding community perceptions and practices is essential for strengthening infection prevention and control strategies and supporting evidence-based antimicrobial stewardship policies. This study was designed to assess the awareness and behaviour towards antibiotic use and resistance among community dwellers in Ede region of Osun State, Nigeria.

Methods: A validated, structured questionnaire was used to collect data via a four-level multistage sampling technique, with an appropriate sample size determination technique. Data generated were captured and cleaned in Excel 2019, then exported and analysed using SPSS Statistics version 25. P-values of less than 0.05 were taken as significant at a 95% confidence interval.

Results: The study was conducted among 336 respondents, comprising 165 (49.1%) respondents from Ede South and 171 (50.9%) from Ede North. The participants included 157 (46.7%) males and 179 (53.3%) females, and the majority were young people under 40 years old (248/73.9%), had low levels of education (207/61.6%), and were low-income earners (207/61.6%). The study revealed low levels of awareness (47.3%) and behaviour (Attitude: 38.3%; Practice: 55.3%) among the respondents. Several independent variables significantly influenced respondents' AMR knowledge and practices, including location, marital status, education, and choice of healthcare facility. Meanwhile, age and gender significantly influenced AMR knowledge, while distance to a healthcare facility and monthly income significantly influenced respondents' practice. High prevalence of self-medication, misuse of antibiotics, premature discontinuation of therapy, and non-prescription antibiotic use were prevalent among respondents.

Conclusions: These findings are of major public health concern because inappropriate antibiotic use contributes significantly to the emergence and spread of antimicrobial resistance, which remains a growing global health threat, and a serious implication for infection prevention and control in Nigeria. There is a need for a concerted effort to strengthen the enforcement of policies on antibiotic prescribing and sales among relevant healthcare workers, especially patent medicine vendors and community pharmacies.

KEYWORDS: Antibiotic use, antimicrobial resistance (AMR), community-based study, knowledge attitude and practice (KAP), Infection prevention and control, Osun State, Nigeria

BACKGROUND

Antibiotics are of great importance in infection prevention and control, as they play a critical role in preventing and treating bacterial infections. When used appropriately, they significantly reduce morbidity and mortality associated with infectious diseases and improve the outcomes of medical treatments. However, the misuse of antibiotics has significantly contributed to the emergence and spread of antimicrobial resistance (AMR), posing a major risk to public health and to infection prevention and control strategies [1,2]. AMR occurs when microorganisms, through genetic mutation, develop the ability to withstand antimicrobial agents that were previously effective in treating them, thereby making infections challenging to treat [3].

The World Health Organisation (WHO) identified antimicrobial resistance as one of the top global health threats to humans. In 2019, it was globally recorded that AMR accounted for approximately 4.95 million deaths, with underdeveloped and developing countries bearing the burden [4]. This would be even more fatal if not properly curbed, as AMR could cause up to 10 million deaths annually by 2050 [3]. According to Nigeria's One Health Antimicrobial Resistance National Action Plan, the country ranks 19th out of 204 countries with the highest age-standardised mortality rate associated with antimicrobial resistance (AMR) per 100,000 population [4].

In developing African countries, with weak healthcare and regulatory systems, poor awareness and ineffective intervention programmes, like Nigeria, antibiotics are frequently misused through self-medication, inappropriate prescriptions, sharing of medications, purchase of antibiotics without prescription, use of leftover drugs, and failure to complete prescribed treatment regimens. Furthermore, the widespread availability of antibiotics through patent medicine vendors and community pharmacies without proper prescription continues to undermine national antimicrobial

stewardship efforts in Nigeria [5]. Public awareness and behavioural practices regarding antibiotic use are important determinants of AMR control.

Nigeria has made efforts to address the growing burden of AMR through the implementation of the National Action Plan on Antimicrobial Resistance, which is based on the One Health approach and integrates the human, animal and environmental health sectors. The recently launched Second National Action Plan on AMR (2024-2028) emphasises antimicrobial stewardship, surveillance, public education, infection prevention and control, and multisectoral collaboration as strategic approaches to mitigating AMR in the country [4]. Despite these interventions, evidence suggests that community-level awareness and responsible antibiotic use practices remain suboptimal in many Nigerian communities, particularly in semi-urban and rural settings where healthcare information dissemination may be limited.

Several studies in Nigeria have investigated knowledge, attitudes, and practices regarding antibiotic use and resistance among specific populations, such as pharmacy clients, healthcare workers, and urban residents [2, 6-8]. However, there remains limited community-based data assessing awareness and behavioural patterns regarding antibiotic use and resistance among residents in semi-urban communities in Osun State, Southwestern Nigeria. Understanding community perceptions and practices is essential for designing targeted educational interventions, strengthening infection prevention and control strategies, and supporting evidence-based antimicrobial stewardship policies.

Therefore, this study was designed to assess the awareness and behaviour towards antibiotic use and resistance among community dwellers in Ede region of Osun State, Nigeria. The findings from this study are expected to provide valuable information to public health authorities and policymakers for developing effective community-based interventions to promote rational

antibiotic use, improve infection prevention and control practices, and reduce the burden of antimicrobial resistance in Nigeria.

METHODS

Study Location

The study was conducted in Ede region of Osun State, located in the Guinea Savannah region along the Osun River. Ede comprises two Local Government Areas (LGAs): Ede North and Ede South LGAs. The region has one state hospital, numerous private hospitals, primary health centres, pharmacies, and patent medicine vendors, serving a combined population of 159,866 according to the 2006 population census, and a landmass of 330 square kilometres. The inhabitants are predominantly farmers, artisans and petty traders.

