



## EVALUATING THE KNOWLEDGE REGARDING ANTIBIOTIC USE AND ANTIBIOTIC RESISTANCE IN THE COMMUNITY OF KARACHI, PAKISTAN

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### Abstract

**Introduction:** Worldwide antimicrobial resistance is increasing in response to inappropriate antibiotic use.

**Objectives:** To investigate the knowledge about antibiotics and their resistance in the community of Karachi, Pakistan.

**Methods:** This cross-sectional study involved a convenient sampling technique from the community participants in Karachi, Pakistan. A 200 sample sizes were part of the study. An adopted questionnaire was used for the data collection.

**Results:** Among 200 participants, 46% understood antibiotic resistance as reduced effectiveness and 50% recognized increasing infection resistance. About 54% knew treating antibiotic-resistant infections was challenging, and 63% understood the personal impact. Moreover, 64% acknowledged antibiotic-resistant bacteria spread, and 44% recognized procedure complications. On antibiotic use, 67% believed stopping when feeling better, 56% found using antibiotics from others acceptable, and 65% considered reusing effective.

**Conclusion:** The survey reveals a mix of understanding and misconceptions. Participants recognized antibiotic resistance's impact but lacked awareness of its global scope. Similarly, while aware of

proper use, they misunderstood treatable conditions. This highlights the need for enhanced education on these topics.

**Keywords:** Evaluating, Knowledge, Antibiotic use, Antibiotic Resistance

## Introduction

Antibiotics are secondary metabolites with antipathogen or other microbial properties produced by higher plants or microorganisms such as bacteria, fungi, and actinomycetes.

Antibiotics works against microbes, which they are further divided according to causative agent such as anti-bacterial, anti-viral, anti-fungal etc. The group of anti-bacterial are widely used against bacteria worldwide and they are categorized regarding the mode of action such as protein synthesis inhibitors, cell-wall synthesis inhibitors, DNA synthesis inhibitors and folate synthesis inhibitors that are essential for treating infectious diseases in humans. Antibiotics have been widely used in fish and cattle farms, and they have even been sprayed on crops and fruit trees to prevent and control diseases, according to reports from the Food and Agriculture Organization of the United Nations (FAO) (1). The use of antibiotics without a prescription (self-prescription) or as directed by a doctor but not according to the doctor's recommendations about the time, dose, and length of treatment constitutes antibiotic misuse (2). In regions other than Northern Europe and North America, 19 to 100% of antibiotic usage occurs without a prescription (3). According to a recent meta-analysis of research from developing countries, the combined prevalence of antibiotic non-prescription use in these nations is notably high (78%) (4). Pakistan is currently the third-highest user of antibiotics among low- to middle-income countries, behind China and India. Between 2000 and 2015, Pakistan's rate of antibiotic usage rose by 65%, from 0.8 to 1.3 billion defined daily doses (5).

In high-income nations like the US, where the percentage of people who use antibiotics without a prescription can reach 66% in some instances, and the percentage of people who store drugs for later use ranges from 14 to 48%, antibiotic abuse is also common (6). At least 700,000 people die annually from antibiotic resistance (ABR) globally, with over 35,000 fatalities in the US alone. In Europe, a comparable record has been registered. Disturbing statistics indicate that the effects of ABR on the economy are also growing. Antibiotic resistance (ABR) is predicted to produce a higher yearly death rate by 2050 than significant causes of death such as diabetes and cancer (2).

Several factors have been linked to antibiotic overuse. Most of these are sociodemographic, involving female gender, young individuals and the elderly, low educational attainment, challenges in accessing the healthcare system, the high expense of doctor visits, and the availability of antibiotics (6-8). Therefore, it is crucial to keep pushing for and developing initiatives that support the responsible use of antibiotics among all relevant parties, including patients, decision-makers, healthcare providers for both humans and animals and citizens (9). To help address the issue of ABR, it is essential to ensure that these medications are used appropriately (10). To determine people's various attitudes, it is essential to understand the public's knowledge about antibiotics. This understanding may inform campaigns and policies addressing this issue (11). Therefore, this study aims to assess the knowledge regarding antibiotic resistance (ABR) in the general population of Karachi, Pakistan.

## Methodology

The research employs a quantitative, community-based cross-sectional study design. The study targets a sample size of 200 individuals from a community in Karachi, Pakistan, from January to May 2023. The study employs a convenient sampling technique to select participants. The study includes individuals above the age of 15 years who willingly volunteered to participate. This ensures that the participants have reached an age where they can provide informed responses. Participants under 15 are excluded due to potential limitations in their comprehension and ability to provide accurate information. The adopted tool was used for the data collection (12). The sixteen-item questionnaire comprises four questions on sociodemographic traits, four questions regarding antibiotic knowledge, and eight questions about ABR. The research's validity and reliability were validated using a pilot

study including thirty individuals who had previously used antibiotics. In this study, Cronbach's alpha coefficients for internal consistency and reliability were 0.92 and 0.85, respectively. Consequently, the questionnaire's validity and reliability were validated (12).

