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Original Article

Knowledge, Attitudes, and Practices Regarding Antibiotic Use in Rural Bangladesh

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ABSTRACT

Introduction: *Antibiotics have been a cornerstone of modern medicine, yet their misuse has led to the global crisis of antimicrobial resistance (AMR). This study aims to explore the knowledge, attitudes, and practices (KAP) regarding antibiotic use in a rural Bangladeshi community to identify key gaps contributing to this growing issue.* ***Methods & Materials:*** *Conducted at Meghna Upazila Health Complex in Comilla, the cross-sectional survey included a sample size of 60 participants, comprising patients, attendants, and healthcare workers.* ***Result:*** *Findings revealed significant knowledge deficits, with 50% of respondents unaware that antibiotics are ineffective against viral infections and only 30% recognizing the implications of misuse on AMR. Attitudes reflected a normalization of over-the-counter availability and self-medication, with 37% believing antibiotics are necessary for any illness. Practices such as incomplete courses (60%), sharing antibiotics (30%), and improper disposal (40%) further exacerbate resistance risks. Awareness of AMR was low, with only 37% acknowledging it as a serious issue.* ***Conclusion:*** *The study underscores the urgent need for targeted educational interventions, stricter regulatory policies, and community-based awareness campaigns to mitigate antibiotic misuse and combat AMR. These findings provide a foundation for evidence-based strategies tailored to rural settings in Bangladesh, aligning with global efforts to address this critical public health challenge.*

Keywords: *Antibiotic use, Antimicrobial resistance, Knowledge, Attitudes, Practices, Rural Bangladesh*

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INTRODUCTION

Antibiotics have been a cornerstone of modern medicine since their discovery in the early 20th century, drastically reducing mortality and morbidity from bacterial infections. They have enabled major advances in medical treatments, including surgeries, chemotherapy, and organ transplants, by preventing and treating infections. However, the misuse and overuse of antibiotics have accelerated the emergence and spread of antimicrobial resistance (AMR), which is now a major global health threat. The World Health Organization (WHO) has declared AMR one of the top ten global health priorities of the 21st century, warning that if left unchecked, it could lead to a post-antibiotic era where even minor infections become life-threatening[1,2]. In Bangladesh, as in other low- and middle-income countries (LMICs), the challenges surrounding antibiotic misuse are complex and multifaceted. Factors such as unregulated access to antibiotics, low awareness about their proper use, and weak healthcare infrastructure exacerbate the problem[3]. Over-the-counter availability of antibiotics in pharmacies is common, with patients often purchasing these drugs without a prescription. Studies suggest that 60% of antibiotics in Bangladesh are obtained through informal channels [4]. This lack of regulation not only fuels inappropriate use but also undermines efforts to contain AMR. The rural population in Bangladesh faces unique challenges contributing to antibiotic misuse. Limited healthcare access, coupled with cultural beliefs and economic constraints, often drives individuals to self-medicate or seek care from informal providers. Antibiotics are frequently perceived as a "one-size-fits-all" remedy for infections, including viral illnesses such as colds and fevers[5,6]. Globally, the misuse of antibiotics in LMICs has been extensively documented. In Indonesia, studies found that a significant proportion of the population uses antibiotics for symptoms like fever or sore throat, often without consulting healthcare professionals[7]. Similar trends are evident in

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Mozambique, where low literacy levels and a lack of awareness about AMR contribute to widespread misuse[8]. These findings mirror the situation in Bangladesh, underscoring the importance of addressing the social, economic, and cultural determinants of antibiotic use in rural communities. AMR is not only a health issue but also an economic one. In Bangladesh, where a significant portion of the population depends on agriculture and manual labor, illness due to AMR can lead to loss of productivity and income, exacerbating poverty cycles. The economic cost of AMR is estimated to reach trillions globally, with LMICs bearing the heaviest burden due to their reliance on affordable, widely available antibiotics[9]. The impact of AMR extends beyond human health, affecting livestock and aquaculture industries that rely heavily on antibiotics for disease prevention, further compounding the problem[10]. Despite increasing global awareness of AMR, rural populations remain underrepresented in research and interventions. Most AMR studies focus on urban settings, where healthcare infrastructure and literacy levels are relatively better. However, rural communities in countries like Bangladesh contribute significantly to the national healthcare burden due to their size and vulnerability. Addressing antibiotic misuse in these settings is crucial for achieving the goals of Bangladesh's National Action Plan on AMR, which aligns with the WHO Global Action Plan[11,3]. This study aims to address these gaps by exploring the knowledge, attitudes, and practices (KAP) of rural Bangladeshi populations regarding antibiotic use. By focusing on this underrepresented group, the research contributes to the broader goal of developing evidence-based interventions to combat AMR at the community level.

