FACTORS CONTRIBUTING TO ANTIBIOTIC MISUSE AMONG PARENTS OF SCHOOL-GOING CHILDREN IN DHAKA CITY, BANGLADESH

This community-based cross-sectional study investigates the knowledge, attitudes, and practices (KAP) regarding antibiotic misuse among parents in Dhaka City, Bangladesh. Conducted between August and September 2022, the study involved a random sample of 384 parents selected from ten private and government schools. A structured questionnaire, designed to accommodate varying educational backgrounds and translated into Bengali for accessibility, assessed participants' KAP. The reliability of the instrument was confirmed, with Cronbach's alpha values exceeding 0.7. The findings revealed that while 75% of parents acknowledged the potential for antibiotic misuse to contribute to antibiotic resistance (AR), a significant portion (63%) erroneously believed that antibiotics were effective treatments for common ailments such as colds and fevers. Factors influencing knowledge and practices included parental age, educational level, employment status, and household income. Specifically, older parents and those with higher educational attainment exhibited better understanding and practices. The study highlights the critical need for enhanced public awareness campaigns and stricter regulations on antibiotic sales to promote responsible usage and combat the growing threat of antibiotic resistance.Antibiotic resistance (AR) is a growing global public health concern, particularly in low- and middle-income countries where antibiotic misuse is prevalent. In Bangladesh, the overuse and misuse of antibiotics by parents in treating their children is an alarming issue that may contribute to the rising incidence of AR. This study aims to assess the knowledge, attitudes, and practices (KAP) of parents regarding antibiotic use for their children in Dhaka City. By examining various demographic and socioeconomic factors, the study seeks to identify potential gaps in understanding and behavior surrounding antibiotic use. Through a community-based cross-sectional design, this research offers insights that could inform public health strategies to mitigate the risks associated with antibiotic misuse.

Antibiotic resistance (AR) has emerged as a significant global health threat, contributing to increased morbidity and mortality associated with infections that were once easily treatable. Misuse and overuse of antibiotics, particularly in low- and middle-income countries, exacerbate this problem, leading to the emergence of resistant bacterial strains. In Bangladesh, where healthcare access can be limited and antibiotic regulations are often lax, parents frequently self-medicate their children with antibiotics without proper medical guidance. This behavior not only increases the risk of AR but also complicates treatment protocols for common childhood illnesses.

This study aims to assess the knowledge, attitudes, and practices (KAP) of parents regarding antibiotic misuse in their children within the urban context of Dhaka City. By exploring the demographic and socioeconomic factors that influence these KAP levels, the research seeks to identify significant gaps in parental understanding and behavior regarding antibiotic use. This information is crucial for developing targeted interventions to educate parents, promote responsible antibiotic use, and ultimately mitigate the risks associated with AR. Through this study, we hope to shed light on the critical role of parental education in improving child health outcomes and addressing public health challenges related to antibiotic misuse.

The table presents demographic data on 704 study participants, focusing on their age, gender, education, employment, family type, income, and children's details. Most parents are aged 23 to 30 (54%), with a majority being female (79.4%). The education level is relatively high, with 54% holding undergraduate degrees. Employment rates are low, with only 5% employed, while 71.5% are not employed. Most families are nuclear (50%) and fall into the middle-income category (35%).

Regarding children, the gender split is 54% female and 46% male, with most children aged 5 to 9 (50%). Most families have two children (60%), and mothers are the primary caregivers in 7.78% of households. The data helps understand factors influencing healthcare and antibiotic use among families.

Characteristic	N = 704[1]
Parent’s age (years)	
< 25	13 (1.8%)
> 45	47 (6.7%)
25–35	377 (54%)
36–45	267 (38%)
Parent’s sex	
Female	551 (78%)
Male	153 (22%)
Parent’s education level	
Postgraduate	175 (25%)
Primary	35 (5.0%)
Secondary	381 (54%)
Undergraduate	113 (16%)
Employment status	
Employed	95 (13%)
Not employed	503 (71%)
Self employed	106 (15%)
Family type	
Extended family	147 (21%)
Nuclear family	372 (53%)
Single parent family	185 (26%)
Your average household income per month (BDT)	
High (greater than 50000 BDT)	139 (20%)
Low (less than 30000 BDT)	160 (23%)
Middle (less than 50000 BDT)	405 (58%)
Child’s sex	
Female	379 (54%)
Male	325 (46%)
Child’s age (years)	
< 5	37 (5.3%)
> 10	313 (45%)
5–9	353 (50%)
Unknown	1
Number of children	
>= 3	104 (15%)
1	176 (25%)
2	424 (60%)
Who is the leading child caregiver at home?	
Father	54 (7.7%)
Grandmother	16 (2.3%)
Mother	629 (89%)