Once data collection was complete, the responses were likely analyzed using SPSS version 24. Descriptive statistics, such as frequencies and percentages, have been calculated to summarize participants' knowledge regarding ABR and usage. Before the data collection, the study proposal was sent to the relevant institute for approval. After that, written permission was granted from the research committee of the relevant institute. Before agreeing to participate, the researchers would have ensured that each participant was fully informed about the study's purpose, procedures, potential risks, and benefits. Participants were allowed to ask questions and provided written consent forms that outlined their rights as participants. By obtaining informed consent, the researchers ensured that participants were making a voluntary and informed decision to participate.

## Result

The table shows information about a group of people based on different factors. Firstly, it tells us that 150 people (75%) are male, and 50 (25%) are female. In terms of age, most people are between 15 and 30 years old, making up 110 people (55%). The second-largest group is those aged 31 to 45, with 67 people (33.5%). The table also reveals that 150 people (75%) are single, 40 people (20%) are married, and 10 people (5%) are widowed. Regarding education, 65 people (32.5%) completed primary school, and 46 (23%) finished secondary school. (See table 1).

**Table 1 Demographic Data**

Variables	Frequency (n-200)	Percent
<b>Gender</b>		
Male	150	75%
Female	50	25%
<b>Age</b>		
15-30	110	55%
31-45	67	33.5%
45-60	20	10%
61 and above	3	1.5%
<b>Marital Status</b>		
Single	150	75%
Married	40	20%
Widow	10	5%
<b>Qualification</b>		
Never gone to school	25	12.5%
Primary	65	32.5%
Matric	46	23%
Intermediate	40	20%
Undergraduate	15	7.5%
Graduate	9	4.5%

Table 2 shows the result of the knowledge regarding ABR, in which 46% of respondents knew that ABR occurs when the body resists antibiotics, rendering them less effective. A more significant portion, 50%, recognized that many infections are becoming more resistant to antibiotic treatments. Moreover, 54% acknowledged that infections caused by antibiotic-resistant bacteria can be challenging or even impossible to treat. The survey participants also recognized the potential personal impact of ABR, with 63% understanding that it could affect them or their families. A significant portion, 64%, correctly understood that antibiotic-resistant bacteria can spread between individuals.

Additionally, 44% of respondents realized that antibiotic-resistant infections could complicate medical procedures like surgeries, organ transplants, and cancer treatments. On a broader scale, 20% of participants recognized ABR as a global concern. However, a notable 60% were unsure about this global dimension. There were also misconceptions, with 49% of respondents believing that ABR only affects those who take antibiotics regularly, and 37% believed that ABR is not a problem.

**Table 2 Knowledge Regarding Antibiotic Resistance**

Statement	Response	Percentage (%)
When body doesnot respond to antibiotics are called antibiotic resistanance	Yes	46%
	No	36%
	Don't Know	18%
Many infections are becoming increasingly resistant to treatment by antibiotics.	Yes	50%
	No	30%
	Don't Know	20%
It is challenging to treat a infection if bacteria is resistant to bacteria	Yes	54%
	No	39%
	Don't Know	7%
ABR could affect me or my family.	Yes	63%
	No	29%
	Don't Know	8%
ABR is currently a global issue.	Yes	20%
	No	20%
	Don't Know	60%
People who take antibiotics regularly, so resistance will cause problem to that patients only	Yes	49%
	No	37%
	Don't Know	14%
Bacteria which are resistant to antibiotics can spread from person to person.	Yes	64%
	No	30%
	Don't Know	6%
Antibiotic-resistant infection could make medical procedures like surgery, organ transplant, and cancer treatment much more dangerous.	Yes	44%
	No	35%
	Don't Know	21%

Table 3 shows the result of knowledge regarding antibiotics use among 200 participants. The survey results indicate that most participants (67%) believe antibiotics should be stopped when they start feeling better, a (56%) consider using antibiotics from friends or family members acceptable as long as they were used for the same illness. Moreover, 65% believe it's okay to reuse antibiotics if they've worked, while 50% of respondents believe antibiotics can treat HIV/AIDS, gonorrhea, bladder infections, headaches, diarrhea, colds, flu, and body aches.