METHODS & MATERIALS

This study adopted a cross-sectional survey design to assess the knowledge, attitudes, and practices (KAP) related to antibiotic use among a rural population in Bangladesh. The research was conducted at Meghna Upazila Health Complex in Comilla District, Bangladesh. This location was strategically selected due to its role as a primary healthcare facility serving a diverse rural population. Data collection, interpretation and analysis were carried out over seven consecutive days, July 12–18, 2024. The study population comprised three distinct groups of individuals associated with Meghna Upazila Health Complex: individuals visiting the health complex for consultations or treatment, family members or caregivers accompanying patients and staff members, such as support staff, who regularly interact with antibiotics in their professional capacity. Convenience sampling was employed to select participants. A total of 60 participants were included in the study. Data was collected using a structured questionnaire. Data were analyzed using Microsoft 365. The following steps were undertaken: Descriptive statistics: Summarized demographic characteristics and KAP scores, graphical representations (e.g., bar charts, pie charts) were generated for key findings. Ethical approval was obtained from the Upazila Health and Family Planning Officer (UHFPO) of Meghna Upazila Health Complex. Consent was obtained before participation.

Inclusion criteria:

- Adults aged 18 years and older.
- Individuals (patients, attendants, or healthcare workers) present at Meghna Upazila Health Complex during the study period.
- Respondents were willing to provide informed consent.

Exclusion criteria:

- Individuals below 18 years of age.
- Participants were unable to provide informed responses due to severe illness or cognitive impairments.
- Those unwilling to participate in the study.
- Physician, nurse, or paramedic.

RESULTS

The demographic analysis of respondents by age range shows that the largest group was aged 38-47 years, with 15 respondents (25.0%), followed by those in the 28-37 range, with 11 respondents (18.3%), and the 48-57 age group, with 10 respondents(16.7%). The remaining respondents were distributed across the other age ranges: 7 respondents (11.7%) in the 18-27 age range, 9 respondents (15.0%) in the 58-67 range, and 8 respondents (13.3%) aged above 67. This age distribution highlights a broad representation of middle-aged and older [Table I]

Table – I: Distribution of Respondents by Age Range (*n*=60)

Age Range (Years)	Number of Respondents	Percentage (%)
18–27	7	11.7
28–37	11	18.3
38–47	15	25.0
48–57	10	16.7
58–67	9	15.0
>67	8	13.3
Total	60	100.0

The gender distribution shows that (63%) of the respondents were male, while (37%) were female. [Figure 1]

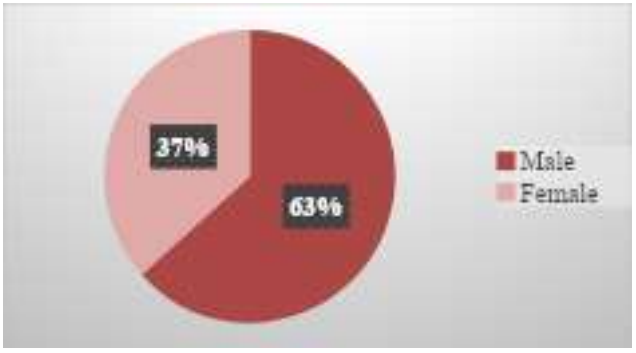

Figure – 1: Gender Distribution of Respondents (*n*=60)

Out of 60 respondents, 25 (41.7%) were illiterate, amking it the largest group. This was followed by 12 (20%) respondents

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with primary education. Secondary education was completed by 9 (15%) respondents, while 8(13.3%) respondents had attained higher secondary education. The smallest group consisted of a 6 (10%) respondents with bachelor's or higher qualification. [Figure 2]

