UDC 614.2+ 614.4+615:316-053,8(04)
DOI https://doi.org/10.32782/2077-6594/2025.2/13

Лехан В.М.[1], Пучкова Н.В.[2], Заярський М.І.[1]

# Знання та практика використання антибіотиків: результати кроссекційного опитування серед дорослих

[1]Дніпровський державний медичний університет, м. Дніпро, Україна
[2]Департамент охорони здоров'я Дніпропетровської обласної державної адміністрації, м. Дніпро, Україна

Lekhan V.M.[1], Puchkova N.V.[2], Zaiarskiy M.I.[1]

# Knowledge and practice of antibiotic use: results of the cross-sectional survey among adults

[1]Dnipro State Medical University, Dnipro, Ukraine
[2]Department of Health Care of the Dnipropetrovsk Regional State, Dnipro, Ukraine

v.n.lexan@gmail.com

## Introduction

The World Health Organization (WHO) urges countries to commit to combating antimicrobial resistance (AMR) in the treatment of patients, as it has transformed from a medical issue into a global public health threat. WHO also recommends an action plan to address AMR, one of the objectives of which is to improve awareness and understanding of AMR through effective communication, education, and training [1; 2].

In Ukraine, initiatives for optimizing the use of antibiotics have been particularly active in recent years, largely in response to the alarming rise of AMR amid the full-scale war unleashed by Russia. It should be noted that the Ministry of Health of Ukraine has adopted a series of regulatory acts aimed at strengthening antimicrobial management. These measures include the implementation of infection prevention and control systems in healthcare facilities, as well as the introduction of standardized protocols and clinical guidelines that focus on the rational use of antibacterial and antifungal agents [3; 4]. The promotion of these provisions is envisaged by the Strategy for the Development of the Healthcare System of Ukraine for the period up to 2030 with a corresponding operational plan for its implementation and the State Strategy for Combating Antimicrobial Resistance for the period up to 2030. The key objectives outlined in these documents include establishing mechanisms to monitor the prescribing and dispensing of antibacterial agents, preventing the spread of antimicrobial resistance, and restricting advertising and marketing practices that may unduly influence patient decision-making [5; 6].

While these regulatory measures represent a significant step towards controlling antibiotic use, their effectiveness is closely tied to public awareness and behavior regarding antibiotic use. In this context, understanding the public's knowledge, attitudes, and practices becomes a critical component of any comprehensive antimicrobial stewardship strategy.

In line with WHO recommendations, numerous countries around the world, including those in the European Region, have conducted public surveys to assess these parameters [7; 8]. However, despite the implementation of policy interventions in Ukraine, a significant gap remains in the available data regarding the current level of public knowledge and behavior patterns related to antibiotic use. To date, no systematic evaluation of these aspects has been conducted in the Ukrainian population. This lack of empirical evidence hinders the development of targeted and evidence-based interventions aimed at optimizing antibiotic use and curbing AMR. Therefore, there is an urgent need for dedicated research to fill this knowledge gap and inform the advancement of health strategies in Ukraine.

**The purpose** of the present study is to assess the population's knowledge, practice and attitude towards antibiotic use in the treatment of infectious diseases with the subsequent scientific justification of measures aimed at increasing awareness of the principles of rational antibacterial therapy.

## Object, materials and methods

A cross-sectional sociological study was conducted among 744 randomly selected individuals from December 2024 to January 2025. To assess awareness, practices, and attitude towards antibiotic use, we adapted a World Health Organization questionnaire previously used in 12 countries of the world [7]. The survey was conducted with the assistance of members of the Dnipropetrovsk Region Family Medicine Association.

Among the respondents, 66.7% were women, 33.3% were men. The average age of the respondents was

48 (39–64) years. Most participants resided in urban areas (83%), while 17.0% lived in rural areas. Regarding education, 49.3% of the respondents had general secondary or secondary specialized education, and 50.7% had incomplete higher or higher education. Representatives of almost all socio-professional categories participated in the study (Fig. 1).

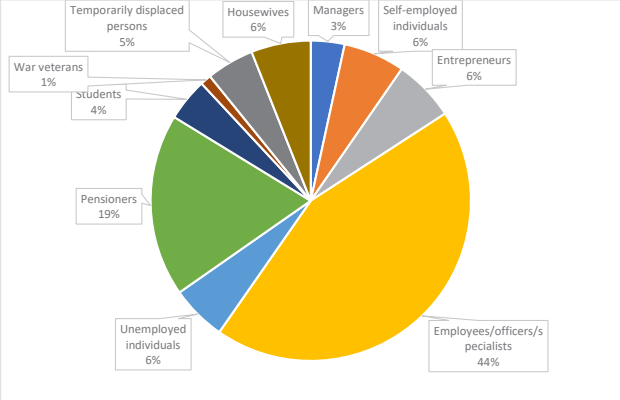


**Fig. 1. Composition of respondents by socio-professional categories (%)**

The study was conducted in accordance with the principles of bioethics and medical deontology, as confirmed by the conclusion of the Biomedical Ethics Commission of the Dnipro State Medical University (Protocol No. 26 dated March 19, 2025).

