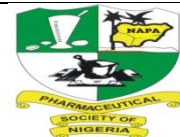


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Assessment of Knowledge, Attitude and Practices of Pharmacy Clients about Antibiotic Use and Misuse in Ogun State, Nigeria

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation; D – writing the article; E – critical revision of the article; F – final approval of article.

Abstract

Background: The rise of antimicrobial resistance poses a global health challenge, driven by the widespread misuse of antibiotics. This misuse includes self-medication, sharing of antibiotics and failing to complete prescribed courses. This fosters an environment conducive for antibiotic resistance making future treatment less effective.

Objectives: This study aims to evaluate the knowledge, attitudes, and practices (KAP) of antibiotic use/misuse and their influencing factors among pharmacy clients in Ogun State, Nigeria.

Methods: A descriptive cross-sectional study was carried out in ten (10) community pharmacies obtained from the list provided by the Association of Community Pharmacists of Nigeria, Ogun State branch, across its five zones in Ogun State, Nigeria. Pre-tested questionnaires adapted from previous studies were used to collect data which was entered into Microsoft Excel 2016 and analyzed using the Statistical Package for Social Sciences (SPSS) version 23.0. Descriptive and inferential statistical analyses were carried out with significance level set at ≤ 0.05 .

Results: Good knowledge and practice (KP) scores of pharmacy clients about antibiotic use of 54.5% and 56.2% but poor attitude to antibiotics (60.5%) was documented along with notable misconceptions. Several demographic factors influenced the KP levels including gender ($p=0.00027$), marital status ($p=0.013$), religion ($p=0.005$), and education ($p=0.001$) for knowledge; and religion ($p=0.027$) and education ($p=0.006$) for practices.

Conclusion: The study showed that though moderate levels of KP were obtained, there is a need for targeted interventions to improve public awareness about antibiotics and promote responsible use.

Keywords: Antibiotics, Antimicrobial resistance, Self-medication, Knowledge, Attitude, Practice, General Public.

INTRODUCTION

Antibiotics are one of the most frequently prescribed drugs (WHO, 2014), but they are often misused (WHO, 2014). Antibiotic use, which could be appropriate or inappropriate, has been viewed as a key driver for the emergence, increase, and spread of antibiotic resistance (Nordberg, 2004; Laxminarayan, 2007). Antibiotics were considered to be one of the wonder discoveries of the 20th century (Davies and Davies, 2010). However, antimicrobial resistance threatens all the gains provided by antibiotics over the years and poses a significant threat to patient care worldwide (WHO, 2014). A 2019 study in the Lancet

revealed that approximately 5 million deaths were attributed to antimicrobial resistance, with over 1 million of those fatalities arising in Sub-Saharan Africa (Murray *et al.*, 2022). Other significant ramifications of antimicrobial resistance include prolonged illnesses, extended hospital stays, higher treatment costs, and in many cases, treatment failures (Ye *et al.*, 2017; Dadgostar, 2019). Numerous factors contribute to this burden including inadequate patient education, illicit sales of antibiotics, and poor prescription practices (Thriemer *et al.*, 2013; Ayukekbong *et al.*, 2017). It is widely agreed that the

misuse of antibiotics is the leading contributing factor to antimicrobial resistance, transgressing both healthcare facilities and community settings (Ye *et al.*, 2017; Dadgostar, 2019; Akande-Sholabi and Oyesiji, 2023). Such misuse includes practices such as skipping doses, failing to complete prescribed regimens, and using leftover medications (Gebrekirstos *et al.*, 2017).

Notably, the trend of antibiotic over-consumption has been transitioning from solely high-income countries to low-income countries over the past decade (Dadgostar, 2019). In Nigeria, studies reveal a concerning rate of antibiotic consumption, ranging from 62% to 70% among hospitalized patients (Oduyebo *et al.*, 2017; Ekuma *et al.*, 2019). This irrational use of antibiotics is facilitated in Nigeria by unrestricted access in community pharmacies, stores, and drug markets without prescription, although illegal in the country (Akinyandenu and Akinyandenu, 2014). Research conducted in Nigeria revealed that 70-90% of antibiotics are used without a proper prescription (Aika *et al.*, 2021; Abibu *et al.*, 2023) and that patients (22%) engage in self-medication (Auta *et al.*, 2013). In Nigeria, antibiotics are viewed as a cure-all medication and are often used to treat a vast range of diseases, ranging from sexually transmitted diseases to fever, common colds, and other viral infections

