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*Original article*

# Knowledge, Attitude, and Practices about Antibiotic Misuse among Libyan Community: A Cross-Sectional Survey

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***Abstract***
*The misuse of antibiotics has become a global concern due to their contribution to the development of resistance against these medications. This study aims to assess knowledge, attitudes, and practices regarding antibiotic use among the Libyan population in Tarhuna city. We conducted a cross-sectional study using a validated questionnaire comprising 17 variables among 160 participants from Tarhuna. Results showed that nearly half of the respondents had reported side effects, while more than two-thirds believed they were not experiencing any adverse effects. The majority relied on pharmacists and doctors for information about antibiotics. These medications were mainly used to treat bacterial infections, followed by viral infections, UTIs, and RTIs. Respondents perceived the most common reasons for using antibiotics as resistance and side effects. Many participants believed that misuse of antibiotics could lead to their loss of effectiveness in the future, while a minority were optimistic about their continued efficacy. The study highlights a lack of appropriate attitudes and behaviors leading to antibiotic misuse, emphasizing the need for healthcare institutions to control prescriptions.*
***Keywords***. *Knowledge, Practice, Attitude, Antibiotics, Libyan Community, Tarhuna.*

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## Introduction

Over the past 50 years, the discovery of antibiotics has undergone remarkable progress, leading to their widespread use in both clinical and community settings. Antibiotics are well-established for their efficacy, safety, and cost-effectiveness, playing a crucial role in saving millions of lives. However, this success has also resulted in challenges related to misuse, including the use of antibiotics without prescriptions and the overprescribing for infections that typically resolve without treatment [1-3]. The misuse of antibiotics is now considered one of the leading public health challenges worldwide [4-6]. Despite being designed to target and eliminate bacteria, antibiotics have no effect on viral infections. Nonetheless, they are often mistakenly prescribed for viral conditions, such as most upper respiratory tract infections [7]. Several factors are significantly associated with the overuse of antibiotics at both the patient (parent of children) level and the physician level [8-10]. These factors encompass cultural influences, behavioral characteristics, socio-economic status, and educational attainment. Furthermore, physicians frequently report that their tendency to overprescribe is influenced by pressure from patients or parents [11].

A crucial contributor to the misuse of antibiotics is the inadequate provision of health education, which can lead to misunderstandings about appropriate antibiotic use [12]. Additionally, self-medication emerges as a critical behavioral aspect that exacerbates the misuse of antibiotics, posing a considerable challenge to public health [13, 14]. The overuse of antibiotics leads to several critical issues: the development of antimicrobial resistance, an increased burden of chronic diseases, and rising healthcare costs. These problems complicate infection management and exacerbate health conditions, ultimately straining healthcare systems and impacting patients financially [15]. Antibiotic resistance represents a significant global challenge, imposing substantial social burdens on communities and resulting in serious outcomes, including therapeutic ineffectiveness, prolonged morbidity, and heightened risks of complications and mortality.

The implications of this resistance extend beyond individual health, affecting public health systems and necessitating urgent action to address the underlying factors contributing to antibiotic misuse and overprescription [15]. Rational prescribing practices are essential in tackling the global public health challenge of antibiotic overuse and misuse [16].

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By effectively preventing these issues, they play a critical role in preserving public health [17]. The concept has been integrated at a disappointingly slow rate, with fewer than half of the countries establishing policies that effectively promote robust antimicrobial stewardship [18]. Although antibiotics are effective in treating bacterial infections, they are frequently misused to manage viral infections [4]. This inappropriate use constitutes a significant public health challenge globally [19]. In Libya, a study with 250 students found that most (38.0%) don't use antibiotics for respiratory infections, while a significant number (34.0%) use them occasionally, and a smaller percentage (26.0%) use them consistently. Additionally, 61.0% of the participants stopped taking antibiotics as advised by their healthcare provider, and 8.0% stopped once their symptoms improved. 82.0% of the study's participants showed a favorable attitude towards the inappropriate use of antibiotics [20]. This present study was aimed and designed to assess the knowledge, attitude, and practice regarding antibiotic use, among the Libyan population to gain further understanding in order to implement more effective strategies in raising awareness.

