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CUNOȘTINȚE, ATITUDINI ȘI PRACTICI PRIVIND REZISTENȚA ANTIMICROBIANĂ ÎN RÂNDUL POPULAȚIEI GENERALE DIN ZONA UMEDĂ CONSTRUITĂ ORHEI

KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING ANTIMICROBIAL RESISTANCE: A STUDY AMONG THE GENERAL POPULATION FROM THE ORHEI CONSTRUCTED WETLAND

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Rezumat
Obiective. Rezistența la antimicrobiene este o problemă majoră de sănătate, deoarece compromite eficacitatea tratamentelor și crește riscul de infecții severe. Identificarea lacunelor în cunoștințe și planificarea unor intervenții pentru utilizarea rațională a antibioticelor sunt esențiale în reducerea rezistenței la antimicrobiene. Sensibilizarea și educarea populației reprezintă strategii cruciale pentru combaterea acestui fenomen. Scopul prezentului studiu a fost elaborarea și validarea unui chestionar pentru evaluarea cunoștințelor, atitudinilor și practicilor (CAP) privind rezistența la antimicrobiene în rândul populației generale.
Metode. Studiul a cuprins dezvoltarea și testarea unui chestionar bazat pe o analiză a literaturii. Etapa de validare a inclus evaluarea validității de față, de conținut și de construct. Un număr de 767 de respondenți au fost chestionați, iar datele preliminare au fost analizate în SPSS 28.0, utilizând statistici descriptive (frecvențe, procente, medii, abateri standard).
Rezultate. Din 767 de participanți, 99,87% urmaseră cel puțin un tratament cu antibiotice. În 86,44% din cazuri, informațiile primite despre antibiotice le-au schimbat percepția privind utilizarea acestora. Dintre respondenți, 76,0% consideră că antibioticele sunt eficiente împotriva bacteriilor, în timp ce doar 10,1% consideră (corect) că antibioticele nu sunt eficiente împotriva infecțiilor virale sezoniere. În plus, 55,3% consideră că pacientul trebuie să aibă încredere în decizia medicului de a prescrie antibiotice. Doar 51,8% dintre participanți au efectuat o investigație microbiologică înainte de tratamentul cu antibiotice, iar 44,0% au solicitat informații de la medic privind utilizarea antibioticelor. Referitor la automedicație, 39,1% dintre respondenți nu au procurat medicamente antimicrobiene fără rețetă.
Concluzii. Chestionarul dezvoltat se dovedește util pentru evaluarea nivelului de cunoștințe, atitudini și practici ale populației cu privire la rezistența la antimicrobiene. Rezultatele obținute cu ajutorul acestui instrument pot fundamenta măsuri de creștere a conștientizării problemei și de promovare a bunelor practici de utilizare a antimicrobienelor.
Cuvinte-cheie: cunoștințe, atitudini, practici, rezistența la antimicrobiene, antibiotic

Summary
Objectives. Antimicrobial resistance is a major health issue as it compromises the effectiveness of treatments and increases the risk of severe infections. Identifying knowledge gaps and planning interventions for the rational use of antibiotics are crucial to reducing antimicrobial resistance. Raising awareness and educating the public are essential strategies to combat this phenomenon. The aim of this study was to develop and validate a questionnaire to assess knowledge, attitudes, and practices (KAP) regarding antimicrobial resistance in the general population.
Methods. This study involved the development and testing of a questionnaire based on a literature review. The validation phase included face, content, and construct validity. A total of 767 respondents were surveyed, and preliminary data were analyzed using SPSS 28.0, employing descriptive statistics (frequency, percentage, mean, standard deviation).
Results. Out of 767 participants, 99.87% had taken at least one course of antibiotics. In 86.44% of cases, information received about antibiotics changed their perspective on antibiotic use. Among respondents, 76.0% believe that antibiotics are effective against bacteria, while only 10.1% correctly think that antibiotics are not effective against seasonal viral infections. Additionally, 55.3% believe that patients should trust the doctor's decision to prescribe antibiotics. Only 51.8% of participants underwent microbiological investigation before antibiotic treatment, and 44.0% requested information from their doctor regarding antibiotic use. Regarding self-medication, 39.1% of respondents have never purchased antimicrobial drugs without a prescription.
Conclusions. The developed questionnaire is a useful tool for assessing public knowledge, attitudes, and practices concerning antimicrobial resistance. The results obtained using this tool can support measures to increase awareness of the issue and promote the widespread adoption of best practices in antimicrobial use.
Keywords: knowledge, attitudes, practices, antimicrobial resistance, antibiotics

