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## Original Research

# Public knowledge, attitudes and practices regarding antibiotic use in Kosovo

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### Abstract

**Background:** Antimicrobial resistance is becoming a major public health challenge worldwide, caused primarily by the misuse of antibiotics. Antibiotic use is closely related to the knowledge, attitudes and behaviour of a population.

**Objective:** The objective of this study was to assess the level of knowledge, attitudes and practices about antibiotic use among the general public in Kosovo.

**Methods:** A cross-sectional face-to-face survey was carried out with a sample of 811 randomly selected Kosovo residents. The methodology used for this survey was based on the European Commission Eurobarometer survey on antimicrobial resistance.

**Results:** More than half of respondents (58.7%) have used antibiotics during the past year. A quarter of respondents consumed antibiotics without a medical prescription. The most common reasons for usage were flu (23.8%), followed by sore throat (20.2%), cold (13%) and common cold (7.6%). 42.5% of respondents think that antibiotics are effective against viral infections. Almost half of respondents (46.7%) received information about the unnecessary use of antibiotics and 32.5% of them report having changed their views and behaviours after receiving this information. Health care workers were identified as the most trustworthy source of information on antibiotic use (67.2%).

**Conclusion:** These results provide quantitative baseline data on Kosovar knowledge, attitudes and practice regarding the use of antibiotic. These findings have potential to empower educational campaigns to promote the prudent use of antibiotics in both community and health care settings.

### Keywords

Health Knowledge, Attitudes, Practice; Anti-Bacterial Agents; Drug Resistance, Bacterial; Patient Acceptance of Health Care; Surveys and Questionnaires; Kosovo

## INTRODUCTION

Antimicrobial resistance is one of the major public health challenges worldwide with an impact on increasing morbidity, mortality and costs.<sup>1,2</sup> Inappropriate use of antimicrobials is the most important cause of emerging resistance of microorganisms in the community and hospitals.<sup>3,4</sup> Antibiotic use is closely related to the attitudes

and behaviour of populations. Insufficient knowledge on antibiotic use and resistance is strongly correlated with increased use of these drugs in communities.<sup>5,6</sup>

High antibiotic consumption is the result of many factors, such are non-restrictive prescription by physicians, over the counter sales, lack of consistent policies on antibiotic usage and patient exposure to increasingly more resistant microorganisms.<sup>7,8</sup>

Kosovo, with a population approaching 2 million in an area of 10,908 sq-km, is located in the south-east of Europe in the region of the Balkans. Health care in Kosovo has undergone important reforms in the last decade and faces immense difficulties and obstacles, the most important of which are a lack of political commitment and scarce resources.<sup>9</sup> No health insurance system has been established yet, which represents a key obstacle to efforts to improve the health care sector. The budget for the healthcare system in Kosovo for the year 2015 was only 160 million Euros (80 Euro/ per capita); the budget dedicated to the pharmaceutical sector was only 19.8 million Euros.<sup>10</sup>

Kosovo ranks high in total consumption of antibiotics in Europe, with a wholesale level of 26.3 DID (Defined Daily Doses/1000 inhabitants/day); it holds sixth place for cephalosporin consumption (DID 4.0) and is the European leader with the highest proportional total parenteral use of ceftriaxone.<sup>11,12</sup> With the exception of vancomycin resistant Enterococci, the resistance rates of all microorganisms to antibiotics tested in susceptibility testing in Kosovo is 2- to 5-fold higher compared to the average rates reported by

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the European Antimicrobial Resistance Surveillance Network (EARS-Net). There are currently no approved treatment guidelines for various infectious diseases at all levels of health care in Kosovo.

The general public plays an important role in reducing the inappropriate use of antibiotics. While there are numerous publications around the world about the knowledge, attitudes, and behaviors of the general public on antibiotic use<sup>13-15</sup>, there are no population-based studies in Kosovo regarding this topic. Therefore, the aim of this survey was to assess knowledge, attitudes and practices among Kosovar citizens on antibiotic use and resistance. This study also aims to: compare results with similar studies in Europe and worldwide, increase public awareness about the importance of the prudent use of antibiotics, identify targets for quality improvement and submit the results to competent bodies for the prevention of antibiotic resistance.

## METHODS

The methodology used for this survey was based and adapted on Eurobarometer survey on antimicrobial resistance by European Commission.<sup>16</sup> The questionnaire, based on The KAP Survey Model (Knowledge, Attitudes, Practices), was initially translated into Albanian and Serbian languages. Translation was evaluated using the standard forward and backward method. Validation of the content of questionnaire was performed by field experts of the Medical School at the University of Prishtina, Kosovo. The questionnaire was initially piloted in a sample of 30 persons; these respondents were not included in the final sample. The interviews for this survey were carried out between March and May, 2014. Data were collected throughout the country, including areas with minority populations.

A total of 811 respondents were included in this study. They were selected randomly and participation in survey was voluntary. Calculation of sample size was performed using Raosoft software with a 5% margin of error, a 95% confidence level and a 50% response distribution. Since the Kosovar population over 15 years of age is estimated at 1,252,248 (according to the Kosovo Agency of Statistics), the calculated minimum sample size was 385. As the study was designed to be representative of the entire country, to increase reliability of sampling and sampling-based coverage, the required sample size was doubled. The sampling points were drawn from each of Kosovo's seven administrative regions after stratification by individual unit and type of area and with probability proportional to population size and density.<sup>16</sup>

Ethical approval was obtained from the Board for Supervision of Professional Ethics at the Ministry of Health of Kosovo. The study was conducted through a face-to-face interview-based on a questionnaire containing both open- and close-ended questions.

