

Original article

Knowledge, Attitude, and Practice About Antibiotic Misuse and Antimicrobial Resistance Among the Libyan Community

Fathia Bougafa^{1*}, Aisha Almgarbi², Mareia Elghalidh³

¹Department of Zoology, Faculty of Science, Tobruk University, Tobruk, Libya

²Libyan Center for Research Studies and Strategies, Al-Marj, Libya

³Department of Botany, Faculty of Science, Al-Jafra University, Al-Jefra, Libya

Email. ehrik2010@yahoo.com

Abstract

Antimicrobial resistance (AMR) is an urgent, critical global health issue due to bacterial infections that are known as the second leading cause of death worldwide. Antibiotic overuse and misuse remain the main drivers of resistance development. The high rate of Antimicrobial Resistance (AMR) has been exacerbated worldwide, including in North Africa, and Libya is no exception. To assess the knowledge, attitudes, and awareness regarding antibiotic use among the Libyan population. A descriptive cross-sectional study was done online through Google Forms from August to October of 2025. A Questionnaire was sent to the general population across Libya by sharing a link through popular social media groups. A total of 260 responses were received from different cities across Libya. Most of the participants were well-educated (94.6%), in their middle age (31–45) years old (52.3%). The majority of them were female (77.3%). 65.8% of the participants correctly reported that antibiotics are not used to treat viral infections; most individuals are cautious and acknowledge the potential risks of using antibiotics without a prescription, with 62.7%, believing that it is acceptable only in rare cases. Despite a good level of knowledge, 71.9 % reported that they had previously purchased antibiotics without a prescription. The results also indicated that 58.1% have a good level of awareness of the term antibiotic resistance. Most respondents show responsible behavior by completing their antibiotic course, with just 15.4% admitting that they stop taking antibiotics once they feel better. A large majority, 72.3%, are supporters of stricter regulations. This finding will be useful in designing effective and targeted interventions to decrease misconceptions about antibiotic use and to increase awareness about the risks of inappropriate use of antibiotics in the community.

Keywords. Antibiotics, Antimicrobial Resistance, Knowledge, Practice, Attitude, Libya

Introduction

One of the biggest risks to global public health in the twenty-first century is antimicrobial resistance (AMR) (1). The World Health Organization (2023) states that antimicrobial resistance (AMR) occurs when bacteria develop mechanisms that make antibiotics ineffective, leading to longer illnesses, higher death rates, and higher medical expenses. The WHO highlights that one of the main causes of this issue is the illogical and needless use of antibiotics (2).

Antibiotic self-medication (ASM) is the use of antibiotics without a prescription or medical advice. These behaviors raise the risk of antibiotic resistance and medication abuse, which can result in longer hospital stays, greater medical expenses, and higher death rates (3). Two out of every five children in low- and middle-income countries use non-prescription antibiotics, according to the aggregated prevalence of this practice. The authors stressed that this practice accelerates the emergence of antibiotic resistance in communities and exposes youngsters to unnecessary medication harm (4).

Antibiotic abuse is another growing concern in Libya. That patients frequently self-administer antibiotics because they believe it will save them money and time, which is a significant health issue in Libya. The study made clear that public education programs are desperately needed and that community understanding of antibiotic resistance is still poor (5). In Libya, community pharmacists are essential to the provision of antibiotics without a prescription. According to observational data, a significant portion of pharmacists provide antibiotics to patients upon request, even when there isn't a legitimate prescription (6). Adults in Misurata City were found to be quite likely to self-medicate with antibiotics; a sizable percentage of participants reported getting antibiotics from private pharmacies without a doctor's supervision. According to the study, it must be implemented in conjunction with public and health professional education initiatives (7).