METHODOLOGY

Study Setting

The study was conducted in community pharmacies affiliated with the Association of Community Pharmacists of Nigeria in Ogun State with list obtained from the Association. Pharmacy Council of Nigeria (PCN) is the regulatory body for the profession. Ogun State is in the South-west zone of Nigeria and is primarily inhabited by Yoruba-speaking people and serves as a gateway from Lagos. The Association of Community Pharmacists of Nigeria (ACPN) in Ogun state is divided into five zones: Ota; Akute (Akt); Abeokuta (Abk); Sagamu (Sgm) and Ijebu (Ijb). Ten (10) registered community pharmacies (two from each zone) were selected based on accessibility and similar client volume.

Study Design

A descriptive cross-sectional study was carried out on clients in two pharmacies each (conveniently chosen) from the five ACPN zones in Ogun State.

Study Population

The study population comprised adults who visited selected pharmacies at the time of the study. The sample size was determined using the Raosoft online sample size calculator (Raosoft Inc., 2004) with the

(Dadari, 2020; Abibu *et al.*, 2023). A 2017 report from the Nigeria Centre for Disease Control (NCDC) highlights a rapid rise in antimicrobial resistance across the country, especially with antibiotics such as ceftriaxone, ampicillin, gentamicin, and co-trimoxazole, with resistance rates soaring to 100% for ampicillin and co-trimoxazole in some cases (Egwuenu *et al.*, 2018).

In addressing this concern, it is important not only to monitor and assess prescribing and dispensing practices among healthcare practitioners but also to engage the general public in curbing antimicrobial resistance as lack of patient compliance significantly contributes to the escalation of antimicrobial resistance (Ayukekbong *et al.*, 2017; Gebrekirstos *et al.*, 2017). Studies conducted on the public emphasize the correlation between patients' perception of antibiotics and their subsequent behaviour in using them (Auta *et al.*, 2013; Awad and Aboud, 2015; Dadari, 2020; Alnasser *et al.*, 2021). Although a plethora of research on this study exists globally, there is a notable scarcity of this relationship in some community settings in Nigeria. Hence, this study aims to investigate the knowledge, attitudes, and practices of the public in Ogun State, Nigeria about antibiotics and factors that could impact knowledge and practices.

population of clients visiting the pharmacies estimated at 150 per day (1500 for two pharmacies in 5 zones), a 5% margin of error and a confidence interval of 95%. The sample size calculated was 306. A further 20% was added to cover non-response or unusable data, giving 367 clients. Therefore, to ensure a 95% confidence interval of pharmacy clients to determine antibiotic use and/or misuse within 5% of the true population, a sample size of 367 was required.

Data collection tool

The data collection tool was a questionnaire adapted from previous studies (McNulty *et al.*, 2007; Oh *et al.*, 2011; Auta *et al.*, 2013; Mbwambo *et al.*, 2017; Ye *et al.*, 2017; Okide *et al.*, 2020). The final iteration of the questionnaire had 5 sections, consisting mainly of close-ended questions. The first was related to socio-demographic characteristics and included seven items. The second section assessed the level of knowledge through eighteen questions while the questions regarding attitudes toward antibiotic use were collected in the third section. Practices toward antibiotic use (Fill or tick as many as apply) were 13 questions in section four. Finally, the fifth section included 6 statements to explore the effects of antibiotic use (Fill or tick as many as apply). The questionnaire was reviewed by two senior colleagues

and pretested among 12 community pharmacy clients from 3 community pharmacies in Lagos state. The final version of the questionnaire was produced after corrections from the pretest was used to modify a few questions.

Data collection

The questionnaire was self-administered to clients after the purpose of the study was explained to them and their consent was obtained. Clients who required assistance were helped to complete the questionnaire.

Data Analysis

Collected data were collated and entered into Microsoft Excel 2016 and analyzed using the

Statistical Package for Social Sciences (SPSS) version 23. Responses to questions regarding attitudes toward antibiotic use had three options: 'yes', 'no', or 'I don't know'. The level of knowledge was evaluated as follows: One point was given for each correct answer and zero for each incorrect answer. The overall score on knowledge was obtained by adding up the scores of the answers, 11 points and below were classified as poor while 12 and above were good. Relationships between variables were tested using the Chi-Square test. The Chi-Square statistic was calculated and compared against a critical value at alpha of 95% ($p \leq 0.05$) significance level. The results obtained were presented in tables and charts.

