Assessment of Knowledge, Attitudes, and Practice Related to Rational Use of Antibiotics among Outpatients at the Madhesh Institute of Health Sciences

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Abstract

Introduction: Antimicrobial resistance is a major public health problem that has increased due to inappropriate use of antibiotics. It is necessary to know the patient's knowledge, attitude and practices towards the antibiotics to uncover behavioural gaps and inform antimicrobial stewardships.

Objective: To assess the knowledge, attitudes, and practices regarding to rational use of antibiotics among outpatients attending Madhesh Institute of Health Sciences, Nepal.

Materials and Methods: A hospital-based descriptive cross-sectional study was conducted among 220 adults attending outpatient departments of Madhesh Institute of Health Sciences between December 2025 and February 2026. Data were collected using a structured questionnaire and questions assessing knowledge, attitudes and practices related to antibiotic use and AMR. Data were entered and analysed using IBM SPSS Statistics version 27.

Results: Among 220 participants, the median age was 34 years (IQR: 26–45), 68.2% were male and 56.4% were from rural areas. Although 80.5% knew that antibiotics should be taken as prescribed, misconceptions were common, with 65.0% believing antibiotics are effective against viral infections. Attitudes were similarly concerning, with 84.5% supporting antibiotic use for colds and 70.9% for fever. About 52.3% of participants had adequate knowledge, but only 34.5% had favorable attitudes and 40.5% demonstrated good practices.

Conclusion: The findings concluded that there is between understanding the principles of antibiotic use and their application in practice. Misconceptions concerning antibiotics for viral infections and minor illnesses, together with inappropriate self-management behaviours, indicate the need for targeted patient education, strengthened antimicrobial stewardship.

Keywords: *Antibiotics; antimicrobial resistance; cross-sectional study; rational drug use.*

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Introduction

Antimicrobial resistance (AMR) is a major public-health problem, driven in part by inappropriate use of antibiotics. It is a condition in which microorganisms become resistant to antimicrobial medicines, thereby making previously effective treatments less effective or ineffective against infections. Inappropriate antibiotic use, including unnecessary or excessive use and incorrect dosing or duration, can accelerate the emergence and spread of antimicrobial resistance.[1] The World Health Organization also emphasizes the rational use of medicine, which involves selecting the medicine based on clinical needs while minimizing the unnecessary harm.[2]

The issue of antibiotic misuse is significant in low- and middle- income countries. There antibiotics are obtained without prescriptions.[1] In Nepal, a study revealed the presence of gap between knowledge and use of antibiotic. About 42.9% of the patients reported that fever could be treated by antibiotics and 79% reported obtaining antibiotics over the counter.[3] A study from Nepal reported inappropriate use of antibiotic, including the use of antibiotics for common colds, along with limited awareness of AMR. The study also identified factors such as expense, accessibility and patient demand as major drivers for over-the-counter antibiotic sales.[4]

The knowledge, attitude and practice of antibiotic use can alter according to population and healthcare setting.[5] Patient in tertiary care center are important in identifying existing misconceptions and inappropriate use of antibiotic and can guide effective local antimicrobial stewardship interventions. Therefore, the aim of this study was to assess knowledge, attitudes, and practices regarding to rational use of antibiotics among outpatients attending Madhesh Institute of Health Sciences, Nepal.

Materials and Methods

A hospital-based cross-sectional study was conducted among adult outpatients attending the General Medicine outpatient departments (OPD) of Madhesh Institute of Health Sciences (MIHS), Nepal. Data collection was undertaken over a three-month period from December 2025 to February 2026. Ethical approval was obtained from Institutional Review Committee of MIHS (MIHS-IRC/082/083-26).

The study population comprised outpatient adults aged 18 years or older attending General Medicine OPD at MIHS during the study period. Participants were eligible if they were able to understand and respond to the questionnaire in Nepali or English and provided informed consent. Severely ill patients unable to participate, patients requiring emergency inpatient care, individuals who had previously participated in the study, and health professionals or medical students presenting as patients were excluded from the study.

Sample size was calculated using Cochran's formula: $N = (z)^2 x\ pq/d^2$ for a single population proportion. Taking a prevalence of 35.6% from a previous study,6 with a 95% confidence level and a margin of error of 6%, the initial sample size was calculated. After adjusting for a 20% non-response rate, the final sample size was approximately, N=220. A convenience sampling technique was used to recruit participants.

