An evaluation of knowledge, attitude, and behaviour amongst patients regarding antibiotic use and misuse in an urban setting within South Africa

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Abstract

Background: Antibiotic misuse is a major driver of antimicrobial resistance (AMR), a global health threat intensified by limited public awareness and inappropriate community practices. In South Africa, where the burden of infectious diseases remains high, understanding patients' knowledge, attitudes, and behaviours is essential for informing locally relevant education and stewardship strategies.

Methods: A descriptive cross-sectional study was conducted using a structured, self-administered questionnaire among 135 adult patients attending a community pharmacy in the eThekwini Metropolitan Municipality. Data were analysed using Microsoft Excel and SPSS to generate descriptive statistics and assess associations between socio-demographic variables and antibiotic-related knowledge, attitudes, and behaviours.

Results: While 80% of participants correctly acknowledged that different antibiotics are used for different infections, 73% mistakenly believed antibiotics are effective against viral illnesses. Only 61% recognised antimicrobial resistance as a global concern. Although 77% reported receiving antibiotic counselling from pharmacists and 72% from doctors, misconceptions about appropriate antibiotic use persisted. No statistically significant associations were found between gender, education level, or recent antibiotic use and knowledge or attitudes.

Conclusion: Communication between healthcare providers and patients is occurring; however, significant gaps in public knowledge persist, particularly regarding the inappropriate use of antibiotics for viral infections. To address these misconceptions and reduce antimicrobial resistance, context-specific educational interventions and strengthened provider–patient communication strategies are essential within both public and private healthcare settings in South Africa.

Keywords: antibiotic misuse, antimicrobial resistance, self-medication, knowledge, attitude, behaviour, South Africa

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Introduction

Antibiotics remain among the most widely prescribed and used medications globally due to their essential role in managing bacterial infections.[1] These agents act either as bactericidal by destroying bacteria, or bacteriostatic by suppressing bacterial growth and function synergistically with the host immune system to eliminate infectious pathogens.[2] However, the inappropriate and excessive use of antibiotics has accelerated the development and spread of antimicrobial resistance (AMR), which now poses a serious global health threat, contributing to increased treatment failure, prolonged illness, and rising healthcare costs.[1,3]

The World Health Organization (WHO) recognises AMR as one of the top ten global public health threats.[4] Misuse and overuse of antibiotics within communities including the use of antibiotics without prescriptions, poor adherence to treatment regimens, and using antibiotics for viral infections like the common cold and influenza are among the primary drivers of AMR.[5,6] Public knowledge, attitudes, and behaviours significantly influence these practices.

South Africa (SA) faces a complex and unique set of healthcare challenges that heighten the risk of AMR. The country's quadruple burden of disease comprising HIV/AIDS, tuberculosis, non-communicable diseases, and injuries places sustained pressure on its public and private healthcare sectors.[7,8] Inadequate regulation, over-the-counter access to antibiotics in some settings, and inconsistent public health messaging further contribute to inappropriate use.[9] Additionally, variations in healthcare access, urban and rural service delivery gaps, and varying levels of education and health literacy affect how patients understand, access, and use antibiotics.[10]

International studies, including those from Saudi Arabia and Southeast Asia, have shown that antibiotic misuse is shaped by cultural beliefs, health-seeking behaviours, and perceived accessibility of medical care.[11,12] Similar trends have been reported in SA, where patient pressure, cost concerns, and variable pharmacy counselling influence prescribing and consumption behaviours.[10] Moreover, household practices such as storing leftover antibiotics, sharing them among family members, or using them without professional consultation remain widespread, further exacerbating the risk of resistance.[13,14]

Understanding how patients interact with antibiotics at the community level is essential for developing contextually relevant educational and behavioural interventions. While international

studies have explored these issues in high-income countries, there remains a scarcity of research focusing on antibiotic-related knowledge, attitudes, and behaviours among South African patients, particularly within urban community pharmacy settings. This study aims to address that gap by examining these factors within a community pharmacy in the eThekwini Metropolitan Municipality, SA.

Aim

To evaluate the knowledge, attitudes, and behaviours of patients regarding the use and misuse of antibiotics in a community pharmacy setting in the eThekwini Metropolitan Municipality, South Africa.