## Methods

### *Study design and setting*

A cross-sectional study was carried out in Tarhuna city, among the Libyan community, using a validated questionnaire comprising 17 variables with 160 participants.

### *Data collection*

An online questionnaire that has been administered and evaluated for reliability and validity through an online platform prior to its official form. From August to December 2024, data were gathered and subsequently analyzed using analysis that is descriptive and inferential. The survey was comprised of a sequence of closed-ended multiple-choice inquiries. The majority of these inquiries were adjusted and revised from earlier materials utilized in the World Health Organization's campaign to raise awareness about the misuse of antibiotics. The survey consisted of three inquiries pertaining to the socio-demographic characteristics of Libyan healthcare practitioners, in addition to fourteen questions addressing their practices in antibiotics. The demographic survey encompassed inquiries regarding the gender, age, and educational attainment of the respondents.

### *Data analysis*

The survey responses were collected and subsequently entered into the SPSS version 22 software. Descriptive statistics, such as percentages and frequency distribution, were calculated for each of the variables. The chi-square test and student t-test were used for the data analysis and to investigate the level of association among variables at the significance level of $p<0.05$.

## Results

A total this study 160 participants were received from Tarhuna city in Libya. The gender distribution of respondents was 50% female and 50% male. Among them, 37.5% reported side effects, while 62.5% did not, p-value (0.0016). Respondents were stratified into five age cohorts (15–24 years [48.75%], 25–34 years [25.42%], 35–44 years [11.25%], 45–54 years [9.16%], and ≥55 years [5.42%]). The distribution exhibited a pronounced predominance of younger individuals, as confirmed by a chi-square goodness-of-fit test (*p* < 0.001). The study revealed that only 75% of participants had a university-level education, 18.75% had postgraduate qualifications, and 6.25% had secondary education, with a p-value < 0.001, as shown in Figure 1.

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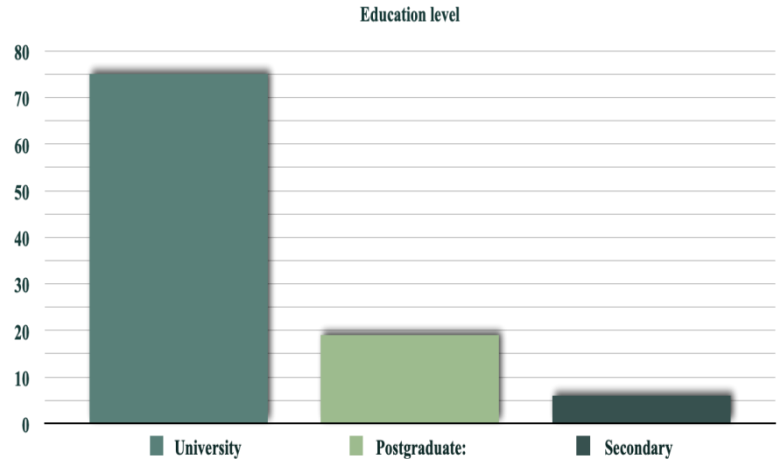


*Figure 1. Education level*

Only 37.5% **of** pharmacists and 43.75% of doctors were the most common sources of information, while the internet (12.5%) and friends (6.25%) were less frequently cited. with p-value (< 0.001), as shown in Table 1.

*Table 1. Source of Information*

| Specialization | % |
|---|---|
| Pharmacist | 37.5 |
| Doctor | 43.75 |
| Internet | 12.5 |
| Friends | 6.25 |

Concerning attitudes, 50% had a high level of awareness, 37.5% had a moderate level, and 12.5% had a low level, with p-value < 0.001, as shown in Figure 2.