Characteristic	N = 704[1]
Others	5 (0.7%)
Are grandparents at home involved in treatment decisions when your child is ill?	
Always	34 (4.8%)
Never	459 (65%)
Often	54 (7.7%)
Sometimes	157 (22%)

[1]n (%)

Table 1 *Demographic characteristics of study participants (N=704).*

Figure 1 is a graphical representation that illustrates the level of knowledge about antibiotic resistance among 704 parents of school-going children. It highlights the importance of understanding antibiotic resistance, which occurs when bacteria evolve and become resistant to antibiotics, making common infections harder to treat and leading to more serious health issues. Knowledge is crucial for parents as they play a significant role in the appropriate use of antibiotics for their children; informed parents are more likely to use antibiotics correctly and only when necessary. The figure likely categorizes parents into levels of knowledge: high, moderate, and low. For instance, if 30% of parents fall into the high knowledge category, it indicates a solid understanding of antibiotic resistance, while 50% in the moderate category suggests some awareness but a need for further education. If 20% are classified as having low knowledge, this highlights a critical gap that educational programs should address. By analyzing this distribution, researchers and health officials can identify areas needing improvement in public education efforts, ultimately aiding in the fight against antibiotic resistance in both children and the wider community.

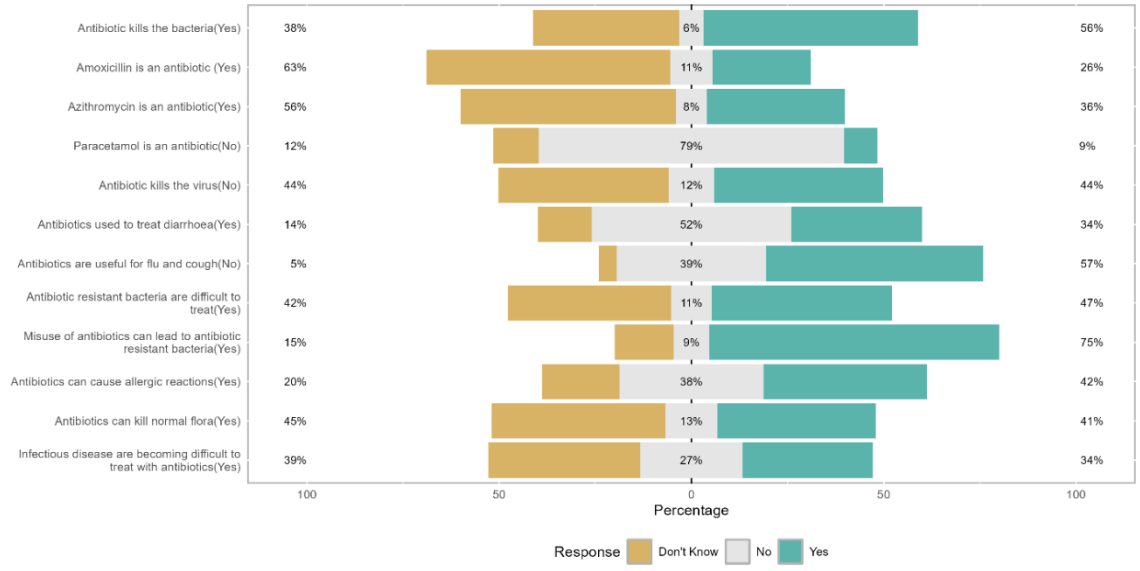

Figure 1 *Distribution of knowledge of antibiotic resistance among parents of school-going children (N=704).*

Figure 2 presents a visual representation of the attitudes and behaviors of 704 parents regarding antibiotic resistance and their misuse of antibiotics. It highlights the seriousness of antibiotic resistance, a situation where bacteria evolve and become resistant to treatments, making infections harder to treat. The figure likely reflects parents' beliefs about the severity of antibiotic resistance and whether they think it affects their children. Additionally, it may illustrate instances of antibiotic misuse, such as administering antibiotics without a prescription or using them for non-

bacterial infections like colds. Understanding these attitudes and behaviors is crucial for identifying knowledge gaps and guiding educational efforts to prevent misuse, which is essential for combating antibiotic resistance. Overall, Figure 2 offers valuable insights into parental perceptions and practices, informing strategies to promote responsible antibiotic use and ultimately protect