Eligibility

Participants recruited in this study included indigens of the sampled communities who were 18 years and above, willing to participate, and had spent a minimum of one (1) year in the community. Visitors to the area, those unwilling to participate and those who did not return or complete their questionnaires were excluded from the study.

Sampling Technique and Sample Size

A four-level multistage sampling technique was employed to recruit participants in this study. In stage one (1), a simple random sampling method was used to select one semi-urban region from the ten identified in Osun State. Ede region, which comprised two LGAs, was randomly selected, and the study was carried out at the LGAs' headquarters: Oja-Timi area for Ede North and Oke-Iresi area for Ede South. In stage two, five (5) streets were randomly selected from each area, while seven (7) habitable houses with even numbers starting from the even number two (2) were selected

from each street in stage three (3). Finally, in stage four (4), two (2) eligible respondents were recruited from each household by balloting. When a selected house had no/fewer eligible respondents, then the next consecutive house was used. When only two eligible respondents were present, the two were recruited for the study.

The sample size (N) for this study was determined using the formula; Z^2PQ/d^2 [9], where Z represents the standard normal value (1.96), P represents good knowledge of AMR usage among community dwellers, Q represents 1-P, and d stands for the margin of error (0.05). Therefore, P was set at 71.2%, corresponding to the prevalence of respondents demonstrating adequate knowledge in a previous study [10], yielding a sample size of 315. However, 348 questionnaires were distributed equally in the two (2) study sites, considering a 10% non-response rate. At the end of the study, 336 questionnaires (165/94.8% from Ede South and 171/49.1% from Ede North) were returned complete, yielding a response rate of 96.6%.

Study Design and Data Collection

This community-based study used a cross-sectional descriptive design to collect responses from respondents. The study was conducted between October 2025 and March 2026, using a pretested and validated structured questionnaire. The data collection tool was adapted from previous studies (10 – 12] with some adjustments to align with this study's purpose. The tool was pretested among indigens of Akoda community, which is outside the study area, using 10% (32) of the total sample size as participants for the pretest. The feedback from the pretest was used to revise and validate the questionnaire following initial face validity testing. The questionnaire was designed and administered in English. However, research assistants fluent in Yoruba language were engaged for the study.

The questionnaire was divided into four (4) sections. Section 1 included the social-demographic characteristics of the respondents, while Section 2 comprised questions that border on the general knowledge of antimicrobial drugs, and Sections 3 and 4 comprised questions on the respondents' attitudes and practices regarding antibiotic use, while Section 5 deals with prevention, control, access and community factors regarding antibiotic usage.

Statistical Analysis

Data generated from the fieldwork were captured and cleaned in Excel 2019, then exported and analysed using SPSS Statistics version 25 (IBM SPSS Inc.). P-values of less than 0.05 were taken as significant at a 95% confidence interval. Frequency, percentages, chi-square, bivariate analysis and odds ratio were performed on the data to determine the occurrence, significance, KAP score and the association between independent variables and KAP. The KAP scores were determined by allocating a score of one (1) to each correct response and zero (0) to incorrect responses across all items. Thereafter, the respondents' scores were summed, and the KAP scores were expressed as percentages.

RESULTS

Socio-Demographic Features of the Respondents

The study was conducted among 336 respondents, comprising 165 (49.1%) respondents from Ede South and 171 (50.9%) from Ede North LGAs. There were 157 (46.7%) males and 179 (53.3%) females. The majority of the respondents (248/73.9%) were young people aged 40 years and below, married (183/54.5%), possessed secondary-level education (148/44%), ran a private business (108/32.1%), and engaged in trading (105/31.3%). About two-fifths of the respondents were low-income earners (207/61.6%), while (129/38.4%) and (113/33.6%) of the respondents accessed care

155 in government-owned and private hospitals, respectively, while 193 (57.4%) accessed care over a
156 short distance of less than 1km.

157 A statistically significant difference between the two locations was observed for age distribution
158 ($p=0.042$), gender ($p=0.011$), education ($p<0.001$), distance to the nearest healthcare facility
159 ($p<0.001$), and the place of choice for seeking care when sick ($p<0.001$). The social demographic
160 characteristics of the respondents are shown in Table 1.

161 **Knowledge of Antimicrobial Resistance among the Respondents**

162 The respondents' knowledge of antimicrobial use and resistance was tested using eight (8) items
163 as listed in Table 2. The result revealed a below-average overall knowledge score of 47.3% among
164 respondents, with 96 (26.8%) demonstrating good knowledge of antimicrobial use and resistance.
165 The average knowledge score was 3.8 out of 8. The results of this study showed that more than
166 four-fifths (83%) of respondents had no idea what AMR is, and 65.8% could not identify the uses
167 of antibiotics. However, many respondents have above-average knowledge of some items, such as
168 antibiotics misuse leading to AMR (67.6%), incomplete use of antibiotics leading to AMR
169 (60.7%), and frequent use of antibiotics leading to AMR (68.2%).