Objectives

1. To assess patients' knowledge and attitudes toward antibiotic use and misuse.
2. To explore patient behaviours and perceptions related to antibiotic adherence, self-medication, and communication with healthcare providers.

Method

Study location

The eThekwini Metropolitan Municipality population was estimated at approximately 4.2 million in 2022, underscoring the public health relevance of the setting for evaluating antibiotic use, attitudes, and behaviours among community members.[15] The study was conducted at an independently owned community pharmacy located within a Mall in the Phoenix suburb, which is a densely populated area within the eThekwini Metropolitan Municipality. The pharmacy serves a socio-economically diverse population and provides daily access to essential primary healthcare services. During the study period, a total of 135 patients consented to participate in the survey.

Study population and sampling

The study population included adult male and female patients who were prescribed antibiotics and accessed the pharmacy during the one-month data collection period. Inclusion criteria were patients aged between 21 and 65 years, who were able to provide informed consent, and currently prescribed antibiotics. Patients younger than 21 were excluded to ensure independent decision-making capacity and comprehension, while those over 65 were excluded to limit recall bias and age-related cognitive variation. A convenience sampling method was employed; eligible participants present in the dispensary area during operational hours were invited to participate by the principal investigator.

Sample size

The sample size was determined using the Leslie Kish's formula, $n = Z2pq/d2$, where; n = desired sample size population < 10 000; Z = standard normal deviate set at 1, 96 at 95% confidence level and $d = 0.05$. This yielded a minimum required sample size of 135 participants, accounting for the small population size typically serviced by a single pharmacy.[16]

Study design

A quantitative, descriptive cross-sectional study was conducted to assess patients' knowledge, attitudes, and behaviours regarding antibiotic use and misuse within a community pharmacy setting in South Africa.

Instrument development and validation

Data were collected using a self-administered, semi-structured questionnaire adapted from validated instruments used in Kuwait, Sweden, and the United Kingdom.[17–19] The questionnaire was pilot-tested with 15 participants from the same community to assess clarity, language appropriateness, and cultural relevance. Based on feedback, minor modifications were made to align with local terminology, healthcare access experiences, and common medication examples. The final version was administered in English, the primary language of communication in the region. Internal consistency was assessed using Cronbach's alpha, with a threshold of ≥ 0.70 considered acceptable for reliability.[20]

The instrument consisted of four sections:

- Section 1: Demographic information (10 items)
- Section 2: Knowledge of antibiotic use (13 items)
- Section 3: Attitudes toward antibiotics (7 items)
- Section 4: Perceptions of doctor–patient communication (5 items)

Sections 2 through 4 used a five-point Likert scale (Strongly Disagree to Strongly Agree).

Data collection procedure

Data collection took place over four weeks following ethics approval. Participants who met the inclusion criteria were approached in the pharmacy and invited to complete the anonymous questionnaire after providing written informed consent. All responses were completed on-site and returned directly to the principal investigator to minimise loss or contamination of data.

Data analysis

Completed questionnaires were coded and entered the Microsoft Excel and analysed using SPSS Version 23. Descriptive statistics, including frequencies and percentages, were used to summarise demographic and survey data. Cronbach's alpha was calculated to assess internal consistency of the questionnaire domains. Associations between key variables were analysed using chi-square tests, and multivariate analysis of variance (MANOVA) was applied to explore correlations between knowledge, attitudes, and behaviours.

Ethics considerations

Ethics approval for the study was obtained from the Biomedical Research Ethics Committee at the University of KwaZulu-Natal

(Reference: BE061/19). Written informed consent was obtained from the study site and all participants prior to data collection. Permission to conduct the study at the site was granted by the pharmacy owner and responsible pharmacist. Site and participant confidentiality and anonymity were maintained throughout the study, in accordance with the Declaration of Helsinki.[21]

Table I: Sociodemographic characteristics of respondents (*n* = 135)