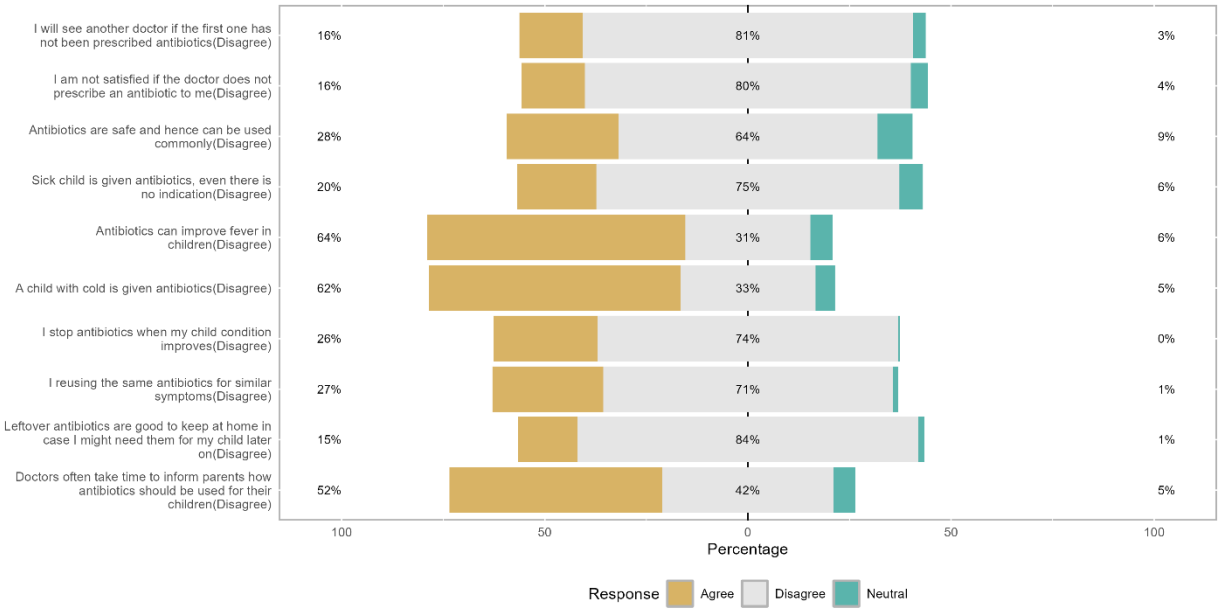

Figure 2 *Attitude towards antibiotic resistance and the misuse of antibiotics among parents of school-going* children's health.

Figure 3 visually represents the practices of 704 parents in Dhaka City, Bangladesh, regarding antibiotic resistance. Antibiotic resistance occurs when bacteria become resistant to antibiotics, making infections harder to treat and posing significant health risks. Focusing on parents is essential, as they play a vital role in their children's health and antibiotic usage; misuse can lead to increased resistance affecting the wider community. The figure likely highlights practices such as using antibiotics without a prescription, not completing the full course of antibiotics, sharing leftover medications among children, and incorrectly using antibiotics for viral infections. The study aims to identify the prevalence of these practices, providing insights for educational programs on proper antibiotic use. Increased awareness of the risks associated with misuse may lead to behavioral changes among parents, ultimately reducing antibiotic resistance in the community. Overall, Figure 3 is crucial for understanding parental behaviors regarding antibiotics and addressing a significant public health issue while promoting responsible antibiotic use to protect children's health.

