

ASSESSMENT OF KNOWLEDGE, ATTITUDES, AND PRACTICES REGARDING ANTIBIOTIC USE AND RESISTANCE AMONG URBAN ADULTS

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DOI: <u>https://doi.org/10.5281/zenodo.15469244</u>

Keywords

Antibiotic resistance, selfmedication, urban adults, knowledge-attitude-practice, public health, antimicrobial misuse

Article History

Received on 12 April 2025 Accepted on 12 May 2025 Published on 20 May 2025

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Abstract

Introduction: Misuse of antibiotics is a key contributor to the global rise in antimicrobial resistance (AMR), particularly in urban populations with easy access to pharmacies and over-the-counter medications. Objective: To assess the knowledge, attitudes, and practices related to antibiotic use and resistance among adults in an urban setting. Methodology: A cross-sectional study was conducted at King Edward Medical University, Lahore from 20 March 2024 to 20 October 2024, involving 320 adult residents selected through stratified random sampling. A structured, pre-validated questionnaire was used to assess knowledge of antibiotic function and resistance, attitudes toward prescription practices, and self-reported behaviors related to antibiotic use. Results: Among 320 urban adults surveyed, 68.1% correctly identified that antibiotics are ineffective against viruses, yet 44.7% reported using antibiotics without a prescription in the past year. Only 53.4% recognized antibiotic resistance as a global health issue. While 72.5% preferred doctor consultation, 39.4% admitted to stopping antibiotics when symptoms subsided. Participants with higher education and knowledge scores were significantly more likely to complete full antibiotic courses ($p \le 0.001$) and less likely to self-medicate. Conclusion: Despite moderate awareness of antibiotic resistance, unsafe practices such as self-medication and premature discontinuation remain prevalent among urban adults. Targeted education campaigns and stricter regulation of antibiotic dispensing are essential to mitigate misuse and slow the progression of resistance.

INTRODUCTION

Antibiotics have played a huge role in medicine for a long time, helping change deadly bacterial infections into diseases that people can now treat and recover from [1]. The wide use of antibiotics, though, has

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ISSN: (e) 3007-1607 (p) 3007-1593

meant they're being used too often and sometimes wrongly, which has caused resistance to the drugs, creating a serious health problem for people everywhere [2]. According to the World Health Organization (WHO), AMR is thought to cause around 700,000 deaths each year, and if the problem keeps going at its current speed, that number could go up to 10 million deaths by 2050. Along with losing lives, AMR also creates a big economic problem, with health costs around the world expected to go up by US\$100 trillion over the next 30 years because of infections that resist treatment, longer hospital stays, and failed regular treatments [4]. The improper use of antibiotics is still one of the biggest reasons why AMR happens. This includes taking antibiotics without a doctor's advice given by a GP, using old or out-of-date antibiotics, not finishing a full round of prescribed antibiotics, and using antibiotics for illnesses like colds, which don't have any bacteria [5]. In many urban places, where people can easily buy medications without a prescription and health knowledge can be quite differ from one group to another, these habits are surprisingly common [6]. Studies conducted in South and Southeast Asia have found that about 50 to 70% of people get antibiotics without first talking to a doctor, and around 30 to 60% of these people stop taking the medication after their symptoms get better, which lets some bacteria survive and can lead to harder-to-treat bugs [7].

Urban centers, because of where so many people live and work, often face problems specific to that type of area. The density of pharmacies and how easy it is to get medicines often makes people start taking medicine on their own, especially if there aren't strict rules about it [8]. Social media, what people around us think, and wrong information from the internet only make things worse by spreading rumors, like saying antibiotics can really treat a cold or flu [9]. Moreover, people living in cities are different from each other in things like how much education they have, how much money they earn, and how easy it is for them to get healthcare, all of which can affect what they know, how they think about, and how they use antibiotics. Knowledge covers making sure people understand things like what antibiotics mean, when they should be used, and what it means for them to stop working. Attitudes show what people