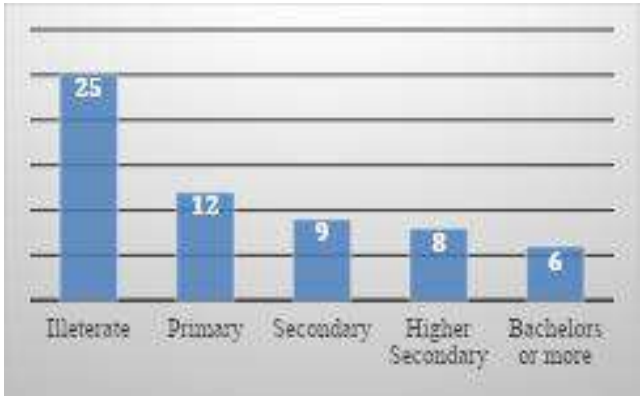

Figure – 2: Educational Level of the Respondents(*n*=60)

The occupational distribution of respondents indicates that the largest group comprises farmers 22 (36.7%), followed by housewives 18 (30%). Other occupations include business 8 (13.3%), day laborers 5 (8.3%), service workers 3 (5%), and a smaller proportion in miscellaneous categories 4 (6.7%). [Figure 3]

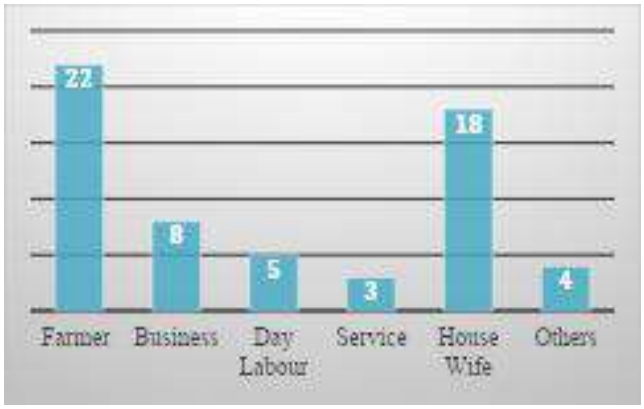

Figure – 3: Distribution of Respondents According to Occupation (*n*=60)

The majority respondents, 25(41.7%), fall within the income bracket of 10,000-20,000 BDT, followed closely by 23(38.3%) who earns less than 10,000 BDT. A smaller portion of the respondents, 8(13.3%), report earning between 20,000 and 30,000 BDT, while only 4(6.7%) are in the highest income category, earning more than 30,000 BDT. This figure highligh the economic disparity among respondents, with most clustered in lower-income brackets. [Figure 4]

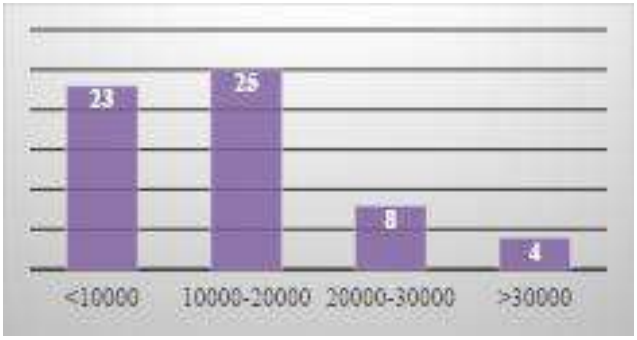

Figure – 4: Distribution of Respondents According to Family Income (*n*=60)

The pie chart illustrates the roles of respondents in the study exhibit a fairly balance distribution. Patients make up largest group, totaling 25(42%), closely followed by attendants at 24(40%). Health workers constitute 9(15%), while a smaller fraction of 2(3%) represents other roles. This diverse representation ensures a holistic view of perspectives relevant to the study, with patients and attendants forming the core of the analysis. [Figure 5]

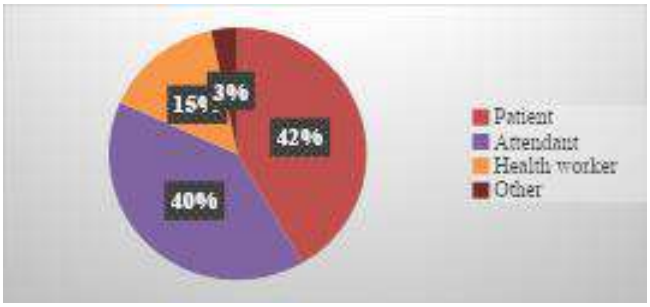

Figure – 5: Distribution of Respondents According to their role in the study (*n*=60)

This table highlights the varying levels of understanding among respondents regarding the use of antibiotics. The most commonly identified use was to treat fever, reported by 29 respondents (48.3%), followed by treating infections cited by 24 respondents (40%). However, a significant proportion of respondents were unaware of the proper usage of antibiotics, with 18 respondents (30%), and 14 respondents (23.3%) held the misconception that antibiotics can reduce pain. [Table II]