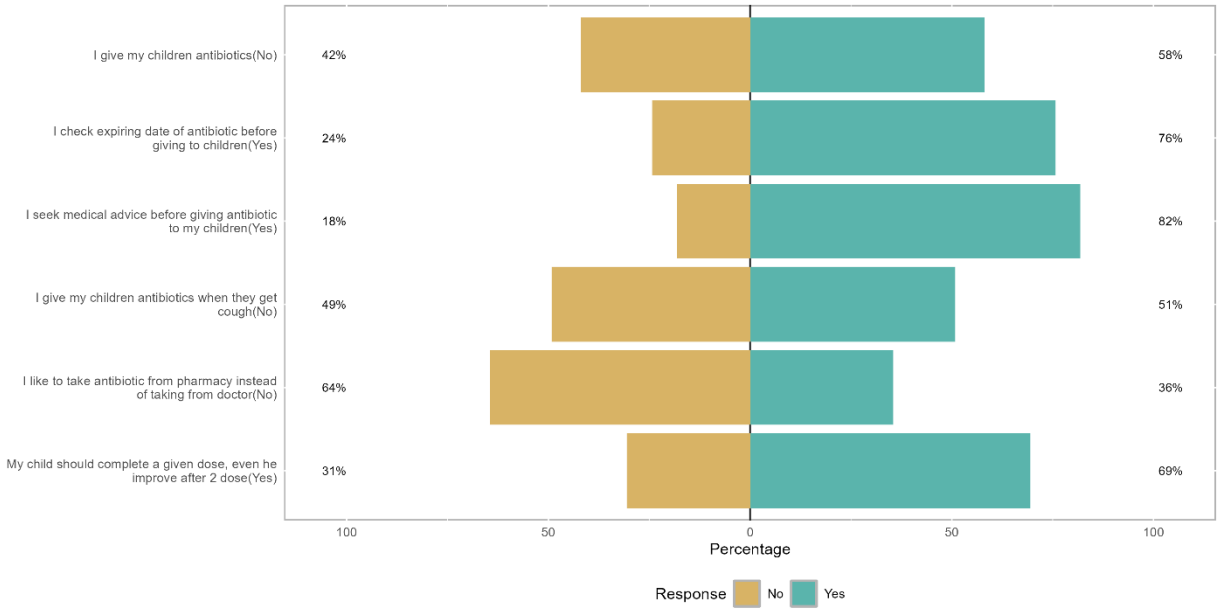

Figure 3 *Practices among parents of school-going children regarding antibiotic resistance*

Table 2 presents data on the sources of information about antibiotics that parents of school-going children in Dhaka City, Bangladesh, rely on, based on a survey of 704 parents (N = 704). The majority of parents, 86%, obtain their information from prescribers, such as doctors or healthcare professionals, indicating a strong trust in medical guidance. Additionally, 36% of parents turn to dispensers, like pharmacists, for advice on proper medication usage. However, only a small percentage consult nurses (3.1%) or rely on information from colleagues (4.8%) and university courses (2.3%), suggesting that peer discussions and formal education on antibiotics are limited. Notably, around 30% of parents use the internet and 23% use social media as sources of information, highlighting both the potential for broad access to information and the need for caution regarding the reliability of these sources. Lastly, 13% of parents seek information from various other sources not listed in the table. This data underscores the critical role healthcare professionals play in informing parents about antibiotics and indicates the necessity for educational programs that help parents discern reliable information to reduce antibiotic misuse.

Characteristic	**N = 704**[1]
Information provided by pharmaceutical companies leaflet	78 (11%)
Information from prescribers	607 (86%)
Information from dispensers	252 (36%)
Information from nurses	22 (3.1%)
Information given by a colleague	34 (4.8%)
Information from University courses	16 (2.3%)
Internet	213 (30%)
Social media	165 (23%)
Others...55	89 (13%)

[1]n (%)

Table 2 *Major sources of information about antibiotic parents*

Table 3 provides critical insights into the knowledge, attitudes, and practices of parents with school-going children in Dhaka City, Bangladesh, regarding antibiotic use, based on a survey of 704 parents (N = 704). In terms of knowledge levels, only 17% of parents demonstrate good knowledge about antibiotics and their appropriate usage, while 45% possess moderate knowledge, indicating partial understanding. Alarmingly, 38% of parents have poor knowledge, suggesting a significant gap in essential information regarding antibiotic use. Regarding attitudes, 30% of parents maintain a positive outlook towards the responsible use of antibiotics, whereas 18% exhibit a negative attitude, potentially reflecting skepticism about their necessity. Notably, over half (53%) of the parents remain uncertain about their attitudes toward antibiotics, highlighting a lack of clarity or understanding on the subject. In terms of practices, a concerning 64% of parents misuse antibiotics, often administering them without a doctor's prescription or for conditions that do not

warrant antibiotic treatment, such as viral infections. This misuse is particularly troubling as it contributes to the rising issue of antimicrobial resistance (AMR). The findings underscore the urgent need for targeted educational programs to enhance parents' understanding of antibiotics, improve their attitudes, and promote responsible practices. Overall, while some parents demonstrate good knowledge and practices, the high rate of misuse among many emphasizes the necessity for awareness campaigns aimed at improving antibiotic use and combating resistance

effectively.