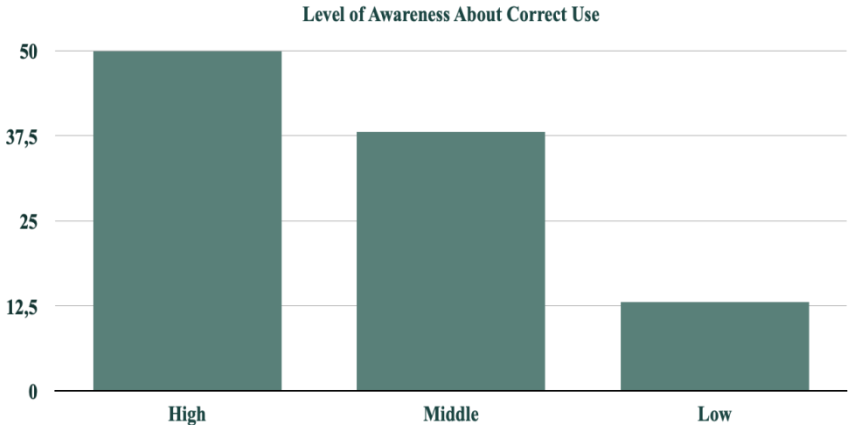


*Figure 2. Level of Awareness about the correct use*

However, about 62.5% of participants reported infections annually, 25% monthly, and 12.5% weekly, with p-value < 0.001, as shown in Figure 3. And only 43.75% of participants did not prefer using antibiotics, 37.5% preferred them, and 18.75% were unsure, with p-value (< 0.001)

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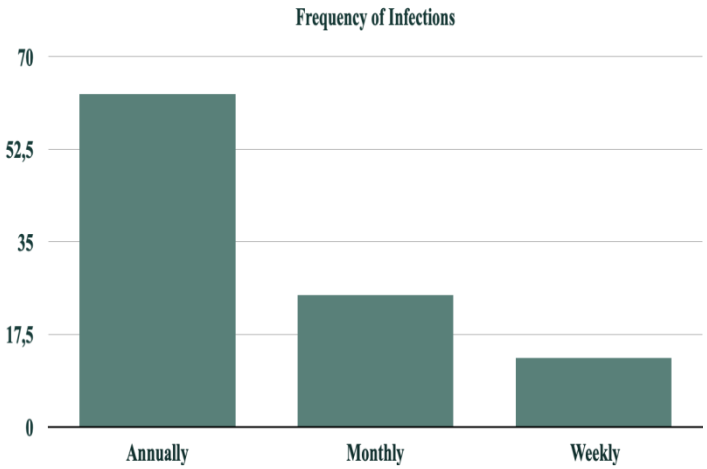


*Figure 3. Frequency of Infections*

Furthermore, Antibiotics were most frequently used for bacterial infections (37.5%), followed by viral infections (25%), UTIs (18.75%), and RTIs (12.5%), with p-value < 0.001, as shown in Figure 4.