**Data processing:** Statistical data processing was carried out using STATISTICA 6.1 software (StatSoft Inc., serial number AGAR909E415822FA). To describe asymmetric distributions, the median (Me) with interquartile range (25%; 75%) was used. Relative indicators were estimated by calculating 95% confidence intervals (CI) using the adjusted Wald method.

Statistical analysis included assessing the relationship between variables using Spearman's rank correlation analysis ($r_s$), as well as determining the relationship between dependent and independent variables using the multiple regression analysis method. All types of analysis were performed with a critical level of statistical significance $p<0.05$.

## Results

Among all respondents, only 3.4% (95% CI 2.1–4.7) had never used antibiotics. Frequent (2–3 times a year) or very frequent (almost annually) use of antibacterial drugs was reported by 42.8% (95% CI 39.2–46.4) of respondents, while the majority (53.8%; 50.2–57.4) reported that they rarely took antibiotics (Fig. 2).

Respondents most often associated their most recent use of antibiotics with the treatment of bronchitis (29.1%), pneumonia (16.0%), tonsillitis (12.1%) and urinary tract infections (11.4%). However, some respondents also reported using antibiotics for flu (7.6%), colds (5.7%), sore throat (5.5%) and cough (5.4%).

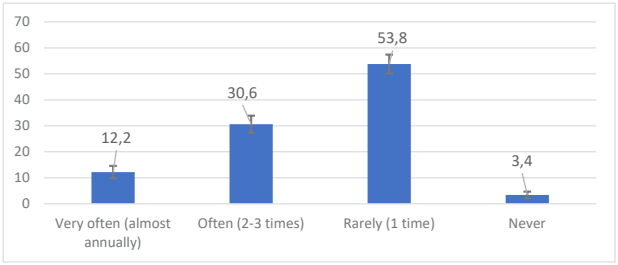


**Fig. 2. Frequency of antibiotic use by the population (% of respondents, CI)**

The question "Who prescribed antibiotic treatment?" was answered by 96.6% of respondents who used antimicrobial drugs. Among them, 78.3% (75.3–81.3%) indicated that the drugs were prescribed by family doctors, 16.7% (14.0–19.4%) – by doctors of other specialties. Some respondents indicated several answers, and the most common combination was family doctors and doctors of other specialties. In 18.0% (15.7–20.3%) of cases, respondents were guided by the advice of pharmacists, family members, acquaintances, users of Internet communities or made their own decisions regarding the use of antibiotics. At the same time, 8.0% (6.0–10.0) noted that they used antibiotics both as prescribed by a doctor and without his recommendations, and 10.0% (7.8–12.2%) indicated that they took antibiotics without the participation of medical professionals at all. This practice was observed somewhat more often among residents of rural areas ($r_s$=0.10; $p < 0.05$), which may be due to limited access to qualified medical care for this population group.

A total of 67.3% (63.9–70.7) of respondents reported that they underwent certain tests before starting antibiotics during their most recent infectious disease case to determine its cause. The remaining respondents indicated that antibiotics were prescribed without any additional examination.

The majority of respondents (84.3%; 81.7–86.9) are aware of the ban on the sale of antibiotics without a doctor's prescription, but only half of respondents (52.8%; 49.2–56.4) support this initiative. About one-third (30.6%; 27.3–33.9) hold a negative attitude towards the ban on the free purchase of antibiotics, and the remaining respondents found it difficult to answer.

According to respondents, the main way to purchase antibiotics was to get them at a pharmacy with a doctor's prescription (57.7%). Another 6.7% received antibiotics in a medical institution (inpatient). However, a significant part of the study participants purchased antibiotics based on a doctor's written recommendation (17.1%) or without any prescription and formal medical prescriptions (13.5%). In addition, 4.5% of respondents indicated that they took leftover antibiotics from previous treatment when similar symptoms appeared, and 3.0% received medication from family members or acquaintances (Fig. 3).

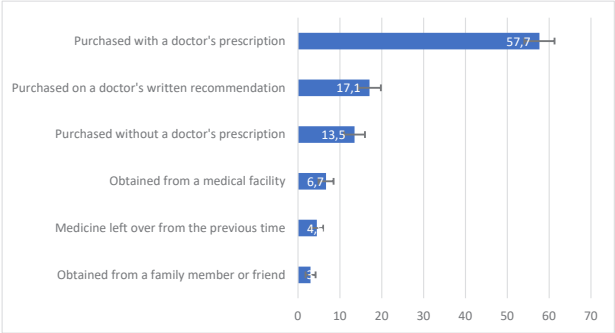


**Fig. 3. Methods of obtaining antibiotics (% of respondents, CI)**

The decision to purchase a particular drug depends most on the patient's well-being (34.5%; 31.1–37.9%), as well as on the price-effectiveness ratio (29.1%; 25.8–32.4%), and to a lesser extent on the cost of the drug (18.2%; 15.4–21.0%). More than half of the respondents (53.6%; 50.0–57.2%) asked for additional information about the antibiotic when purchasing it at a pharmacy. In particular, they were interested in data on the quality of the drug (27.6%, which is half of all those who expressed interest), the manufacturer (11.2%), and the pharmacist's help in choosing among several analogues (7.4%).