Characteristic	**N = 704**[1]
Knowledge_Level	
Good	122 (17%)
Moderate	314 (45%)
Poor	268 (38%)
Attitude_Level	
Negative	124 (18%)
Positive	209 (30%)
Uncertain	371 (53%)
Practice_Level	
Good	250 (36%)
Misuse	454 (64%)

[1]n (%)

Table 3 *Level of knowledge, attitudes, and practices towards antibiotic resistance among parents with school going children*

Table 4 highlights the factors influencing parents' knowledge about antibiotic use among 704 surveyed parents in Dhaka City, Bangladesh. It reveals that parental age significantly affects knowledge levels, with parents aged 36-45 years showing lower knowledge (OR = 0.16, $p = 0.008$). While male parents have a slightly higher knowledge level than female parents (OR = 1.28), this finding is not statistically significant ($p = 0.4$). Education level plays a crucial role, as parents with only primary education exhibit much lower knowledge (OR = 6.84, $p < 0.001$), and those with secondary education also demonstrate significantly lower knowledge (OR = 249, $p < 0.001$). Employment status is another important factor, with unemployed parents more likely to have lower knowledge (OR = 2.28, $p = 0.007$). Additionally, low-income parents (under 350 USD) are associated with lower knowledge levels (OR = 2.28, significant), while parents of children over 10 years also show a higher likelihood of lower knowledge (OR = 2.48, significant). Overall, this table underscores the impact of parental age, education, employment, and income on understanding antibiotic use, highlighting the need for targeted educational interventions to improve awareness and reduce antibiotic misuse.

Characteristic	OR	95% CI[1]	p-value
Parent's age (years)			
< 25	—	—	
> 45	1.54	1.09, 2.16	**0.014**
25–35	1.55	1.15, 2.07	**0.004**
36–45	1.62	1.20, 2.19	**0.002**
Parent's sex			
Female	—	—	
Male	0.93	0.80, 1.08	0.4
Parent's education level			
Postgraduate	—	—	
Primary	0.63	0.52, 0.76	**<0.001**
Secondary	0.79	0.72, 0.87	**<0.001**
Undergraduate	0.91	0.80, 1.03	0.13
Employment status			
Employed	—	—	
Not employed	0.75	0.64, 0.88	**<0.001**
Self employed	1.06	0.91, 1.22	0.5
Family type			
Extended family	—	—	
Nuclear family	1.00	0.91, 1.11	>0.9
Single parent family	1.06	0.94, 1.19	0.3
Your average household income per month (BDT)			
High (greater than 50000 BDT)	—	—	
Low (less than 30000 BDT)	0.81	0.71, 0.91	**<0.001**
Middle (less than 50000 BDT)	0.89	0.80, 0.98	**0.022**
Child's sex			
Female	—	—	
Male	1.02	0.95, 1.11	0.5
Child's age (years)			
< 5	—	—	
> 10	0.80	0.66, 0.96	**0.016**
5–9	0.78	0.65, 0.93	**0.006**
Number of children			
>= 3	—	—	
1	1.01	0.88, 1.15	>0.9
2	1.02	0.91, 1.14	0.7

[1]CI = Confidence Interval

Table 4 *Factors associated with the level of knowledge among parents of school-going children (N=704). OR odds ratio, CI confdence interval. *p-value <0.05 was considered statistically signifcant. Signifcant values are in bold.*

Table 5 provides valuable insights into how various characteristics of parents influence their attitudes toward antibiotic resistance. The table is structured into four main columns: Characteristic, which lists the traits or factors being examined; OR (Odds Ratio), indicating the strength of the relationship between each characteristic and attitudes toward antibiotic resistance; 95% CI (Confidence Interval), reflecting the reliability of the OR; and p-value, assessing the statistical significance of the results.

