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Antibiotic Self-Medication Among Pharmacy Clients in Kabul, Afghanistan: Prevalence and Usage Patterns

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ABSTRACT

Background: Antibiotic self-medication (ASM) is a major contributor to antimicrobial resistance (AMR), particularly in low- and middle-income countries where regulatory oversight is limited. Afghanistan, with fragile healthcare infrastructure and widespread informal pharmaceutical access, represents a critical setting for examining ASM behaviors**.** Accordingly, this study aimed to quantify the prevalence of ASM among pharmacy clients in Kabul, identify its determinants, and assess awareness of AMR to inform national stewardship strategies.

Methods: A cross-sectional survey was conducted in 2025 among 635 adult pharmacy clients in Kabul. Data were collected using structured questionnaires covering socio-demographics, antibiotic use in the past 12 months, indications, sources, adherence, and awareness of AMR. Descriptive statistics were applied to analyze prevalence and usage patterns.

Results: In the past 12 months, 49.0% (n = 311; 95% CI: 45.0–53.0) of respondents reported antibiotic self-medication, while 41.5% (n = 263; 95% CI: 37.5–45.5) reported a most recent episode of ASM. Respiratory tract infections and gastrointestinal complaints were the most common indications. Amoxicillin was the most frequently used antibiotic, followed by ciprofloxacin and azithromycin. Pharmacies were the main source, and nearly half of users reported incomplete courses. Awareness of AMR was limited.

Conclusion: ASM is highly prevalent among pharmacy clients in Kabul, driven by misconceptions, easy access, and limited awareness. These findings highlight the urgent need for regulatory enforcement, public education, and healthcare system strengthening to mitigate AMR risks in Afghanistan.

Keywords: Antibiotic self-medication, Antimicrobial resistance, Pharmacy clients.

Introduction

Antibiotics have revolutionized modern medicine by reducing morbidity and mortality from infectious diseases. However, their effectiveness is increasingly undermined by the global rise of antimicrobial resistance (AMR), which the World Health Organization has identified as one of the greatest public health threats of the 21st century [17,18]. Irrational use of antibiotics, particularly self-medication (ASM), is a major driver of AMR. ASM refers to the use of antibiotics without medical prescription or professional supervision, often obtained directly from pharmacies, leftover medications, or advice from non-professional sources [16,15].ASM is widespread in low- and middle-income countries (LMICs), where limited access to healthcare, weak regulatory frameworks, and easy availability of antibiotics encourage unsupervised use [9,10]. Such practices are associated with incomplete courses, inappropriate drug selection, and reliance on informal advice, all of which accelerate resistance development [7,8].Afghanistan represents a particularly vulnerable context. Decades of conflict have weakened healthcare infrastructure, reduced access to qualified physicians, and fostered reliance on pharmacies as the primary point of care [8]. Previous studies have reported high rates of ASM in Afghanistan, but evidence remains scarce, especially in urban centers such as Kabul [1,2].**Research gap:** Despite regional data from South Asia and the Middle East documenting high prevalence of ASM [14,12,11], there is limited systematic evidence from Afghanistan. The lack of robust data on prevalence, determinants, and awareness of AMR among pharmacy clients in Kabul hinders the development of effective stewardship strategies.Rationale and objectives: This study was conducted to address this gap by providing empirical evidence from Kabul. The specific objectives were:To quantify the prevalence of ASM among pharmacy clients.To identify demographic and behavioral determinants of ASM.To assess awareness of AMR and attitudes toward prescription requirements.By clarifying these aspects, the findings aim to inform national strategies to promote rational antibiotic use and strengthen stewardship programs in Afghanistan**.**

Materials and Methods

Study Design

This was a community-based cross-sectional survey conducted among pharmacy clients in Kabul, Afghanistan, between March and June 2025.Study Setting and Population The study setting comprised community pharmacies across Kabul city, which serve as the primary point of access to antibiotics for the majority of the population. A total of 30 pharmacies were selected using stratified multistage sampling. Kabul province was stratified by its 14