Characteristics	Category	*n* (%)
Gender	Male	63 (46.7)
	Female	72 (53.3)
Age	21–29	32 (23.7)
	30–39	52 (38.5)
	40–49	31 (22.9)
	50–59	16 (11.9)
	≥ 60	4 (3.0)
Antibiotic use in past 6 months	Yes	78 (57.8)
	No	57 (42.2)
Do you work or study in the medical field?	Yes	31 (23)
	No	104 (77)
Educational Qualifications	Matric	54 (40)
	Certificate	23 (17)
	Diploma	15 (11.1)
	Degree	24 (17.8)
	Masters	5 (3.7)
	Doctorate	4 (3.0)
	Other	10 (7.4)

Note: *n* = frequency (number of respondents) and % = percentage

Results

A total of 135 questionnaires were distributed with a 100% response rate. The Cronbach's Alpha test was used to measure the reliability of the items through internal consistency. The Cronbach's alpha coefficient was 0.752, indicating acceptable internal consistency for the questionnaire items in this sample. Table I provides information on the demographic characteristics of respondents.

Over half of the study respondents (*n* = 72; 53.3%) were females. The majority of the respondents (*n* = 52; 38.5%) were between 30 and 39 years old. More than half of the study population (*n* = 78; 57.8%) had used antibiotics in the past six months. The largest proportion of respondents (*n* = 54; 40%) reported high school (matric) as their highest educational qualification, while the remainder had post-secondary or tertiary education. However, a small portion (*n* = 31; 23%) worked or studied in the healthcare environment. Table II depicts the results of the respondent's knowledge of antibiotics and their use.

The majority of the respondents (*n* = 108; 80%) stated that different antibiotics are needed to "cure" different diseases. Most of the sample (*n* = 108; 80%) knew that antibiotics are effective against bacteria. Approximately two-thirds of respondents believed that antibiotics accelerate recovery from coughs and colds (*n* = 87; 64%) and are effective for most coughs and colds (*n* = 80; 59%). Over two-thirds (*n* = 98; 73%) incorrectly stated that antibiotics are effective against viral infections. Furthermore, the majority (*n* = 113; 84% and *n* = 108; 80%, respectively) agreed that antibiotic treatment should be discontinued if side-effects or skin reactions occur. Table III presents the results of the respondent's attitude towards antibiotic use.

Table II: Analysis of respondents' knowledge on antibiotics use

Statements	Strongly Disagree *n* (%)	Disagree *n* (%)	Neutral *n* (%)	Agree *n*(%)	Strongly Agree *n* (%)	Total *n* (%)
Different antibiotics are needed to cure different diseases	4 (3)	4 (3)	19 (14)	65 (48)	43 (32)	135 (100)
Antibiotics are effective against bacteria	7 (5)	5 (4)	15 (11)	63 (47)	45 (33)	135 (100)
Antibiotics can kill bacteria that normally lives on the skin and gut	2 (2)	7 (5)	17 (13)	67 (50)	42 (30)	135 (100)
Antibiotics speed up the recovery from coughs and colds	14 (10)	17 (13)	17 (13)	57 (42)	30 (22)	135 (100)
Antibiotics work on most coughs and colds	16 (12)	20 (15)	19 (14)	54 (40)	26 (19)	135 (100)
Antibiotics are effective against viruses	15 (11)	8 (6)	14 (10)	60 (45)	38 (28)	135 (100)
If you get side-effects during a course of antibiotics, you should stop taking it	9 (6)	7 (5)	6(4)	60 (45)	53 (40)	135 (100)
If you get a skin reaction when using antibiotics, you should not use antibiotics again	2 (2)	12 (9)	13 (10)	59 (44)	49 (36)	135 (100)
Antibiotics can cause an imbalance in the body's own bacterial flora	4 (3)	7 (5)	32 (24)	49 (36)	43 (32)	135 (100)
The unnecessary use of antibiotics can increase the resistance of bacteria to them	6 (4)	7 (5)	23 (18)	54 (40)	45 (33)	135 (100)
Antibiotics resistance is a worldwide problem	9 (6)	11 (8)	33 (25)	46 (34)	36 (27)	135 (100)
Antibiotics use among animals can reduce the effects of antibiotics among humans	21 (16)	34 (25)	31 (23)	29 (21)	20 (15)	135 (100)
Humans can be resistant to antibiotics	6 (4)	12 (9)	20 (15)	49 (37)	48 (35)	135 (100)