**Table 3 Knowledge Regarding Antibiotic Use**

Question	Response	Percentage
When to stop taking antibiotics?	Feel better	67%
	Taken all	7%
	Don't know	26%
Is it okay to use antibiotics from a friend/family member?	Yes	56%
	No	40%
	Don't know	4%
Is it okay to use the same antibiotics again?	Yes	65%
	No	30%
	Don't know	5%
Can antibiotics treat the following conditions? Gonorrhoea Bladder infection/UTI Diarrhoea alone Cold and flu Body aches Headache	Yes	50%
	No	35%
	Don't know	15%

## Discussion

The misuse and overuse of antibiotics have resulted in ABR, a severe global public health issue (13). When bacteria develop a resistance to the medications intended to eradicate them, ABR results (14), increasing the difficulty and expense of managing previously manageable diseases. It poses a serious threat to the efficacy of antibiotics. To address this issue adequately, it is critical to comprehend the general public's degree of understanding regarding antibiotics and ABR.

The findings revealed that 55% of the participants are aged 15-28. Similarly, another study found that most participants are 18-30 years (15). Present findings show that the majority of the participants, 75% had male participants. In contrast, another study found females were 76% (16).

Moreover, the findings show that 46% of respondents knew that ABR occurs when the body resists antibiotics. In contrast, another study found that 45% had no idea that ABR occurs when the body becomes resistant to antibiotics (12). Since antibiotic-resistant infections impact both industrialized and developing nations equally, examining the worldwide rise of ABR is critical. It is crucial to investigate the significant socioeconomic and political variables that lead to the growth in the prevalence of ABR in both developed and developing countries, as infectious organisms are continuously evolving and developing resistance to antibiotics (14).

Present findings revealed that 50% recognized that many infections are becoming more resistant to antibiotic treatments. Another study found a slightly different result that 23.5% knew that many infections are becoming more resistant to antibiotic treatments (12). Moreover, findings show that 50% believed colds and flu should be treated with antibiotics. Another study found that 29% believed that colds and flu were treated with antibiotics (17). Another study found that 15% of respondents said they typically use antibiotics to cure fever, while 27% acknowledged using them to treat sore throats or colds (18). This is because an increasing number of people are using antibiotics as self-medication for ailments like the flu and the common cold. In today's culture, this habit has achieved epidemic proportions. Antibiotics are not the right kind of treatment for viral diseases like the flu and colds. Instead, antivirals or anti-inflammatory medications should be taken (19).

Present findings show that the majority % of participants, 67% believe antibiotics should be stopped when they start feeling better. Similarly, another study found that 40.3 had wrong beliefs about this statement (20). The present findings show 65% agreed that this is okay to use the same antibiotics again. Half of the study participants said they could use antibiotics without a prescription from a doctor. This is consistent with earlier research showing that self-medication is not limited to medical students (21). Given that one of the leading causes of AMR is self-medication, these results are quite discouraging (18).

There is still much ignorance regarding antimicrobial resistance (AMR). Participants' medical education did not sufficiently address AMR. Education has come to be recognized as the cornerstone of a successful AMR response. Urgent action should be taken to increase training investments on AMR-related issues (22).

## Conclusion

The survey indicates a blend of comprehension and misconceptions. Participants understood that ABR reduces effectiveness and infections are becoming harder to treat. Yet, they lacked awareness of its global impact and held misconceptions about its scope. Similarly, while respondents were aware of proper antibiotic use, like stopping when better and reusing effective ones, they still misunderstood which conditions antibiotics accurately treat. These findings emphasize the need for improved education on both fronts.

## References

1. Shao Y, Wang Y, Yuan Y, Xie Y. A systematic review on antibiotics misuse in livestock and aquaculture and regulation implications in China. *Science of The Total Environment*. 2021;798:149205.

