Original Article

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Knowledge, Awareness, and Practice Regarding Antibiotics and Antibiotic Resistance among Patients Attending a Tertiary Health Care Center

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Abstract:

Background: Antibiotic resistance remains a pressing global health concern, driven largely by public misconceptions and inappropriate antibiotic use. This study aimed to assess knowledge, awareness, and practices related to antibiotics and AMR among patients at a tertiary care center in Bangladesh.

Methodology: A cross-sectional survey was conducted from February to March 2025 at Sylhet Women's Medical College, involving 391 adult patients selected through convenient sampling. Data were collected via face-to-face interviews using a semi-structured questionnaire covering sociodemographic, antibiotic knowledge, antibiotic resistance awareness, and antibiotic usage practices. Data were analyzed using SPSS version 25.

Results: Among participants, 66.8% demonstrated good antibiotic knowledge, though substantial misconceptions persisted. Only 5.1% correctly rejected the use of antibiotics for viral infections, and 64.7% mistakenly believed it acceptable to use antibiotics prescribed to family members. About 71.1% had received resistance-related information in the past year, predominantly from doctors (58.6%), and 81.1% reported changing their perceptions following this information. Although 94.9% adhered to prescribed regimens strictly on time daily, 23% discontinued antibiotics when they felt well, and 74.9% reported using antibiotics as prophylaxis. Knowledge levels were significantly higher among males, those with higher education, service workers, and individuals connected to the healthcare sector ($p<0.05$). Factors such as age, income, residence, and chronic illness showed no significant association.

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Introductiopn:

The invention of antibiotics nearly 100 years ago sparked a time of pharmaceutical advancement and application in the health of humans, animals, and agriculture.[1]

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The beneficial effects of antibiotics on health are increasingly jeopardized by rising antimicrobial resistance globally and hindered by insufficient access to essential antibiotics in numerous low- and middle-income nations.[2] Growing antibiotic resistance leads to serious infections, complications, extended hospital stays, and

higher mortality rates. It also serves as a financial strain since it results in substantial healthcare costs, particularly because of the extra expenses related to hospital resources and medications.[3]

Worldwide initiatives are underway to assess public understanding and awareness regarding antibiotic usage and its resistance. The World Health Organization, across its six regions, has conducted surveys to measure existing knowledge, awareness, and practice regarding antibiotics.[4] Additionally, even before the WHO initiative, European countries shared a similar methodology and instrument to assess.[5,6] These surveys based on population are included in the monitoring and evaluation structure suggested in the 'WHO Global Action Plan for Antimicrobial Resistance'.

Vital factors contributing to the increase in antibiotic resistance are unregulated distribution, inadequate supervision, and a widespread tendency to misuse, such as self-treatment.[7] The tendency to self-treat arises when individuals keep their remaining antibiotics for future usage. Conversely, in developing nations, antibiotics are easily accessible as over-the-counter drugs.[8]

The CDC reports that over two million individuals in the United States contract antibiotic-resistant illnesses annually, leading to at least 23,000 fatalities. Moreover, antimicrobial resistance leads to billions in direct healthcare costs, excluding the time and money lost in productivity annually.[9] Globally, 3.7% of tuberculosis incidence and 20% of all prevalence cases who had already completed their regimen later present with drug-resistant tuberculosis. Just 50% of multidrug-resistant tuberculosis can be treated successfully with existing drugs, and extensively resistant tuberculosis has been detected in 84 nations.[10]

Due to antibiotic misuse being the reason for antibiotic resistance, it is crucial to increase public awareness about this issue. A prior systematic review revealed that the general public possesses an inadequate comprehension of antibiotic resistance and its underlying factors. Despite 70% of participants knowing the phrase "antibiotic resistance," most (76%) believed it referred to alterations in the human body.[11] Another study in KSA reported that 36.2% of the public has never heard about antibiotic resistance.[8] Other studies among Asian countries showed that 30 to 70 percent of participants used antibiotics to treat viral infections, and 60 to 83 percent of them had no clue about the cause of antibiotic resistance.[12-15] A Swedish study among the general public found that 19% of participants believed that antibiotic accelerates recovery from the common cold.[16]

Antibiotic resistance represents a complex issue requiring collaborative action from multiple stakeholders, including patients, to make progress in addressing this lethal and unavoidable challenge. In this study, we aimed to assess the knowledge, awareness, and practice regarding antibiotics and antibiotic resistance among patients attending a tertiary health care center.