171 **TABLE 1: SOCIO-DEMOGRAPHIC FEATURES OF RESPONDENTS**

Variable	Ede South	Ede North	Total	P value
	Occurrence (%)	Occurrence (%)		
Age				0.042
<20	30 (18.2)	28 (16.4)	58 (17.3)	
21-30	56 (33.9)	39 (22.8)	95 (28.3)	
31-40	40 (24.2)	55 (32.2)	95 (28.3)	
41-50	26 (15.8)	23 (13.5)	49 (14.6)	
>50	13 (7.9)	26 (15.2)	39 (11.6)	
Total	165 (100)	171 (100)	336 (100)	
Gender				0.011
Male	88 (53.3)	69 (40.4)	157 (46.7)	
Female	77 (46.7)	102 (59.6)	179 (53.3)	
Total	165 (100)	171 (100)	336 (100)	
Marital Status				0.114
Single	74 (44.8)	68 (39.8)	142 (42.3)	
Married	89 (53.9)	94 (55)	183 (54.5)	
Divorced	02 (1.2)	04 (2.3)	06 (1.8)	
Widow	----	05 (2.9)	5 (1.5)	
Education				<0.001
No formal education	----	30 (17.5)	30 (8.9)	
Pry education	15 (9.1)	09 (5.3)	24 (7.1)	
Sec education	65 (39.4)	83 (48.5)	148 (44)	
Tertiary education	85 (51.5)	49 (28.7)	134 (39.9)	
Occupation				0.197
Farming	04 (2.4)	08 (4.7)	12 (3.6)	
Trading	48 (29.1)	57 (33.3)	105 (31.3)	
Artisan	24 (14.5)	25 (14.6)	49 (14.6)	
Govt worker	06 (3.6)	14 (8.2)	20 (6)	
Private Business	58 (35.2)	50 (29.2)	108 (32.1)	
Unemployed	25 (15.2)	17 (9.9)	42 (12.5)	
Monthly Income				0.309
Low	102 (61.8)	105 (61.4)	207 (61.6)	
Medium	41 (24.8)	51 (29.8)	92 (27.4)	
High	22 (13.3)	15 (8.8)	37 (11)	
Distance to Healthcare Facility				<0.001
<1km	77 (46.7)	116 (67.8)	193 (57.4)	
1-5km	66 (40)	46 (26.9)	112 (33.3)	
>5km	22 (13.3)	09 (5.3)	31 (9.2)	
Where to seek treatment when sick				<0.001
Govt hos	51 (30.9)	78 (45.6)	129 (38.4)	
Private hos	74 (44.8)	39 (22.8)	113 (33.6)	
PHC	14 (8.5)	10 (5.8)	24 (7.1)	
Pharmacy	02 (1.2)	17 (9.9)	19 (5.7)	
PMV	10 (6.1)	14 (8.2)	24 (7.1)	
Trad healer	04 (2.4)	08 (4.7)	12 (3.6)	
Self-treatment	10 (6.1)	05 (2.9)	15 (4.5)	

TABLE 2: KNOWLEDGE OF ANTIMICROBIAL RESISTANCE AMONG THE RESPONDENTS

Variable	Ede South	Ede north	Total	P value
	Occurrence (%)	Occurrence (%)		
Antibiotics are used to treat				<0.001
Bacterial infection	70 (42.4)	45 (26.3)	115 (34.2)	
Viral infection	10 (6.1)	02 (1.2)	12 (3.6)	
All infection	57 (34.5)	66 (38.6)	123 (36.6)	
Don't know	28 (17)	58 (25.6)	86 (25.6)	
Antibiotics for common cold & flu				0.005
Yes	82 (49.7)	86 (50.3)	168 (50)	
No	53 (32.1)	33 (19.3)	86 (25.6)	
Don't know	30 (18.2)	52 (30.4)	82 (24.4)	
What is AMR				0.212
Correct answer	35 (21.2)	22 (12.9)	57 (17)	
Wrong answer	130 (78.8)	149 (87.1)	279 (83)	
Antibiotic misuse leads to DR				0.017
True	119 (72.1)	108 (63.2)	227 (67.6)	
False	16 (9.7)	10 (5.8)	26 (7.7)	
Don't know	30 (18.2)	53 (31)	83 (24.7)	
Incomplete use of antibiotics leads to DR				<0.001
Yes	120 (72.7)	84 (49.1)	204 (60.7)	
No	21 (12.7)	33 (19.3)	54 (16.1)	
Don't know	24 (14.5)	54 (31.6)	78 (23.2)	
Frequent use of antibiotics leads to DR				<0.001
Yes	133 (80.6)	96 (56.1)	229 (68.2)	
No	10 (6.1)	17 (9.9)	27 (8)	
Don't know	22 (13.3)	58 (33.9)	80 (23.8)	
Is AMR a problem in Nigeria				0.085
Yes	103 (62.4)	93 (54.4)	196 (58.3)	
No	24 (14.5)	20 (11.7)	44 (13.1)	
Don't know	38 (23)	58 (33.9)	96 (28.6)	
Is antibiotic misuse common in your area				0.001
Yes	121 (73.3)	96 (56.1)	217 (64.6)	
No	29 (17.6)	38 (22.2)	67 (19.9)	
Not sure	15 (9.1)	37 (21.6)	52 (15.5)	

Half of the respondents (50.0%) believed antibiotics should be used for common cold and flu, while only 25.6% correctly disagreed with this misconception ($p=0.005$). Compared with Ede North, the Ede South study site had greater knowledge (Ede South 54.6%; Ede North 40.2%) of antimicrobial use and resistance, as shown across all items tested (Table 2 and Table 6). Statistically, there were significant differences between the two study sites with regard to the meaning of antibiotics ($p<0.001$), antibiotics can be used for common cold and flu ($p=0.005$), antibiotic misuse leads to drug resistance (DR) (0.017), Incomplete use of antibiotics leads to DR ($p<0.001$), and frequent use of antibiotics leads to DR ($p<0.001$).