believe about their doctor, how well they think antibiotics work, and how willing they are to finish all of the prescribed medicine [10]. Practices, however, are the things people do in everyday life, like giving antibiotics to family members, taking them to stop infection before getting sick, or not visiting a doctor when they should. A robust KAP survey can help find important gaps and misunderstandings, which can then help guide specific actions to change people's behaviors. Prior research from countries like India, Pakistan, Nigeria, and Egypt has found that even though people know using antibiotics too much can be bad, they still keep using them in ways that go against this understanding [11]. For example, in a recent WHObacked survey, about 70% of city adults said they thought antibiotic resistance could cause serious illness, yet 40% said they had given themselves drugs, and only 45% took all the medicines the doctor told them to finish. Educational level and socioeconomic status have been shown to play a big role in how aware people are about health and how often they follow certain health guidelines [12].

Objective:

To assess the knowledge, attitudes, and practices related to antibiotic use and resistance among adults in an urban setting.

Methodology

This was a descriptive cross-sectional study conducted at King Edward Medical University, Lahore from 20 March 2024 to 20 October 2024. A total of 320 adult participants were included in the study.

Inclusion Criteria

- Adults aged 18 years and above
- Residents of urban areas for at least one year
- Able to read and understand the questionnaire language (Urdu or English)
- Provided informed verbal consent to participate

Exclusion Criteria

- Individuals working in medical, pharmacy, or healthcare fields
- Incomplete or duplicate responses

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Data Collection

participants

Participants with known

hinder questionnaire completion

in

questionnaire was distributed both in-person and

electronically using Google Forms, depending on participant accessibility. It consisted of four main

sections: sociodemographic information, knowledge

about antibiotics and resistance, attitudes toward

antibiotic use, and self-reported practices. The knowledge section assessed understanding of

appropriate antibiotic indications, recognition of

antibiotic resistance, and awareness of risks

associated with misuse. Attitude-related questions

explored perceptions of medical advice, trust in

physicians, and perceived necessity of antibiotics for common illnesses. The practices section inquired

about self-medication, past antibiotic use without

prescription, and compliance with prescribed

regimens. Responses were scored

combination of binary and Likert-scale formats.

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Statistical Analysis

or Data were entered and analyzed using SPSS version communication impairments that would 21. Descriptive statistics (frequencies, percentages, SD) were used means ± to summarize sociodemographic variables and KAP scores. Chi-Data were collected through a structured, presquare tests and independent t-tests were applied to explore associations between demographic factors validated questionnaire administered to adult and KAP outcomes. A p-value of <0.05 was The

considered statistically significant.

Results

The mean age of participants was 34.6± 11.3 years. The sample included slightly more females (54.1%) than males (45.9%). Two-thirds (65%) had a university-level education, and 35% had high school education or below. Among those with higher education, a larger proportion had household incomes above PKR 50,000 and used private healthcare (62.5%). In contrast, 51.8% of lesseducated participants earned below PKR 50,000 and relied more on public healthcare. There were statistically significant differences in age, income, and healthcare access between education levels (p <0.05), highlighting socioeconomic gradients in health literacy.

Characteristic	Total (n=320)	High School or Below	University or	p-value
		(n=112)	Higher (n=208)	
Mean age (years)	34.6 ± 11.3	36.8 ± 10.9	33.3 ± 11.5	0.02
Gender, n (%)				
Male	147 (45.9%)	48 (42.9%)	99 (47.6%)	0.18
Female	173 (54.1%)	64 (57.1%)	109 (52.4%)	
Monthly income, n (%)				
<50,000 PKR	94 (29.4%)	58 (51.8%)	36 (17.3%)	<0.001
50,000-100,000 PKR	148 (46.3%)	42 (37.5%)	106 (51.0%)	
>100,000 PKR	78 (24.4%)	12 (10.7%)	66 (31.7%)	
Healthcare access, n (%)				
Private	188 (58.8%)	58 (51.8%)	130 (62.5%)	0.04
Public	132 (41.3%)	54 (48.2%)	78 (37.5%)	