Introduction

Antimicrobial resistance (AMR) represents a major global public health threat, with significant consequences for healthcare systems and the economy [1-4]. Social and behavioral factors contributing to the inappropriate use of antibiotics drive the AMR phenomenon [5], and the

excessive and misuse of these drugs is the main cause behind the emergence of multidrug-resistant pathogens. Infections with antimicrobial-resistant microbes lead to increased morbidity, mortality, hospital stay duration, and treatment costs. Such a scenario continues to heavily affect low- and middle-income countries (LMICs), where excessive and inappropriate antibiotic use is common. In response to these challenges, the holistic "One Health" approach has been strongly promoted in recent years. Several studies in LMICs have documented low levels of knowledge, attitude, and practice regarding antibiotic prescribing, along with non-prescription antibiotic use that can ultimately lead to the development of AMR [6,7].

Identifying knowledge gaps and planning interventions for the rational use of antibiotics are decisive steps in reducing AMR [8, 9]. KAP (knowledge, attitude, and practice) studies in the general population are part of the monitoring and evaluation framework proposed by the WHO Global Action Plan on antimicrobial resistance [5].

The present study was conducted under the research project "Phage treatment and wetland technology as intervention strategy to prevent dissemination of antibiotic resistance in surface waters (PhageLand)" (code 22.80013.8007.1M). The research protocol was approved by the Research Ethics Committee of the Nicolae Testemițanu State University of Medicine and Pharmacy (approvals no. 11 of 28.12.2021 and no. 7 of 09.01.2022) and by the National Ethics Committee for Clinical Studies of the Ministry of Health (approval no. 1245 of 26.01.2022). In this context, the aim of the present study was to develop and validate a questionnaire for assessing the knowledge, attitudes, and practices of the general population regarding antimicrobial resistance in the Orhei region, and to apply this tool to determine the KAP levels among the surveyed population.

Materials and methods

The research included two components: a secondary study (narrative synthesis) and a primary observational, descriptive, cross-sectional questionnaire-based study carried out in the population served by the Orhei Constructed Wetland area [2]. For the narrative synthesis, information was retrieved from PubMed, Google Scholar and Hinari using combinations of keywords such as "antimicrobial resistance AND KAP", "antimicrobial resistance NEAR knowledge AND attitude AND practice", and "antimicrobial resistance NEAR knowledge attitude practice"; after duplicate removal and title/abstract screening, 31 records remained eligible, of which 9 were excluded (including for lack of relevance to low- and middle-income countries), and 14 articles were included for full-text analysis [2]. In the primary study stage, the instrument was developed by adapting a standardized questionnaire (Vallin M et al.), in an abbreviated version, adjusted for the context of low- and middle-income countries in Eastern Europe within the PhageLand project [10-12]. The final version comprised 56 questions and sub-questions addressing knowledge about antimicrobials and antimicrobial resistance, attitudes towards antibiotic use and associated risks, practices related to antibiotic use, as well as socio-demographic data [10-12]. To enhance comprehensibility, the questionnaire also included feedback items on clarity (confusing/difficult questions, easy-to-understand questions and suggestions for improvement); subsequently, the instrument was translated and adapted into three languages, and copyright was registered with State Agency on Intellectual Property (AGEPI) [10-12]. The survey targeted the adult population from the area served by the Orhei Constructed Wetland (10 rural localities and Seliștevillage), and the sample included 767 respondents; data collection was anonymous, conducted both online and offline, with confidentiality ensured through respondent coding and storage of results in a secure database. KAP responses were coded using a scoring system: for dichotomous items (correct = 1, incorrect = 0), for three-option items (correct = 2, neutral = 1, incorrect = 0), and for five-point Likert items (scores 1–5, from "strongly disagree" to "strongly agree"); scores were summed and transformed to a 0–100% scale (maximum possible score = 100%), and levels were classified using modified Bloom cut-offs: good/positive ≥80%, moderate 60–79%, poor/negative <60%. For certain analyses, "neutral" and "don't know" responses were treated as non-adequate, and similar categories were merged for interpretation. Data were initially coded in Microsoft Excel and analyzed using SPSS v28.0 (licensed); distribution normality was assessed using the Kolmogorov–Smirnov test and variance homogeneity using Levene's test, while descriptive statistics were used to present results; associations between variables were tested using the chi-square test ($p \leq 0.05$; 95% confidence interval), and logistic regression was performed to estimate associations between the dependent variable (KAP level) and independent variables.