Respondents Attitudes Towards Antibiotic Use

Five (5) items were used to assess respondents' attitudes towards antimicrobial use and resistance (Table 3). Many respondents had several inappropriate beliefs and practices, including taking antibiotics when there is a fever (66.1%), sharing antibiotics with family members (50.6%), and using antibiotics to recover faster from illness (82.7%). More than half of respondents (57.1%) reported always stopping antibiotics once they feel better, while only 19.9% indicated never discontinuing treatment prematurely. About half of the respondents (50.6%) believed it was acceptable to share antibiotics with family members, whereas 41.4% disagreed ($p<0.001$).

Overall, 37 (11%) respondents had a positive attitude with an average score of 1.9 out of 5. This yielded an overall positive attitude score of 38.3% among the respondents (Table 6).

Respondents Practices Regarding Antibiotic Use

Regarding antibiotic use practices (Table 4), the majority of respondents (73.2%) reported taking antibiotics occasionally, while 19.6% used them regularly. There was a significant difference in frequency of antibiotic use between the study locations ($p=0.047$). Doctor's prescription was the

197 most common means of obtaining antibiotics (59.5%), followed by pharmacies (17.9%) and patent
198 medicine vendors (16.7%). However, self-medication was common, as 59.5% admitted practising
199 self-medication with antibiotics ($p=0.033$).

200 Although 60.7% reported completing their antibiotic course, a considerable proportion (39.3%)
201 did not complete the prescribed treatment. Additionally, 61.0% reported taking antibiotics when
202 they had malaria, reflecting inappropriate antibiotic use ($p=0.005$). Sharing antibiotics with others
203 was also prevalent among 59.2% of respondents ($p=0.004$). Nearly half of the respondents (49.7%)

204

205 **TABLE 3: ATTITUDES TOWARDS ANTIBIOTICS USE AMONG THE RESPONDENTS**

Variable	Ede South	Ede North	Total	P value
	Occurrence (%)	Occurrence (%)		
Antibiotics should be taken when there's a fever				<0.001
Agree	91 (55.1)	131 (76.6)	222 (66.1)	
Disagree	74 (44.9)	40 (23.4)	114 (33.9)	
I stop taking antibiotics once I feel better				0.296
Always	100 (60.6)	92 (53.8)	192 (57.1)	
Sometimes	32 (19.4)	45 (26.3)	77 (22.9)	
Never	33 (20)	34 (19.9)	67 (19.9)	
Its acceptable to share antibiotics with family members				<0.001
Yes	89 (53.9)	81 (47.4)	170 (50.6)	
No	74 (44.8)	65 (38)	139 (41.4)	
Not sure	02 (1.2)	25 (14.6)	27 (8)	
Antibiotics help recover faster from illness				0.390
Agree	133 (80.6)	145 (84.4)	278 (82.7)	
Disagree	32 (19.4)	26 (15.2)	58 (17.3)	
Antibiotics should only be taken when prescribed by an HCP				0.038
Agree	140 (84.8)	129 (75.4)	269 (80)	
Disagree	25 (15.2)	42 (24.6)	67 (20)	

206

207 **TABLE 4: RESPONDENTS' PRACTICES REGARDING ANTIBIOTIC USE**

Variable	Ede South	Ede North	Total	P value
	Occurrence (%)	Occurrence (%)		
How often do you take antibiotics				0.047
Regularly	40 (24.2)	26 (15.2)	66 (19.6)	
Sometimes	117 (70.9)	129 (75.4)	246 (73.2)	
Never	08 (4.8)	16 (9.4)	24 (7.1)	
How antibiotics were obtained				0.001
Dr's prescription	89 (53.9)	111 (64.9)	200 (59.5)	
Pharmacy	42 (25.5)	18 (10.5)	60 (17.9)	
PMV	24 (14.5)	32 (18.7)	56 (16.7)	
Leftover drugs	-----	05 (2.9)	05 (1.5)	
Friends/relatives	10 (6.1)	05 (2.9)	15 (4.5)	
Do you complete your antibiotics course				0.015
Yes	90 (54.5)	114 (66.7)	204 (60.7)	
No	75 (45.5)	57 (33.3)	132 (39.3)	
Self-medication				0.033
Yes	107 (64.8)	93 (54.4)	200 (59.5)	
No	58 (35.2)	78 (45.6)	136 (40.5)	
Ever been told of having a DR infection				0.025
Yes	25 (15.2)	32 (18.7)	57 (17)	
No	132 (80)	118 (69)	250 (74.4)	
Not sure	08 (4.8)	21 (12.3)	29 (8.6)	
Do you take antibiotics when you have malaria				0.005
Yes	94 (57)	111 (64.9)	205 (61)	
No	67 (40.6)	46 (26.9)	113 (33.6)	
Not sure	04 (2.4)	14 (8.2)	18 (5.4)	
Sharing antibiotics with others				0.004
Yes	110 (66.7)	89 (52)	199 (59.2)	
No	55 (33.3)	82 (48)	137 (40.8)	
Antibiotics use without prescription				0.223
Yes	86 (52.1)	81 (47.4)	167 (49.7)	
No	79 (47.9)	90 (52.6)	169 (50.3)	
Why do people buy antibiotics without a prescription				<0.001
Costly hos bill	61 (37)	41 (24)	102 (30.4)	
Far distance to hos	25 (15.2)	18 (10.5)	43 (12.8)	
Long waiting time	24 (14.5)	30 (17.5)	54 (16.1)	
Advise from PMV	25 (15.2)	20 (11.7)	45 (13.4)	
Previous exp	28 (17)	30 (17.5)	58 (17.3)	
PMVs sell antibiotics without a prescription				0.001
Yes	105 (63.6)	83 (48.5)	188 (56)	
No	48 (29.1)	52 (30.4)	100 (29.8)	
Not sure	12 (7.3)	36 (21.1)	48 (14.3)	