The problem is not unique to Libya; a thorough worldwide analysis has shown that both industrialized and developing countries continue to see an increase in the inappropriate usage of antibiotics. It showed that self-medication and over-the-counter sales continue to be global issues despite the implementation of public awareness campaigns and stewardship programs in many nations, suggesting that behavioral and regulatory interventions have not yet had the intended effect (8). The aim of the current study was to evaluate the level of knowledge, attitude, and practice related to antibiotic use and AMR among the general population in Libya. These findings underscore the necessity for tailored educational campaigns that not only inform but also engage and alter behaviors across all demographic groups to combat antibiotic resistance effectively.

Methods

Study Design and Setting

A descriptive, cross-sectional study was conducted among the general public from a wide range of Libyan cities from August to October of 2025.

Study Population and Sampling

The target population was the general adult public in different Libyan cities, as shown in the first table. A sample of 260 participants was recruited using a convenience sampling method. A structured questionnaire was developed to assess participants' Knowledge, Attitudes, and Practices (KAP) regarding antibiotic use and antimicrobial resistance. To encourage widespread participation, a structured questionnaire was created in Arabic and disseminated electronically through social media sites. The goals and methods of the study were briefly explained before the questionnaire was introduced. All replies were gathered anonymously to guarantee total anonymity, and participation was entirely optional.

Table 1 presents the geographical distribution of the study sample by city. The highest proportion of participants is from Tobruk (74 respondents, 28.5%), followed by Houn (55 respondents, 21.2%). Smaller proportions of respondents are from Benghazi (10.8%), Tripoli (7.3%), and Misrata (5.8%), while the remaining cities each account for relatively limited shares of the total sample.

Table 1. The geographical distribution of the study sample by city.

Cities	Frequency	Percent
Tobruk	74	28.5
Benghazi	28	10.8
Tripoli	19	7.3
Ak kams	1	.4
Misrata	15	5.8
Al marj	9	3.5
Gharyan	7	2.7
Ajdabiya	3	1.2
Al bayda	12	4.6
Zliten	4	1.5
AL abyar	2	.8
Darna	3	1.2
Sabha	4	1.5
Sahat	1	.4
Houn	55	21.2
Al gmil	3	1.2
Ghadames	1	.4
Wadan	6	2.3
Tazerbo	1	.4
Qaminis	1	.4
Nalut	4	1.5
Ajilat	2	.8
Janzour	2	.8
Wadi AL shatee	1	.4
Sloug	1	.4
shehat	1	.4
Total	260	100.0

Design of the questionnaire

To encourage widespread participation, a structured questionnaire was created in Arabic and disseminated electronically through social media sites. The goals and methods of the study were briefly explained before the questionnaire was introduced. All replies were gathered anonymously to guarantee total anonymity, and participation was entirely optional.

The questionnaire covered the demographic and professional data of the participants and was then divided into two parts. Gender, age, educational attainment, and place of residence were among the demographic information collected in the first segment. The second section of the questionnaire evaluated participants' knowledge, attitudes, and behaviors concerning non-prescription antibiotic use.

Knowledge items assessed understanding of appropriate antibiotic use, including recognition of their ineffectiveness against viral infections and awareness of antibiotic resistance. Attitude questions investigated beliefs about the safety of non-prescription antibiotic use, opinions on completing antibiotic courses, and views on stricter sales regulations.

Practice-related items analyzed self-reported behaviors regarding antibiotic purchases without prescriptions, motivations, types of illnesses treated, side effects experienced, family decision-making on purchases, age demographics for non-prescription use, and information sources influencing antibiotic choices.

Statistical analysis

All the questionnaires were reviewed before entering the data into the analysis program. Statistical analysis was done using a statistical package for the social sciences (SPSS) v.26.0. (Armonk, NY, USA: IBM Corp.) to generate tables and charts. Results were expressed as percentages and frequencies.

This study used Pearson's Chi-Square test to explore the relationship between antibiotic knowledge, attitudes, and practices and demographic factors, after confirming the test's assumptions. A p-value of less than 0.05 was considered statistically significant for interpreting the findings.