Methodology:

Study Settings and Sampling

This cross-sectional study was conducted from February 2025 to March 2025 among the patients attending Sylhet Womens Medical College, a tertiary-level hospital located in Sylhet City. All patients receiving outpatient and inpatient services were considered part of the sampling frame. The sample size was calculated using the formula z^2pq/d^2, resulting in a required sample size of 373, based on a 95% confidence interval and a relative precision of 5%. The expected prevalence (p) was assumed to be 58.8% (p = 0.588), as reported by Bhatt et al.[11] Inclusion criteria comprised individuals aged 18 years or older who voluntarily consented to participate in the study. Pediatric and psychiatric patients were excluded. A convenient sampling technique was employed for sample selection. A total of 400 interviews were conducted, and after excluding incomplete responses, the final sample size included 391 participants.

Data collection tool

Data were collected using a semi-structured questionnaire with 4 parts: Socio-demographic profile, knowledge regarding antibiotic efficacy and resistance, awareness of antibiotic resistance, and antibiotic usage practice. The socio-demographic part consisted of questions regarding age, sex, marital status, educational

qualification, occupation, residence, monthly income, participant or family member working in the health sector, smoking, perceived health status, and presence of any chronic disease that requires regular medication. Knowledge regarding antibiotics and antibiotic resistance included questions like "Antibiotics are used for the treatment of viral infections" or "Antibiotics are used for the treatment of bacterial infections". The response was recorded as true or false, correct or incorrect, and yes or no, with a score of 0 for a correct answer and 1 for an incorrect answer. The total possible knowledge score was 12. To categorize knowledge levels, the median split method was employed: scores below the median were classified as "poor knowledge," and scores at or above the median as "good knowledge".[11] The antibiotic resistance awareness section included questions on whether participants had received information about antibiotic resistance, the sources of that information, whether their opinions had changed after receiving it, and whom they trusted most as a source of information. The antibiotic practice section explored behaviors such as the number of antibiotic courses taken in the past year, time elapsed since the last course, sources from which antibiotics were obtained, conditions for which antibiotics were taken, when the participant stopped taking the medication, use of antibiotics for disease prevention, whether antibiotics were stored at home in advance, and adherence to prescription guidelines. The entire questionnaire was translated into Bangla. A pretest among 20 patients was done, and a minor linguistic adjustment was made for ease of answering.

Data collection method

Data were collected through face-to-face interviews with each participant. Before the interview, a consent form outlining the study's objectives and participation procedures was read to each participant. Participation in the study was entirely voluntary, and individuals were informed of their right to decline participation or withdraw from the study at any point without any consequences. No personally identifying information, such as names or addresses, was collected during the survey. Participants were assured of the confidentiality and anonymity of all information provided.

Data analysis

For analysis purposes, data were grouped using median as follows: age into ≤30 years and >30 years; monthly family income into <50,000 BDT and ≥50,000 BDT; yearly average antibiotic courses taken in the past year into less than or equal to one and more than one. For the test of significance, the $\chi 2$ (chi-square) test was used to see the association between knowledge level and associated factors. Data were analyzed using SPSS version 25.

Ethical Clearance

This study involved human participants and was approved by the Institutional Review Board and Ethical Clearance Committee of the Sylhet Women's Medical College Hospital, Sylhet, Bangladesh (Ref/SWMCH/Eth.C/IERB/2025006).