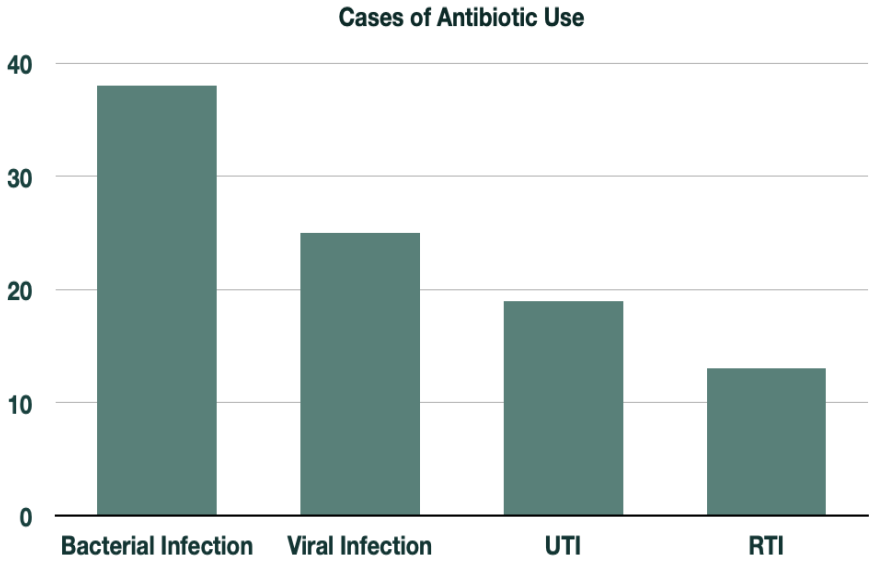


*Figure 4. Cases of Antibiotic Use*

This study showed that Bacterial resistance (31.25%) and side effects (25%) were the most common reasons, followed by effects on the immune system (18.75%) and other reasons (25%), with P-value=0.1718, as shown in Figure 5.

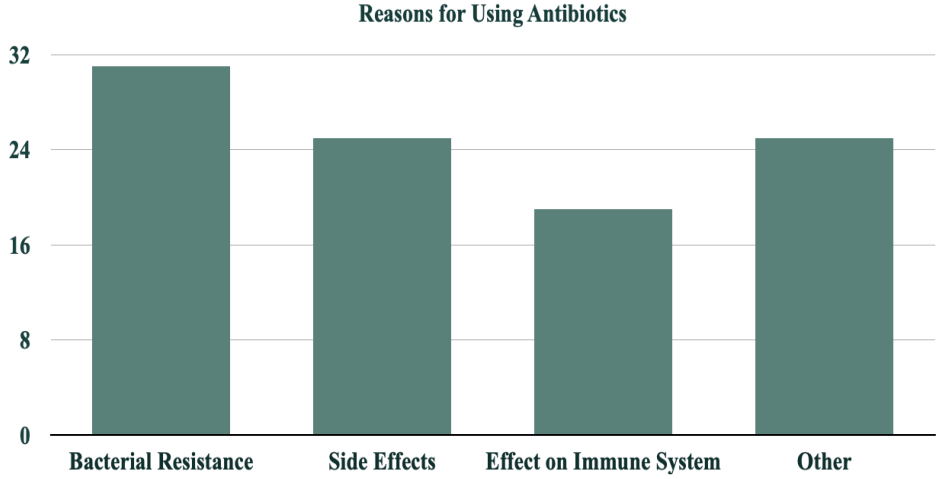


*Figure 5. Reasons for Using Antibiotics*

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The study showed significant differences in the frequency of antibiotic prescriptions. Amoxil/Augmentin (43.75%) and Zomex/KLACID (31.25%) were the antibiotics most frequently prescribed, while Flagyl (12.5%) and Penicillin (6.25%) were less commonly prescribed. A chi-square test showed that the distribution significantly differed from an equal prescription pattern ($p < 0.001$), suggesting a clear preference for specific antibiotics in clinical practice, as shown in Table 2.

**Table 2. Antibiotics used**

| Antibiotics used | Number | Percentage |
|---|---|---|
| Amoxil.Augmentin | 44 | |
| Zomex, KLACID | 31 | |
| Flagyl | 13 | |
| Penicillin | 6 | |
| Other | 6 | |