Table – II: Knowledge About Why Antibiotics Are Used (n=60)

Reason	Number of Respondents	Percentage (%)
Treat infections	24	40.0
Treat long-term illness	16	26.7
Treat fever	29	48.3
Reduce pain	14	23.3
Others	9	15.0
Don't know	18	30.0

The pie chart illustrates respondents' understanding of the limitations of antibiotics in treating infections, highlighting

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varying levels of awareness and misconceptions within the community. While 28% correctly acknowledged that antibiotics do not act against every infection, a concerning 37% mistakenly believed that antibiotics are universally effective, showcasing a significant misconception. Additionally, 35% of respondents admitted to not knowing, reflecting a considerable knowledge gap within the community. [Figure 6]

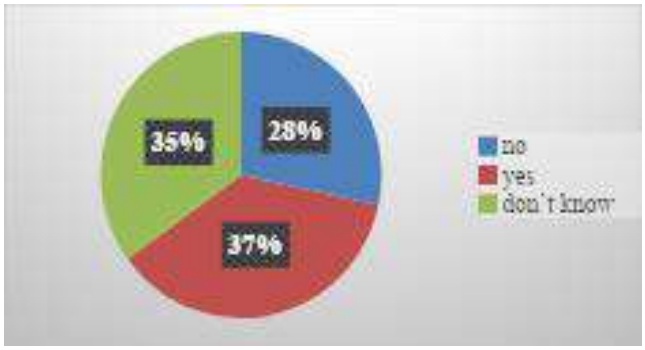

Figure – 6: Perception of Respondents on Whether Antibiotics Act Against Every Infection (*n*=60)

Respondents agreement plot illustrates the level of agreement among respondents regarding the harmful effects of unnecessary antibiotic use. A significant majority, 38 respondents (63%), strongly agreed, and 12 respondents (20%)agreed, indicating a positive awareness of the potential risks. However, 9 respondents (15%) remained neutral or expressed uncertainty, while 1 respondents (1.67%) disagreed, and none strongly disagreed. [Figure 7]

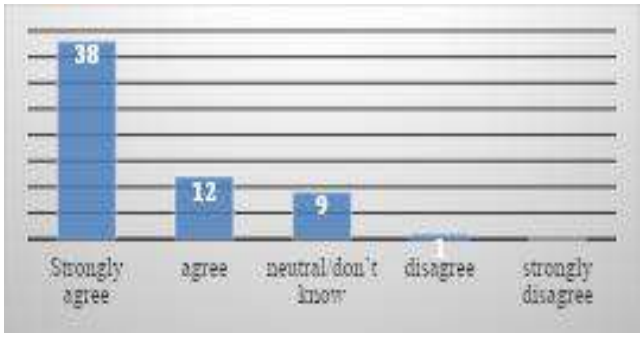

Figure – 7: Respondents' Agreement on Whether Unnecessary Use of Antibiotics May Cause Harm (*n*=60)

The bar plot highlights the respondents' perspectives on completing the full course of antibiotics as per dosage and duration. A notable 22 respondents (36%) strongly agreed, and 12 respondents (20%) agreed with the importance of completing the antibiotic course, reflecting a promising level of awareness among a portion of the participants. However, 18 respondents (30%) remained neutral or uncertain, 7 respondents (11.6%) disagreed, and 1 respondent (1.67%) strongly disagreed. [Figure 8]

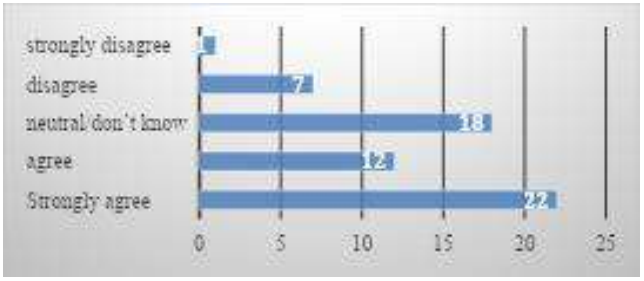

Figure – 8: Respondents' Opinion on Completing Antibiotic Course in Terms of Dosage and Duration (*n*=60)