Note: *n* = frequency (number of respondents) and % = percentage

Table III: Analysis of respondents' attitude towards antibiotic use

Statements	Strongly Disagree *n* (%)	Disagree *n* (%)	Neutral *n* (%)	Agree *n* (%)	Strongly Agree *n* (%)	Total *n* (%)
I always complete the course of treatment with antibiotics even if I feel better	1 (1)	5 (4)	15 (11)	56 (41)	58 (43)	135 (100)
It is good to be able to get antibiotics from relatives or friends without having to see a doctor	64 (49)	37 (27)	6 (4)	22 (16)	6 (4)	135 (100)
I prefer to keep antibiotics at home in case there may be a need for it later	39 (30)	41 (31)	12 (8)	24 (17)	19 (14)	135 (100)
If I feel better, I sometimes stop taking my antibiotics before completing the course of treatment	44 (33)	36 (27)	11 (8)	54 (25)	10 (7)	135 (100)
I prefer to use antibiotics if I have a cough for more than a week	25 (18)	29 (21)	29 (21)	32 (26)	20 (14)	135 (100)
When I have a sore throat, I prefer to use antibiotics	30 (22)	44 (33)	21 (15)	28 (21)	12 (9)	135 (100)

Note: *n* = frequency (number of respondents) and % = percentage

Table IV: Analysis of perception on doctors habits and health professional/patient relationship

Statements	Strongly Disagree *n* (%)	Disagree *n* (%)	Neutral *n* (%)	Agree *n* (%)	Strongly Agree *n* (%)	Total *n* (%)
Pharmacists often tell you how to use antibiotics	3 (2)	11 (8)	17 (13)	51 (38)	53 (39)	135 (100)
Doctors often take time to inform patients during consultation how to use antibiotics	4 (3)	8 (6)	26 (19)	55 (41)	42 (31)	135 (100)
I trust the doctor's decision if they decide not to prescribe antibiotics	5 (4)	8 (6)	15 (11)	65 (48)	42 (31)	135 (100)
Doctors often prescribe antibiotics because the patient expects it	3 (2)	3 (2)	19 (14)	66 (49)	44 (33)	135 (100)
Doctors often take time to carefully consider the need for antibiotics	10 (7)	7 (5)	24 (18)	56 (42)	38 (28)	135 (100)

Note: *n* = frequency (number of respondents) and % = percentage

A large percentage of the respondents (n = 114; 84%) admitted to always completing the course of treatment with antibiotics, even if they felt better. The majority (n = 101; 74%) disagreed that it is good to get antibiotics from family or friends without having to see a doctor. About one-quarter of respondents (n = 31; 23%) reported that they sometimes discontinue antibiotics before completing the prescribed course, if they feel better. Table IV outlines responses concerning the perceptions of healthcare professionals' habits and health professional/patient relationships.

The vast majority of the sample population (n = 104; 77%) agreed that the pharmacists often tell them how to use their antibiotics during the dispensing process. Similarly, 72% (n = 97) agreed that doctors usually take time during consultations to explain how prescribed antibiotics should be used but this number is slightly lower when compared to the pharmacists. The majority of respondents (n = 107; 79%) stated that they trusted the doctor's decision not to prescribe antibiotics though many (n = 110; 82%) also believed that doctors often prescribed antibiotics because the patient expects it.

In order to assess whether the socio-demographic factors have an impact on antibiotic use, Pearson's Chi-Square test of independence was performed to identify the association between two variables: age, gender, education, antibiotic use in the past six months, and job status and antibiotic use. The Phi and Cramer's V depicts the test of the association level between the variables. Overall, based on the Pearson's chi-square test results, apart from gender (p = 0.364), all other socio-demographic variables are associated with using antibiotics as the p-values were less than 0.05. Table V presents the results of multivariate analysis of variance.