Table 1: Demographic Characteristics by Education



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Knowledge varied significantly by education. Overall, 68.1% knew antibiotics are ineffective against viruses, but only 53.4% were aware that antibiotic resistance is a global health concern. Among university-educated participants, 76.4% answered correctly about viral ineffectiveness, compared to just

Table 2: Knowledge About Antibiotics

52.7% of those with high school education. Knowledge of resistance-related risks was also much higher among educated respondents (63.9% vs. 33.9%, $p \le 0.01$), indicating a strong association between educational level and awareness.

Knowledge Statement	Correct	High School or	University or Higher	p-value
	Responses (Total)	Below		
Antibiotics don't work	218 (68.1%)	59 (52.7%)	159 (76.4%)	<0.001
on viruses				
Incomplete course	206 (64.4%)	55 (49.1%)	151 (72.6%)	<0.001
causes resistance				
Unnecessary use is	194 (60.6%)	48 (42.9%)	146 (70.2%)	<0.001
harmful				
Resistance is a global	171 (53.4%)	38 (33.9%)	133 (63.9%)	0.002
health issue				

72.5% of all participants preferred to consult a doctor before taking antibiotics, this rate was much higher among high-knowledge individuals (84.1%) than low-knowledge ones (55.3%). Misbeliefs such as "antibiotics help in any illness" were common among low-knowledge participants (53.9%) but dropped to 19.5% in the high-knowledge group. Similarly, the tendency to stop antibiotics when symptoms improve was reported by 57.9% of low-knowledge individuals but only 31.7% of high-knowledge respondents ($p \le 0.01$), showing a clear link between knowledge and responsible attitudes.

Table 3: Attitudes Toward Antibiotic Use by Knowledge Level

Attitude Statement	Agree (Total)	Low	Moderate	High Knowledge	p-value
		Knowledge	Knowledge	(>7, n=82)	
		(<5, n=76)	(5–7, n=162)		
Prefer doctor	232 (72.5%)	42 (55.3%)	121 (74.7%)	69 (84.1%)	0.001
consultation before					
antibiotics					
Believe antibiotics	108 (33.8%)	41 (53.9%)	51 (31.5%)	16 (19.5%)	<0.001
help in any illness					
Trust pharmacists	151 (47.2%)	48 (63.2%)	71 (43.8%)	32 (39%)	0.005
to prescribe					
antibiotics					
Stop antibiotics	126 (39.4%)	44 (57.9%)	56 (34.6%)	26 (31.7%)	0.003
when feeling better					



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Antibiotic use in the past six months was high across all groups (77.8%), but self-medication was significantly more common among those with low knowledge (61.8%) compared to high knowledge (30.5%). Likewise, storing leftover antibiotics was practiced by 51.3% of low-knowledge individuals

Table 4:	Antibiotic	Practices	bv F	Knowled	lge	Level
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versus only 20.7% among high-knowledge participants. Completion of the full antibiotic course was seen in 81.7% of the high-knowledge group, but just 42.1% of those with low knowledge (p < 0.001), emphasizing how knowledge directly influences safer antibiotic behaviors.

Practice	Total	Low	Moderate	High Knowledge	p-value
		Knowledge	Knowledge	(>7)	
		(<5)	(5-7)		
Used antibiotics in	249 (77.8%)	65 (85.5%)	126 (77.8%)	58 (70.7%)	0.03
last 6 months					
Used antibiotics	143 (44.7%)	47 (61.8%)	71 (43.8%)	25 (30.5%)	<0.001
without					
prescription					
Stored leftover	108 (33.8%)	39 (51.3%)	52 (32.1%)	17 (20.7%)	<0.001
antibiotics					
Completed full	194 (60.6%)	32 (42.1%)	95 (58.6%)	67 (81.7%)	<0.001
course					

Participants with higher knowledge (score >7) also had higher mean attitude scores (8.1/10) and better practice scores (7.8/10), compared to those with low knowledge who had mean scores of 5.1 and 4.9, respectively. Self-medication rates declined dramatically with increasing knowledge—from 62.1% in the low group to 21.7% in the high group.