208 Dr- Medical doctor; PMV- Patent Medicine Vendors

admitted to using antibiotics without a prescription. The major reasons for purchasing antibiotics without a prescription included high hospital bills (30.4%), previous experience with a similar illness (17.3%), and long waiting times at health facilities (16.1%). Furthermore, 56.0% reported that patent medicine vendors sell antibiotics without a prescription, with significant variation between the study locations ($p=0.001$).

TABLE 5: PREVENTION AND CONTROL

Variable	Ede South	Ede North	Total	P value
	Occurrence (%)	Occurrence (%)		
Factors that can prevent antimicrobial resistance				0.118
Three (all) correct answers	29 (17.6)	32 (18.7)	61 (18.2)	
Two correct answers	31 (18.8)	31 (18.1)	62 (18.5)	
One correct answer	75 (45.5)	60 (35.1)	135 (40.2)	
No correct answer	30 (18.2)	48 (28.1)	78 (23.2)	
Do you practice proper hygiene for IPC				0.294
Yes	155 (93.9)	157 (91.8)	312 (92.9)	
No	10 (6.1)	14 (8.2)	24 (7.1)	
Any training on antibiotics uses				0.124
Yes	65 (39.4)	56 (32.7)	121 (36)	
No	100 (60.6)	115 (67.3)	215 (64)	

IPC- Infection Prevention and Control

Prevention and Control of Antimicrobial Resistance

Assessment of preventive measures (Table 5) against AMR showed that only 18.2% of respondents correctly identified all three preventive factors, while 23.2% could not identify any preventive measure. Nevertheless, hygiene practices were generally good, with 92.9% reporting proper hygiene for infection prevention and control. Only 36.0% of respondents had ever received training on antibiotic use, while the majority (64.0%) had never received any. No statistically significant difference was observed between the two study locations regarding preventive practices or training on antibiotic use ($p>0.05$).

Knowledge, Attitude, and Practice (KAP) Scores of Respondents

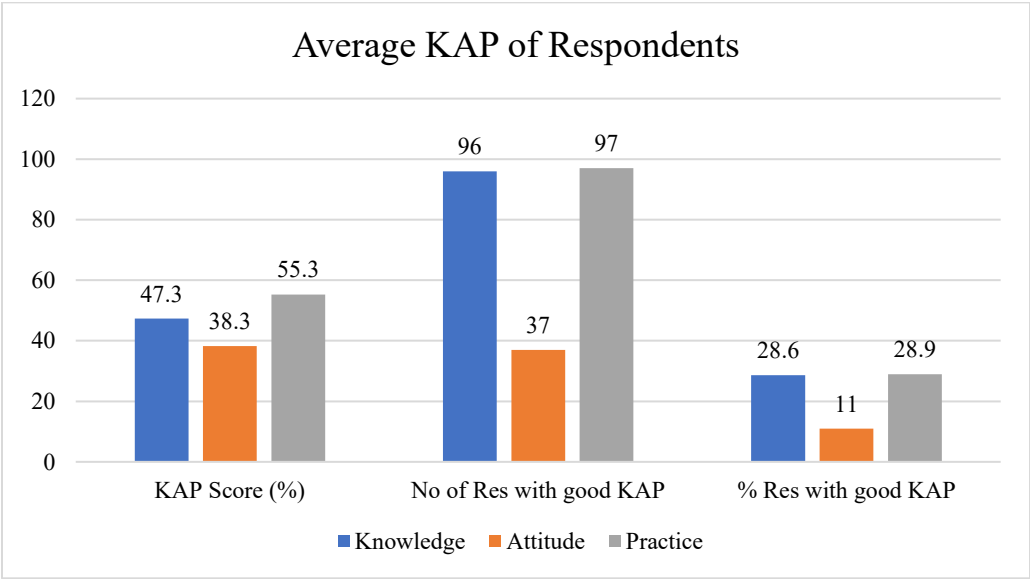
The overall knowledge score of respondents was 47.3%, with only 96 (28.6%) respondents demonstrating good knowledge of AMR (Figure 1). Respondents from Ede South had significantly higher knowledge scores (54.6%) than those from Ede North (40.2%) ($p<0.001$). The overall attitude score was 38.3%, with only 11.0% of respondents showing a positive attitude towards antibiotic use and AMR prevention. Attitude scores were also significantly higher among respondents from Ede South (42.5%) than from Ede North (34.2%) ($p=0.008$), as shown in Figures 1 and 2.

Practice scores were relatively better, with an overall score of 55.3%. Ninety-seven (28.9%) respondents demonstrated good antibiotic use practices. Although respondents from Ede North had slightly higher practice scores (58.9%) than those from Ede South (51.5%), the difference was not statistically significant ($p=0.401$). The KAP scores of respondents are shown in Table 6 and Figures 1 and 2.

