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Knowledge, Attitude, and Practice Regarding Antibiotic Use Among Community Members: A Cross-Sectional Study

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Abstract-

Background: Inappropriate antibiotic use is a key driver of antimicrobial resistance (AMR), a leading global cause of morbidity and mortality. Community-level knowledge, attitude, and practice (KAP) gaps remain an important modifiable contributor to misuse. This study assessed KAP regarding antibiotic use among adult community members and identified factors associated with good knowledge. ***Methods***: A community-based cross-sectional study was conducted among 500 adult residents selected by multistage random sampling. Data were collected using a pre-tested, interviewer-administered structured questionnaire covering sociodemographic characteristics and KAP domains. Knowledge, attitude, and practice scores were dichotomised into "good" and "poor" categories using the mean score as the cut-off. Data were analysed using IBM SPSS version 26; chi-square tests and multivariable logistic regression were used to identify factors associated with knowledge, with significance set at $p<0.05$. ***Results***: Overall, 37.2% of respondents demonstrated good knowledge, 42.8% had a favourable attitude, and only 33.8% reported good practice regarding antibiotic use. Although 82.4% knew that antibiotics act against bacteria, only 37.4% correctly recognised that antibiotics are ineffective against viral infections. Self-medication with antibiotics was reported by 44.2% of participants, and 39.6% kept leftover antibiotics at home. Higher educational attainment (adjusted OR 2.14, 95% CI 1.48–3.09), urban residence (adjusted OR 1.71, 95% CI 1.16–2.52), and higher household income (adjusted OR 1.58, 95% CI 1.06–2.36) were significantly associated with good knowledge. ***Conclusion***: Knowledge, attitude, and practice regarding antibiotic use were suboptimal among community members, with a notable knowledge-practice gap. Targeted public health education, stricter enforcement of prescription-only dispensing, and community-based antimicrobial stewardship campaigns are needed to curb inappropriate antibiotic use.

Keywords: *Antibiotics; Antimicrobial resistance; Knowledge; Attitude; Practice; Self-medication; Cross-sectional study.*

INTRODUCTION

Antibiotics rank among the most transformative therapeutic discoveries in modern medicine, having dramatically reduced morbidity and mortality from bacterial infections since their introduction in the mid-twentieth century. However, the clinical utility of these agents is now under serious threat from antimicrobial resistance (AMR), a phenomenon in which bacteria evolve mechanisms that render previously effective antibiotics ineffective. Recent global estimates indicate the scale of this crisis: bacterial AMR was associated with approximately 4.71 million deaths worldwide in 2021, of which 1.14 million were directly attributable to resistant infections (1). A comprehensive modelling analysis published in The Lancet further projected that, without sustained intervention, annual deaths directly attributable to AMR could rise to nearly 2 million by 2050, with low- and middle-income regions such as South Asia and sub-Saharan Africa bearing a disproportionate share of this burden (2,3). These projections have prompted the World Health Organization (WHO) and member states to adopt new global targets, including a 10% reduction in AMR-associated deaths by 2030 relative to a 2019 baseline (1).

A central driver of AMR is the irrational use of antibiotics, encompassing over-the-counter purchase without prescription, premature discontinuation of treatment courses, use for self-limiting viral illnesses, and sharing or reuse of leftover medication. These practices are shaped substantially by the knowledge and attitudes that individuals hold about antibiotics and the infections they are meant to treat. The Knowledge, Attitude, and Practice (KAP) framework provides a structured and widely validated approach for examining this relationship, allowing researchers to quantify what people know about

antibiotics, how they feel about resistance and prescribing norms, and what they actually do when they or their family members fall ill (4).