This reveals the sources from which respondents typically obtain antibiotics. A significant portion, (37%), reported relying on consultations with quacks, reflecting a concerning trend of unregulated and potentially harmful antibiotic procurement. Additionally, (30%) acquired antibiotics through pharmacy keepers, which also raises concerns regarding the lack of prescriptions in such transactions. While (25%) obtained antibiotics following a consultation with a doctor, a notable (8%) used leftover antibiotics from previous prescriptions. [Figure 9]

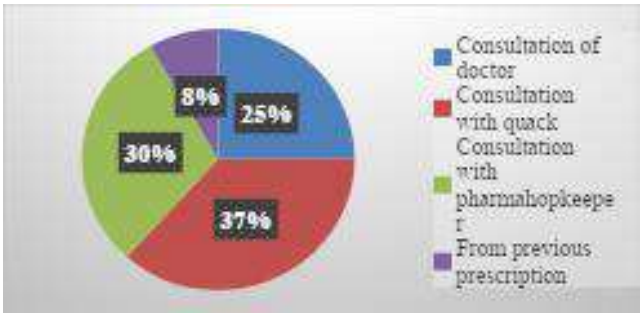

Figure – 9: Usual Sources of Antibiotics for Respondents (*n*=60)

Figure 10 illustrates the frequency with which respondents consult doctors while using antibiotics. The majority, 27 respondents (45%), indicated that they "sometimes" seek medical advice, highlighting inconsistent practices in antibiotic usage. About 15 respondents (25%) stated they "always" consult a doctor, showing adherence to safe medical practices. Conversely, 12 respondents (20%) "rarely" consult a doctor, and 6 respondents (10%) admitted to "never" seeking medical guidance.

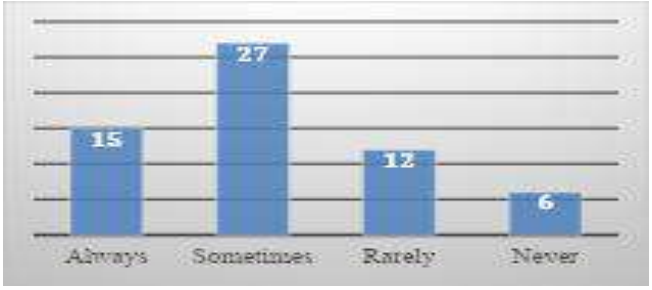

Figure – 10: Frequency of Consulting a Doctor While Taking Antibiotics (*n*=60)

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This pie chart represents the frequency with which respondents complete their prescribed antibiotic course even when they start feeling better. A significant (48%) respondents reported "rarely" completing the course, which highlights a common issue in antibiotic misuse. Meanwhile, (23%) of the respondents said they "sometimes" continue the course, and only (17%) respondents consistently "always" follow through with the full dosage. Additionally, (12%) respondents admitted to "never" completing their antibiotic course. [Figure 11]

Figure – 11: Continuation of Antibiotic Course Despite Feeling Well (*n*=60)

In addition, this pie chart also shows the tendency of respondents to preserve antibiotics for future use. Nearly half of the participants (47%) indicated that they "sometimes" save antibiotics, while 28% of respondents reported "always" preserving them. On the other hand, 20% of respondents "rarely" save antibiotics, and a small minority of respondents (5%) "never" do so. [Figure 12]

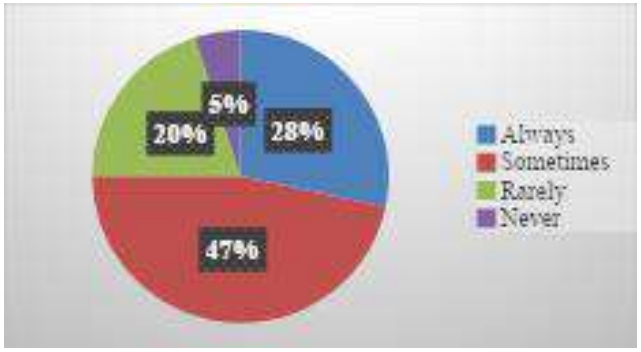

Figure – 12: Preservation of Antibiotics for Future Use (*n*=60)

The bar chart illustrates the respondents' opinions regarding the availability of antibiotics over the counter. A considerable proportion 25 (41%) of respondents expressed a neutral stance, indicating either uncertainty or lack of awareness. Meanwhile, 18 respondents (30%) "agree" and 9 respondents (15%)" strongly agree" that antibiotics should be accessible without a prescription. However, 7 respondents (11.67%) "disagree," and 1 respondent (1.67%) "strongly disagree" with this view. [Figure 13]