239

240 **Factors associated with knowledge, attitude, and practice**

241 Logistic regression analysis (Table 7) showed that several socio-demographic variables
242 significantly influenced respondents' knowledge and practices regarding AMR. Respondents aged
243 40 years or younger were more likely to have good knowledge compared with older respondents
244 (OR=3.56, 95% CI: 1.63–7.77; p=0.001). Male respondents were also more likely to demonstrate
245 good knowledge than females (OR=2.74, 95% CI: 1.46–5.13; p=0.002). Educational status was
246 strongly associated with knowledge and practice. Respondents with lower educational levels were
247 significantly more likely to have poor knowledge (OR=7.12, 95% CI: 3.71–13.64; p<0.001) and



248 **Figure 1:** KAP of respondents showing KAP scores, respondents with good KAP, and the
249 percentage of respondents with good KAP.
250

251 **(PLACE FIGURE 1 HERE)**

252

253

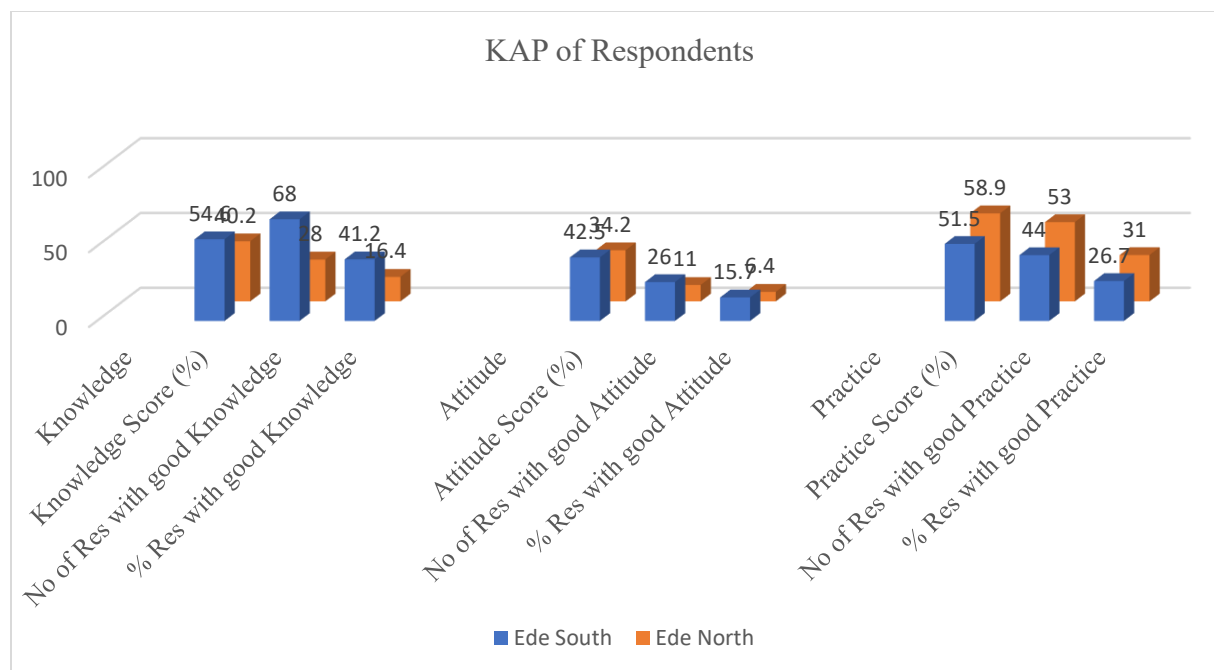


Figure 2: KAP scores of respondents showing the two study sites.

(PLACE FIGURE 2 HERE)

258 **TABLE 6: KAP SCORE OF RESPONDENTS**

Variable	Occurrence	Ede South	Ede North	P value
Knowledge				<0.001
Knowledge Score (%)	47.3	54.6	40.2	
No of Res with good Knowledge	96	68	28	
% Res with good Knowledge	28.6	41.2	16.4	
Attitude				0.008
Attitude Score (%)	38.3	42.5	34.2	
No of Res with good Attitude	37	26	11	
% Res with good Attitude	11	15.7	6.4	
Practice				0.401
Practice Score (%)	55.3	51.5	58.9	
No of Res with good Practice	97	44	53	
% Res with good Practice	28.9	26.7	31	

259 KAP- knowledge, Attitude, and Practice

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261

262 **Table 7: Effects of independent variables on KAP of Respondence**

Variable	Knowledge		Attitude		Practice	
	OR (95%CI)	P-value	OR (95%CI)	P-Value	OR (95%CI)	P-value
Location		<0.001		0.52		0.02
Ede South	0.30 (0.16-0.55)		0.46 (0.21-1.01)		1.91 (1.11-3.31)	
Ede North						
Age		0.001		0.48		0.35
≤40	3.56 (1.63-7.77)		1.41 (0.55-3.59)		1.35 (0.72-2.53)	
>40						
Gender		0.002		0.98		0.76
Male	2.74 (1.46-5.13)		0.99 (0.47-2.10)		0.92 (0.53-1.59)	
Female						
Marital Status		0.009		0.84		0.01
Single	0.39 (0.19-0.79)		0.92 (0.39-2.16)		2.19 (1.19-4.01)	
Others						
Education		<0.001		0.28		<0.001
Low level	7.12 (3.71-13.64)		1.56 (0.70-3.49)		3.86 (2.15-6.93)	
Tertiary						
Monthly Income		0.93		0.99		0.05
Low	0.97 (0.50-1.89)		1.0 (0.45-2.21)		0.56 (0.31-1.01)	
Medium						
Distance to HCF		0.67		0.12		0.04
≤1km	1.14 (0.61-2.13)		1.88 (0.86-4.12)		1.77 (1.02-3.01)	
>1						
Where to seek treatment when sick		0.004		0.83		0.04
Trained HCW	0.18 (0.06-0.56)		0.89 (0.31-2.55)		0.41 (0.17-0.96)	
None HCW						

263 KAP- knowledge, attitude, and Practice; OR- Odds ratio; HCW- Healthcare worker

poor practices (OR=3.86, 95% CI: 2.15–6.93; $p<0.001$) compared with those with tertiary education.