A multivariate logistics regression was used to determine the relationship between socio-demographic variables and knowledge, attitude, and behaviour of patients regarding antibiotic use. The reference groups were chosen based on the group to which the researcher wanted to compare all other groups within the same category, thus interpretation of the results much easier. The males were less likely to have good knowledge, attitude, and behaviour on antibiotic usage than the females. It can be seen in Table V that none of the variables (p = 0.051, 0.118 and 0.068 respectively) are statistically significant, as the p = values are greater than the significance value 0.05.

The knowledge and behavioural aspects across all age groups presented p = 0.000 (p-values are less than 0.05). When considering the attitude component, age group 21–29 years scored p = 0.005, age group 30–39 years scored p = 0.003, age group 40–49 years and 50–59 years scored p = 0.037. Therefore, the respondents aged 21–29, 30–39, 40–49, and 50–59 years old were likely to have good knowledge, attitude, and behaviour of antibiotic usage. The

Table V: Summary of multivariate analysis of variance (MANOVA)

Factor	Category	Knowledge		Attitude		Behavior	
Gender		*P*-Value					
	Male	0.051		0.118		0.068	
	Female	Reference Group					
	Overall	Chi-Square	Sig. Value	Chi-Square	Sig. Value	Chi-Square	Sig. Value
		3.020	.554	2.355	.671	1.520	.823
Age		*P*-Value					
	21–29	0.000		0.005		0.000	
	30–39	0.000		0.003		0.000	
	40–49	0.000		0.037		0.000	
	50–59	0.000		0.037		0.000	
	> 60	Reference Group					
	Overall	Chi-Square	Sig. Value	Chi-Square	Sig. Value	Chi-Square	Sig. Value
		10.640	.223	7.031	.533	6917.09	.000
Employment status		*P*-Value					
	Unemployed	0.000		0.037		0.000	
	Employed	Reference Group					
	Overall	Chi-Square	Sig. Value	Chi-Square	Sig. Value	Chi-Square	Sig. Value
		3.067	0.547	4.319	0.365	2.149	0.708
Educational Qualifications		*P*-Value					
	Matric	Reference Group					
	Certificate	0.565		0.560		0.974	
	Diploma	0.599		0.634		0.978	
	Degree	0.565		0.587		0.327	
	Masters	0.678		0.712		0.097	
	Doctor	0.713		0.761		0.097	
	Other	0.634		0.677		0.097	
		Reference Group					
	Overall	Chi-Square	Sig. Value	Chi-Square	Sig. Value	Chi-Square	Sig. Value
		18.104	0.947	13.422	0.859	14.104	0.825
Antibiotic usage in past 6 months		*P*-Value					
	Yes	0.288		0.069		0.758	
	No	Reference Group					
	Overall	Chi-Square	Sig. Value	Chi-Square	Sig. Value	Chi-Square	Sig. Value
		1.581	0.812	1.679	0.795	1.147	0.887
Work in medical field		*P*-Value					
	Yes	0.002		0.005		0.034	
	No	Reference Group					
	Overall	Chi-Square	Sig. Value	Chi-Square	Sig. Value	Chi-Square	Sig. Value
		4.093	0.394	3.713	0.446	1.071	0.899

associations were significant, which is different from the reference group.

Based on the survey responses (Table V), both groups of respondents that used or had not used antibiotics in the past six months differed in knowledge, attitude and behaviour regarding antibiotic usage, but these results are not statistically significant (knowledge $p = 0.288$, attitude $p = 0.069$ and behaviour $p = 0.758$).

Knowledge did not differ across all educational qualification groups towards antibiotic usage ($p > 0.05$). Furthermore, the respondents aged 21–29 years (14.8%), 30–39 years (17.8%), 40–49 years (12.6%) and 50–59 years (8.8%) were in disagreement with the use of antibiotics for a sore throat. Only 2.3% of respondents aged ≥ 60 years reported they would use antibiotics for a sore throat. The majority in younger age groups aged 21–29 years (16.3%), 30–39 years (21.5%), and 40–49 years (11.8%) agreed that antimicrobial resistance is a global problem.