Data were collected using a pre-structured questionnaire. The questionnaire included sections on sociodemographic characteristics and knowledge, attitude, and practice (KAP) regarding rationale use of antibiotic. The knowledge, attitude and practice domain contained 10 questions each. The questionnaire was adapted from a previously published studies.[6-9] The questionnaire was initially developed in English language. The draft of the questionnaire was reviewed by experts in the field and was updated based upon the feedback of the experts. The modified questionnaires was then translated into Nepali language by two independent Nepali language teachers who were not a part of the study. Then the Nepali version was translated back into English to assess the consistency of the translation. The questionnaire was pretested among 20 individuals who were not included in the main study. The questionnaire was finalized based on the pretesting. Data were collected by administering the questionnaire to eligible participants attending the OPD. Participants were informed about the purpose of the study, and consent was obtained before data collection.

The collected data were entered and analysed using statistical software SPSS (Version 27). Descriptive statistics such as frequency and percentage were used to summarize the data, and results were presented in tables.

Results

Table 1 showed that the study included 220 participants, with a median age of 34 years (IQR: 26–45). The participants were predominantly male (68.2%), while 31.8% were female. More than half of the participants were from rural areas (56.4%). Regarding education, participants represented different educational levels, although those with no formal education and those with higher-secondary education constituted relatively large groups.

Table 1: Sociodemographic characteristics of the study participants, including age, gender, educational status, and place of residence.

Characteristics		Frequency	Percent
Age (years) Median (Q1, Q3)		34 (26, 45) years	
Gender	Male	150	68.2
	Female	70	31.8
Education	No formal education	59	26.8
	Primary	28	12.7
	Secondary	41	18.6
	Higher Secondary	58	26.4
	University	34	15.5
Resident	Rural	124	56.4
	Urban	96	43.6

Table 2 demonstrated variable levels of knowledge regarding antibiotic use and AMR. Most participants (80.5%) recognised that antibiotics should be taken according to a doctor's prescription, and 78.6% knew that using expired antibiotics is harmful. However, important knowledge gaps were evident: only 45.5% recognised that unnecessary or excessive antibiotic use contributes to AMR, while 65.0% believed that antibiotics are effective against viral infections. More than half (55.5%) also considered antibiotics useful for minor illnesses such as a simple cold.

Table 2: Illustration of the knowledge of participants regarding antibiotic use and antimicrobial resistance

Knowledge	Yes		No		Don't know	
	n	%	n	%	n	%
1. Are you aware of commonly used antibiotics (e.g., Azithromycin, Amoxicillinclavulanate, Metronidazole)?	111	50.5	10	4.5	99	45.0
2. Antibiotic resistance is a serious global health problem.	127	57.7	18	8.2	75	34.1
3. Antibiotics should be taken strictly as per a doctor's prescription.	177	80.5	9	4.1	34	15.5
4. Changing the dose or frequency of antibiotics can cause antibiotic resistance.	116	52.7	33	15.0	71	32.3
5. Stopping antibiotics after feeling better can have negative effects.	127	57.7	32	14.5	61	27.7
6. Unnecessary or excessive use of antibiotics leads to antimicrobial resistance.	100	45.5	36	16.4	84	38.2
7. Antibiotics are useful for treating common minor ailments (e.g., simple cold).	122	55.5	64	29.1	34	15.5
8. Antibiotics are effective against viral infections.	143	65.0	19	8.6	58	26.4
9. Selfmedication and overthecounter use of antibiotics should be avoided	127	57.7	51	23.2	42	19.1
10. Using expired antibiotics is harmful	173	78.6	9	4.1	38	17.3

Table 3: Attitudes of participants toward antibiotic use and antimicrobial resistance

Attitudes	Agree		Neutral		Disagree	
	n	%	n	%	n	%
1. When I have a cold, I should take antibiotics to prevent serious illness.	186	84.5	11	5.0	23	10.5
2. When I have fever, antibiotics help me recover faster.	156	70.9	25	11.4	39	17.7
3. Antibiotics should be stopped once I feel better, even if the course is incomplete.	118	53.6	13	5.9	89	40.5
4. Antibiotics are safe medicines and can be used for all types of illnesses.	106	48.2	21	9.5	93	42.3
5. Taking antibiotics without a prescription contributes to antibiotic resistance.	81	36.8	15	6.8	124	56.4
6. Skipping one or two doses does not cause antibiotic resistance.	97	44.1	21	9.5	102	46.4
7. If I experience side effects, I should stop antibiotics without consulting a doctor.	111	50.5	5	2.3	104	47.3
8. For minor illnesses, I should ask the pharmacist to give me antibiotics.	101	45.9	9	4.1	110	50.0
9. Taking an incorrect dose of antibiotics can cause resistance.	124	56.4	14	6.4	82	37.3
10. Leftover antibiotics should be stored at home for future use.	133	60.5	13	5.9	74	33.6

Table 3 indicated that a large majority agreed that antibiotics should be taken for a cold to prevent serious illness (84.5%), while 70.9% believed that antibiotics help recovery from fever. More than half (53.6%) agreed that antibiotics should be stopped once they felt better, even if the course was incomplete, and 60.5% believed that leftover antibiotics should be stored at home for future use. These findings indicate attitudes that may facilitate inappropriate antibiotic use.