Additionally, a percentage of 37.5% believed that antibiotics would lose their effectiveness in the future, while 31.25% believed they would remain effective, and another 31.25% were uncertain. The p-value for these findings is 0.5353. And 43.75% of the participants indicated a lack of preference for the use of antibiotics, while 37.5% expressed a preference for their use, and 18.75% remained undecided on the matter. Significant effect ($p < 0.001$). Only 75% of the individuals surveyed indicated that they had successfully finished the prescribed regimen of antibiotics, whereas twenty-five percent acknowledged not doing so. P-value was less than 0.001. Additionally, 56.25% of the respondents expressed a desire to acquire antibiotics without a prescription, whereas 43.75% did not share this sentiment. The p-value is 0.1138. Of the participants surveyed, 75% demonstrated awareness of antibiotic resistance, while the remaining 25% lacked this knowledge, with a p-value ($p < 0.001$). The data from the study shows that the majority of participants (81.25%) were aware of the potential harm caused by misuse, whereas a minority (18.75%) were not. Having a p-value of less than 0.001. The findings of the survey revealed that 37.5% of the respondent's expressed skepticism about the future effectiveness of antibiotics, while 31.25% were optimistic about their continued efficacy. The remaining 31.25% of participants expressed uncertainty regarding the future effectiveness of antibiotics. The p-value is (0.5353) as shown in Table 3.

***Table 3. Effectiveness of Antibiotics.***

| Parameter | Yes | No | Maybe |
|---|---|---|---|
| Side Effects | 37.5 | 62.5 | 0 |
| Antibiotic Effectiveness | 31.25 | 50 | 19.75 |
| Preference for Using Antibiotics | 37.5 | 43.75 | 18.75 |
| Completing the Antibiotic Course | 75 | 25 | 0 |
| Needing Antibiotics Without a Prescription | 65.25 | 43.75 | 0 |
| Knowledge of Antibiotic Resistance | 75 | 25 | 0 |
| Knowledge of Harmful Effects of Misuse | 81.25 | 18.75 | 0 |
| Future Effectiveness of Antibiotics | 31.25 | 37.5 | 31.25 |

The study found several important strategies to reduce antibiotic misuse, with varying levels of endorsement among respondents. Notably, the most frequently recommended measures included doctors' guidance (43.75%), public awareness campaigns (31.25%), and stricter regulatory policies (18.75%). Importantly, a chi-square test revealed a statistically significant deviation from an equal distribution ($p < 0.001$), indicating that healthcare professionals and policymakers may prioritize clinician-led interventions and public education over legislative measures alone. This finding underscores the perceived importance of professional oversight and community engagement in promoting responsible antibiotic use, as shown in Figure 6.

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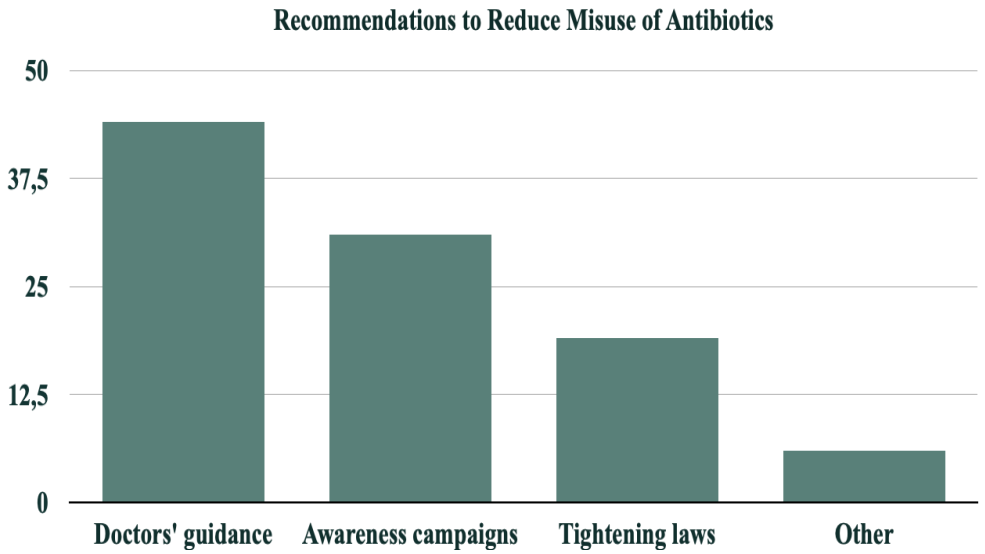