Results:

A total of 391 participants were included in this study. The sociodemographic profile of the participants is listed in Table I. The age distribution revealed that slightly more than half of the participants (51.9%) were aged above 30 years, while the remainder (48.1%) were 30 years or younger. Males constituted the majority of the sample (58.6%), with females accounting for 41.4%. Most participants were married (64.5%), while 42.7% had school-level education, 28.4% college education, 22.5% university degrees, and 6.4% no formal education. Occupations varied: 28.9% in service roles, 17.6% in business, 26.3% homemakers, and 27.1% in other fields. A majority resided in rural areas (62.4%), while 37.6% were urban dwellers. Over half (54.5%) reported a monthly family income below 50,000 BDT. Smoking habits were also assessed, revealing that 24.6% of participants were smokers. Participants were asked to assess their perceived health status: 66.0% rated their health as good, and 34% reported poor health. A relatively small proportion (18.7%) of participants or their family members were associated with the healthcare sector. Finally, 24.0% of respondents reported requiring regular medication for chronic illnesses.

Table I: Sociodemographic profile of the participants (n=391)

Variable	Category	Frequency	Percentage
Age	≤30 years	188	48.1
	>30 years	203	51.9
Sex	Male	229	58.6
	Female	162	41.4
Marital status	Unmarried	126	32.2
	Married	252	64.5
	Widowed/Divorced	13	3.3
Education	Uneducated	25	6.4
	School	167	42.7
	College	111	28.4
	Graduation	88	22.5
Occupation	Service	113	28.9
	Business	69	17.6
	Homemaker	103	26.3
	Others	106	27.1
Residence	Rural	244	62.4
	Urban	147	37.6
Monthly family income	<50,000 BDT	213	54.5
	≥50,000 BDT	178	45.5
Smoking Habit	Smoker	96	24.6
	Non-smoker	295	75.4
Perceived health status	Good	258	66.0
	Poor	133	34.0
Participant or a family member works in the health sector	Works	73	18.7
	Does not work	318	81.3
Regular medication is needed for a chronic disease	Needed	94	24.0
	Does not need	297	76.0

Table II demonstrates the knowledge of antibiotics and antibiotic resistance among the participants. A large majority (93.6%) correctly identified that antibiotics are used to treat bacterial infections. However, only 5.1% correctly stated that antibiotics are not effective against viral infections, and just 9.2% recognized that antibiotics do not work against colds and flu. Knowledge about potential side effects was moderate, with 45.5% acknowledging that antibiotics can cause adverse effects such as diarrhea. Knowledge of the term "antibiotic resistance" was reported by 71.6%, although only 40.2% could define it correctly, and 44.5% indicated knowledge of how it occurs. Notably, only 11.0% correctly rejected the misconception that the human body becomes resistant to antibiotics, while 86.7% understood that it is bacteria that develop resistance. Furthermore, 64.7% incorrectly believed it acceptable to use antibiotics prescribed for a family member if the illness appeared similar. A strong majority (91.8%) agreed that unnecessary antibiotic use reduces their effectiveness. However, 53.5% mistakenly believed antibiotic resistance is only a concern for those who take antibiotics regularly. Overall, 66.8% of participants demonstrated a "good" level of knowledge, while 33.2% were classified as having "poor" knowledge based on the median split score.

Table II: Knowledge of Antibiotics and Antibiotic Resistance (n=391)

Statements / Questions*		Correct Answer	Percentage
Antibiotics can treat bacterial infections (T/F)		366	93.6
Antibiotics can treat viral infections (T/F)		20	5.1
Antibiotics are effective against cold and flu (T/F)		36	9.2
Taking antibiotics often has side effects, such as diarrhea (T/F)		178	45.5
Have you heard about antibiotic resistance? (Y/N)		280	71.6
What do you mean by antibiotic resistance? (C/I)		157	40.2
Do you know how antibiotic resistance occurs? (Y/N)		174	44.5
Antibiotic resistance occurs when your body becomes resistant to antibiotics (T/F)		43	11.0
Antibiotic resistance occurs when Bacteria become resistant to the effect of antibiotics (T/F)		339	86.7
It's okay to use antibiotics that were prescribed to a family member, as long as they were used to treat the same illness (T/F)		253	64.7
Unnecessary use of antibiotics makes them ineffective (T/F)		359	91.8
Antibiotic resistance is only a problem for people who take antibiotics regularly (T/F)		209	53.5
Knowledge Score	Good Knowledge	261	66.8
	Poor Knowledge	130	33.2