Table 4: Summarizes the antibiotic use practices among the study participants.

Practices	Yes		No	
	n	%	n	%
1. Do you always consult a doctor before using antibiotics?	185	84.1	35	15.9
2. Do you check the expiry date before using antibiotics?	193	87.7	27	12.3
3. Do you complete the full course of antibiotics as prescribed?	176	80.0	44	20.0
4. Do you insist on antibiotics even when the doctor says they are not required?	50	22.7	170	77.3
5. Do you keep antibiotics with you while travelling?	113	51.4	107	48.6
6. Do you use antibiotics for seasonal cough or cold?	127	57.7	93	42.3
7. Do you buy antibiotics without a prescription (over the counter)?	85	38.6	135	61.4
8. Do you store leftover antibiotics for future use?	133	60.5	87	39.5
9. Do you stop taking antibiotics once you start feeling better (before completing the course)?	134	60.9	86	39.1
10. Do you selfmedicate or give antibiotics to family members without consulting a doctor?	63	28.6	157	71.4

Table 4 showed a mixed pattern of appropriate and inappropriate antibiotic-use practices. Most participants reported consulting a doctor before using antibiotics (84.1%), checking expiry dates (87.7%), and completing the prescribed course (80.0%). However, inappropriate practices remained common: 57.7% reported using antibiotics for seasonal cough or cold, 38.6% reported purchasing antibiotics without a prescription, 60.5% stored leftover antibiotics for future use, and 60.9% reported stopping antibiotics after feeling better. In addition, 28.6% reported self-medicating or giving antibiotics to family members without consulting a doctor.

Table 5: Distribution of participants according to knowledge, attitude and practice scores regarding rational antibiotic use and antimicrobial resistance (n = 220)

KAP score	Frequency	Percent
Knowledge score		
Inadequate knowledge	105	47.7
Adequate knowledge	115	52.3
Attitude score		
Unfavorable attitude	144	65.5
Favorable attitude	76	34.5
Practice score		
Poor practice	131	59.5
Good practice	89	40.5

Overall, 52.3% of participants demonstrated adequate knowledge, while 47.7% had inadequate knowledge regarding rational antibiotic use and AMR. Unfavourable attitudes were observed in 65.5% of participants, compared with 34.5% who had favourable attitudes. Similarly, 59.5% demonstrated poor antibiotic-use practices, indicating a substantial gap between knowledge and appropriate antibiotic-related behaviour (Table 5).

Discussion

The present study demonstrated gaps in knowledge, attitude and practices of antibiotic among the study participants at MIHS. Potentially inappropriate practices such as use of antibiotics for cough and cold, non-prescription acquisition, storage of leftover antibiotics and self-decision making on premature discontinuation was identified.

It is a known fact that antibiotics act against susceptible bacteria and cannot treat viral infections.[10,11] The participants showed high knowledge of appropriate behavior towards antibiotics, however, misconceptions about its role in viral and minor illness were observed. About 65% of the participants reported that antibiotics are effective against viral infections. The observed findings are consistent with similar publications related to AMR from Nepal and other regions of world.[1,3,12,13] A community-based study conducted in Eastern Nepal documented that 43.15% of participants used antibiotics for common cold. In the same study 81.84% of participants demonstrated lack of knowledge of antibiotic resistance. The misconceptions related to antibiotics was also shown by another study conducted in Nepal where 42.9% of participants believed its use in fever.[3] The higher proportion observed in the present study may be due to differences in population, study setting, and the tool used and should therefore not be interpreted as a direct estimate of the prevalence of antibiotic misuse in the general Nepalese population.