Results

Adults (18 years and older) living in the communities around the Orhei Constructed Wetland Zone (CWZ) were included in this study. To participate, they had to have lived there for at least six months, given their consent, and be able to speak, read, or write in Romanian or Russian. Anyone who didn't meet all of these criteria was left out. In analyzing the data, socio-demographic factors were treated as independent variables, while the participants' knowledge, attitudes, and practices (KAP) related to antibiotic use and disposal were the dependent variables.

Table 1 provides an overview of the respondents's socio-demographic background (n=767) and some self-reported behaviors around antibiotic use. Most participants were from urban areas (n=456; 59.45%; 95% CI: 55.88–62.95), while 40.55% were from rural communities (n=311; 95% CI: 37.05–44.12). When it came to age, the largest group was between 35 and 65 years old (n=342; 44.59%; 95% CI: 41.03–48.19). They were followed by those under 35 (n=215; 28.03%) and those over 65 (n=209; 27.25%).

There were more men than women in the sample—426 men (55.54%; 95% CI: 51.94–59.09) and 341 women (44.46%; 95% CI: 40.91–48.06), with a male-to-female ratio of about 1.2.

Looking at education, most respondents had either

Table 1

Sociodemographic characteristics and selected information on antibiotic use among participants (N = 767)

Characteristic	Category	n (%) [95% CI]
Place of residence	Urban	456 (59.45) [55.88–62.95]
	Rural	311 (40.55) [37.05–44.12]
Age (years)	<35	215 (28.03) [24.88–31.35]
	35–65	342 (44.59) [41.03–48.19]
	>65	209 (27.25) [24.13–30.55]
Sex	Male	426 (55.54) [51.94–59.09]
	Female	341 (44.46) [40.91–48.06]
Educational status	Completed lower secondary education	99 (12.91) [10.62–15.49]
	Completed high school	186 (24.25) [21.26–27.44]
	Post-secondary vocational or university	482 (62.84) [59.31–66.27]
Marital status	Married/cohabiting (with or without children)	574 (74.84) [71.61–77.88]
	Not married (single/divorced/widowed)	193 (25.16) [22.12–28.39]
Number of children (<18 years)	1	212 (27.64) [24.50–30.95]
	2	236 (30.77) [27.52–34.17]
	≥3	320 (41.74) [38.22–45.32]
Occupation of household head	Public sector (health worker/civil servant/teacher)	403 (52.54) [48.94–56.12]
	Private sector (self-employed/worker, etc.)	206 (26.86) [23.75–30.15]
	Agriculture	158 (20.60) [17.79–23.64]
Ever used antibiotics?	Yes	766 (99.87) [99.28–100.00]
	No	1 (0.13) [—]
In the last 12 months, how often used antibiotics?	Once/year	575 (74.97) [71.75–78.00]
	2–4 times/year	96 (12.52) [10.26–15.07]
	>5 times/year	40 (5.22) [3.76–7.04]
	Do not know	56 (7.30) [5.56–9.38]
Who provided information about antibiotic importance and use?	Doctors	269 (35.07) [31.69–38.56]
	Health center	110 (14.34) [11.94–17.02]
	Hospital	163 (21.25) [18.40–24.32]
	Pharmacist	225 (29.34) [26.14–32.70]
Did the information change your view on antibiotic use?	Yes	104 (13.56) [11.22–16.19]
	No	663 (86.44) [83.81–88.78]

Abbreviations: *CI = confidence interval; N = total number of participants; n = number in category.*

Note: *Percentages are calculated out of N and may not sum to 100% due to rounding. The 95% CI was not reported for the "No" category (n = 1).*

vocational or higher education (n=482; 62.84%; 95% CI: 59.31–66.27). Others had completed high school (n=186; 24.25%) or middle school (n=99; 12.91%).

Marital status showed that a majority were married or living with a partner (with or without kids) (n=574; 74.84%; 95% CI: 71.61–77.88). The rest (25.16%, n=193) were single, divorced, or widowed.

Family size-wise, 41.74% of participants had three or more children under 18 (n=320), 30.77% had two kids (n=236), and 27.64% had just one child (n=212).

When it came to the main breadwinner's job, most worked in the public sector (n=403; 52.54%), followed by the private sector (n=206; 26.86%) and agriculture (n=158; 20.60%).