According to the respondents, among patients who took antibiotics, the majority (79.9%; 77.0–82.8) used them in solid form (tablets or capsules). At the same time, every fifth (19.7%; 16.8–22.6) received antibiotics in injectable form, and in 60% of cases they were prescribed by family doctors. A small proportion of patients (0.4%) used local remedies, such as ointments and creams.

According to the results of our study, a significant proportion of respondents (73.9%; 70.7–77.1) used drugs to normalize intestinal microflora while taking antibiotics. At the same time, more than a quarter of respondents (26.1%; 22.9–29.3) noted that they did not use such drugs or could not answer this question.

Two-thirds of respondents (62.6%; 59.1–66.1) noted that they stop taking antibiotics after completing the course prescribed by a doctor or indicated in the instructions. The rest of the respondents are guided by other motives, in particular, improving well-being (6.5%; 4.7–8.3) or completing a 7–10-day course of treatment (20.7%; 17.8–23.6). Compliance with the rules for taking antibiotics has a weak association with gender and age: women: women and older people are more likely to follow the doctor's prescription ($r_s$=0.13; $p < 0.05$). There is also a connection with the level of education: people with higher education demonstrate greater adherence to correct antibiotic treatment ($r_s$=0.15; $p < 0.05$).

A substantial proportion of respondents (65.1%, 61.7–68.5) reported having received information regarding the risks associated with the improper use of antibiotics. In contrast, the remaining participants either did not receive such information or were unable to clearly indicate whether they had.

The characteristics of the knowledge of the study participants about the indications for the use of antibiotics and factors affecting their effectiveness are presented in the table. The vast majority of the study participants (84.8%) demonstrated correct beliefs that antibiotics kill bacteria. About ¾ of respondents stated that improper use of antibiotics, including their frequent use or skipping doses, negatively affects the effectiveness of treatment (76.2%, 73.5% and 78% of respondents, respectively). The majority of respondents also know that adverse reactions may occur during antibiotic treatment (84.1%), in particular dysbacteriosis, allergies, etc. (76.9% and 79.2%, respectively).

Table 1

**Respondents' assessment of various aspects of antibiotic use and effectiveness, % (95% CI)**

| Statement | Rating | | |
|---|---|---|---|
| | True | False | No answer |
| Antibiotics kill viruses | 23,5 20,4–26,6 | 64 60,5–67,5 | 11,6 9,3–13,9 |
| Antibiotics kill bacteria | 84,8 82,2–87,4 | 8,6 6,6–10,6 | 6,6 4,8–8,4 |
| Antibiotics are effective in acute respiratory viral infections (colds) | 20,4 17,5–23,3 | 67,7 64,3–71,1 | 11,8 9,5–14,1 |
| Antibiotics are used to prevent infectious diseases | 22,3 19,3–25,3 | 64,9 61,5–68,3 | 12,8 10,4–15,2 |
| Antibiotics can cause allergic reactions | 79,2 76,3–82,1 | 10,3 8,1–12,5 | 10,5 8,3–12,7 |
| Antibiotics are safe during pregnancy | 17,9 15,1–20,7 | 69,9 66,6–73,2 | 12,2 9,8–14,6 |
| Antibiotics are safe during breastfeeding | 19,2 16,4–22,0 | 68,1 64,8–71,4 | 12,6 10,2–15,0 |
| Frequent use of antibiotics reduces their effectiveness | 73,5 70,3–76,7 | 16,4 13,7–19,1 | 10,1 7,9–12,3 |
| Missing antibiotics affects their effectiveness | 78,0 75,0–81,0 | 11,7 9,4–14,0 | 10,3 8,1–12,5 |
| Incorrect use of antibiotics can lead to their ineffectiveness in the future. | 76,2 74,0–78,4 | 13,6 11,1–16,1 | 10,2 8,0–12,4 |
| Side effects may occur when taking antibiotics | 84,1 81,5–86,7 | 6,6 4,8–8,4 | 9,3 7,2–11,4 |
| The use of antibiotics causes dysbacteriosis | 76,9 73,9–79,9 | 14,1 11,6–16,6 | 9,0 6,9–11,1 |

At the same time, about a third of the participants supported incorrect statements or refused to evaluate them, in particular, that antibiotics kill viruses, are effective for colds and can be used to prevent infectious diseases (35.1%, 32.2% and 35.1% of respondents, respectively), as well as that taking antibiotics is safe during pregnancy and breastfeeding (30.1% and 31.8%, respectively). No significant relationships were found between public

knowledge about antibiotics and the age, gender, education, position and place of residence of the respondents ($p > 0.05$).