Results

The socio-demographic profile of the participants (N=260) is presented in (Table2). The sample was predominantly female (77.3 %) and comprised mainly middle-aged adults, with the largest proportion belonging to the 31-45 age group (52.3%). Educationally, the participants had attained higher education, with 55.8% have postgraduate qualifications, and 38.8% holding a university degree.

Table2: Socio-demographic characteristics of the participants.

Variable	Categories	Frequency	%	Chi-Square Test
Age Groups (Years)	>18	3	1.2	<.000
	18–30	74	28.5	
	31–45	136	52.3	
	<45	47	18.1	
Gender	Male	59	22.7	
	Female	201	77.3	
Education Level	Less Than Secondary	5	1.9	
	Diploma	9	3.5	
	University	101	38.8	
	Postgraduate Studies	145	55.8	

Assessment of the knowledge of participants regarding the use of antibiotics:

A strong majority of participants generally demonstrate sufficient knowledge regarding core antibiotic concepts (e.g., that they treat bacterial infections and must not be used for viruses). However, significant gaps persist. Many individuals fail to link misuse to antimicrobial resistance (AMR) and frequently engage in unsafe practices.

Table 3 presents respondents' knowledge regarding the use of antibiotics for viral illnesses, such as colds or influenza, within the context of purchasing and using antibiotics without a prescription in Libya. The results indicate that a majority of participants (171 respondents, 65.8%) correctly reported that antibiotics are not used to treat viral infections, suggesting a relatively good level of basic antibiotic-related knowledge among the sample. However, a considerable proportion of respondents either believed that antibiotics can be used for such illnesses (63 respondents, 24.2%) or were uncertain about their effectiveness (26 respondents, 10.0%). The Chi-square test result ($p < .001$) demonstrates that the distribution of responses is statistically significant, indicating meaningful differences in respondents' knowledge levels.

As shown in Table 3, respondents' perceptions of the safety of using antibiotics without a prescription. The majority of participants, 62.7%, believe that it is acceptable only in rare cases, while 34.6% clearly recognize that using antibiotics without a prescription poses a health risk. A very small fraction, 2.7%, think it is always safe to use antibiotics without medical guidance.

The chi-square test ($p < .001$) indicates that these differences are statistically significant, showing a clear consensus among respondents. Overall, while most individuals are cautious and acknowledge the potential risks, a small proportion still consider self-medication with antibiotics to be safe, which may point to the need for better public awareness about responsible antibiotic use. Furthermore, respondents' awareness of the term "antibiotic resistance" is presented in Table 3. A majority of 58.1% reported that they know what it means, indicating a good level of understanding among participants. Another 21.9% have only heard of the term without being sure of its meaning, while 20% admitted that they do not know about antibiotic resistance at all.

The chi-square test result ($p < .001$) indicates that the differences in awareness are statistically significant. Overall, the findings suggest that while awareness is relatively high, a substantial portion of respondents either have limited knowledge or no knowledge of antibiotic resistance, highlighting the need for ongoing public education campaigns to improve understanding of this important health issue.

Table 3. Knowledge regarding antibiotic use (n=260)

Item	Response	Frequency	Percent
Antibiotics are not used to treat viral illnesses such as colds or the flu	Yes	171	65.8
	No	63	24.2
	Not sure	26	10.0
Have you heard of the term " Antibiotic Resistance "	Yes, I know what it means	151	58.1
	I've only heard of it	57	21.9
	I don't know	52	20.0
Do you think using antibiotics without a prescription is safe?	Yes, always	7	2.7
	Only in rare cases	163	62.7
	No, it's a health risk	90	34.6

Assessment of Practice and Attitudes of participants regarding the use of antibiotics:

Table 4 illustrates respondents' experience with purchasing antibiotics without a prescription in the Libyan context. The findings reveal that a substantial majority of participants (187 respondents, 71.9%) reported that they had previously purchased antibiotics without a prescription, while 73 respondents (28.1%) indicated that they had not engaged in this practice.