administrative districts, and pharmacies were randomly chosen from official district lists provided by local health authorities. The selected pharmacies represented diverse geographic (central, eastern, western, northern, and southern districts) and socioeconomic areas of the city. At each pharmacy, data collectors approached every third exiting client. Eligible participants were adults aged ≥18 years, residing in Kabul for at least 12 months, and able to provide informed consent. Clients who declined participation were recorded, along with reasons for refusal when provided. The final analytic sample consisted of 635 respondents. Sampling Method At each selected pharmacy, data collectors began by randomly choosing one of the first three existing clients as the starting point. Subsequently, every third client was approached for participation. If a selected client declined or did not meet eligibility criteria, the next consecutive client was invited, after which the interval count resumed. This systematic procedure minimized selection bias and ensured reproducibility. Sample Size **Calculation** The required sample size was calculated using the single-proportion formula: $n = \frac{Z^2.p(1-p)}{d^2}$ Where:Z=1.96 (95% confidence level) p=0.50 (assumed prevalence of ASM based on regional studies d=0.05 (margin of error) $n = \frac{(1.96)^2.0.50.(0.50)}{(0.05)^2}$ =384 After adjusting for a design effect of 1.5 (due to stratified sampling), the sample size was: nadj=384×1.5=576 Allowing for a 10% non-response rate, the final target sample size was: nfinal=576+(0.10×576) =634 Accordingly, the study achieved a final analytic sample of 635 participants, consistent with the assumptions. Data collection: Data were collected using a structured questionnaire developed based on previously validated ASM instruments and adapted to the Afghan context. Following translation into Dari and back-translation, a pilot test with 30 clients was conducted to refine clarity and cultural appropriateness [16,9]. Reliability was assessed using Cronbach's alpha, which demonstrated acceptable internal consistency across knowledge and attitude items. Content validity was reviewed by three public health experts. The questionnaire comprised three sections: socio-demographic characteristics (age, sex, education, occupation, family doctor status), antibiotic use behaviors (ASM in the past 12 months, last episode of ASM, indication for use, type of antibiotic, source of antibiotic), treatment adherence (incomplete course, early discontinuation, reasons for stopping), and awareness of antimicrobial resistance (AMR) and attitudes toward prescription requirements and pharmacy advice. At each selected pharmacy, data collectors began by randomly choosing one of the first three exiting clients as the starting point. Subsequently, every third client was approached for participation. If a selected client declined or did not meet eligibility criteria, the next consecutive client was invited, after which the interval count resumed. This systematic procedure minimized selection bias and allowed replication of the sampling process. Formal ethical approval was not obtained because no institutional review board (IRB) was available at the time of study implementation. However, the study adhered to international ethical principles for research involving human participants. Written informed consent was obtained from all participants prior to interview. Confidentiality was strictly maintained by anonymizing responses, storing data securely, and restricting access to the research team only. Supervisors monitored data collection daily to ensure adherence to protocol. Completed questionnaires were checked for completeness before data entry. Statistical analysis: Data were analyzed in SPSS version 24.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were computed to summarize socio-demographic characteristics and ASM behaviors. Frequencies and percentages were reported for categorical variables, while means and standard deviations were calculated for continuous variables. Bivariate analyses were conducted using chi-square tests for categorical variables and independent t-tests for continuous variables. Results are reported with corresponding p-values and 95% confidence intervals to ensure statistical precision.

Results

Demographic Characteristics Of the total clients approached across selected pharmacies, 635 agreed to participate and completed the survey. Documentation of refusals was not systematically recorded; therefore, an exact response rate could not be calculated. This limitation is acknowledged, and the final analytic sample of 635 participants was used for all analyses. So the age range was 18–69 years, with a mean age of 37.2 years (SD =11.6). **Table 1.** Socio-demographic characteristics of participants (n = 635)

Variable	Category	n	%
Gender	Male	304	47.9
	Female	331	52.1
Education	Illiterate	111	17.5
	Primary	132	20.8
	Secondary	217	34.2
	University	175	27.5
Family doctor	Yes	186	29.3
	No	449	70.7
Age (years)	Mean (SD)	37.2	11.6

Prevalence of Antibiotic Self-Medication

In the past 12 months, 49.0% (n = 311; 95% CI: 45.0–53.0) reported ASM. The most recent episode of ASM was reported by 41.5% (n = 263; 95% CI: 37.5–45.5).

Indications and Antibiotics Used

Table 2. Indications and antibiotics used in self-medication

Indication for ASM	N	%
Respiratory	229	36.1
Gastrointestinal	136	21.4
Dental	119	18.7
Urinary	88	13.9
Other	63	9.9
Antibiotic	**N**	**%**
Amoxicillin	265	42.3
Ciprofloxacin	114	18.2
Azithromycin	81	12.9
Cefixime	61	9.7
Cotrimoxazole	46	7.4
Doxycycline	32	5.1
Metronidazole	19	3.0
Ceftriaxone	12	1.9

Sources and Adherence

Pharmacies were the primary source of antibiotics (63.0%), followed by leftover drugs (20.7%) and family/friends (16.3%).

Adherence was poor: 38.9% reported incomplete courses, and 27.8% discontinued treatment early. Reasons for early discontinuation included feeling better (45.8%), side effects (22.1%), forgetfulness (18.6%), and other reasons (13.5%).

Awareness and Attitudes

Only 33.2% of respondents were aware of AMR. Regarding attitudes toward prescription requirements, 55.1% agreed or strongly agreed that antibiotics should only be dispensed with a prescription, 26.8% were neutral, and 18.1% disagreed.