Nearly everyone in the study had taken antibiotics at least once (n=766; 99.87%), with only one person saying they never had. In the past year, most people reported using antibiotics once (n=575; 74.97%). Others said 2–4 times (n=96; 12.52%) or more than 5 times (n=40; 5.22%). About 7.3% weren't sure how often they'd used them (n=56).

When asked where they got information about antibiotics, most mentioned doctors (n=269; 35.07%) and pharmacists (n=225; 29.34%). Others cited hospitals (n=163; 21.25%) or health centers (n=110; 14.34%).

However, it should be noted that: only 13.56% of

respondents (n=104) said this information actually changed how they view antibiotic use. The vast majority—86.44% (n=663)—said their views stayed the same. That suggests current communication strategies might not be effective in changing public behavior when it comes to changing public behavior.

The data in **Table 2** reveals a mixed knowledge profile. While many respondents correctly understand that antibiotics are effective against bacteria, there are major gaps when it comes to distinguishing bacterial from viral infections and grasping the principles of responsible antibiotic use. Fewer than half correctly identified that unnecessary use of antibiotics reduces their effectiveness (47.6%; CI95%: 44.02–51.20), suggesting that the basic message about antibiotic resistance has not yet been fully comprehended by the general public. Similarly, only 42.9% (CI95%: 39.37–46.49) understood that antibiotics "kill bacteria," even though a relatively larger portion (61.7%; CI95%: 58.15–65.15) recognized the harm antibiotics can do to the body's natural bacterial flora—indicating partial awareness of the biological risks involved.

Table 2

Participants' knowledge regarding antibiotic use (N = 767)

Item	Question/statement	Correct response*	% correct [95% CI]
Q1	Unnecessary use of antibiotics leads to decreased effectiveness of antibiotics.	Agree	47.6 [44.02–51.20]
Q2	Taking antibiotics destroys bacteria in the body.	Agree	42.9 [39.37–46.49]
Q3	Antibiotics often have negative effects on the body's normal bacterial flora.	Agree	61.7 [58.15–65.15]
Q4	Antibiotics are effective against bacteria.	Agree	76.0 [72.82–78.98]
Q5	Antibiotics are effective against seasonal respiratory infections.	Disagree	10.1 [8.06–12.45]
Q6	Antibiotics help you recover faster from a cold.	Disagree	17.1 [14.50–19.95]
Q7	Antibiotics are necessary for sore throat due to a seasonal cold.	Disagree	9.7 [7.70–12.02]
Q8	Leftover antibiotics after treatment should be returned to the pharmacy.	Agree	21.0 [18.17–24.06]
Q9	The more frequently antibiotics are used, the higher the risk of bacteria becoming resistant to antibiotics.	Agree	58.5 [54.92–62.01]
Q10	Once the patient feels better, antibiotic treatment should be stopped immediately.	Disagree	24.0 [21.02–27.18]

**The "correct response" is defined as the option consistent with rational antibiotic use and antimicrobial resistance prevention principles.*

Abbreviations: *CI = confidence interval; N = total number of participants.*

Note: *Percentages may not sum to 100% due to rounding.*

Encouragingly, a significant majority (76.0%; CI95%: 72.82–78.98) know that antibiotics work against bacteria. However, this general knowledge doesn't translate into the ability to apply it in common clinical scenarios. Only 10.1% (CI95%: 8.06–12.45) disagreed correctly with the false claim that antibiotics help with seasonal respiratory infections. Likewise, just 17.1% (CI95%: 14.50–19.95) correctly rejected the idea that antibiotics speed up recovery from a cold. And only 9.7% (CI95%: 7.70–12.02) denied the need for antibiotics when dealing with a sore throat caused by a viral cold. These findings show that people often overestimate the role of antibiotics in treating mostly viral illnesses—one of the classic drivers of unnecessary prescriptions and self-medication.

When it comes to recommended behaviors, knowledge remains limited. Only 21.0% (CI95%: 18.17–24.06) correctly stated that leftover antibiotics should be returned to the pharmacy. This points to a vulnerability—both in terms of inappropriate reuse and improper disposal. Although 58.5% (CI95%: 54.92–62.01) acknowledged that frequent use can lead to resistance, only 24.0% (CI95%: 21.02–27.18) correctly rejected the idea that is acceptable to stop treatment

Table 3

Participants' attitudes regarding antibiotic use (N = 767)

Item	Question/statement	Correct response*	% correct [95% CI]
Q1	Patients should trust the doctor's decision to prescribe antibiotics.	Agree	55.3 [51.70–58.86]
Q2	A doctor who does not prescribe antibiotics when the patient thinks they are needed is considered a "good" specialist.	Disagree	16.3 [13.75–19.11]
Q3	Patients should trust the doctor's decision even if antibiotics are prescribed in uncertain situations (eg, the diagnosis is not definitive, the etiology has not been established).	Agree	41.3 [37.79–44.88]