Regarding the experiences of side effects from using over-the-counter antibiotics, Table 4 shows that the majority of respondents (86.5%) reported not experiencing any side effects, while (13.5%) indicated that they did experience side effects.

The chi-square test ($p < .001$) indicates that this difference is statistically significant. Overall, although most respondents did not report adverse effects, a notable minority did, highlighting that unsupervised use of antibiotics can carry health risks and reinforcing the need for careful guidance and awareness about proper antibiotic use.

Table 4. Practices toward antibiotic use (n=260)

Item	Response	Frequency	Percent
Have you ever bought an antibiotic without a prescription?	Yes	187	71.9
	No	73	28.1
Have you experienced any side effects from using an over-the-counter antibiotic?	Yes	35	13.5
	No	225	86.5

Table 5 examines respondents' practices regarding completing a course of antibiotics even if symptoms improve. The majority, 55%, reported that they always complete the course, which reflects proper antibiotic use. About 22.7% said they sometimes complete it, while 6.9% do so rarely. A smaller group, 15.4%, admitted that they stop taking antibiotics once they feel better, which can contribute to antibiotic resistance. The chi-square test ($p < .001$) indicates that the differences in responses are statistically significant. Overall, while most respondents show responsible behavior by completing their antibiotic course, a notable proportion do not, suggesting a need for further education on the importance of completing prescribed treatments.

The findings presented in Table 9 illustrate respondents' opinions regarding imposing stricter restrictions on the sale of antibiotics. A large majority, 72.3%, support stricter regulations, while 9.6% are opposed to such measures. About 18.1% are not sure about their stance. The chi-square test ($p < .001$) shows that these differences are statistically significant, reflecting a strong consensus among respondents in favor of stricter control over antibiotic sales. Overall, this suggests that most individuals recognize the risks associated with unsupervised antibiotic use and support regulatory measures to promote responsible usage.

Table 5. Attitudes toward antibiotic use (n=260)

Item	Response	Frequency	Percent
Should you complete the course of antibiotics even if your symptoms improve	Always	143	55.0
	Sometime	59	22.7
	Rarely	18	6.9
	Stop taking it when you get better	40	15.4
What do you think about imposing stricter restrictions on the sale of antibiotics?	Supporter	188	72.3
	Against	25	9.6
	Not Sure	47	18.1

Discussion

The findings from this study are consistent with a substantial body of research indicating that public understanding of antibiotic resistance, while relatively informed, often fails to translate into appropriate behavior. For example,

McCullough et al. discovered that even when people recognize the issue of antibiotic resistance, they frequently fail to adhere to practices that mitigate its risk [9]. Similarly, a survey by Napolitano et al. highlighted the disparity between knowledge and behavior regarding antibiotic use in Italy [10]. Comparing our results with similar studies conducted in Saudi Arabia, such as those by Alhur et al. and Hawkins et al., reveals consistent patterns of knowledge gaps and misuse of antibiotics [11,12]. These findings underscore the need for targeted interventions that address both informational and behavioral aspects of antibiotic use.

Antimicrobial resistance is a critical global public health threat, as a result of inappropriate use of antibiotics. This study assessed the knowledge, attitudes, and practices (KAP) concerning antimicrobial resistance (AMR) among the general public in Libya. The current analysis of demographic factors indicate that the majority of the sample 201 (77.3%) out of the total number of participants 260 are female while male respondents represent 59 participants (22.7%) and this difference between distribution by gender is statistically significant ($p < .001$) and may reflect greater willingness among females to participate in health-related surveys or higher engagement with issues related to medication use and healthcare practices. This result is in agreement with different Libyan cities such as Tripoli (female respondents represent 63.7%) [13], Elzawia (female respondents represent 88%) [14], and Benghazi [15] (female respondents represent 87%). Worldwide, Egypt is 76% [16], Sudan is 53.4% [17], and Saudi Arabia is 63.6% [18]. Consequently, gender should be considered an important contextual factor when interpreting the findings related to antibiotic purchasing and usage behaviors. This study indicates another demographic factor, which is age; more than half of the respondents fall within the 31–45 years age group, comprising 136 participants (52.3%), almost the same response as reported by Egyptian study 4, which indicated that the majority of the participants (51%) were aged 31 to 50 years old.