Regarding parent's age, there is no data for those aged less than 25 years. For parents aged over 45 years, the OR is 0.54 with a p-value of 0.3, suggesting that older parents might be less likely to hold negative attitudes toward antibiotic resistance, though this result is not statistically significant. Parents aged 25-35 and 36-45 show similar trends, with ORs of 0.86 and 0.64, respectively, but these findings also lack statistical significance. In terms of parent's sex, males have an OR of 2.40 and a p-value of 0.002, indicating a significant likelihood of negative attitudes compared to female parents.

When examining parent's education level, those with secondary education have an OR of 0.61 and a p-value of 0.010, indicating they are less likely to have negative attitudes, a statistically significant finding. However, results for other education levels do not show significant associations. For employment status, not-employed parents have an OR of 1.62 and a p-value of 0.10, suggesting a higher likelihood of negative attitudes, although this is not statistically significant.

The analysis of family type indicates that the ORs for extended, nuclear, and single-parent families are close to 1, showing no significant differences in attitudes. In terms of household income, parents with low income have an OR of 0.75 and a p-value of 0.2, hinting at a potential lower risk of negative attitudes, but this is also not statistically significant. The child's sex and age do not significantly impact attitudes, with ORs close to 1. Finally, the number of children shows no significant effect on attitudes toward antibiotic resistance.

In conclusion, the p-value is crucial for determining the meaningfulness of the results, with values below 0.05 indicating significance. In this table, only sex and secondary education levels exhibit significant associations with attitudes. Overall, Table 5 elucidates how parental factors influence attitudes toward antibiotic resistance, emphasizing the importance of education and gender while indicating that age, income, and family structure have a lesser impact. Understanding these relationships can guide the development of more effective educational programs aimed at combating antibiotic misuse among parents.

Characteristic	OR	95% CI[1]	p-value
Parent's age (years)			
< 25	—	—	
> 45	0.89	0.57, 1.38	0.6
25–35	0.93	0.64, 1.36	0.7
36–45	0.88	0.60, 1.30	0.5
Parent's sex			
Female	—	—	
Male	1.12	0.92, 1.36	0.3
Parent's education level			
Postgraduate	—	—	
Primary	0.64	0.50, 0.82	**<0.001**
Secondary	0.83	0.73, 0.95	**0.005**
Undergraduate	0.95	0.80, 1.11	0.5
Employment status			
Employed	—	—	
Not employed	1.08	0.88, 1.32	0.5
Self employed	0.91	0.76, 1.10	0.4
Family type			
Extended family	—	—	
Nuclear family	0.78	0.69, 0.89	**<0.001**
Single parent family	0.90	0.78, 1.05	0.2
Your average household income per month (BDT)			
High (greater than 50000 BDT)	—	—	
Low (less than 30000 BDT)	0.85	0.72, 1.0	**0.043**
Middle (less than 50000 BDT)	0.88	0.77, 1.00	0.059
Child's sex			
Female	—	—	
Male	0.96	0.87, 1.06	0.4
Child's age (years)			
< 5	—	—	
> 10	1.06	0.84, 1.34	0.6
5–9	1.00	0.79, 1.25	>0.9
Number of children			
>= 3	—	—	
1	0.87	0.73, 1.04	0.12
2	0.89	0.77, 1.03	0.12

[1]CI = Confidence Interval

Table 5 *Factors associated with the level of attitudes towards antibiotic resistance among parents of school going children (N=704). OR odds ratio, CI confdence interval. *p-value<0.05 was considered statistically signifcant. Signifcant values are in bold.*

Table 6 explores the factors influencing parents' antibiotic use practices for their children, based on data from 704 parents in Dhaka City, Bangladesh. The table is organized into four main columns: characteristics of the parents, odds ratios (OR), confidence intervals (CI), and p-values, which help assess the strength and significance of the associations.

In terms of parental age, parents over 45 years have a low OR of 0.11 ($p = 0.016$), indicating they are significantly less likely to misuse antibiotics. Conversely, parents aged 25-35 and 36-45 show higher ORs (0.24 and 0.25), suggesting potential misuse, but these findings are not statistically significant.

Regarding sex, there is no significant difference in antibiotic misuse practices between male and female parents (OR = 0.96, $p > 0.9$). Education level reveals that parents with primary education have an OR of 1.52, indicating possible misuse, but this is not significant. Parents with secondary and undergraduate education show lower ORs (0.81 and 0.65), suggesting less misuse, though still not statistically significant.