Correlation analysis showed that awareness of this problem has a positive effect on a number of factors related to the use of antibiotics: completion of the full course of antibiotics prescribed by a doctor ($r_s = 0.28$; $p < 0.001$), use of drugs that normalize intestinal microflora during treatment ($r_s = 0.24$; $p < 0.001$), approval of the ban on the sale of antibiotics without a prescription ($r_s = 0.34$; $p < 0.001$).

The equation for the regression analysis of the interaction of these factors has the following form:

$$\mathbf{Y = 0{,}510 + 0{,}183x_1 + 0{,}185x_3 + 0{,}285x_4},$$

where:

**Y** – receiving information about the correct use of antibiotics,

$\mathbf{x_1}$ – taking the full course of antibiotics prescribed by a doctor,

$\mathbf{x_2}$ – using drugs that normalize the intestinal microflora,

$\mathbf{x_3}$ – attitude towards the ban on the sale of antibiotics without a prescription.

## Discussion

The sociological survey showed that more than half of the respondents had a high level of awareness of antibiotics and experience in their adequate practical use. At the same time, a significant part of the respondents identified significant problems associated with the irrational use of antimicrobial drugs, which indicates gaps in understanding the basic principles of antibiotic therapy and emphasizes the need for further information and educational work among the population.

The most common violations were: taking antibiotics without prior consultation with a doctor (18% of respondents), purchasing antibacterial drugs without a prescription and self-medication (42.3%), and not following the recommended duration of treatment (37.4%).

Similar trends in the unreasonable use of antibiotics are observed in other countries. In particular, in Southern Italy, 25.5% of study participants noted that they bought antibiotics without a prescription, and 30.6% engaged in self-medication [9, which is comparable to the indicators obtained in our study. The experience of some Asian countries demonstrates similar problems, but with a more pronounced intensity. For example, in Qatar, 23% of respondents received antibiotics in a pharmacy without a prescription, 82% used antimicrobial drugs on their own, and 45% did not complete the full course of treatment [10]. In China, 59.02% of respondents reported purchasing antibiotics without a prescription, 76.56% reported stopping the medication early, and 39.63% reported self-medicating with antibiotics [11]. At the same time, there is compelling evidence that premature and unjustified discontinuation of antibiotic therapy is a critical factor in the development of AMR, as it can contribute to resistance to drugs for the treatment of infections caused by other microbes, parasites, viruses, and fungi in the future [11].

It is also worth noting that a significant proportion of respondents received antibacterial drugs in injectable form as prescribed by family doctors, which contradicts the provisions of the Medical Care Standard "Rational Use of Antibacterial Drugs" in force in Ukraine, which limits the use of injectable forms at the primary care level [4].

A separate problem is the lack of attention to concomitant therapy during antibiotic therapy: about 25% of respondents did not use probiotics during treatment. This is of concern, as numerous studies confirm the link between antibiotic use and a decrease in intestinal microbiota diversity, which can lead to the development of complications, including dysbiosis [12].

It has been proven that the level of public awareness significantly affects the rational use of antibiotics [13]. According to a systematic review of current scientific sources, insufficient public awareness is one of the key factors in the spread of AMR in the countries of the European region and thus poses a threat to public health [14]. The study revealed significant gaps in the knowledge of respondents regarding the specifics of the use of antibacterial drugs and their impact on the development of AMR. Similar conclusions have been obtained by other researchers in different countries of the world [15; 16], which indicates the global nature of the problem.

Therefore, there is an objective need to develop and implement comprehensive educational programs aimed at eliminating key gaps in the knowledge of the population, changing behavioral patterns regarding the use of antibiotics, as well as forming a conscious attitude towards antibiotic therapy [17]. The need to obtain more information about antibiotics and the specifics of their use is supported by a significant proportion of the participants in our study (56.3%; 52.7–59.9%). The greatest interest in them is caused by topics related to the rational use of antibacterial drugs and indications for their appointment (25.5%; 22.4–28.6%), the problem of AMR (20.3%; 17.4–23.2%), as well as the use of antibiotics in agriculture and food production (8.7%; 6.7–10.7%).

## Prospects for further research

Development of a set of measures to increase awareness of different population groups regarding the rational use of antibiotics using adapted educational campaigns and various communication channels. Further development of indicative monitoring indicators for increasing awareness of different population groups regarding the rational use of antibiotics is necessary.

## Conclusions

1. The study found a high prevalence of inappropriate use of antibiotics among the population, which contradicts the requirements of the current Standard of Medical Care for the Use of Antimicrobial Drugs. In particular, cases of self-medication, use of antibiotics without a prescription, and non-compliance with the prescribed course of therapy were identified.

2. The level of public awareness of the rational use of antibiotics is insufficient, which leads to the spread of misconceptions about their effectiveness in viral infections and the risks of developing antimicrobial resistance.

3. There is an urgent need to develop and implement targeted educational programs and activities aimed at increasing the level of public knowledge about antibiotics, eliminating key gaps in understanding the mechanisms of their action, forming a responsible attitude to antibiotic therapy and correcting behavioral models in the context of the rational use of antimicrobial drugs, and conducting communication campaigns to promote a value-based attitude to health.