* (T/F) = True / False; (Y/N) = Yes / No; (C/I) = Correct or Incorrect

Awareness regarding antibiotic resistance is shown in Table III. Among the participants, 71.1% reported receiving information in the past 12 months concerning the unnecessary use of antibiotics. The primary source of information was doctors (58.6%), followed by pharmacies (13.3%), Facebook (12.8%), friends and family (3.1%), other healthcare workers (1.8%), television (1.5%), and newspapers (1.3%). Notably, 7.7% reported not receiving any information from any source. A substantial proportion of participants (81.1%) reported a change in perception after understanding antibiotic resistance, whereas 18.9% did not alter their views. When asked about the most trusted source for information regarding antibiotic resistance, the majority cited doctors (86.7%), followed by other healthcare workers (5.1%), friends and family (4.6%), pharmacies (3.3%), and newspapers (0.3%).

Table III: Awareness regarding Antibiotic Resistance (n=391)

Variable	Category	Frequency	Percentage
Received information regarding the unnecessary use of antibiotics in the last 12 months	Yes	278	71.1
	No	113	28.9
Source of information regarding antibiotic resistance	Doctor	229	58.6
	Pharmacy	52	13.3
	Facebook	50	12.8
	Friends and Family	12	3.1
	Other Healthcare Workers	7	1.8
	TV	6	1.5
	Newspaper	5	1.3
	No Information received	30	7.7
Changed their mind after understanding antibiotic resistance	Yes	317	81.1
	No	74	18.9
Whom would participants trust most for receiving information about antibiotic resistance	Doctor	339	86.7
	Other Healthcare Worker	20	5.1
	Friends and Family	18	4.6
	Pharmacy	13	3.3
	Newspaper	1	0.3

Table IV represents the practice of antibiotic usage. Among 391 participants, 68.5% took antibiotics once or less in the past year, while 31.5% used them more frequently. Regarding the timing of their most recent antibiotic course, 22.5% took it within the past month, 43.5% within the last six months, 18.4% within the past year, and 15.6% more than a year ago. Doctors' prescriptions were the primary source for the last antibiotic course in 65.5% of cases, while 17.6% relied on leftover medication from a previous course, and 16.9% obtained antibiotics directly from pharmacies without a prescription. A large proportion (74.9%) reported using antibiotics as a preventive measure, while 12.5% stated they kept antibiotics at home for future usage. Regarding adherence, 94.9% reported taking antibiotics on time strictly as prescribed. When asked about when they stopped taking antibiotics, 77% completed the full course, whereas 23% discontinued use once they began to feel better. The most commonly reported illnesses for which antibiotics were taken included fever (32.5%), UTI (urinary tract infections) (13.6%), and cough (12.8%).

Table IV: Practice of antibiotics usage (n=391)

Variable	Category	Frequency	Percentage
Average antibiotics course taken in the past 1 year	Once or less	268	68.5
	More than once	123	31.5
Time of last antibiotics course	Last month	88	22.5
	Last 6 months	170	43.5
	Last year	72	18.4
	More than a year	61	15.6
Source of the last antibiotics course	Doctor prescription	256	65.5
	Previous course	69	17.6
	Pharmacy without a prescription	66	16.9
Antibiotics used as a preventive measure	Yes	293	74.9
	No	98	25.1
Store antibiotics at home for future usage	Yes	49	12.5
	No	342	87.5
Take antibiotics strictly on time as mentioned on the prescription	Yes	371	94.9
	No	20	5.1
When stop taking antibiotics	Feels well	90	23.0
	End of course	301	77.0
The last antibiotic taken for an illness	Fever	127	32.5
	UTI	53	13.6
	Cough	50	12.8
	Cold	30	7.7
	Flu	24	6.1
	Sore throat	22	5.6
	Skin infection	14	3.6
	Headache	10	2.6
	Diarrhorea	8	2.0
	Pneumonia	8	2.0
	Others	34	8.7
	Cannot remember	11	2.8