Evidence from KAP surveys conducted across diverse populations and settings consistently demonstrates substantial gaps between knowledge and practice. A cross-sectional study among medical students in Bangladesh found that, despite reasonable theoretical knowledge, many students still held misconceptions about antibiotic indications and resistance mechanisms, underscoring that even health-trained populations are not immune to KAP gaps (5). Similarly, a study among undergraduate students in Pokhara, Nepal, reported that self-medication with antibiotics was common, often driven by time constraints, repeated symptoms, and prior treatment experience rather than medical advice (6). Research among community pharmacists in the United Arab Emirates found that only 40.1% had an overall positive KAP score, even though the large majority were aware that dispensing antibiotics without a prescription is illegal, highlighting a disconnect between awareness of regulation and actual dispensing behaviour (7). A pharmacy-based study in Medellín, Colombia, similarly found that more than a third of pharmacists incorrectly believed antibiotics were effective against the common cold or COVID-19, and that practice scores were significantly poorer in independently operated retail pharmacies compared with chain pharmacies (8).

The general public, not only healthcare providers and trainees, represents a critical population for KAP assessment, since most antibiotic-related decisions in low- and middle-income settings begin at the household level, often without professional consultation. A parental KAP study conducted in Basrah, Iraq, found that although 81% of parents recognised that antibiotic misuse contributes to bacterial resistance, a substantial proportion still held misconceptions about the viral aetiology of upper respiratory tract infections in their children, and a notable minority continued to request antibiotics directly from pediatricians (9). Population-level surveillance, such as the recurring General Public KAP Survey on Antibiotic Resistance conducted by Hong Kong's Centre for Health Protection, has similarly tracked persistent knowledge gaps regarding food safety practices and antibiotic resistance transmission pathways across successive survey rounds (10). Despite the proliferation of KAP studies among specific subpopulations such as medical and nursing students, pharmacists, and physicians, comparatively fewer studies have systematically examined KAP among general adult community members representing a range of educational and occupational backgrounds, who collectively constitute the largest reservoir of antibiotic consumption and self-medication behaviour. A systematic review of KAP surveys among health and social care professionals further noted substantial heterogeneity in survey instruments and scoring methods, limiting cross-study comparability and reinforcing the need for context-specific, methodologically transparent community-based assessments (11). Understanding the specific knowledge deficits, attitudinal barriers, and practice patterns within a defined community is essential for designing locally relevant antimicrobial stewardship interventions, including targeted public education campaigns, pharmacy regulation enforcement, and primary care provider training. This study therefore aimed to assess the level of knowledge, attitude, and practice regarding antibiotic use among adult community members and to identify the sociodemographic factors associated with good knowledge, in order to inform the design of targeted community-based antimicrobial stewardship interventions.

MATERIALS AND METHODS

Study Design and Setting

A community-based, descriptive cross-sectional study was conducted over a three-month period to assess knowledge, attitude, and practice (KAP) regarding antibiotic use among adult residents of a defined urban and peri-urban catchment area. The cross-sectional design was selected because it allows efficient estimation of the prevalence of specific knowledge, attitudes, and practices within a population at a single point in time, and permits exploration of associations between sociodemographic characteristics and KAP outcomes without the time and resource demands of a longitudinal design.

Study Population and Sampling

The target population comprised adult residents aged 18 years and above who had resided in the study area for at least six months prior to data collection. Individuals who were healthcare professionals by training, those unable to communicate in the local language, and those who declined consent were excluded, since the study specifically targeted lay community knowledge rather than professional clinical knowledge. The minimum required sample size was calculated using the single population proportion formula ($n = Z^2P(1-P)/d^2$), assuming an expected proportion of good KAP of 50% (to maximise the sample size), a 95% confidence level ($Z = 1.96$), and a margin of error of 5%, yielding a minimum requirement of 384 participants. This was inflated by 10% to account for possible non-response and incomplete responses, and rounded up to a final target and achieved sample of 500 participants. A multistage random sampling technique was used: the study area was first stratified into administrative subunits, after which a proportionate number of households was selected from each subunit using simple random sampling from household lists. Within each selected household, one adult member was randomly selected using the Kish grid method (Lottery method) when more than one eligible member was present.