RESULTS AND DISCUSSION

Overview

A total of 367 questionnaires were distributed to clients in community pharmacies and 354 were filled and returned, thus representing a response rate of 96.5%.

Socio-demographic characteristics of respondents

In terms of geographic distribution, 66 respondents (18.6%) were from Sagamu while Ota, Ijebu, Akute,

and Abeokuta each had 72 respondents (20.3%). Gender and marital status distributions slightly favoured the male (51.7%) and single (55.1%), and many of the respondents fell within the 16 to 29 age group (56%). Most respondents identified as Christians (70.9%), were of Yoruba origin (80.2%), and had attained tertiary-level education (59.9%).

Table 1: Sociodemographic distribution of respondents

Variables	Frequency (n=354)	Percent (%)
Zone		
Sagamu	66	18.6
Ota	72	20.3
Ijebu	72	20.3
Akute	72	20.3
Abeokuta	72	20.3
Gender		
Male	183	51.7
Female	171	48.3
Marital Status		
Single	195	55.1
Married	147	41.5
Divorced	5	1.4
Separated	4	1.1
Widowed	3	0.8
Age group (years)		
16-29	198	55.9
30-44	105	29.7
45-59	39	11.0
60-74	10	2.8
>74	2	0.6
Religion		
Christian	251	70.9
Moslem	94	26.6
Traditional	8	2.3
Atheist	1	0.3
Ethnic group		
Yoruba	284	80.2
Igbo	51	14.4
Edo/Delta	8	2.2
Hausa	6	1.7
Others	5	1.5
Highest Educational level		
None	1	0.3
Primary	40	11.3
Secondary	101	28.5
Tertiary	212	59.9
Occupation		
Student	124	35.0
Self-employed	121	34.2
Civil servant	58	16.4
Unemployed	18	5.1
Housewife	17	4.8
Others	16	4.5

n= no. of respondents in the study

Knowledge about antibiotics use and misuse.

Detailed knowledge characteristics of respondents are presented in Table 2. Nearly half of the respondents (n = 176; 49.7%) believed that misuse is the primary cause of resistance and a significant number (n = 254; 71.8%) agreed that antibiotic misuse occurred globally. About one-third of the respondents (n = 122;

34.5%) believed that expensive brands of antibiotics were more effective than their cheaper alternatives. Almost half of the respondents (n = 174; 49.2%) agreed that antibiotics should be terminated once symptoms improved.

Table 2: Respondents’ general knowledge about antibiotics

Statements (N=354)	Yes [n (%)]	No [n (%)]	I don’t know [n (%)]	No Response [n (%)]
Misuse of antibiotics is the main cause of bacteria resistance.	176 (49.7)	103 (29.1)	68 (19.2)	7 (2.0)
There is misuse of antibiotics worldwide at present	254 (71.8)	26 (7.3)	57(16.1)	17 (4.8)
Misuse of antibiotics is a Nigerian problem only	195 (55.1)	74 (20.9)	68 (19.2)	17 (4.8)
It is good to keep left over antibiotics at home in case of future need	130 (36.7)	191 (54.0)	30 (8.5)	3 (0.8)
The more expensive antibiotics usually work better than the cheaper ones	122 (34.5)	165 (46.6)	51 (14.4)	16 (4.6)
Antibiotics have no side effect	59 (16.7)	218 (61.6)	58 (16.4)	19 (5.4)
When I have common cold antibiotics will be useful in treating it	117(33.1)	175 (49.4)	43 (12.1)	19 (5.4)
Prescribed course of antibiotics should be terminated once symptoms improve	174 (49.2)	162 (45.8)	8 (2.3)	10 (2.8)
Effectiveness of antibiotics is reduced if a full course of antibiotics is not finished	255 (72.0)	79 (22.3)	12 (3.4)	8 (2.3)
One may be infected with bacteria that are difficult to treat if a person is repeatedly treated with the same antibiotics and does not complete the dose	217 (61.3)	61 (17.2)	71 (20.1)	5 (1.4)
Antibiotics will not be effective for treating infections if it is overused	231 (65.3)	105 (29.7)	7 (2.00)	11 (3.1)

N= no. of respondents in the study, n= no. of respondents with specific response

Attitudes

The study’s findings indicated that many of the respondents (60.5%) hold a poor attitude towards antibiotic use. More than half of the respondents (n=185; 52.3%) believed that antibiotics could cleanse the system after sexual intercourse, and many believed that antibiotics were the quickest means for treating

runny nose and cough (n=167; 47.2%). Over half of the respondents would preserve leftover antibiotics for future cost-saving purposes (n=119; 56.2%) and about 61% (n=215) indicated willingness to share leftover antibiotics with friends and relatives (Table 3).