Table V demonstrates the factors associated with antibiotics and antibiotic Resistance knowledge. Males (73.4%) exhibited higher knowledge levels than females (57.4%) (p=0.001). Educational attainment showed a strong association, with graduates (89.8%) demonstrating superior knowledge compared to uneducated participants (36.0%) (p<0.001). Occupation was also significant (p<0.001); service workers (77.9%) and business owners (68.1%) had higher knowledge levels than homemakers (48.5%). Participants with health sector exposure, either personally or through family members, displayed significantly better knowledge (76.7% vs. 64.5%; p=0.045). Those who perceived their health as good had higher knowledge (70.9%) compared to those with poor self-rated health (58.6%) (p=0.015). Other factors, including age, marital status, residence, income, smoking status, and chronic disease, were not significantly associated with knowledge levels.

Table V: Factors associated with Antibiotics and Antibiotic Resistance Knowledge (n=391)

Variable		Knowledge*		Test of Significance
		Good	Poor	
Age	≤ 30 years	131 (69.7)	57 (30.3)	0.237
	> 30 years	130 (64)	73 (36)	
Sex	Male	168 (73.4)	61 (26.6)	0.001**
	Female	93 (57.4)	69 (42.6)	
Marital status	Unmarried	87 (69)	39 (31)	0.248
	Married	168 (66.7)	84 (33.3)	
	Widowed/Divorced	6 (46.2)	7 (53.8)	
Education	Uneducated	9 (36)	16 (64)	<0.001**
	School	104 (62.3)	63 (37.7)	
	College	69 (62.2)	42 (37.8)	
	Graduation	79 (89.8)	9 (10.2)	
Occupation	Service	88 (77.9)	25 (22.1)	<0.001**
	Business	47 (68.1)	22 (31.9)	
	Homemaker	50 (48.5)	53 (51.5)	
	Others	76 (71.7)	30 (28.3)	
Residence	Rural	158 (64.8)	86 (35.2)	0.280
	Urban	103 (70.1)	44 (29.9)	
Monthly family income	<50,000 BDT	133 (62.4)	80 (37.6)	0.061
	≥50,000 BDT	128 (71.9)	50 (28.1)	
Smoking Habit	Smoker	62 (64.6)	34 (35.4)	0.604
	Non-smoker	199 (67.5)	96 (32.5)	
Participant or a family member works in the health sector	Works	56 (76.7)	17 (23.3)	0.045**
	Does not work	222 (64.5)	111 (35.5)	
Regular medication is needed for a chronic disease	Needed	61 (64.9)	33 (35.1)	0.661
	Does not need	200 (67.3)	97 (32.7)	
Perceived health status	Good	183 (70.9)	75 (29.1)	0.015**
	Poor	78 (58.6)	55 (41.4)	

*Row Percentage in Parenthesis **Statistically Significant

Discussion:

The present study highlights several critical insights into patient knowledge, awareness, and practices concerning antibiotics and antibiotic resistance. The findings demonstrate both encouraging awareness levels and persistent misconceptions, reflecting broader global trends. Overall, 66.8% of participants demonstrated a "good" level of knowledge, while 33.2% were classified as having "poor" knowledge based on the median split score. Bhatt et al. in a similar study using a similar median split found that 58.8% had good knowledge and 41.2% had low knowledge, which is similar to our findings.[11]