Respondents who sought treatment from trained healthcare workers were less likely to exhibit poor knowledge (OR=0.18, 95% CI: 0.06–0.56; $p=0.004$) and poor practices (OR=0.41, 95% CI: 0.17–0.96; $p=0.04$). Additionally, respondents residing within 1 km of a healthcare facility demonstrated significantly better practices than those living farther away (OR=1.77, 95% CI: 1.02–3.01; $p=0.04$).

DISCUSSION

This study assessed the knowledge, attitudes, and practices (KAP) regarding antibiotic use and antimicrobial resistance (AMR) among residents of Ede community, comprising Ede North and Ede South Local Government Areas of Osun State, Nigeria. The findings revealed poor knowledge of antimicrobial resistance, inappropriate attitudes toward antibiotic use, and predominant irrational antibiotic practices among community members. These findings are of major public health concern because inappropriate antibiotic use contributes significantly to the emergence and spread of antimicrobial resistance, which remains a growing global health threat, and a serious implication for infection prevention and control in Nigeria [13,14].

The socio-demographic characteristics of the participants in this study revealed that most were young adults aged 40 years and below (248/73.8%), married (54.5%), and had at least secondary-level education (83.9%). The predominance of younger respondents in this study [6] reflects the active population group that frequently utilises healthcare services and medicines. Furthermore, the high proportion of low-income earners observed in this study (61.6%) may partly explain the high prevalence of self-medication and inappropriate antibiotic use practices identified among the respondents. Similar findings have been reported in a previous Nigerian study, where low

socioeconomic status and limited healthcare access were associated with irrational antibiotic use and self-medication practices [15].

The overall knowledge score (47.3%) recorded in this study indicates poor public awareness of antimicrobial use and resistance. Only 28.6% of respondents demonstrated good knowledge of AMR, while the majority could not correctly define antimicrobial resistance or identify appropriate antibiotic use. This finding aligns with previous studies in Nigeria [6,16] and elsewhere [17]. Poor knowledge of AMR among the general population has been recognised as a major challenge to infection prevention and control efforts in resource-limited countries [17], such as Nigeria. However, this is contrary to another Nigerian study [18], which found increased awareness that did not result in appropriate antibiotic use.

The respondents' (50%) belief that antibiotics should be used for common cold and flu supports the poor understanding of antibiotic indications among the study population. Similar misconceptions have been reported in several studies, in which many respondents incorrectly believed that antibiotics were effective against viral infections [19, 20]. Such misconceptions lead to unnecessary antibiotic use and accelerate the development of antibiotic-resistant microorganisms, with serious implications for infection prevention and control.

Despite the overall poor knowledge observed in this study, many respondents recognised that misuse (67.6%), incomplete use (60.7%), and frequent use (68.2%) of antibiotics contribute to AMR. This may be attributable to the appreciable number of respondents with tertiary education (39.9%) and receipt of training on antibiotic use (36%). Furthermore, this may suggest that some members of the community may have received awareness messages regarding AMR. However, a fragmented understanding of antibiotics, without adequate knowledge, may still lead to inappropriate antibiotic use [21].

In this study, there was a significant difference in knowledge scores between Ede South (54.6%) and Ede North (40.2%), where respondents from Ede South demonstrated greater knowledge of antimicrobial use and resistance. This difference may be due to variations in educational attainment, socioeconomic conditions, access to healthcare facilities, and exposure to health information between the two study sites. Ede South had a higher proportion of respondents with tertiary education (51.5%), a higher socioeconomic status (13.3%), and greater exposure to health information (39.4%). Education, socioeconomic status, and exposure to health information have been identified as predictors of good antimicrobial knowledge and rational antibiotic use [14, 22, 23].

Respondents' attitudes toward antibiotic use revealed several inappropriate beliefs and behaviours. The majority of respondents believed antibiotics should be taken whenever there is a fever (66.1%) and that antibiotics help individuals recover faster from illness (82.7%). Furthermore, about half (50.6%) of the respondents believed it is acceptable to share antibiotics with family members, while more than half (57.1%) reported discontinuing antibiotics once symptoms improved. These findings reflect poor adherence to recommended antibiotic treatment guidelines and inadequate understanding of the importance of completing antibiotic therapy [24]. These negative attitudes among respondents in this study have been found to be a barrier to the success of infection prevention and control in Nigeria [8].

The practice-related findings in this study portend serious implications for IPC in Nigeria. Findings indicate that approximately 60% of respondents admitted to antibiotic self-medication, approximately 40% do not complete their antibiotic regimen, and over two-thirds (61%) use antibiotics when they have malaria. There is also a high prevalence of sharing antibiotics with others (59.2%) and PMVs selling antibiotics without a prescription (56%). These findings are

widespread in resource-limited settings due to weak regulatory systems, leading to poor enforcement of regulations governing antibiotic sales in Nigeria and limited healthcare access [25].