Table 3: Respondents attitude about use and sharing of antibiotics

Statements (N=354)	Yes [n (%)]	No [n (%)]	I don’t know [n (%)]	No response [n (%)]
Antibiotics can speed up the treatment of any illness.	205 (57.9)	113 (31.9)	28 (7.9)	8 (2.3)
Antibiotic can be used to cleanse the body system like after sexual intercourse	185 (52.3)	114 (32.2)	46 (13.0)	9 (2.5)
When I have watery nose and cough antibiotics are the fastest therapy	167 (47.2)	140 (39.5)	38(10.7)	9 (2.5)
Antibiotics are good for treating diarrhea in children	223(63.0)	82 (23.2)	40 (11.3)	9 (2.5)
When mucous become coloured when having cold, antibiotics are required to get rid of the cold	239 (67.5)	61 (17.2)	45 (12.7)	9 (2.5)
Persistent cough (longer than one week) always needs be treated with antibiotic to disappear	256 (72.3)	52 (14.7)	37(10.5)	9(2.5)
Left over antibiotics can be kept because it saves money for next use	119 (56.2)	112 (31.6)	34 (9.6)	9 (2.5)
Left over antibiotic can be shared with relatives and friends when they need	215 (60.7)	102 (28.8)	27 (7.6)	10 (2.8)
Antibiotics makes recovery faster when having a cold	159 (44.9)	130 (36.7)	56 (15.8)	9 (2.5)

N= no. of respondents in the study, n= no. of respondents with specific response

Practice

Table 4 below shows that ciprofloxacin (11.7%), amoxicillin (11.4% and ampicillin/cloxacillin (8.7%) were the most common antibiotics last used by the

respondents. Other commonly used antibiotics were metronidazole (3.3%), amoxicillin/clavulanic acid (2.4% and cotrimoxazole (2.4%).

Table 4: Antibiotic used last by respondents prior to study

Antibiotics used recently	Total (%)
Ciprofloxacin	39 (11.7)
Amoxicillin	37(11.4)
Ampicillin/Cloxacillin (Ampiclox®)	29 (8.7)
Metronidazole (Flagyl®)	11 (3.3)
Amoxicillin/Clavulanic acid (Augmentin®)	8 (2.4)
Cotrimoxazole (Septrin®)	8 (2.4)
Erythromycin	6 (1.8)
Doxycycline (Doxycap®)	5 (1.5)
Azithromycin	4 (1.2)
Ampicillin	3 (0.9)
Tetracycline	3 (0.9)
Cefuroxime	4 (1.2)
Streptomycin	3 (0.9)
Chloramphenicol	2 (0.6)
Gentamicin	1 (0.3)
Levofloxacin	1(0.3)
Penicillin	1 (0.3)
Vancomycin	1 (0.3)
No response	21 (6.3)

Table 5 shows that about 56% of the respondents had used an antibiotic in the three months preceding the study with most of them indicating it was on the recommendation of a pharmacist (96%) or through a prescription (69%). More than two-fifths of the respondents use antibiotics without a prescription,

when they have nasal congestion with headache, when coughing up sputum (49% each), and when they have sore throat (44.4%). About one-fifth of the respondents (20.3%) reported failing to complete their antibiotics course as prescribed.