Discussion

This study demonstrates that antibiotics remain frequently used in the community, with notable gaps in public knowledge, attitudes, and behaviours regarding their appropriate use. The knowledge component examined participants' understanding of antibiotics, their indications, potential side-effects, and the concept of AMR. While 80% of respondents correctly recognised that different antibiotics are required to treat various diseases, higher than the figure reported in Jordan (32.9%) but lower than in Kuwait (91.8%) and comparable to Malaysia (76.7%) where misconceptions persisted in key areas.[17,22,23]

A substantial proportion (73%) of participants believed antibiotics are effective against viruses, consistent with findings from Kuwait and Malaysia.[17,23] Misunderstandings were also evident about respiratory infections: 64% believed antibiotics speed recovery from coughs and colds, and 59% thought they were effective for most such cases which is lower than the proportions reported in Kuwait and Jordan.[17,22] These misconceptions mirror patterns observed in Namibia, where antibiotics were preferred for common cold symptoms such as sore throat and cough.[24]

The persistence of such beliefs reflects a lack of awareness that antibiotics have no therapeutic effect against viral infections, such as the common cold or influenza, nor fungal pathogens. Viruses differ fundamentally from bacteria in structure and replication mechanisms, rendering antibiotics ineffective. Inappropriate antibiotic use in viral infections not only fails to improve symptoms but also increases the risk of side-effects, elevates healthcare costs, and contributes to the emergence of resistant bacterial strains.[14]

Although 61% of respondents identified AMR as a global health concern, the prevalence of correct knowledge was still lower than in Kuwait and Malaysia.[17,23] This aligns with evidence that awareness of resistance does not necessarily translate into rational antibiotic use, as self-medication and misuse persist.

The attitude component assessed participants' predisposition towards antibiotic use. A considerable proportion reported willingness to use antibiotics for prolonged cough (39%) or sore throat (30%), and one-third (33%) indicated they sometimes stopped treatment early if they felt better; a pattern similar to that in Kuwait.[17] While 84% stated they always completed the prescribed course, the discrepancy between stated adherence and the proportion who admitted early cessation suggests that misconceptions about the duration of therapy remain. Premature discontinuation increases the risk of relapse, promotes resistance, and may lead to more severe or prolonged illness, increased medical costs, and, in severe cases, mortality.

Behaviourally, 31.8% of respondents reported keeping leftover antibiotics for future use which is lower than the 44.3% reported in Kuwait,[17] and 20.7% admitted obtaining antibiotics from family or friends without a prescription (like the 23.3% seen in Kuwait).[17] Such practices heighten risks of inappropriate drug choice, incorrect dosing, and delayed medical care, and may contribute to treatment failures and resistance development. Storing leftover antibiotics also poses safety hazards, particularly for children, and may result in the use of degraded or expired medications.[17,22,24]

Information sources emerged as an important behavioural determinant: a higher proportion of respondents reported receiving counselling on antibiotic use from pharmacists compared to doctors. This highlights the crucial role of both professions in public education and opportunities to enhance community-level antibiotic stewardship through improved communication during prescriber-patient consultations and dispensing of antibiotics.

Study limitations

This study employed convenience sampling from a single healthcare facility in one province of South Africa, which may limit the generalisability of the findings to the broader national population. The sample may not fully capture variations in antibiotic use behaviours across different cultural, socio-economic, or regional contexts. Future research should consider multi-centre sampling across diverse geographic areas to enhance representativeness and account for contextual differences.

Recommendation

This study emphasises the need for public education to dispel misconceptions about antibiotics, particularly their use for viral infections. Campaigns should address the risks of misuse, such as resistance and treatment failure. Strengthening healthcare provider and patient communication, restricting non-prescription sales, and implementing culturally tailored stewardship programmes are vital. Further provincial research should explore how socio-demographic factors shape antibiotic knowledge and attitudes.

Conclusion

This study in a South African community pharmacy highlights ongoing misconceptions about antibiotic use, especially regarding viral infections, as well as prevalent self-medication practices. Addressing these challenges requires consideration of socio-demographic and cultural factors, to inform targeted education. Enhancing communication between patients and healthcare providers, along with stricter antibiotic access controls, is essential to promote rational use and reduce resistance.

Conflicts of interest

The authors have declared that no competing interest exist.

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Ethical considerations

Ethics approval was sought from the Biomedical Research Ethics Committee at the University of KwaZulu-Natal (BE061/19).

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