Self-medication contributes significantly to inappropriate antibiotic use, delayed diagnosis, treatment failure, and antimicrobial resistance. Respondents' sharing of antibiotics with others indicates poor antimicrobial stewardship practices within the communities, which may lead to underdosing, incomplete treatment, inappropriate drug selection, and an increased risk of antimicrobial resistance. This behaviour may be influenced by poverty, cultural practices, and limited access to healthcare services [13,26]. Economic and healthcare system factors also played major roles in respondents' inappropriate antibiotic use. High hospital bills, long waiting times, and previous experiences with similar illnesses were major reasons respondents purchased antibiotics without a prescription [13].

Despite the respondents' poor KAP in this study, they demonstrated good IPC hygiene practices, which are important for reducing infection transmission and limiting unnecessary antibiotic use. However, only a small proportion of respondents correctly identified preventive measures against AMR, indicating limited understanding of broader AMR prevention strategies such as vaccination, antimicrobial stewardship, and adherence to prescribed therapy.

The logistic regression analysis in this study showed that younger respondents were more likely to demonstrate better knowledge than older respondents (OR=3.56, 95% CI: 1.63–7.77; p=0.001). This may be due to young people's exposure to health-related information on digital and social media platforms. Educational attainment was strongly associated with knowledge and practice outcomes, further emphasising the importance of literacy and formal education in promoting compliance with rational antibiotic use [11,16].

Seeking treatment from trained healthcare workers significantly impacted the respondents' knowledge and practices regarding antibiotic use; these respondents were less likely to exhibit poor knowledge and poor antibiotic practices. This finding underscores the important role healthcare professionals play in promoting antimicrobial stewardship and educating the public on rational antibiotic use. Similarly, respondents residing closer to healthcare facilities demonstrated better practices, suggesting that healthcare accessibility positively influences appropriate antibiotic use [11].

The findings of this study have important implications for infection prevention and control in Nigeria. Poor public understanding of AMR, widespread self-medication, irrational antibiotic use, and weak regulation of antibiotic sales contribute significantly to the development and spread of antimicrobial resistance. Antimicrobial resistance threatens the effectiveness of commonly used antibiotics, increases healthcare costs, prolongs hospital stays, and contributes to preventable morbidity and mortality globally [14].

Community-level antimicrobial stewardship interventions are therefore urgently needed. Government agencies, healthcare institutions, and regulatory authorities should intensify public education regarding appropriate antibiotic use and antimicrobial resistance. Enforcement of regulations restricting over-the-counter antibiotic sales should be strengthened, particularly among patent medicine vendors and community pharmacies. In addition, integrating antimicrobial resistance education into school curricula and primary healthcare programs may promote long-term behavioural change, thereby improving infection prevention and control [21].

Limitations of the Study

This study has some limitations that should be considered when interpreting the findings. First, the cross-sectional design limits the ability to establish causal relationships between socio-demographic factors and KAP outcomes. Second, the study relied on self-reported data, which may be affected by recall and social desirability biases. Some respondents may have underreported inappropriate antibiotic practices or overreported desirable health behaviours. Third, the study was conducted in only two Local Government Areas in Osun State, which may limit the generalizability of the findings to other parts of Nigeria. Despite these limitations, the study provides valuable community-based evidence regarding antibiotic use and antimicrobial resistance in southwestern Nigeria.

Recommendations

Based on the findings of this study, there is a need for intensified public health educational campaigns on rational antibiotic use and antimicrobial resistance at the community level. Government at all levels, through their respective regulatory agencies, should strengthen enforcement of policies on antibiotic prescribing and sales among relevant healthcare workers, especially among patent medicine vendors and community pharmacies. Similarly, healthcare facilities should improve access to affordable, timely healthcare services to reduce self-medication. Community-based antimicrobial awareness programs should be implemented with active involvement of relevant stakeholders, including healthcare workers, schools, religious institutions, traditional leaders, and local media organisations. Furthermore, continuous training of healthcare providers and medicine vendors on infection prevention and control and rational antibiotic dispensing practices is strongly recommended.

398 CONCLUSION

399 The findings from this study showed poor knowledge, negative attitudes, and inappropriate
400 practices regarding antibiotic use and antimicrobial resistance among residents of Ede community.
401 High prevalence of self-medication, misuse of antibiotics, premature discontinuation of therapy,
402 and non-prescription antibiotic use were prevalent among respondents. Educational status,
403 healthcare access, and healthcare-seeking behaviour significantly influenced KAP outcomes. The
404 findings highlight the urgent need for strengthened antimicrobial stewardship interventions, public
405 awareness campaigns, regulatory enforcement, and infection prevention and control strategies to
406 address the growing threat of antimicrobial resistance in Nigerian communities.

407

408 **DECLARATIONS**

409 **Ethics approval and consent to participate**

410 The study was conducted in accordance with the Declaration of Helsinki. Ethical clearance for the
411 study was granted by the Redeemer's University Ethics Committee (RUN/REC/2023/012). All
412 participants provided written consent before they were included in the study, and the researchers
413 ensured their privacy and confidentiality by de-identifying the data collection tool.

414 **Consent for publication**

415 Not applicable.

416 **Availability of data and materials**

417 All data and materials used in this study are available upon reasonable request

418 **Competing interests**

419 There is no conflict of interest declared for this study

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422 **Authors' contributions**

423 All authors contributed to the study conception and design. Material preparation and data
424 collection were performed by all authors. Data analysis was performed by O.T. Ohiengbomwan.

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