*Figure 6. Recommendation to Reduce Misuse of Antibiotics*

## Discussion

This study of 160 participants from Tarhuna, Libya (50% female/male) revealed important demographic and health trends. The high proportion of young participants (48.75% aged 15–24 years) reflects the youth-dominated demographics in Libya. While the low representation of adults ≥ 55 years (5.42%) is in line with regional demographic patterns [21]. The high reporting of adverse effects (37.5%, p=0.0016) is concerning given the participants' high education levels (75% had university education), suggesting that even an educated population may lack knowledge of medication safety, as observed in Saudi Arabia [22]. The distribution of education ($p<0.001$) reflects Libyan urban trends but contrasts with rural areas, highlighting potential urban-rural disparities in access to healthcare. These findings underscore the need for targeted health education, particularly for the majority of youth in Libya, to address medication safety gaps despite high levels of formal education [23].

The study reveals a strong reliance on healthcare professionals for medical information in Libya, with pharmacists (37.5%) and doctors (43.75%) serving as primary sources ($p < 0.001$), consistent with patterns observed in Libya [24]. Yet contrasts with global trends favoring digital sources (WHO, 2023). The minimal use of internet sources (12.5%) highlights Libya's digital health literacy gap compared to GCC countries, where e-health adoption exceeds 60% [25]. The low peer consultation rate (6.25%) differs from collectivist norms in Arab societies [26], possibly reflecting medical mistrust or strong professional authority in Libyan healthcare culture. These findings suggest an urgent need for: (1) pharmacist-led public health education, (2) quality-controlled Arabic digital health platforms, and (3) context-specific interventions addressing Libya's unique information-seeking behaviors. The significant p-value underscores the robustness of these observed preferences in the studied population [27].

The study reveals significant variations in health awareness levels among Libyans ($p<0.001$), with 50% demonstrating high awareness. The moderate awareness cohort (37.5%) represents a critical target for educational interventions, as this group possesses foundational knowledge that could be enhanced through primary care-based programs. The persistence of low awareness (12.5%) despite high education levels suggests structural barriers to health information access. These disparities highlight the need for tiered awareness campaigns addressing specific knowledge gaps while considering Libya's unique post-conflict healthcare landscape. The statistically significant distribution ($p<0.001$) underscores the importance of developing culturally-adapted health education strategies that account for these varying awareness levels [28].

The high frequency of reported infections (62.5% annually, 25% monthly, and 12.5% weekly; *p* < 0.001) suggests concerning patterns of infectious disease burden in Tarhuna, Libya, potentially linked to environmental, behavioral, or healthcare access factors (20). Alarmingly, only 43.75% of participants demonstrated appropriate antibiotic avoidance, while 37.5% preferred antibiotics and 18.75% were uncertain (*p* < 0.001), reflecting widespread misconceptions that may contribute to antimicrobial resistance (AMR) [29]. These findings align with regional studies showing excessive antibiotic use in Arab countries, often driven by self-medication and limited public awareness. The significant *p*-values underscore urgent needs for targeted interventions, including community education on

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infection prevention and antibiotic stewardship programs. Future research should explore socioeconomic and cultural drivers of these trends to inform context-specific public health strategies [30].

The inappropriate use of antibiotics for viral infections (25%) revealed in this study is particularly alarming, as it represents a clear misuse of antimicrobial agents that contributes to the growing threat of antibiotic resistance in Libya [31]. While bacterial infections (37.5%) were the most common indication for antibiotic use, the significant proportion of prescriptions for viral respiratory infections (12.5%) and unspecified viral infections suggests poor adherence to treatment guidelines among healthcare providers. The findings mirror concerning patterns observed across North Africa, where antibiotics are frequently prescribed without proper diagnostic confirmation [31]. The statistically significant results ($p < 0.001$) underscore the urgent need for implementation of antimicrobial stewardship programs in Libyan primary care settings. These programs should particularly target the management of urinary tract infections (18.75%) and respiratory tract infections, where antibiotic overuse appears most prevalent [32].