In the current study, the dominance of the 31–45 age group is statistically significant ($p < .001$) and may reflect higher exposure to healthcare decision-making and medication use within this age range, making this group particularly relevant for examining non-prescription antibiotic purchasing and usage practices in the Libyan context. However, the Sudanese study reported that the majority of participants were younger; the 18–30-year age group represents 57% more than Libya. Also in Saudi Arabia, the dominant age is that of aged 18–30 years (56.2%) [18]. The majority of the participants, 94.6%, were university graduates holding a bachelor's or a higher degree. The same level of education among participants was reported in Egypt, 85% [16], and Saudi Arabia, 70.7% [19], had college or higher education.

The majority of participants demonstrated a relatively accurate understanding that antibiotics are not used to treat viral diseases, reflecting an acceptable level of awareness. However, the fact that a significant percentage of participants still believe otherwise may contribute to the irrational use of antibiotics. This aligns with the findings of a study conducted in 11 Arab countries, where 73.3% of participants mistakenly believed that antibiotics help treat colds and influenza, suggesting that misconceptions remain prevalent in the Arab world [20]. Nevertheless, such misconceptions appear to be less widespread in Northern European countries like Sweden, likely reflecting ongoing public health campaigns and robust antimicrobial management programs [21]. A considerable proportion of participants still hold inaccurate perceptions about the use of antibiotics without a prescription. Some still consider it acceptable in certain cases, reflecting persistent gaps in health awareness. These findings align with the report by [22] that self-medication with antibiotics represents a global health problem linked to widespread misconceptions and a lack of public knowledge. They also corroborate the study by Maarouf et al. (2023) [16], which highlighted inappropriate attitudes and behaviors toward antibiotic use in Egyptian society, underscoring the need to strengthen health education. Furthermore, the study by Yosif (2025) [15]. Libya supported these findings, revealing knowledge gaps and inappropriate attitudes toward self-medication with antibiotics among various segments of society.

With regard to antibiotic resistance, mere familiarity with the term does not necessarily indicate a deep understanding of its nature or health implications. The literature suggests that awareness of this problem at the general level may be relatively high; however, detailed understanding remains limited. McCullough et al. (2016) reported that although knowledge about antibiotic resistance is global, it is not always accompanied by a sufficient understanding of its mechanism and impact [23]. Similarly, Chukwu et al. (2020) [24] emphasized that awareness of the term does not necessarily mean having correct knowledge, as misconceptions remain common. Similarly, Karuniawati et al. (2021) pointed out that many individuals have a superficial knowledge of the concept, while a deep understanding remains insufficient, reflecting a persistent gap between awareness and accurate knowledge [25].

Table 11 shows that a significant proportion of participants do not complete the course of antibiotic treatment, while another proportion are uninterested in treatment and rarely complete it; this, in turn, increases the risk of antibiotic resistance, which is consistent with a study conducted by Gashaw, T., et al. 2025 [3]. Table 15 illustrates, through graphical percentages, the side effects of using antibiotics without a prescription. This is due to the misuse of antibiotics, which poses a serious risk and calls for awareness programmes addressing this growing problem. These findings are consistent with a study conducted by [5]. Table 18 shows that a significant proportion of respondents in the study supported imposing restrictions on the over-the-counter sale of antibiotics; this differed in principle from a study conducted by [8].

Conclusion

This study provides a baseline of the knowledge, attitude, and behaviour regarding antibiotics among the Libyan community. Despite moderate knowledge and positive attitudes, dangerous practices regarding antibiotic use are

common. This finding will be useful in designing effective and targeted interventions to decrease misconceptions about antibiotic use and to increase awareness about the risks of inappropriate use of antibiotics in the community

Conflicts of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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