**The "correct response" is defined as the option consistent with attitudes supporting rational antibiotic use and antimicrobial resistance prevention.*

Abbreviations: *CI = confidence interval; N = total number of participants.*

Note: *Percentages may not sum to 100% due to rounding.*

once the patient "feels better," which shows a critical gap in understanding treatment adherence. Overall, highlights a core of accurate knowledge, but also a consistent set of common misconceptions—like using antibiotics for viral infections, stopping treatment early, or improperly managing leftovers - that can contribute to misuse and increase antimicrobial resistance in the population.

The results on attitudes reveal a mixed pattern, where trust in the doctor coexists with social norms and expectations that may encourage unnecessary prescriptions. More than half of respondents (55.3%; 95% CI: 51.70–58.86) believe that patients should trust the doctor's decision to prescribe antibiotics, suggesting a general orientation toward medical authority.

However, only 16.3% (95% CI: 13.75–19.11) correctly disagreed with the statement that a doctor who doesn't prescribe antibiotics when the patient thinks they are needed is still a "good" specialist. This low proportion points to a problematic attitude: for a significant part of the population, a "good doctor" might be perceived as one who prescribes medication—potentially creating social pressure on prescribers and contributing to inappropriate prescribing.

Additionally, only 41.3% (95% CI: 37.79–44.88) agreed that patients should trust the doctor even when antibiotics are prescribed in uncertain situations. This finding may reflect either a lack of trust in clinical judgment without clear etiological confirmation or a misunderstanding of the nature of medical uncertainty. In the context of antimicrobial resistance, such attitudes can contribute to ambivalence toward clinical recommendations and negatively impact treatment adherence or the tendency to request antibiotics.

In summary, suggests that public health interventions should target not only knowledge but also social norms (such as the expectation to receive antibiotics) and reinforce the message that choosing not to prescribe antibiotics in cases of viral infections is sound medical practice.

Table 4

Participants' practices regarding antibiotic use (N = 767)

Item	Question/statement	Correct response*	% correct [95% CI]
Q1	Was a microbiological investigation (culture) performed to identify the bacteria causing your illness (before or during antibiotic treatment)?	Yes/Agree	51.8 [48.20–55.39]
Q2	Although you knew how the antibiotic should be taken, the doctor provided you with information about its use.	Yes/Agree	44.0 [40.45–47.60]
Q3	Have you ever obtained antibiotics from a pharmacy without a doctor's recommendation?	No/Disagree	60.0 [56.43–63.49]
Q4	Have you ever obtained antibiotics from a pharmacy without a prescription?	No/Disagree	39.1 [35.63–42.66]
Q5	Borrowing or receiving antibiotics from relatives/acquaintances is a good practice because it avoids a visit to the doctor.	No/Disagree	41.1 [37.59–44.68]

**The "correct response" is defined as the option consistent with rational antibiotic use and antimicrobial resistance prevention practices.*

Abbreviations: *CI = confidence interval; N = total number of participants.*

Note: *Percentages may not sum to 100% due to rounding.*

Practice indicators show suboptimal behaviors when it comes to the core principles of antibiotic stewardship. Key gaps were identified were related to how microbiological tests are used, how doctors communicate with patients, and how easily people can access antibiotics without a prescription.

Only 51.8% (95% CI: 48.20–55.39) of respondents said a microbiological test (like a culture) was done before or during treatment. That means many treatments aren't based on knowing the actual cause of the infection, which raises the risk of using the wrong antibiotics.

When it comes to communication, just 44.0% (95% CI: 40.45–47.60) said their doctor gave them information about how to use antibiotics—even when patients thought they already knew what to do. This low number points to a big opportunity: doctors can play a stronger role in educating patients about things like how long to take antibiotics, why it's important to follow instructions, possible side effects, drug interactions, and the importance of only using antibiotics when truly needed.

There's also a clear issue with access to antibiotics without prescriptions. On the bright side, 60.0% (95% CI: 56.43–63.49) said they didn't get antibiotics without a doctor's recommendation. But only 39.1% (95% CI: 35.63–42.66) said they hadn't bought antibiotics without a prescription—meaning a large number either did it or weren't sure, which raises concerns about non-prescription (over-the-counter) antibiotic sales.