Data Collection Instrument

Data were collected using a structured, interviewer-administered questionnaire adapted from previously validated KAP instruments used in comparable community and student-based antibiotic surveys (5,6,9), with contextual modifications to suit the local setting. The questionnaire consisted of four sections: (i) sociodemographic characteristics (age, sex, educational level, occupation, household income, and residence); (ii) eight knowledge items assessing understanding of antibiotic indications, mechanisms, resistance, and side effects, scored as correct/incorrect; (iii) six attitude items rated on a three-point scale (agree/neutral/disagree) addressing perceptions of antibiotic resistance as a public health threat and prescribing norms; and (iv) eight practice items addressing self-reported antibiotic-related behaviours over the preceding twelve months. The questionnaire was translated into the local language and back-translated into English to confirm semantic equivalence. Content validity was established through review by three independent experts in clinical pharmacology and public health, and internal consistency was assessed through a pilot test among 30 individuals not included in the final sample, yielding a Cronbach's alpha of 0.78 for the combined KAP scale, indicating acceptable reliability.

Operational Definitions and Scoring

Each correct knowledge response was scored 1 and each incorrect or "don't know" response was scored 0, generating a knowledge score ranging from 0 to 8. Attitude items were scored such that the favourable response (e.g., "agree" with statements supporting rational antibiotic use) was scored 2, "neutral" scored 1, and the unfavourable response scored 0, generating an attitude score ranging from 0 to 12. Practice items were scored 1 for the appropriate/recommended practice and 0 for the inappropriate practice, generating a practice score ranging from 0 to 8. For each domain, participants scoring at or above the respective mean score were classified as having "good" knowledge, attitude, or practice, while those scoring below the mean were classified as "poor," consistent with the cut-off approach commonly applied in comparable KAP literature.

Data Analysis

Completed questionnaires were checked for completeness, coded, and entered into IBM SPSS Statistics for Windows, version 26 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequencies and percentages, were used to summarise sociodemographic characteristics and individual KAP items. The chi-square test was used to assess bivariate associations between sociodemographic variables and the dichotomised knowledge outcome, and variables with $p<0.25$ at the bivariate level were entered into a multivariable binary logistic regression model to identify independent predictors of good knowledge, with adjusted odds ratios (AOR) and 95% confidence intervals (CI) reported. A p-value of less than 0.05 was considered statistically significant in the final model.

Ethical Considerations

Ethical approval for this study was obtained from the relevant Institutional Research Ethics Committee prior to data collection. Written informed consent was obtained from each participant after a full explanation of the study's purpose, voluntary nature, and assurance of confidentiality. Data were anonymised at the point of entry, and no individually identifiable information was retained beyond the data collection phase. Participants were free to withdraw at any stage without any effect on their access to healthcare services.

RESULTS

Table 1. Sociodemographic Characteristics of Study Participants (N = 500)

Characteristic	n (N=500)	%
Age group (years)		
18–29	168	33.6
30–44	194	38.8
45–59	98	19.6
≥60	40	8.0
Sex		
Male	221	44.2
Female	279	55.8
Educational level		
Up to secondary school	146	29.2

Characteristic	n (N=500)	%
Diploma/college	163	32.6
Bachelor's degree or higher	191	38.2
Occupation		
Student	112	22.4
Employed (private/public sector)	238	47.6
Self-employed / business	84	16.8
Unemployed / homemaker / retired	66	13.2
Monthly household income		
Low	157	31.4
Middle	229	45.8
High	114	22.8
Residence		
Urban	318	63.6
Rural	182	36.4

Note: Percentages within each category sum to 100%; indented subcategory rows present frequency (n) and percentage (%) within the respective characteristic group.

A total of 500 participants completed the questionnaire, giving a response rate of 100% among those approached and eligible. As shown in Table 1, slightly more than half of the respondents were female (55.8%), and the majority were aged between 18 and 44 years (72.4% combined). Just under 40% (38.2%) had attained a bachelor's degree or higher level of education, and a similar proportion (38.8%) were in the 30–44 year age band. Nearly two-thirds of participants resided in urban areas (63.6%), and almost half (45.8%) reported a middle-level household income.