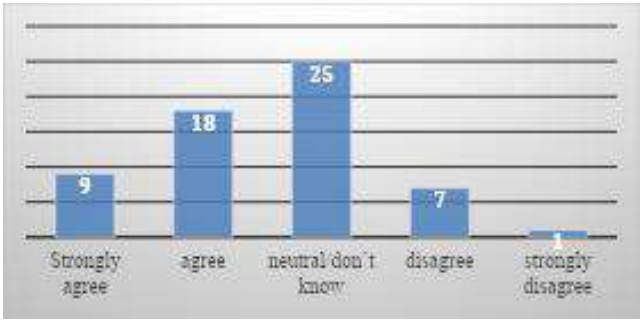

Figure – 13: Opinion on Antibiotics Being Over the Counter (*n*=60)

Moreover, the pie chart depicts the sources from which respondents usually obtain antibiotics. The largest proportion (37%) acquire antibiotics through consultations with quacks, highlighting the role of unregulated and informal healthcare providers. This is followed by (30%) who obtain them from pharmacy keepers without proper prescriptions, further reflecting a lack of enforcement of drug regulations. Only (25%) rely on legitimate consultations with doctors, while 8% use leftover antibiotics from previous prescriptions. [Figure 14]

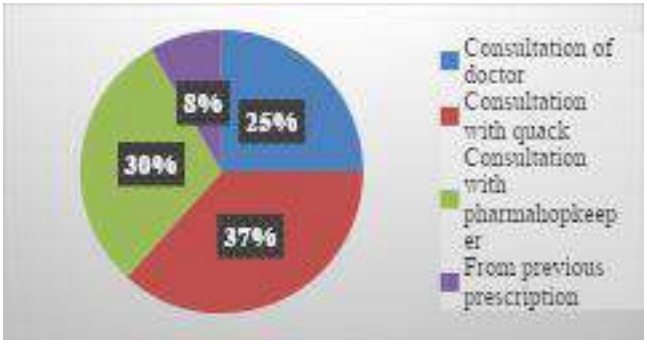

Figure – 14: How Respondents Usually Obtain Antibiotics (*n*=60)

The bar chart illustrates the prevalence of sharing antibiotics among respondents. The chart shows that a significant number 23 respondent (38%) sometimes share antibiotics, while 17 respondents (28%) always do so. Only 12 (20%) respondents indicated that they never share antibiotics, which suggests that antibiotic sharing is a common behavior in this community. [Figure 15]

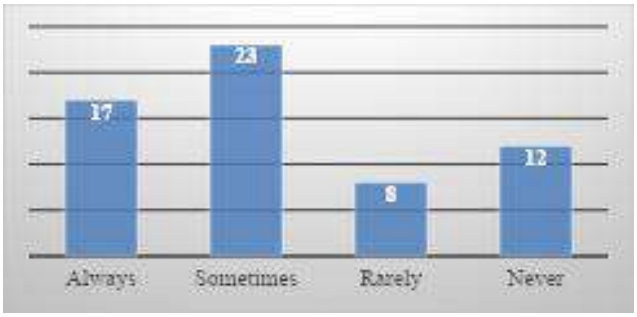

Figure – 15: Sharing Antibiotics with Friends or Family (*n*=60)

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The pie chart highlights the knowledge of antibiotic resistance among respondents. Only (37%) of respondents have heard about antibiotic resistance, while a significant (63%) remain unaware. This lack of awareness is alarming, given the critical role that understanding antibiotic resistance plays in its prevention. [Figure 16]

Figure – 16: Knowledge of Antibiotic Resistance (*n*=60)

The outlines the respondents' understanding of why antibiotic resistance occurs. The majority 8 respondents (27.5%) identified "not using at the correct indication" as the primary cause, followed by "not completing the dose" and "don't know," each cited by 6 (36.6%) respondents. A small fraction 2 respondent (9.09%) associated resistance with the "use of antibiotics themselves." These findings highlight a lack of comprehensive awareness about the multifaceted causes of antibiotic resistance. [Figure 17]