Another concerning behavior: just 41.1% (95% CI: 37.59–44.68) strongly disagreed with borrowing or accepting antibiotics from family or friends just to avoid seeing a doctor. That suggests that "sharing" antibiotics and self-medicating is still pretty common, which can easily lead to misuse—wrong dose, wrong duration, or even using them when they're not needed at all.

Overall, **Table 4** shows that many reported behaviors don't fully align with responsible antibiotic use. To address this, we need to: Improve access to proper diagnostic tools; Standardize how doctors give medical advice; Take action to reduce over-the-counter sales and informal sharing of antibiotics. Taken together, reveal a mix of incomplete knowledge, mixed feelings about antibiotic prescriptions, and poor practices around how antibiotics are accessed and used.

This kind of pattern increases the risk of inappropriate use - and helps fuel antimicrobial resistance at the community level.

Discussion

This study demonstrates that the KAP questionnaire "Knowledge, attitudes and practices regarding antimicrobial resistance" is a valuable tool for assessing the levels of knowledge, attitudes, and practices of the general population regarding antibiotic use and bacterial resistance [13-16]. The results obtained can serve as evidence for decision-makers to increase awareness of antimicrobial resistance and to change attitudes and behaviors in order to reduce this phenomenon [11]. The instrument was developed in the form of a questionnaire precisely for this purpose.

Although the advantages of KAP studies are well documented, these investigations have limitations as well – including the need for proper calculation of a representative sample and its balanced stratification by sex and setting. Moreover, medical-social factors such as access to healthcare services, income, and education level can influence the population's KAP levels [17-26]. The cross-sectional nature of the study means that data are collected at a single point in time; therefore, to capture trends and changes in knowledge and attitudes, periodic studies are needed to establish appropriate cause-effect relationships [19, 23]. Furthermore, the information collected is self-reported and based on the respondents' recall, making it subjective; results may thus be under- or over-estimated [22].

The issue of self-medication and the use of antimicrobials without a prescription is widely discussed in most studies. Inappropriate use, limited practical knowledge, and high rates of self-medication confirm unsatisfactory antibiotic prescribing and dispensing practices in many low- and middle-income countries [27-29]. Previous studies in these countries have documented low levels of knowledge, attitude, and practice regarding antibiotic prescribing, along with significant non-prescription antibiotic use, which can exacerbate the AMR phenomenon [6, 30].

In neighboring countries, similar KAP studies on antibiotic use have been conducted. For example, in a study by Voidăzan et al. [30] with a larger sample of respondents (996), 62.65% of participants believed that antibiotics are used to treat bacterial infections (compared to 76.0% in our study). Additionally, 65.9% of Voidăzan's respondents consulted a doctor every time before taking antibiotics, whereas in our study only 35.07% consulted a doctor and 29.34% consulted a pharmacist regarding antimicrobial use. Furthermore, 82.3% of participants in the Romanian study believed that using antibiotics without a prescription has a negative effect, compared to 39.1% of respondents in our study who reported not resorting to purchasing antibiotics without a prescription.

Interventions aimed at mitigating the AMR phenomenon must address the social, economic, political, and cultural aspects of the region or country in question. Educational interventions for the public and for doctors will help reduce unnecessary antibiotic use and resistance. KAP studies highlight the importance of developing and implementing educational programs and appropriate guidelines for the responsible use of antibiotics by healthcare providers, as well as health education initiatives for the general population. Reforming antibiotic use policies should consider the multiple stakeholders that influence demand, supply, and compliance – including adopting a "One Health" approach to incorporate animal health and environmental considerations. Future research should focus on exploring antibiotic-related attitudes and practices among community healthcare providers, in order to inform antibiotic stewardship and patient education programs [6, 17, 25-29].

Conclusions

Studies of the knowledge, attitudes, and practices of the population regarding antimicrobial resistance are valuable tools for developing measures to reduce this phenomenon. Testing and validation of KAP questionnaires on antimicrobial resistance are crucial for obtaining credible, comparable, and representative data.

The primary results of this study highlight that the majority of respondents do not have a good understanding of the correct use of antimicrobials, even though they are aware of the negative effects of using them without a prescription on both their own health and public health. Nevertheless, a significant portion of the population continues to use antibiotics on their own, which can lead to incorrect choice of antimicrobial due to lack of knowledge or the use of antibiotics for seasonal viral infections.

Increasing public awareness about antibiotic use and antimicrobial resistance should be a priority for the healthcare system, and it should be based on evidence from national and international studies.

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