Table 5: Respondents' antibiotic use practices

Statements (N=354)	Yes [n (%)]	No [n (%)]	I don't know [n (%)]	No response [n (%)]
Used antibiotics in the last three months	199 (56.2)	135 (38.1)	4 (1.1)	16 (4.5)
Selection of the last course of antibiotics was based on recommendation from a pharmacist (n=199)	191 (96.0)	NA	NA	8 (4.0)
Selection of the last course of antibiotics was based on current medical prescription (n=199)	137 (68.8)	NA	NA	62 (31.2)
Use antibiotics when you have sore throat	157 (44.4)	155 (43.8)	0 (0)	42 (11.9)
Use antibiotics when you have congested nose with headache	174 (49.2)	134 (37.9)	0 (0)	46 (13.0)
Use antibiotics when coughing up white sputum	174 (49.2)	139 (39.3)	0 (0)	41 (11.6)
Usually finish prescribed or purchased antibiotics	249 (70.3)	72 (20.3)	0 (0)	33 (9.3)
Use antibiotics without doctor's prescription	175 (49.4)	148 (41.8)	0 (0)	31 (8.8)

N= no. of respondents in the study, n= no. of respondents with a specific response

Inferential Statistical Analysis

About 55%, 40% and 56% of the respondents displayed good knowledge, attitudes to and practices about antibiotic use respectively. Overall differences in attitude and practice scores were statistically

significantly different. Statistically significant differences in knowledge scores existed based on gender ($p=0.00027$), marital status ($p=0.013$), religion ($p=0.005$), and highest education levels ($p=0.00149$). The study also showed that there was statistically

significant differences in practice scores among participants with varying religions ($p=0.027$) and education levels ($p=0.00556$) (Table 6).

Table 6: Relationship between demographic data and Knowledge and Practices of the respondents regarding antibiotic use

Variables (N=354)	Knowledge (n)		p-value	Attitude (n)		p-value	Practice (n)		p-value
	Good	Poor		Good	Poor		Good	Poor	
All Respondents	193	161	^α 0.089	140	214	^α 0.0001*	199	155	^α 0.019*
Gender									
Male	100	83	^β 0.00027*	75	108	^β 0.568	97	86	^β 0.208
Female	61	18		65	106		102	69	
Marital Status									
Divorced	1	4	^γ 0.013*	0	5	^γ 0.1180	3	2	^γ 0.854
Married	74	73		56	91		84	63	
Separated	0	4		0	4		1	3	
Single	117	78		86	112		110	85	
Widowed	1	2		1	2		1	2	
Age group (years)									
16 – 29	116	82	^γ 0.143	75	123	^γ 0.7663	113	85	^γ 0.884
30 – 44	55	50		44	61		59	46	
45 – 59	19	20		16	23		22	17	
60 – 74	3	7		5	5		5	5	
75 and above	0	2		0	2		2	0	
Religion									
Atheist	1	0	^γ 0.005*	0	1	^γ 0.0637	0	1	^γ 0.027*
Islam	51	43		37	57		57	37	
Traditional	0	8		0	8		1	7	
Christianity	141	110		103	148		141	110	
Highest Education Level									
Primary	12	28	^γ 0.00149*	10	30	^γ 0.0758	18	22	^γ 0.00556*
Secondary	53	48		37	64		47	54	
Tertiary	128	84		93	119		134	78	
None	0	1		0	1		0	1	

N= no. of respondents in the study, n= no. of respondents with specific response, *statistically significant ($p \leq 0.05$)

^αOne-way Chi-squared test; ^βPearson's (Two-way) Chi-squared test; ^γFischer's exact test

DISCUSSION

This study provided insights into the knowledge, attitude, and practice of Ogun state residents toward antibiotic use. Our findings reveal moderate antibiotic knowledge among the pharmacy clients with 54.5% of the respondents demonstrating good knowledge about antibiotic use and misuse. A majority recognized antibiotic misuse as a global issue with about half acknowledging this misuse as a primary cause of bacterial resistance. These findings are lower than those from a similar study in the USA where 92% of the respondents agreed that antibiotic misuse led to resistance (Carter *et al.*, 2016).

Some misconceptions were identified in this study. Firstly, a bit more than a third of the clients believe that expensive antibiotics are more effective than their

cheaper alternatives, and one-third believe that antibiotics treat the common cold, a viral infection. These results were significantly lower than those from a similar study conducted in Malaysia where 79.1% of the public believed that antibiotics cure common colds (Kong *et al.*, 2021). Secondly, 49.2% of respondents agreed that antibiotics courses should be terminated when symptoms improve, indicating that these patients do not complete prescribed regimens, a significant contributor to antimicrobial resistance. This aligns with a similar study in northern Nigeria where 49.1% of participants admitted to terminating the prescription course upon symptom improvement (Auta *et al.*, 2013).