Most commonly antibiotics have been used for colds and fever suggesting that antibiotics has been consumed exclusively based on symptoms.[11,13,14] Patients also seek antibiotics from drug store due to convenience, cost, and easy access.[7,13,15] Perceptions regarding the efficiency of earlier healthcare services experience may also lead to increased consumptions suggesting patient behaviour towards antibiotics is led not only by prior knowledge but also by the healthcare environment too.[4] About 80.5% of participants recognized that antibiotics should be taken according to a doctor's prescription, yet 38.6% reported purchasing antibiotics without a prescription. Similarly, 87.7% reported checking expiry dates, but 60.5% reported storing leftover antibiotics for future use. These findings document a discrepancy between recognition of appropriate antibiotic use and the actual practice. In addition, evidence from Nepal show that use of antibiotic and its access is influenced by factors extending beyond individual knowledge including patient demand, dispenser practices and barriers to healthcare access.[4]

In countries like Nepal, there is also an alarming issue related to premature discontinuation of antibiotics after feeling better. In such instances, patients do not report to clinicians too.[5,16,17] The present study also showed that 60.9% of participants reported that they stop antibiotics after feeling better. Practically and theoretically, discontinuation of antibiotics depends upon infection and clinical guidelines, and it is a known fact a premature discontinuation of antibiotics also leads to inadequate treatment of conditions being sought for.[9] Hence, modern antimicrobial stewardship also dictates taking antibiotics as prescribed and altering the dose and durations should be done solely after consultation with respective clinicians.[18,19]

In this study, 52.3% of participants had adequate knowledge, but only 34.5% had favorable attitudes and 40.5% demonstrated good practices. This gap suggests that knowledge alone may not translate into appropriate antibiotic-related behavior. Similar findings have been reported in Nepal, where misconceptions about antibiotic use and inappropriate practices remain common despite reasonable awareness.[5,7] The high proportion of poor practices (59.5%) is concerning because unnecessary antibiotic exposure contributes to the development and spread of AMR. Factors such as self-medication, over-the-counter availability, convenience and patient expectations may contribute to inappropriate use.[20] These findings highlight the need for antimicrobial-stewardship

interventions that extend beyond education to address behavioral and healthcare-system factors.

WHO also identifies inappropriate antibiotic use as a causal factorfor enhancing AMR and focusses on application of interventions that combine appropriate prescribing, dispensing and public engagement to combat AMR.[2,20] About 57.7% of participants in this study reported that they used antibiotics for seasonal cough and cold. This finding is in line with evidence from Nepal and other low- and middle-income countries too.[21] The finding therefore supports incorporating simple, symptom-specific antibiotic messages into outpatient counselling. However, patients alone are not responsible for irrational use of antibiotic. Its use is influenced by prescribers, dispensers, patients, diagnostic modality, national regulation and access to care.[21,22] Hence there is need of a comprehensive mechanism involving patient education with antimicrobial stewardship among clinicians, proper regulatory and diagnostic mechanism in all centre evaluating cost.

This study has limitations. This was a hospital-based cross-sectional design. It does not allow to establish causal relationships between participant characteristics and antibiotic-use behaviours. Due to the use of convenience sampling, selection bias cannot be ignored. The study cannot be generalised to the wider population of Madhesh Province. The antibiotic-use practices were self-reported which may also lead to recall bias and social-desirability bias. In the study objectively verifying the antibiotic prescriptions, dispensing records would have made the study more impactful, but the study only assessed self-reported KAP. In this study the findings obtained should also be considered alongside Nepalese evidence demonstrating variation in antibiotic-related knowledge according to education and other sociodemographic characteristics. In this study descriptive statistics was used so the factors associated were not established.

Conclusion

This study demonstrates in rational antibiotic use among adult outpatients attending Madhesh Institute of Health Sciences. Many participants reported the importance of prescription-based antibiotic use, checking expiry dates and substantial gaps in rational antibiotic use among adult outpatients at MIHS, including misconceptions about indications and frequent inappropriate practices such as non-prescription use, self-medication and premature discontinuation, highlighting the need for integrated patient education and antimicrobial stewardship interventions.

Integrity and compliance statements

Ethics approval
Approved by the Institutional Review Board of the Institute of Health Research (Ref: (MIHS-IRC/082/083-26) on 7th Sept 2025.

Informed consent
Written informed consent was obtained from all participants for data collection and publication of anonymized data.
Trial registration (if applicable) Not applicable (descriptive cross-sectional study design).

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The authors declare no conflicts of interest.

Data availability
Data supporting the findings are available from the corresponding author on reasonable request.

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AI/LLM disclosure
No generative AI or LLM tools were used in the preparation of this manuscript.

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Shailendra Yadav: Design, concept, data collection, literature search, manuscript review and editing.

Shilpa Karna: Concept, literature search, manuscript review and editing.

Aman Kumar Sah: Design, data collection, literature search, manuscript review and editing.

Bios

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