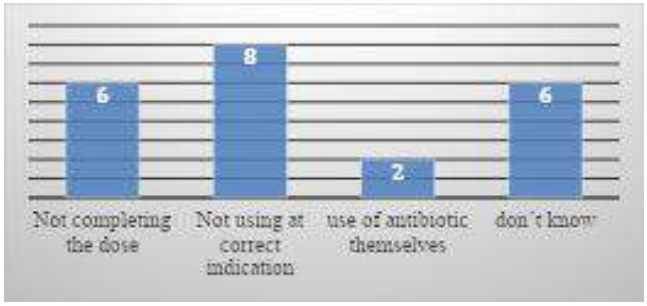

Figure – 17: Reasons for Antibiotic Resistance (*n*=60)

The table demonstrates that 16 respondents (72.7%) of respondents agree that antibiotic resistance is a grave problem, while 3 respondents (13.6%) strongly agree. A smaller portion, 2 respondents (9.1%), is neutral or unaware of the issue, and only 1 respondent (4.5%) strongly disagrees. Notably, no respondents expressed outright disagreement. [Table III]

Table – III: Perceptions About Antibiotic Resistance Being a Grave Problem (*n*=60)

Response	Number of Respondents	Percentage (%)
Strongly Agree	3	13.6
Agree	16	72.7
Neutral/Don't Know	2	9.1
Disagree	0	0.0
Strongly Disagree	1	4.5

The bar plot demonstrates the respondents' understanding of the consequences of antibiotic resistance. A majority 12 (54.5%) respondents identified that antibiotic resistance results in a combination of long-term illness, increased healthcare costs, and failure of treatment, showcasing a comprehensive awareness among these individuals. However, some respondents linked resistance to individual outcomes, with 3 (13.6%) respondents associating it with long-term illness, 5 (22.7%) respondents with treatment failure, and only 2 (9.09%) respondents recognizing increased costs as a consequence. [Figure 18]

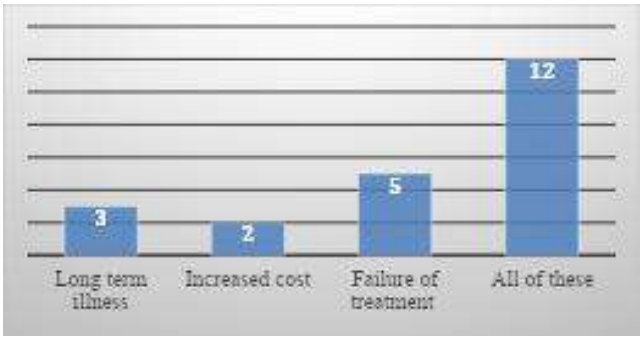

Figure – 18: Understanding of the Fate of Antibiotic Resistance (*n*=60)

DISCUSSION

This study provides critical insights into the knowledge, attitudes, and practices (KAP) regarding antibiotic use among a rural population in Bangladesh. The findings, including demographic patterns, reflect the interplay of cultural, economic, and systemic factors influencing antibiotic use and align with global trends, particularly in low- and middle-income countries (LMICs). The study sample predominantly consisted of males (63%), with the majority aged 38–47 years (25%). A substantial portion of respondents were farmers (37%) and housewives (30%), reflecting the agrarian and domestic nature of rural Bangladesh. Educational attainment was low, with 42% being illiterate, which significantly affected their understanding of antibiotics and AMR. In Bangladesh, similar demographic patterns have been observed in rural health studies. For example, Islam et al. reported that low literacy and high reliance on farming and domestic work characterize rural communities, directly influencing health-seeking behaviors and health literacy [3]. The findings of this study also align with another study that found that gender disparities, with males more likely to be surveyed, influence access to and understanding of healthcare systems[4]. Internationally, comparable trends have been documented in Ethiopia and Nepal, where lower education levels and reliance on subsistence farming were associated with limited health knowledge and risky health practices[12,13]. For instance, Cambaco et al. highlighted similar demographic patterns in Mozambique, where lower education levels were a critical barrier to AMR awareness[8]. These findings underscore the urgent need for tailored health communication strategies that address low literacy and target both men and women equally. Community-level interventions that utilize visual aids,