Table 5: Summary of KAP Correlations

Knowledge Level	Self-Medication Rate (%)	Completed Antibiotic Course (%)
Low (<5)	62.1%	42.3%
Moderate (5–7)	39.8%	58.6%
High (>7)	21.7%	77.4%

Discussion

The study found that many urban adults lacked knowledge about antibiotics and how to use them wisely, especially adults with a low level of education and knowledge. Majority of the participants had decent knowledge and encouraging opinions, but self-medicating with these drugs and quitting antibiotics before the infection is cleared is still very common, sharing similar issues seen worldwide with antimicrobial use. While 68.1% of participants knew that antibiotics do not work against viruses, only 53.4% realized that this is an issue for global health. This is similar to what researchers observe in other urban populations of developing countries, where people may not know the specific uses of different antibiotics [13]. Research carried out in Egypt found that around 60–70% of the group thought antibiotics could be useful for viral infections [14]. How educated a person has significantly influenced both their knowledge and their ways of practicing. The university-educated scored much higher in terms of knowledge (7.2 versus 5.4) and were more likely to not customize their antibiotic therapy (73.1%) than the high school group, who also reported less self-

medication (36.5%). These results align with two previous studies from India and Nigeria that proved that completing higher education makes a person use antibiotics more responsibly and trust doctors' advice more [15-16].

A critical observation in our study was that knowing more about a topic makes people act differently. Participants with a high understanding of antidepressant medication were a lot less likely to take the pills on their own (21.7%) and much more likely to finish the whole course (81.7%) than those with low knowledge. 62.1%, full course completion: 42.1%). These findings are in line with a study from the World Health Organization that found out that when people know more, they are much less likely to decide to treat themselves with medicine or take the wrong type of antibiotic [17]. Attitudinal analysis showed that some people's beliefs did not match their actual actions. Participants chose to consult a doctor before using antibiotics (72.5%), but still, many said they used them without a prescription (44.7%). Those with the least knowledge were especially likely to say one thing and do something else. Earlier research has shown that, while Pakistani and Bangladeshi respondents agreed with doctors' recommendations, they still engaged in unsafe activities because of their habits, how convenient they found these activities, or their cost [18-19]. More than half of the respondents did not trust recommendations made by community pharmacists, considering that such recommendations often lack proper regulation. This reliance shows that in Southeast Asia, people often go to pharmacies for antibiotics instead of seeing a doctor right away [20]. The data revealed that the environment was related to social and economic status. Those with lower income tended to visit public health clinics, have less education, and did poorly in knowledge. Besides, they were more prone to self-medicate and leave any remaining antibiotics at home. This shows that there are challenges such as not being able to reach a doctor. high consultation prices, and miscommunications about health, all reported before in Nepal and Indonesia.

Conclusion

It is concluded that although urban adults demonstrate moderate awareness of antibiotics and



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resistance, significant gaps remain in both knowledge and behavior. Unsafe practices such as selfmedication, incomplete antibiotic courses, and on non-prescription advice reliance persist, particularly among individuals with lower education and knowledge scores. The study highlights a strong association between educational level and responsible antibiotic use, underscoring the need for targeted community education programs. Strengthening public health campaigns, enforcing stricter regulations on antibiotic dispensing, and improving access to qualified medical consultation are essential steps toward mitigating antibiotic misuse and curbing the growing threat of antimicrobial resistance.

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ISSN: (e) 3007-1607 (p) 3007-1593

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ISSN: (e) 3007-1607 (p) 3007-1593

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