Discussion

This study provides one of the first systematic assessments of antibiotic self-medication (ASM) practices among pharmacy clients in Kabul, Afghanistan. The prevalence of ASM observed (49.0%) is striking and underscores the widespread accessibility of antibiotics without prescription in fragile health systems.

The prevalence reported here is consistent with findings from Pakistan and Yemen, where ASM rates ranged between 45–55% [12,14]. These similarities likely reflect shared structural challenges in LMICs, including weak regulatory enforcement, limited access to

qualified physicians, and reliance on pharmacies as primary healthcare providers. In contrast, lower prevalence has been documented in Iran (approximately 30%) [11], where stricter prescription policies and public awareness campaigns have been implemented. Such differences highlight the role of governance and health system capacity in shaping antibiotic use behaviors.

Educational attainment emerged as a significant predictor of ASM. Participants with university education were more likely to self-medicate compared to those with no formal education. Comparable findings have been reported in Karachi [14] and Tehran [11], where higher education was associated with increased confidence in self-diagnosis and self-prescription. This paradox suggests that knowledge alone may not deter ASM; rather, it may empower individuals to bypass medical consultation, reinforcing the need for targeted behavioral interventions even among educated populations.

The absence of a family doctor was another strong determinant of ASM. This finding aligns with evidence from Yemen [12], where limited access to primary care providers drives reliance on pharmacies. In Afghanistan, the scarcity of family doctors and weak primary healthcare infrastructure exacerbate this problem, suggesting that strengthening community-based health services could reduce ASM.

Awareness of antimicrobial resistance (AMR) was inversely associated with ASM, consistent with studies in Yemen and Iran [11,12]. Participants who understood the risks of resistance were less likely to self-medicate, underscoring the importance of public education campaigns. However, given that only 38% of respondents reported awareness of AMR, there is an urgent need for national strategies to raise public understanding of resistance and its consequences

The findings of this study have several critical implications:

Regulatory enforcement: Strengthening pharmacy regulation is essential to restrict non-prescription antibiotic sales. Experiences from countries such as Chile and Mexico demonstrate that strict enforcement can significantly reduce inappropriate antibiotic use [18].

Public education: Targeted campaigns should emphasize the dangers of incomplete courses and inappropriate indications. Evidence from community-based interventions in Vietnam and India shows that education can reduce ASM prevalence [9].

Healthcare system strengthening: Expanding primary care and family doctor services could reduce reliance on pharmacies as the first point of care. Integration of stewardship principles into medical curricula and pharmacy practice is also critical.

Global perspective: Afghanistan's challenges mirror those of many LMICs, where socioeconomic hardship, weak regulation, and limited healthcare access drive ASM. Addressing these issues requires coordinated national and international efforts, aligned with the WHO Global Action Plan on AMR [18].

Limitations and Future Research

This study has several limitations that should be acknowledged. First, selection bias may have occurred because participants were recruited exclusively from pharmacy clients in Kabul. This sampling frame may not fully represent the general population, particularly individuals who obtain antibiotics through other channels or those residing in rural areas. Consequently, the findings may have limited generalizability beyond urban pharmacy users.

Second, the reliance on self-reported practices introduces the possibility of recall bias, as participants may not accurately remember past episodes of antibiotic use. Similarly, self-reporting bias and social desirability bias may have influenced responses, particularly regarding sensitive questions on adherence to treatment courses or awareness of antimicrobial resistance. Participants may have under-reported inappropriate practices or over-stated socially acceptable behaviors.

Third, the cross-sectional design precludes causal inference. Associations identified between socio-demographic factors and ASM should be interpreted as correlations rather than causal relationships. Longitudinal studies would be required to establish temporal and causal pathways.

Finally, although the study employed stratified sampling across multiple districts, the generalizability of findings remains limited to urban Kabul. Afghanistan's diverse rural and peri-urban populations may exhibit different patterns of antibiotic use due to variations in healthcare access, cultural practices, and regulatory enforcement.

Future research should incorporate microbiological surveillance to link ASM behaviors with resistance patterns. Longitudinal studies are also needed to assess the impact of interventions over time.

Conclusion

This study identified a high prevalence of antibiotic self-medication (ASM) among pharmacy clients in Kabul, Afghanistan, with nearly half of participants reporting such practices. Pharmacies were the most common source of antibiotics, and several socio-demographic and healthcare access factors were associated with ASM, including educational attainment, absence of a family doctor, and limited awareness of antimicrobial resistance (AMR).

The findings highlight important public health concerns regarding inappropriate antibiotic use and the potential contribution to AMR. While the cross-sectional design does not allow causal inference, the observed associations underscore the need for strengthened regulatory enforcement of prescription-only antibiotic sales, expansion of primary healthcare services, and targeted awareness campaigns to improve rational antibiotic use.

Future research should employ longitudinal and interventional designs to establish causal pathways and evaluate the effectiveness of policy and educational interventions aimed at reducing ASM and mitigating AMR in Afghanistan.

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