Employment status indicates that self-employed parents have an OR of 1.71, hinting at possible misuse, but this finding is also not significant. Family type shows nuclear families with an OR of 0.89, suggesting they may misuse antibiotics less, while single-parent families have an OR of 1.03, showing no significant difference.

Household income is a significant factor; low-income families (under $350) have a high OR of 2.76 ($p < 0.001$), indicating they are much more likely to misuse antibiotics. Middle-income families (between $350 and $590) also show a high OR of 3.01, which is statistically significant.

The child's sex does not significantly affect misuse practices (OR = 1.34, $p = 0.10$). Children over 10 years show a low OR of 0.62, while those aged 5-9 have an OR of 0.76, indicating less misuse, but these findings lack significance. The number of children shows that families with one child have an OR of 0.72, suggesting less misuse, but it is not significant.

Knowledge levels reveal that parents with moderate knowledge have an OR of 0.85, indicating potential for less misuse, while those with poor knowledge have an OR of 1.02, showing no significant difference. Notably, attitudes play a critical role; parents with a positive attitude have a very low OR of 0.11 ($p < 0.001$), meaning they are much less likely to misuse antibiotics. Parents with uncertain attitudes also show a low OR of 0.23, which is statistically significant.

In summary, the table indicates that factors such as age, education, household income, and parental attitudes significantly influence antibiotic use practices. Specifically, lower income levels and positive attitudes correlate strongly with responsible antibiotic use, while older parents and higher education levels are associated with less misuse. Understanding these relationships can inform strategies to improve antibiotic use and mitigate resistance.

Characteristic	OR	95% CI[1]	p-value
Parent's age (years)			
< 25	—	—	
> 45	1.35	0.86, 2.13	0.2
25–35	1.35	0.91, 1.99	0.13
36–45	1.18	0.79, 1.76	0.4
Parent's sex			
Female	—	—	
Male	1.10	0.90, 1.35	0.4
Parent's education level			
Postgraduate	—	—	
Primary	0.62	0.48, 0.80	**<0.001**
Secondary	0.89	0.78, 1.01	0.069
Undergraduate	0.97	0.83, 1.15	0.8
Employment status			
Employed	—	—	
Not employed	1.10	0.89, 1.36	0.4
Self employed	0.90	0.74, 1.09	0.3
Family type			
Extended family	—	—	
Nuclear family	0.84	0.73, 0.96	**0.010**
Single parent family	0.86	0.74, 1.01	0.059
Your average household income per month (BDT)			
High (greater than 50000 BDT)	—	—	
Low (less than 30000 BDT)	0.69	0.59, 0.82	**<0.001**
Middle (less than 50000 BDT)	0.72	0.62, 0.82	**<0.001**
Child's sex			
Female	—	—	
Male	0.91	0.82, 1.01	0.088
Child's age (years)			
< 5	—	—	
> 10	1.29	1.01, 1.64	**0.045**
5–9	1.11	0.88, 1.41	0.4
Number of children			
>= 3	—	—	
1	1.08	0.90, 1.29	0.4
2	1.03	0.89, 1.20	0.7

[1]CI = Confidence Interval

Table 6 *Factors associated with the level of practices regarding antibiotic resistance among parents of school going children (N=704). OR odds ratio, CI confdence interval. *p value<0.05 was considered statistically signifcant. Signifcant values are in bold.*

The findings of this study reveal substantial gaps in parental knowledge, attitudes, and practices concerning antibiotic use for children, highlighting misconceptions that could lead to increased antibiotic misuse and resistance. While a majority of parents recognized the potential consequences of antibiotic misuse, many continue to hold erroneous beliefs about the effectiveness of antibiotics for common viral infections. The analysis identified key demographic factors—such as parental age, education level, and household income—that significantly impact knowledge and practices related to antibiotic use. Notably, parents with lower household incomes exhibited a higher likelihood of engaging in misuse practices, underscoring the need for targeted educational interventions in these communities.

To address the pressing issue of antibiotic misuse, comprehensive public health education campaigns are essential. These campaigns should aim to improve awareness and understanding of proper antibiotic usage, including the importance of consulting healthcare professionals before administering antibiotics to children. Additionally, stricter regulations on the sale of antibiotics could help limit self-medication practices. By empowering parents with accurate information and fostering a culture of responsible antibiotic use, we can take significant steps toward mitigating the threat of antibiotic resistance in Bangladesh and ensuring better health outcomes for children.