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storytelling, and local influencers can effectively reach populations with low educational attainment. The study revealed significant gaps in knowledge, 30% have very poor knowledge about antibiotics, 38% have a wrong conception about antibiotics use, and only 37% know about AMR. In Bangladesh, similar knowledge gaps have been reported. Another study found that misconceptions about the efficacy of antibiotics for treating viral infections were prevalent among both urban and rural populations [3]. Globally, knowledge gaps are a recurring theme in LMICs. For instance, a study in Indonesia found that 57% of respondents believed antibiotics could treat symptoms such as fever, while in Mozambique, only 35% understood their role in treating bacterial infections [7,8]. The findings indicate that 45% of respondents supported the over-the-counter availability of antibiotics, and 37% believed antibiotics were necessary for any illness. These attitudes reflect a normalization of self-medication and overreliance on antibiotics. Studies in Bangladesh have similarly reported that unrestricted access to antibiotics contributes to misuse. In South Asia, including India and Indonesia, over-the-counter sales of antibiotics are similarly prevalent due to weak regulatory enforcement[14,7]. Thailand offers a counterexample, where stricter prescription policies reduced antibiotic misuse by 30% within three years[6]. Risky behaviors were evident among respondents: only 40% completed prescribed antibiotic courses, from whom only 17% had strict completion, more than 66% shared antibiotics with others, and almost 70% disposed of unused antibiotics improperly. Improper antibiotic practices in rural Bangladesh mirror those reported by another author, who found that 70% of respondents did not adhere to prescribed dosages and durations, citing economic constraints as a key factor[3]. These behaviors are consistent with findings in Ethiopia, Nepal, and Kenya, where non-completion of courses and improper disposal practices were linked to a lack of understanding and limited access to healthcare facilities[12,13,14]. Quack was the primary source (37%), followed by pharma shopkeepers (30%) and only 25% from qualified doctors. These findings reflect the widespread availability of antibiotics in rural areas. In Kenya and Mozambique, informal sources accounted for over 30% of antibiotic sales, driven by convenience and affordability[14,8]. The similarity in findings across LMICs underscores the systemic challenges in regulating antibiotic access. Only 37% of respondents recognized AMR as a serious issue, and 63% were entirely unaware of it. An author reported similarly low AMR awareness in rural Bangladesh, with only 20% of respondents identifying AMR as a public health concern[4]. A systematic review by Tangcharoensathien et al. reported low AMR awareness in LMICs, with rural populations consistently less informed than their urban counterparts[6]. Cultural norms favoring quick remedies and economic barriers significantly influenced antibiotic misuse. Low-income households often relied on informal sources for affordable options. Economic constraints are a major factor influencing antibiotic misuse worldwide. A study in Peru reported that 45% of respondents self-medicated due to high healthcare costs[15]. Similarly, cultural norms in Indonesia and Mozambique perpetuate the misuse of antibiotics as a "cure-all" for minor illnesses[7,8].

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

Antimicrobial resistance (AMR) remains a significant public health challenge, particularly in rural areas like Meghna Upazila in Bangladesh. This study highlights critical gaps in the knowledge, attitudes, and practices of rural populations regarding antibiotic use. A substantial portion of respondents demonstrated limited understanding of the appropriate use of antibiotics and the risks associated with their misuse, including AMR. Practices such as incomplete courses, sharing antibiotics, and obtaining them from informal sources further exacerbate the issue. Despite these challenges, the study underscores the importance of targeted interventions, such as health education programs, to bridge knowledge gaps and promote rational antibiotic use. These efforts should be culturally tailored to resonate with the rural population's unique socio-economic context, ultimately contributing to AMR containment strategies.

RECOMMENDATION

Based on the findings, several recommendations are proposed to address the issue of antimicrobial resistance (AMR). First, community-based health education campaigns should be developed and implemented to raise awareness among rural populations about the proper use of antibiotics and the risks associated with AMR. Additionally, there is a need to strengthen regulatory measures to curb the over-the-counter sale of antibiotics without prescriptions, ensuring that they are only dispensed when necessary and under medical supervision. Improving healthcare access in rural areas is also critical, as enhancing the availability of affordable and accessible healthcare services can help reduce reliance on informal providers who may contribute to inappropriate antibiotic use. Engaging local stakeholders, including healthcare workers, pharmacists, and community leaders, in AMR-related initiatives is crucial to fostering trust and encouraging active participation from the community. Moreover, promoting antibiotic stewardship by encouraging adherence to prescribed courses of treatment, and discouraging the sharing or improper disposal of antibiotics, will further help to mitigate the spread of AMR. Lastly, periodic monitoring through regular surveys should be conducted to track progress in key indicators related to knowledge, attitudes, and practices (KAP) concerning antibiotic use and AMR awareness, ensuring that interventions are effective and adjustments can be made as needed.

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