## Bibliography

1. Global Action Plan on Antimicrobial Resistance. Geneva: World Health Organization; 2015. 28 p. [Інтернет]. Доступно на: https://iris.who.int/bitstream/handle/10665/193736/9789241509763_eng.pdf?sequence=1

2. WHO implementation handbook for national action plans on antimicrobial resistance: guidance for the human health sector. Geneva: World Health Organization; 2022. 80 p. [Інтернет]. Доступно на: https://iris.who.int/bitstream/handle/10665/352204/9789240041981-eng.pdf

3. Про організацію профілактики інфекцій та інфекційного контролю в закладах охорони здоров'я та установах/ закладах надання соціальних послуг/ соціального захисту населення: наказ Міністерства охорони здоров'я України від 03.08.2021 № 1614. [Інтернет]. Доступно на: https://zakon.rada.gov.ua/laws/show/z1318-21#Text

4. Про затвердження Стандарту медичної допомоги «Раціональне застосування антибактеріальних і антифунгальних препаратів з лікувальною та профілактичною метою»: наказ МОЗ України від 23.08.2023 № 1513. [Інтернет]. Доступно на: https://moz.gov.ua/uk/decrees/nakaz-moz-ukraini-vid-23082023--1513-pro-zatverdzhennja-standartu-medichnoi-dopomogi-racionalne-zastosuvannja-antibakterialnih-i-antifungalnih-preparativ-z-likuvalnoju-ta-profilaktichnoju-metoju

5. Про схвалення Стратегії розвитку системи охорони здоров'я на період до 2030 року та затвердження операційного плану заходів з її реалізації у 2025-2027 роках: Розпорядження Кабінету Міністрів України від 17.01.2025 № 34-р. [Інтернет]. Доступно на: https://zakon.rada.gov.ua/laws/card/34-2025-%D1%80

6. Про схвалення Державної стратегії боротьби із стійкістю до протимікробних препаратів на період до 2030 року та затвердження операційного плану заходів з її реалізації у 2024-2026 роках: Розпорядження Кабінету Міністрів України від 13.12.2024 р. № 1265-р. [Інтернет]. Доступно на: https://zakon.rada.gov.ua/laws/show/1265-2024-%D1%80#Text

7. Antibiotic Resistance: Multi-country public awareness survey. Geneva: World Health Organization; 2015. 59 p. [Інтернет]. Доступно на: https://iris.who.int/bitstream/handle/10665/194460/9789241509817_eng.pdf

8. People's knowledge, attitudes and behaviours pertaining to antimicrobial resistance: cross-sectional survey of 14 Member States in the WHO European Region. Copenhagen: WHO Regional Office for Europe; 2024. 92 p. [Інтернет]. Доступно на: https://www.who.int/bosnia-and-herzegovina/publications/i/item/WHO-EURO-2024-10244-50016-75268

9. Bianco A, Licata F, Zucco R, Papadopoli R, Pavia M. Knowledge and practices regarding antibiotics use: Findings from a cross-sectional survey among Italian adults. Evol Med Public Health. 2020 Jul 30;2020(1):129-138. DOI: 10.1093/emph/eoaa028.

10. Aljayyousi GF, Abdel-Rahman ME, El-Heneidy A, Kurdi R, Faisal E. Public practices on antibiotic use: A cross-sectional study among Qatar University students and their family members. PLoS One. 2019 Nov 26;14(11):e0225499. DOI: 10.1371/journal.pone.0225499.

11. Lin R, Duan L, Liu C, Wang D, Zhang X, Wang X, et al. The public's antibiotic use behavioural patterns and their determinants for upper respiratory tract infections: a latent class analysis based on consumer behaviour model in China. Front Public Health. 2023; 11:1231370. DOI: 10.3389/fpubh.2023.1231370

12. Yang L, Bajinka O, Jarju PO, Tan Y, Taal AM, Ozdemir G. The varying effects of antibiotics on gut microbiota. AMB Express. 2021 Aug 16;11(1):116. DOI: 10.1186/s13568-021-01274-w

13. Lim JM, Duong MC, Cook AR, Hsu LY, Tam CC. Public knowledge, attitudes and practices related to antibiotic use and resistance in Singapore: a cross-sectional population survey. BMJ Open. 2021 Sep 13;11(9):e048157. DOI: 10.1136/bmjopen-2020-048157.

14. Machowska A, Stålsby Lundborg C. Drivers of Irrational Use of Antibiotics in Europe. Int. J. Environ. Res. Public Health 2019;16(1):27. DOI: 10.3390/ijerph16010027.