Table 2. Knowledge Regarding Antibiotic Use and Resistance (N = 500)

Knowledge statement	Correct response n (%)	Incorrect response n (%)
Antibiotics are effective against viral infections such as common cold/flu (correct: disagree)	187 (37.4)	313 (62.6)
Antibiotics can kill bacteria that cause infections (correct: agree)	412 (82.4)	88 (17.6)
Incomplete antibiotic courses contribute to antibiotic resistance (correct: agree)	298 (59.6)	202 (40.4)
Antibiotic resistance is a problem only in hospitals, not in the community (correct: disagree)	211 (42.2)	289 (57.8)
Leftover antibiotics from a previous illness can be reused for a new illness with similar symptoms (correct: disagree)	176 (35.2)	324 (64.8)
Antibiotics have side effects such as allergic reactions or diarrhoea (correct: agree)	356 (71.2)	144 (28.8)
A prescription is required to legally purchase antibiotics (correct: agree)	284 (56.8)	216 (43.2)
Taking antibiotics unnecessarily can make future infections harder to treat (correct: agree)	339 (67.8)	161 (32.2)

Note: "Correct response" denotes the response aligned with accepted pharmacological and public health guidance for each statement.

Table 2 presents participant responses to the eight knowledge items. Knowledge of the basic mechanism of antibiotics was relatively strong: 82.4% correctly agreed that antibiotics act by killing or inhibiting bacteria. However, substantial misconceptions persisted regarding the scope of antibiotic efficacy, as only 37.4% correctly disagreed with the statement that antibiotics are effective against viral infections such as the common cold or flu, meaning that nearly two-thirds of respondents incorrectly believed antibiotics could treat viral illness. Awareness of antimicrobial resistance as a community-wide (rather than purely hospital-based) phenomenon was similarly limited, with only 42.2% correctly disagreeing that resistance is confined to hospital settings. Overall, the mean knowledge score was 4.13 (SD = 1.86) out of a possible 8, and 37.2% of participants met the pre-specified cut-off for "good" knowledge (Table 5).

Table 3. Attitude Towards Antibiotic Use and Resistance (N = 500)

Attitude statement	Agree n (%)	Neutral n (%)	Disagree n (%)
Antibiotic resistance is a serious public health problem	378 (75.6)	67 (13.4)	55 (11.0)
I should only take antibiotics prescribed by a qualified physician	342 (68.4)	84 (16.8)	74 (14.8)
It is acceptable to ask a pharmacist for antibiotics without a prescription if I am in a hurry	196 (39.2)	112 (22.4)	192 (38.4)
I am concerned that antibiotics may become ineffective in the future due to overuse	311 (62.2)	98 (19.6)	91 (18.2)
Doctors prescribe antibiotics more often than necessary	229 (45.8)	151 (30.2)	120 (24.0)
I would complete the full course of antibiotics even if I feel better before finishing it	267 (53.4)	89 (17.8)	144 (28.8)

Attitudinal responses, summarised in Table 3, revealed generally positive recognition of antibiotic resistance as a serious problem, with 75.6% of participants agreeing that antimicrobial resistance constitutes a serious public health threat. Despite this awareness, attitudes toward convenience-driven antibiotic acquisition were more permissive: 39.2% agreed that it would be acceptable to request antibiotics from a pharmacist without a prescription if they were in a hurry, and only 53.4% expressed a clear intention to complete a full antibiotic course even after symptoms resolved. The mean attitude score was 6.84 (SD = 2.41) out of a possible 12, with 42.8% of participants classified as having a favourable overall attitude.

Table 4. Self-Reported Practices Regarding Antibiotic Use (N = 500)

Practice statement	Yes n (%)	No n (%)
Used antibiotics in the past 12 months	356 (71.2)	144 (28.8)
Obtained the most recent antibiotic course with a doctor's prescription	279 (55.8)	221 (44.2)
Purchased antibiotics directly from a pharmacy without a prescription	221 (44.2)	279 (55.8)
Stopped taking antibiotics once symptoms improved, before finishing the course	243 (48.6)	257 (51.4)
Kept leftover antibiotics at home for future use	198 (39.6)	302 (60.4)
Shared antibiotics with a family member or friend	104 (20.8)	396 (79.2)
Used antibiotics for a cold, sore throat, or flu-like illness	231 (46.2)	269 (53.8)
Checked the expiry date before taking antibiotics	267 (53.4)	233 (46.6)