Our study revealed inappropriate attitudes towards antibiotic use among the pharmacy clients with 60% having poor attitude scores. Misguided attitudes identified require targeted public awareness programmes to correct them as these attitudes may encourage the misuse and overuse of antibiotics contributing to antibiotic resistance. Notably, a significant proportion of respondents in this study, as in a previous study (Planta, 2007) expressed willingness to share antibiotics, which poses a serious risk for antimicrobial resistance.

Though more than half of the respondents demonstrated good practices concerning antibiotic use, poor practices were still evident. For instance, almost half use antibiotics without a physician's prescription, and about a fifth fail to complete the prescribed regimen. It is worth noting that a study conducted by Okide *et al.* (2020), in eastern Nigeria, revealed a much higher rate (86%) of antibiotics self-medication though lower rates were obtained in some other studies such as in Italy (32.7%) (Napolitano *et al.*, 2013), Lithuania (31%) (Pavydė *et al.*, 2015), Namibia (15%) (Pereko *et al.*, 2015), and Britain (5%) (McNulty *et al.*, 2007). A concerning trend observed was the use of antibiotics for symptoms associated with viral infections by a significant proportion of the respondents. Numerous studies in Nigeria (Asogwa *et al.*, 2017; Chukwu *et al.*, 2020; Dadari, 2020) and beyond (Carter *et al.*, 2016; Khalifeh *et al.*, 2017; Irawati *et al.*, 2019) have also shown similar results of antibiotics being used to manage self-limiting viral symptoms. The practices stated above are known causes of antibiotic resistance and underscore the need for comprehensive efforts that promote the responsible use of antibiotics among the public.

Concerning recent antibiotic use, the study found that 56.2% of patients had utilized antibiotics in the past three months with penicillins (amoxicillin and ampicillin/cloxacillin), fluoroquinolones (ciprofloxacin), and nitroimidazoles (metronidazole) being the most frequently used antibiotics. Chukwu *et*

CONCLUSION

In conclusion, moderate levels of knowledge and practice but poor attitudes about antibiotics and moderate levels of misuse are documented in this study. There is an urgent need for targeted interventions to improve public awareness and promote responsible antibiotic use to contribute to strategies to reverse the growing antimicrobial

ETHICAL CONSIDERATIONS

Ethical approval (Notice of Exemption) was obtained from the Human Research Ethics Committee of the Lagos University Teaching Hospital bearing approval

al. (2020) showed that ampicillin/cloxacillin (54.4%), ampicillin (41.7%), ciprofloxacin (39.4%), and metronidazole (35.9%) were the most commonly consumed antibiotics among respondents across all geo-political zones in Nigeria.

In the three months preceding the study, over 32% of the respondents used antibiotics without a physician's prescription though some must have relied on pharmacists' recommendations as only 6% did not rely on the pharmacist's recommendation before procuring an antibiotic. This reliance on pharmacists can be attributed to various factors, including high costs of medication, prolonged waiting times at hospitals, and the convenience associated with purchasing antibiotics at community pharmacies (Sono *et al.*, 2023).

The study unveiled several factors influencing knowledge, attitude, and practices including marital status, religion, gender and highest educational level. A previous study carried out in Ethiopia revealed that gender, education and marital status influenced knowledge and practice levels with illiterate and married respondents showing poor knowledge and negative practices (Sitotaw and Philipos, 2023). In addition, the study above and others also showed that place of residence and income level also played crucial roles in shaping respondents antibiotics knowledge and practice (You *et al.*, 2008; Abu Taha *et al.*, 2016; Nepal *et al.*, 2019; Karuniawati *et al.*, 2021).

Our study may have a potential sampling bias as it was conducted among clients within a community pharmacy setting and could over-represent individuals with easy access to healthcare services. This might inaccurately reflect the antibiotic practices of the broader population.

Our study's strength lies in its comprehensive examination of knowledge, attitudes, and practices toward antibiotic use. This research offers crucial insights to guide interventions aimed at combating antimicrobial resistance and promoting responsible antibiotic use by clearing up prevailing misconceptions and practices related to antibiotics.

resistance rate currently undermining healthcare. Healthcare providers and policymakers can contribute to the global efforts to combat antibiotic resistance and ensure the effective and sustainable use of these medications by addressing misconceptions and poor behaviours surrounding antibiotic use among their clients and patients.

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