15. Wang Q, Wu Y, Wang D, et al. The impacts of knowledge and attitude on behavior of antibiotic use for the common cold among the public and identifying the critical behavioral stage: based on an expanding KAP model. BMC Public Health 23, 2023; 1683. DOI: 10.1186/s12889-023-16595-7

16. Geta K, Kibret M. Knowledge, Attitudes and Practices of Patients on Antibiotic Resistance and Use in Public Hospitals of Amhara Regional State, Northwestern Ethiopia: A Cross-Sectional Study. Infect Drug Resist. 2022 Jan 22;15:193-209. DOI: 10.2147/IDR.S348765

17. Alhur A, Alghamdi L, Alqahtani F, Alshammari M, Hattany H, Akshah A, Al Ahmary A, Aloqran R, Olagi E, Alshahrani NS, Al-Qahtani R, Alqahtani J, Alghamdi L, Alharbi A, Alshokani S. A Study of Awareness, Knowledge, Attitudes, and Practices Regarding Antibiotic Resistance. Cureus. 2024 Jun 21;16(6):e62854. DOI: 10.7759/cureus.62854

## References

1. Global Action Plan on Antimicrobial Resistance. Geneva: World Health Organization; 2015. 28 p. [Internet]. Available from: https://iris.who.int/bitstream/handle/10665/193736/9789241509763_eng.pdf?sequence=1

2. WHO implementation handbook for national action plans on antimicrobial resistance: guidance for the human health sector. Geneva: World Health Organization; 2022. 80 p. [Internet]. Available from: https://iris.who.int/bitstream/handle/10665/352204/9789240041981-eng.pdf

3. Pro orhanizatsiyu profilaktyky infektsiy ta infektsiynoho kontrolyu v zakladakh okhorony zdorov'ya ta ustanovakh/ zakladakh nadannya sotsial'nykh posluh/ sotsial'noho zakhystu naselennya [On the organization of infection prevention and infection control

in health care facilities and institutions/social service institutions/social protection of the population]. Nakaz Ministerstva okhorony zdorov'ya Ukrayiny vid 03.08.2021 № 1614. [Internet]. Available from: https://zakon.rada.gov.ua/laws/show/z1318-21#Text (in Ukrainian).

4. Pro zatverdzhennya Standartu medychnoyi dopomohy «Ratsional'ne zastosuvannya antybakteryal'nykh i antyfunhal'nykh preparativ z likuval'noyu ta profilaktychnoyu metoyu» [On the approval of the Standard of medical care "Rational use of antibacterial and antifungal drugs for therapeutic and prophylactic purposes"]. Nakaz Ministerstva okhorony zdorov'ya Ukrayiny vid 23.08.2023 No. 1513. [Internet]. Available from: https://moz.gov.ua/uk/decrees/nakaz-moz-ukraini-vid-23082023--1513-pro-zatverdzhennja-standartu-medichnoi-dopomogi-racionalne-zastosuvannja-antibakterialnih-i-antifungalnih-preparativ-z-likuvalnoju-ta-profilaktichnoju-metoju (in Ukrainian).

5. Pro skhvalennya Stratehiyi rozvytku systemy okhorony zdorov'ya na period do 2030 roku ta zatverdzhennya operatsiynoho planu zakhodiv z yiyi realizatsiyi u 2025-2027 rokakh: [On approval of the Strategy for the development of the health care system for the period up to 2030 and approval of the operational action plan for its implementation in 2025-2027]. Rozporyadzhennya Kabinetu Ministriv Ukrayiny vid 17.01.2025 № 34-r. [Internet]. Available from: https://zakon.rada.gov.ua/laws/card/34-2025-%D1%80 (in Ukrainian).

6. Pro skhvalennia Derzhavnoi stratehii borotby iz stiikistiu do protymikrobnykh preparativ na period do 2030 roku ta zatverdzhennia operatsiinoho planu zakhodiv z yii realizatsii u 2024-2026 rokakh. [On approval of the State Strategy for Combating Antimicrobial Resistance for the period until 2030 and approval of the operational plan of measures for its implementation in 2024-2026]. Rozporiadzhennia Kabinetu Ministriv Ukrainy vid 13.12.2024 r. № 1265-r. [Internet]. Available from: https://zakon.rada.gov.ua/laws/show/1265-2024-%D1%80#Text (in Ukrainian).

7. Antibiotic Resistance: Multi-country public awareness survey. Geneva: World Health Organization; 2015. 59 p. [Internet]. Available from: https://iris.who.int/bitstream/handle/10665/194460/9789241509817_eng.pdf

8. People's knowledge, attitudes and behaviours pertaining to antimicrobial resistance: cross-sectional survey of 14 Member States in the WHO European Region. Copenhagen: WHO Regional Office for Europe; 2024. 92 p. [Internet]. Available from: https://www.who.int/bosnia-and-herzegovina/publications/i/item/WHO-EURO-2024-10244-50016-75268

9. Bianco A, Licata F, Zucco R, Papadopoli R, Pavia M. Knowledge and practices regarding antibiotics use: Findings from a cross-sectional survey among Italian adults. Evol Med Public Health. 2020 Jul 30;2020(1):129-138. DOI: 10.1093/emph/eoaa028.

10. Aljayyousi GF, Abdel-Rahman ME, El-Heneidy A, Kurdi R, Faisal E. Public practices on antibiotic use: A cross-sectional study among Qatar University students and their family members. PLoS One. 2019 Nov 26;14(11):e0225499. DOI: 10.1371/journal.pone.0225499.