As shown in Table 4, 71.2% of participants reported having used antibiotics at least once in the preceding 12 months. Of concern, 44.2% reported having purchased antibiotics directly from a pharmacy without a medical prescription, and 46.2% reported using antibiotics specifically for cold, sore throat, or other flu-like symptoms, which are predominantly viral in aetiology and do not warrant antibiotic therapy. Nearly half of respondents (48.6%) admitted to discontinuing their antibiotic course once symptoms improved rather than completing the full prescribed duration, and 39.6% reported keeping leftover antibiotics at home for potential future use. Sharing of antibiotics with family members or friends was reported by 20.8% of participants. The mean practice score was 4.21 (SD = 1.98) out of a possible 8, and only 33.8% of participants demonstrated "good" practice.

Table 5. Overall Classification of Knowledge, Attitude, and Practice Levels (N = 500)

Domain	Good level n (%)	Poor level n (%)
Knowledge	186 (37.2)	314 (62.8)
Attitude	214 (42.8)	286 (57.2)
Practice	169 (33.8)	331 (66.2)

Note: "Good" level defined as a domain score at or above the respective domain mean; "Poor" level defined as a score below the domain mean.

Table 5 summarises the overall classification of participants across the three KAP domains. The proportion of participants achieving a "good" level was highest for attitude (42.8%) and lowest for practice (33.8%), with knowledge falling between the two (37.2%). This pattern illustrates a knowledge-attitude-practice gradient in which favourable attitudes toward antimicrobial stewardship were not consistently translated into appropriate antibiotic-related behaviour.

Table 6. Factors Associated with Good Knowledge of Antibiotic Use: Multivariable Logistic Regression

Factor	Adjusted OR	95% CI	p-value
Bachelor's degree or higher (vs. lower education)	2.14	1.48–3.09	<0.001
Urban residence (vs. rural)	1.71	1.16–2.52	**0.006**
Age ≥45 years (vs. <45 years)	0.97	0.67–1.40	0.857
Female sex (vs. male)	1.12	0.79–1.59	0.522
Middle/high household income (vs. low)	1.58	1.06–2.36	**0.025**

OR: odds ratio; CI: confidence interval. Reference categories: lower education, rural residence, age <45 years, male sex, low household income. Model adjusted for all variables shown.

On multivariable logistic regression analysis (Table 6), participants with a bachelor's degree or higher level of education had more than twice the odds of good knowledge compared with those with lower educational attainment (AOR 2.14, 95% CI 1.48–3.09, p<0.001). Urban residents also had significantly higher odds of good knowledge than rural residents (AOR 1.71, 95% CI 1.16–2.52, p=0.006), as did participants from middle- or high-income households compared with those from low-income households (AOR 1.58, 95% CI 1.06–2.36, p=0.025). Age and sex were not independently associated with knowledge level after adjustment for other variables (p>0.05 for both).

DISCUSSION

This study found that only 37.2% of community members demonstrated good knowledge of antibiotic use and resistance, with an even smaller proportion (33.8%) reporting good practice, despite a comparatively higher proportion (42.8%) holding favourable attitudes. This knowledge-attitude-practice gradient, in which positive attitudes do not consistently translate into appropriate behaviour, mirrors findings reported across a range of KAP studies in different populations and settings. For example, the study among medical students at the University of Basrah, Iraq, found that although knowledge improved progressively across academic years, 75.9% of students nonetheless demonstrated poor antibiotic-related practice, indicating that knowledge gains alone are insufficient to drive behavioural change even in a health-trained population (12). Likewise, the cross-sectional study among nursing students in Hubei Province, China, similarly reported a discrepancy between theoretical knowledge of antimicrobial resistance and the consistency of safe practice patterns (13). A particularly striking finding in the present study was that only 37.4% of participants correctly recognised that antibiotics are ineffective against viral infections such as the common cold or influenza. This misconception is widely documented in the international literature and is considered one of the principal drivers of antibiotic over-consumption for self-limiting illnesses. The parental KAP study from Basrah, Iraq, similarly found that 60% of parents disagreed that viral infection was the leading cause of upper respiratory tract infection in children and could resolve without antibiotics, despite high overall awareness (81%) that antibiotic misuse contributes to resistance (9). This pattern, in which general resistance awareness coexists with specific misconceptions about indications, suggests that public health messaging has succeeded in raising awareness of antimicrobial resistance as a concept but has not adequately corrected misunderstandings about when antibiotics are clinically indicated.