While most participants correctly identified antibiotics as treatments for bacterial infections, few knew they are ineffective against viral infections, with only a few participants knowing that antibiotics do not work against colds and flu. Just like our findings, multiple studies are in agreement that individuals in both developed and developing nations recognize that antibiotics are useful for bacterial infections, yet there is a lack of concern in the community's understanding of the effectiveness of antibiotics against viral infections.[16-18] These results provide proof that individuals cannot distinguish between different causal agents of infectious diseases, and their understanding of the fundamental mechanism of antibiotic function is extremely limited. The lack of a comprehensive understanding of antibiotic risks, like potential side effects, may perpetuate misuse and overconfidence in their safety. Less than half of the participants acknowledged that antibiotics can cause adverse effects such as diarrhea. When people underestimate the potential harms of antibiotics, they may demand antibiotics unnecessarily and self-medicate without proper guidance.[19]

Similar to relevant studies, while most participants were familiar with the term "antibiotic resistance," in our study, fewer than half could accurately define it or explain how it develops.[7,11] This finding aligns with a recurring theme in global and regional studies: while awareness of the term "antibiotic resistance" is increasing, deep understanding of its meaning, causes, and consequences remains limited.[20] Only 11% correctly rejected the misconception that the human body becomes resistant to antibiotics, while 86.7% understood that it is bacteria that develop resistance. This persistent misconception has been repeatedly highlighted in the literature over the years.[11,20-22] Furthermore, 64.7% incorrectly believed it acceptable to use antibiotics prescribed for a family member if the illness appeared similar. A Malaysian study found a much lower (23%) proportion having the misconception.[11] More than half of the patients mistakenly believed that antimicrobial resistance was a concern only for those who frequently use antibiotics. The possible reason for this misconception could be that they did not believe that resistant bacteria could spread from one individual to another. The modern-day fast-paced world has accelerated the spread of resistant organisms, enabling individuals to carry them across and between countries.[23]

The majority of participants (71.1%) reported receiving information within the past year about the unnecessary use of antibiotics. This degree of consciousness is reassuring, as it indicates that a significant segment of the populace is aware of the possible ramifications of antibiotic misuse and overuse. Our findings also indicate that healthcare professionals have been instrumental in educating patients about antibiotic resistance. Doctors were the main source of information, followed by pharmacies and social networks, while a small proportion (7.7%) of participants reported not receiving any information from any source. Similar findings were reported in other studies.[7,11] A substantial proportion of participants (81.1%) reported a change in perception after understanding antibiotic resistance, whereas the rest did not alter their views. This is both encouraging and revealing as it showed that educational interventions to improve public understanding of antibiotic resistance worked for most people, but also highlighted a critical subset resistant to attitudinal change. When asked about the most trusted source for information regarding antibiotic resistance, the majority cited doctors, followed by other healthcare workers. This strongly emphasizes the trusted leadership role of doctors and healthcare workers in shaping public understanding and behavior regarding antibiotic resistance. While broad media campaigns are useful for awareness, deep perception change and behavior modification are most effective when guided by these trusted healthcare providers.[24]

Two-thirds of our participants reported using antibiotics once or less in the past year, while the rest used them more frequently, and 22.5% had taken antibiotics within the past month. Our findings are higher compared to neighboring Southeast Asian countries like Myanmar (58.6%), Thailand (29.7%), and Indonesia (40%).[15,25,26] Our participants mentioned a wide

range of illnesses for which the last antibiotics were taken, which included fever (32.5%), UTI (13.6%), and cough (12.8%). It is important to notice that a significant proportion had misused antibiotics in cases of cold (7.7%), flu (6.1%), and headache (2.6%). This is an alarming discovery, as the inappropriate use and excessive consumption of antibiotics significantly contribute to antimicrobial resistance. The multi-country survey by WHO in 2015 concurs with these findings.[5] This may be influenced by physicians' attitudes; despite knowing the limited effectiveness of antibiotics in some cases, they often continue prescribing them due to patient expectations, illness severity and duration, and diagnostic uncertainty.[27] Another study in Indonesia found that 40% participants believed that antibiotics can be used to treat any disease.[20] Patients in this study reported that doctors prescribed the last antibiotic in 65.5% of cases, while 17.6% used leftovers, and 16.9% obtained them directly from pharmacies without a prescription. These findings from the current study reflect serious gaps in antibiotic stewardship, healthcare system control, and public education, which collectively exacerbate the crisis of antimicrobial resistance. A Saudi study found that 23.4% participants obtained antibiotics without a prescription.[7]