11. Lin R, Duan L, Liu C, Wang D, Zhang X, Wang X, et al. The public's antibiotic use behavioural patterns and their determinants for upper respiratory tract infections: a latent class analysis based on consumer behaviour model in China. Front Public Health. 2023; 11:1231370. DOI: 10.3389/fpubh.2023.1231370

12. Yang L, Bajinka O, Jarju PO, Tan Y, Taal AM, Ozdemir G. The varying effects of antibiotics on gut microbiota. AMB Express. 2021 Aug 16;11(1):116. DOI: 10.1186/s13568-021-01274-w

13. Lim JM, Duong MC, Cook AR, Hsu LY, Tam CC. Public knowledge, attitudes and practices related to antibiotic use and resistance in Singapore: a cross-sectional population survey. BMJ Open. 2021 Sep 13;11(9):e048157. DOI: 10.1136/bmjopen-2020-048157.

14. Machowska A, Stålsby Lundborg C. Drivers of Irrational Use of Antibiotics in Europe. Int. J. Environ. Res. Public Health 2019;16(1):27. DOI: 15.3390/ijerph16010027.

15. Wang Q, Wu Y, Wang D, et al. The impacts of knowledge and attitude on behavior of antibiotic use for the common cold among the public and identifying the critical behavioral stage: based on an expanding KAP model. BMC Public Health 23, 2023; 1683. DOI: 10.1186/s12889-023-16595-7

16. Geta K, Kibret M. Knowledge, Attitudes and Practices of Patients on Antibiotic Resistance and Use in Public Hospitals of Amhara Regional State, Northwestern Ethiopia: A Cross-Sectional Study. Infect Drug Resist. 2022 Jan 22;15:193-209. DOI: 10.2147/IDR.S348765

17. Alhur A, Alghamdi L, Alqahtani F, Alshammari M, Hattany H, Akshah A, Al Ahmary A, Aloqran R, Olagi E, Alshahrani NS, Al-Qahtani R, Alqahtani J, Alghamdi L, Alharbi A, Alshokani S. A Study of Awareness, Knowledge, Attitudes, and Practices Regarding Antibiotic Resistance. Cureus. 2024 Jun 21;16(6):e62854. DOI: 10.7759/cureus.62854

**Purpose:** To investigate the level of knowledge, practice, and attitude of the population towards the use of antibiotics in the treatment of infectious diseases, with subsequent scientific substantiation of measures aimed at increasing awareness of the principles of rational antibiotic therapy.

**Materials and methods**: The cross-sectional survey of 744 Ukrainian adults was conducted between December 2024 and January 2025. Data collection was conducted using an adapted World Health Organization questionnaire for the public, and the results were analyzed using descriptive and analytical statistical methods.

**Results.** Only 3.4% of participants reported never taking antibiotics, whereas 42.8% indicated frequent or widespread usage. Inappropriate practices were widespread: 18% obtained antibiotics without a prescription or medical guidance, relying instead on pharmacists or self-diagnosis; 32.7% initiated therapy without prior diagnostic testing; and 19.7% received injectable antibiotics, with 60% of these administered by family physicians despite restrictions on such practices in primary care settings. Additionally, 26.1% did not incorporate probiotics during treatment. Merely 62.6% adhered to completing the prescribed course or following instructional guidelines. Although 84.3% were aware of the prescription-only antibiotic policy, only 52.8% adhered to it. The survey identified substantial knowledge gaps: approximately one-third of participants incorrectly believed antibiotics are effective against viral infections or considered them safe during pregnancy and breastfeeding.

**Conclusions.** The findings highlight the ongoing problem of inappropriate antibiotic use in Ukraine. Targeted educational programs are essential to increase public understanding and encourage responsible antibiotic use.

**Key words:** antibiotic use, antimicrobial resistance, public awareness, attitude, public health.

**Мета –** дослідити рівень знань, практику застосування та ставлення населення до використання антибіотиків при лікуванні інфекційних захворювань з подальшим науковим обґрунтуванням заходів, спрямованих на підвищення обізнаності щодо принципів раціональної антибіотикотерапії.

**Матеріали та методи.** Проведено перехресне соціологічне дослідження серед 744 дорослих у період з грудня 2024 р. по січень 2025 р. Для збору даних використано адаптований опитувальник Всесвітньої організації охорони здоров'я для громадськості. Анкетування проводилося за участі членів Асоціації сімейної медицини Дніпропетровської області. Серед респондентів 66,7% становили жінки, 33,3% – чоловіки, середній вік – 48 (міжквартильний розмах 39–64) років. 83% учасників проживали у міській місцевості, 17% – у сільській. Рівень освіти: 49,3% мали середню або середню спеціальну освіту, 50,7% – неповну вищу або вищу освіту. Дослідження охопило представників різних соціально-професійних категорій. Статистичну обробку даних здійснювали за допомогою програмного забезпечення STATISTICA 6.1 (StatSoft Inc., серійний номер AGAR909E415822FA). Для опису даних застосовано медіану з міжквартильним розмахом, 95% довірчі інтервали обчислювалися за методом Вальда. Взаємозв'язки оцінювали за допомогою рангової кореляції Спірмена та множинного регресійного аналізу.