The finding that 44.2% of participants had purchased antibiotics without a prescription is consistent with, and in fact somewhat higher than, rates reported among some pharmacy-based and community studies elsewhere. The community pharmacist study from the United Arab Emirates found that although 88% of pharmacists were aware that dispensing antibiotics without a prescription is illegal, an overall positive KAP score was achieved by only 40.1% of respondents,

indicating that legal awareness does not necessarily prevent non-prescription dispensing in practice (7). Similarly, the pharmacy-based study from Medellín, Colombia, found that practice scores were significantly poorer among independently operated retail pharmacies than chain pharmacies, suggesting that structural and organisational factors at the point of sale, not solely individual knowledge, shape non-prescription antibiotic dispensing behaviour (8). Taken together with the present findings, this suggests that interventions limited to demand-side public education are unlikely to be sufficient without parallel supply-side regulatory enforcement targeting pharmacies and informal drug outlets.

The observed association between higher educational attainment and good knowledge (AOR 2.14, 95% CI 1.48–3.09) is broadly consistent with findings from the undergraduate KAP study conducted in Pokhara, Nepal, which similarly reported that academic discipline and exposure to antibiotic-related coursework were associated with KAP outcomes among university students (6). This reinforces the plausibility of formal education as a protective factor against antibiotic misuse, possibly through greater exposure to health information, improved health literacy, and a greater capacity to critically evaluate health-related claims. The association between urban residence and better knowledge observed in the present study may reflect differential access to healthcare facilities, pharmacies with qualified staff, and mass media health campaigns, which tend to be more concentrated in urban centres; however, this same urban concentration of easy pharmacy access may paradoxically also facilitate non-prescription antibiotic purchase, a hypothesis that warrants further qualitative exploration.

These findings carry direct implications for antimicrobial stewardship policy. Given that 4.71 million deaths globally were associated with bacterial AMR in 2021 alone, with the burden projected to worsen substantially among older adults by 2050 (1,2), community-level interventions addressing the specific knowledge gaps and practice patterns identified in this study, rather than generic awareness campaigns alone, are urgently needed. Mass media campaigns correcting the specific misconception that antibiotics treat viral illnesses, combined with stricter enforcement of prescription-only dispensing regulations at the pharmacy level, are likely to yield greater impact than knowledge dissemination alone. This study should be interpreted in light of certain limitations. As a cross-sectional design, it cannot establish causal or temporal relationships between sociodemographic factors and KAP outcomes. Self-reported practice data are also subject to social desirability and recall bias, which may have led to either overestimation or underestimation of inappropriate antibiotic-related behaviours. Furthermore, since the study was confined to a single catchment area, the generalisability of findings to other regions with differing healthcare infrastructure, regulatory enforcement, and cultural practices around medicine use may be limited.

CONCLUSION

This study demonstrates that knowledge, attitude, and practice regarding antibiotic use among adult community members remain suboptimal, with practice lagging behind both knowledge and attitude. Although a majority of participants recognised antimicrobial resistance as a serious public health concern, specific and consequential misconceptions persisted, particularly regarding the inappropriate use of antibiotics for viral illnesses, and a substantial proportion continued to obtain antibiotics without prescription, discontinue treatment prematurely, or retain leftover medication. Higher educational attainment, urban residence, and higher household income were independently associated with better knowledge, identifying population subgroups that may benefit from more intensively targeted intervention. These findings underscore the need for integrated antimicrobial stewardship strategies that combine sustained public health education correcting specific misconceptions, stricter regulatory enforcement of prescription-only antibiotic dispensing, and community engagement initiatives tailored to lower-education and rural populations, in order to translate favourable attitudes into safer antibiotic-related practices and to mitigate the growing burden of antimicrobial resistance.

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