The finding that bacterial resistance (31.25%) and side effects (25%) where the primary concerns regarding antibiotic use aligns with global antimicrobial resistance (AMR) trends reported by the WHO, while reflecting region-specific patterns observed in recent Libyan studies [33]. The relatively high awareness of AMR (31.25%) compared to previous regional reports. highlighting common patient anxieties across Arab healthcare systems. The 18.75% reporting immune system impacts demonstrates growing public awareness of microbiome science, as documented in recent international literature [34]. These findings collectively emphasize the importance of culturally-adapted antibiotic stewardship programs that address both clinical and community-level knowledge gaps. The marked preference for Amoxil/Augmentin (43.75%) and Zomex/Klacid (31.25%) in this study reflects both global antibiotic prescription trends [35], and regional prescribing patterns observed in recent Middle Eastern studies. The significantly lower use of Flagyl (12.5%) and Penicillin (6.25%) ($p < 0.001$) suggests clinicians may be avoiding narrow-spectrum antibiotics despite their effectiveness for specific indications, a phenomenon also documented in neighboring countries [36]. This prescription bias towards broad-spectrum antibiotics mirrors concerning trends in antimicrobial resistance development across North Africa [37] and warrants urgent antimicrobial stewardship interventions. The findings align partially with Libyan prescription guidelines [36] but reveal potential overprescription of certain antibiotics, highlighting the need for continuous monitoring of antibiotic utilization patterns in primary care settings [37].

The study reveals critical insights into antibiotic use perceptions and practices in Libya, with concerning gaps between awareness and behavior. While 75% of participants demonstrated awareness of antibiotic resistance ($p < 0.001$), this knowledge doesn't consistently translate to practice, as evidenced by 25% failing to complete prescribed regimens ($p < 0.001$) and 56.25% seeking antibiotics without prescriptions. These findings align with WHO (2023) reports on the global disconnect between AMR knowledge and behavior, and mirror patterns observed across North Africa [38]. The significant preference for antibiotic use (37.5%, $p < 0.001$) despite awareness of potential harms (81.25%, $p < 0.001$) suggests cultural and systemic factors influencing medication practices, as documented in recent Middle Eastern studies [39]. The non-significant results regarding beliefs about future antibiotic effectiveness ($p = 0.5353$) highlight persistent uncertainties that may undermine stewardship efforts, consistent with findings from antimicrobial perception research. These results collectively emphasize the urgent need for targeted behavioral interventions complementing awareness campaigns, particularly in primary care settings [39].

The findings of the research provide valuable insights into the strategies preferred by the community in Libya for addressing the issue of antibiotic misuse. The substantial inclination towards seeking doctors' advice (43.75%) is in accordance with the World Health Organization's (2023) emphasis on the role of healthcare providers in leading antimicrobial stewardship efforts and is consistent with similar patterns observed in adjacent countries. The significant endorsement of public awareness campaigns (31.25%) reflects growing recognition of health literacy's role in AMR prevention, consistent with successful interventions documented in Saudi Arabia [39]. These findings provide crucial evidence for developing culturally-appropriate AMR strategies in North Africa, balancing professional leadership with community engagement [40].

## Conclusion

This study provides a fundamental comprehension of the knowledge, beliefs, and behaviors regarding antibiotics among the Libyan Community. The understanding of antibiotic usage within our population is deemed satisfactory, yet there is a shortage in the appropriate attitudes and behaviors, leading to many individuals demonstrating misuse of antibiotics. This finding will play a key role in the development of accurate interventions designed to decrease misunderstandings related to antibiotic usage and to increase knowledge about the dangers of the inappropriate use

of antibiotics among the Libyan population. The high occurrence of self-medication with antibiotics in Libya emphasizes the importance of establishing measures to oversee and control the prescription of antibiotics in the country's healthcare institutions.

*Conflict of interest*. Nil

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