**Результати.** Лише 3,4% респондентів повідомили, що не вживали антибіотиків, тоді як 42,8% повідомили про часте або дуже часте використання. Нераціональне використання антибіотиків було поширеним: 18% респондентів використовували антибіотики без рецепта чи медичної рекомендації, покладаючись на поради фармацевта чи самодіагностику; 32,7% не проходили діагностичне тестування перед застосуванням антибіотиків; 19,7% отримували ін'єкційні антибіотики, причому в 60% випадків їх призначали сімейні лікарі, незважаючи на заборону такого застосування в закладах первинної медичної допомоги. Крім того, 26,1% респондентів не використовували пробіотики під час антибіотикотерапії. Лише 62,6% опитаних зазначили, що припиняють прийом антибіотиків після завершення курсу лікування, призначеного лікарем або зазначеного в інструкції; решта респондентів керується іншими мотивами. Встановлено, що жінки, особи старшого віку та люди з вищою освітою більш схильні дотримуватись лікарських рекомендацій. Хоча 84,3% знали про політику призначення антибіотиків тільки за рецептом, лише 52,8% підтримали цю ініціативу. Більшість респондентів (84,8%) знали, що антибіотики діють проти бактерій. Близько ¾ респондентів заявили, що неправильний прийом антибіотиків, включаючи їх часте застосування або пропуск прийому, негативно впливає на ефективність лікування та сприяє розвитку антимікробної резистентності (76,2%, 73,5% та 78% опитаних відповідно). Також більшість опитаних знає, що під час лікування антибіотиками можуть виникати побічні реакції (84,1%), зокрема дисбактеріоз, алергія тощо (76,9% та 79,2% відповідно). Водночас третина респондентів мала хибні уявлення про застосування антибіотиків при вірусних інфекціях, для профілактики і про безпеку їх прийому під час вагітності та годування груддю. Регресійний аналіз показав, що підвищення поінформованості населення позитивно корелює з дотриманням призначених курсів антибіотиків, застосуванням пробіотиків і підтримкою політики призначення їх лише за рецептом. Необхідність отримання більше інформації про антибіотики та особливості їх застосування підтримала значна частка учасників дослідження (56,3%; 52,7–59,9%). Найбільший інтерес у них викликають теми, пов'язані з раціональним використанням антибактеріальних препаратів та показаннями до їх призначення (25,5%; 22,4–28,6%) та проблемою антимікробної резистентності (20,3%; 17,4–23,2%).

**Висновки.** Дослідження встановило високий рівень поширеності неналежного використання антибіотиків серед населення, що суперечить чинним вимогам Стандарту медичної допомоги щодо застосування антимікробних препаратів. Рівень обізнаності населення щодо раціонального застосування антибіотиків є недостатнім, що спричиняє поширенню хибних уявлень про їхню ефективність при вірусних інфекціях та ризики розвитку антимікробної резистентності. Існує нагальна потреба у розробці та впровадженні цільових освітніх програм і заходів, спрямованих на підвищення рівня знань населення про антибіотики, усунення ключових прогалин у розумінні механізмів їхньої дії, формування відповідального ставлення до антибіотикотерапії та корекцію поведінкових моделей у контексті раціонального використання антимікробних препаратів.

**Ключові слова:** використання антибіотиків, антимікробна резистентність, обізнаність населення, ставлення, громадське здоров'я.

**Conflict of interest:** the authors declare no conflict of interest.
**Конфлікт інтересів**: відсутній.

### Information about the authors

**Lekhan Valeriia Mykytivna** – Doctor of Medical Sciences, Professor, Honored Worker of Science and Technology of Ukraine, Professor at the Department of Social Medicine, Public Health and Health Care Management, Dnipro State Medical University; Volodymyr Vernadsky St., 9, Dnipro, Ukraine, 49044.
v.n.lexan@gmail.com, ORCID ID 0000-0003-2953-3292 [A, B, C, D, E, F]

**Puchkova Nadiia Volodymyrivna** – Expert at the Department of Health of the Dnipropetrovsk Regional State Administration in the field of "General Practice – Family Medicine"; Oleksandra Polia Avenue, 2, Dnipro, Ukraine, 49000.
puchkova@adm.dp.gov.ua, ORCID ID 0009-0008-8777-8611 [B, D, F]

**Zaiarskiy Mykola Ivanovich** – Candidate of Medical Sciences, Associate Professor, Associate Professor at the Department of Social Medicine, Public Health and Health Care Management, Dnipro State Medical University; Volodymyr Vernadsky St., 9, Dnipro, Ukraine, 49044.
zayarskiy@gmail.com, ORCID ID 0000-0003-2351-5755 [B, D, F]

*Стаття надійшла до редакції 20.03.2025*
*Дата першого рішення 18.04.2025*
*Стаття подана до друку 05.06.2025*