2. Mallah N, Orsini N, Figueiras A, Takkouche B. Income level and antibiotic misuse: a systematic review and dose–response meta-analysis. *The European Journal of Health Economics*. 2022;23(6):1015-35.
3. Morgan DJ, Okeke IN, Laxminarayan R, Perencevich EN, Weisenberg S. Non-prescription antimicrobial use worldwide: a systematic review. *The Lancet infectious diseases*. 2011;11(9):692-701.
4. Torres NF, Chibi B, Kuupiel D, Solomon VP, Mashamba-Thompson TP, Middleton LE. The use of non-prescribed antibiotics; prevalence estimates in low-and-middle-income countries. A systematic review and meta-analysis. *Archives of Public Health*. 2021;79(1):1-15.
5. Waseem H, Ali J, Sarwar F, Khan A, Rehman HSU, Choudri M, et al. Assessment of knowledge and attitude trends towards antimicrobial resistance (AMR) among the community members, pharmacists/pharmacy owners and physicians in district Sialkot, Pakistan. *Antimicrobial Resistance & Infection Control*. 2019;8(1):67.
6. Grigoryan L, Germanos G, Zoorob R, Juneja S, Raphael JL, Paasche-Orlow MK, et al. Use of antibiotics without a prescription in the US population: a scoping review. *Annals of internal medicine*. 2019;171(4):257-63.
7. Alhomoud F, Aljamea Z, Almahasnah R, Alkhalifah K, Basalelah L, Alhomoud FK. Self-medication and self-prescription with antibiotics in the Middle East—do they really happen? A systematic review of the prevalence, possible reasons, and outcomes. *International journal of infectious diseases*. 2017;57:3-12.
8. Torres N, Chibi B, Middleton L, Solomon V, Mashamba-Thompson T. Evidence of factors influencing self-medication with antibiotics in low and middle-income countries: a systematic scoping review. *Public health*. 2019;168:92-101.
9. David JC, Piednoir E, Delouvé S. Knowledge and perceptions of antibiotic resistance in the French population. *Infectious Diseases Now*. 2022;52(5):306-10.
10. Roque F, Soares S, Breitenfeld L, Figueiras A, Herdeiro MT. Influence of community pharmacists' attitudes on antibiotic dispensing behavior: a cross-sectional study in Portugal. *Clinical therapeutics*. 2015;37(1):168-77.
11. Effah CY, Amoah AN, Liu H, Agboyibor C, Miao L, Wang J, et al. A population-base survey on knowledge, attitude and awareness of the general public on antibiotic use and resistance. *Antimicrobial Resistance & Infection Control*. 2020;9(1):105.
12. Hassan BAR, Mohammed AH, AL-Jewari WM, Blebil A, Dujaili J, Wayyes AM, et al. Knowledge and attitude towards antibiotic use and resistance among Arab population: a questionnaire-based study of 11 countries from the Middle East and North Africa. *Journal of Pharmaceutical Health Services Research*. 2023;14(2):131-40.
13. Alnemri AR, Almaghrabi RH, Alonazi N, Alfrayh AR. Misuse of antibiotic: A systemic review of Saudi published studies. *Curr Pediatr Res*. 2016;20(1&2):169-73.
14. Chokshi A, Sifri Z, Cennimo D, Horng H. Global Contributors to Antibiotic Resistance. *Journal of global infectious diseases*. 2019;11(1):36-42.
15. Khan FU, Mallhi TH, Khan Q, Khan FU, Hayat K, Khan YH, et al. Assessment of antibiotic storage practices, knowledge, and awareness related to antibiotic uses and antibiotic resistance among household members in post-conflict areas of Pakistan: bi-central study. *Frontiers in Medicine*. 2022;9:962657.
16. Mallah N, Badro DA, Figueiras A, Takkouche B. Association of knowledge and beliefs with the misuse of antibiotics in parents: A study in Beirut (Lebanon). *PLoS One*. 2020;15(7):e0232464.
17. Waseem H, Ali J, Sarwar F, Khan A, Rehman HSU, Choudri M, et al. Assessment of knowledge and attitude trends towards antimicrobial resistance (AMR) among the community members, pharmacists/pharmacy owners and physicians in district Sialkot, Pakistan. *Antimicrobial Resistance & Infection Control*. 2019;8(1):1-7.

18. Nisabwe L, Brice H, Umuhire MC, Gwira O, Harelimana JDD, Nzeyimana Z, et al. Knowledge and attitudes towards antibiotic use and resistance among undergraduate healthcare students at University of Rwanda. *Journal of Pharmaceutical Policy and Practice*. 2020;13(1):7.
19. Sunny TP, Jacob R, Krishnakumar K, Varghese S. Self-medication: Is a serious challenge to control antibiotic resistance? *National Journal of Physiology, Pharmacy and Pharmacology*. 2019;9(9):821-7.
20. Pauzi ZM, Hassan BAR, Neo CF, Mohammed AH, Blebil A, Dujaili J. Antibiotic use and resistance in a tertiary care hospital: knowledge and attitude among patients of orthopaedic and surgical wards in Malaysia. *Journal of Pharmaceutical Health Services Research*. 2022:rma068.
21. Suaifan G, Shehadeh M, Darwish DA, Al-Ijel H, Yousef A, Darwish RM. A cross-sectional study on knowledge, attitude and behavior related to antibiotic use and resistance among medical and non-medical university students in Jordan. *Afr J Pharm Pharmacol*. 2012;6(10):763-70.
22. Di Gennaro F, Marotta C, Amicone M, Bavaro DF, Bernaudo F, Frisicale EM, et al. Italian young doctors' knowledge, attitudes and practices on antibiotic use and resistance: A national cross-sectional survey. *Journal of Global Antimicrobial Resistance*. 2020;23:167-73.