Our study findings indicated a widespread misuse and mismanagement of antibiotics, particularly their preventive use without proper medical indication and stockpiling for future unsupervised use. These behaviors contribute significantly to the global health crisis of antimicrobial resistance, undermine public health efforts, and lead to more complex, harder-to-treat infections. Alkhuraisi et al in their study found that 52.4% respondents used antibiotics for preventive measures and 49.2% stored antibiotics at their disposal.[7] Regarding adherence, 94.9% reported taking antibiotics strictly as prescribed, with 77% completing the full course and 23% discontinuing once they felt better. This split between excellent timing adherence and suboptimal treatment duration is a critical insight. It showed that while people can follow daily routines well, they struggle with long-term discipline, especially when symptoms disappear. A comparable study in Saudi Arabia revealed that 27.1% of the respondents confessed to discontinuing antibiotics as soon as they began to feel better, which is similar to our findings.[7] This kind of practice does not conform to best practices and may influence the emergence of antimicrobial resistance.

We found a gender-based knowledge disparity, with male participants exhibiting higher antibiotic knowledge. This points to a significant gender-based health literacy gap, and it is particularly concerning because women often play central roles in household health decision-making, especially regarding children's health. Zhu et al. found that women were more likely to self-medicate their children with antibiotics, often without correct knowledge of resistance.[28] Educational attainment was strongly associated with high knowledge levels. Higher education may be linked to increased knowledge since students have greater access to various resources. This trend is mirrored in similar research carried out in other countries.[11,23,29,30] Occupation significantly influenced antibiotic knowledge levels. Service workers and business owners had higher knowledge levels than homemakers. This highlights a critical occupational disparity in antibiotic knowledge that aligns with well-established social determinants of health. Homemakers—who often are primary caregivers and influence household health practices—may be a key vector for antibiotic misuse if left out of educational initiatives. Participants with health sector exposure, either personally or through family members, displayed significantly better knowledge. Pan et al. in China found that individuals with family members in healthcare had significantly higher awareness of antibiotic resistance and proper antibiotic practices.[31] Those who perceived their health as good had higher knowledge compared to those with poor self-rated health. Individuals who consider themselves healthier often engage more actively in health-seeking behaviors, health education, and preventive practices.[32] These results indicate that women, particularly homemakers and individuals with less formal education, should be prioritized in initiatives aimed at reducing misconceptions regarding antibiotic use. Designing accessible, culturally appropriate, and

community-based interventions that specifically target homemakers and similar underinformed groups could substantially improve antibiotic stewardship.

Conclusions:

In summary, while our study reveals substantial general awareness, gaps remain in conceptual clarity and behavioral practices. These findings call for tailored, context-specific public health campaigns, integrating behavioral science with health education. More importantly, the trend is seen across the globe, which demands international collaboration for effective antimicrobial stewardship education.

Author's Contributions:

Conceptualization and literature review: Rashel ATM, Kairi TK; **Methodology**: Rashel ATM, Kairi TK; **Data collection**: Rashel ATM, Chowdhury MJ, Ahmad Hussain, Ferdoush N; **Data Analysis**: Dey S; **Writing original draft**: Rashel ATM; **Writing review and editing**: Kairi TK, Chowdhury MJ, Ahmad Hussain, Ferdoush N, Munalisa TA, Rifat TA. **All authors read and approved the final manuscript.**

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