The first part of the questionnaire was comprised of demographic characteristics, including gender, age, educational level, occupation, and place of residence. Initially, respondents were asked whether they have taken antibiotics in oral form at any time in the last 12 months. To

establish the most common sources of antibiotics used by Kosovar citizens, the survey asked how respondents obtained the last course of antibiotics they used. Three options were available: from a medical prescription, leftover from a previous course and without prescription from pharmacy.

Respondents who said they had taken antibiotics in the last year were asked for what reasons they had taken them. The interviewer presented respondents with a card containing a variety of illnesses and symptoms.

The second set of questions concerned respondents' objective knowledge of antibiotics. Respondents were asked if each of four statements about antibiotics was 'true' or 'false'. The statements were as follows: a) antibiotics kill viruses; b) antibiotics are effective against cold and flu; c) unnecessary use of antibiotics makes them become ineffective; and d) taking antibiotics often has side-effects, such as diarrhea.

The third set of questions concerns the impact of antibiotic awareness campaigns. Respondents were asked if they remembered receiving any information about the unnecessary use of antibiotics in the last 12 months and to identify the source of this information.

Those respondents who said they received information about antibiotics were asked whether they had changed their mind about antibiotics as a result of that information.

Respondents were asked to give their opinion on which sources of information about antibiotics are the most trustworthy. The interviewer showed the respondent a card with a number of options, from which the respondent could select a maximum of three.

Finally, the respondents were asked to what extent they agree or disagree with the opinion that everyone has a role to play in ensuring that antibiotics remain effective.

Data were presented in tables and charts. Statistical tests were used to determine statistical significance of the data, verified by the confidence level. The data were tested by chi square test and Fisher exact test for reliability level 95%  $p < 0.05$  and 99.7%  $p < 0.01$ .

## RESULTS

The total number of respondents was 811, of which 52.4% were females. According to age-groups, the majority of respondents (35.5%) belonged to the 25-39 years age group. Among all respondents in the survey, most were self-employed (37.3%), or housewives (32%), while the remainder were students and retired people at 11.7% and 19% respectively. One-fourth of respondents (25.9%) came from villages, 26.9% live in small cities and 47.2% in regional centres (Table 1).

The first question in the survey was on the consumption of any antibiotics orally, such as tablets, powder or syrup in the last 12 months. Table 2 shows that 58.7% of respondents have taken antibiotics during the last twelve months when they had health problems. According to gender the women have taken more antibiotics than men, with 63 % vs 54.8 (Fisher's exact test  $P = 0.022$ ).

Characteristics	N	%
Gender		
Male	425	52.4
Female	386	47.6
Age groups		
15-24	103	12.7
25-39	288	35.5
40-54	211	26.0
≥55	209	25.8
Average Age	42.5±14.5	
Range of age	Min 15 year	Max 70 year
Employed status		
Employed	303	37.3
Household	259	32.0
Students	95	11.7
Retired	154	19.0
Locations		
Rural	428	52.8
Urban	383	47.2
Education		
<15	113	13.9
16 - 19	207	25.5
20 +	166	20.5
Still studying	325	40.1

	N	%
Have you taken any antibiotics orally such as tablets, powder or syrup in the last 12 months?		
Yes	476	58.7
No	335	41.3
How did you obtain the last course of antibiotics that you used?		
From a medical prescription	571	70.4
Left over from a previous course	37	4.6
Without prescription from a pharmacy	203	25.0
What was the reason for last taking antibiotics that you used?		
Pneumonia	18	2.2
Bronchitis	24	2.9
Rhino-pharyngitis	49	6.0
Flu	195	23.8
Cold	109	13.3
Sore throat	164	20.2
Cough	62	7.6
Fever	38	4.6
Headache	11	1.3
Diarrhoea	15	1.8
UTI	57	6.9
Skin or wound infection	27	3.3
Other (spontaneous)	14	1.7
Don't know	28	3.4

To determine the sources of antibiotics used by Kosovar citizens, the survey asked how respondents obtained their last course of antibiotics. The majority of respondents (70.4%) answered that they obtained antibiotics from their health care provider with prescription. A quarter of respondents consumed antibiotics without a medical prescription and 4.6% of them used leftover antibiotics.

Respondents who said they had taken antibiotics were also asked for their reasons for using them. The interviewer presented respondents with a list on which a variety of illnesses and symptoms were presented. This question determined the extent to which Kosovo citizens use antibiotics prudently. The most common responses among the listed options are flu (23.8%), followed by sore throat (20.2%), cold (13%), cough (7.6%) and urinary tract infections (6.9%).

A second set of questions contained four statements to measure the knowledge of respondents. They were asked if

it is true or false that antibiotics kill viruses. Only 35% of respondents answered correctly that antibiotics do not kill viruses; 42.5% gave wrong answer, whereas 22% of them were unsure (Chi-square test=50.18; DF=2; p<0.0001).

Respondents were asked whether it was true or false that the unnecessary use of antibiotics makes the antibiotics become ineffective and only 57.8% gave the correct answer. Almost 2/3 (64.4%) of respondents gave the correct answer that antibiotics can have side-effects. One third don't know the answer and 2.2% of respondents gave an incorrect answer.

Only 11.9% of respondents gave correct answers to all questions. Respondents were asked to what extent they agree or disagree with the opinion that everyone has a role to play in ensuring that antibiotics remain effective. Around 30% of respondents agree to a certain extent with this statement. The proportion of respondents who 'totally agree' is 60%.

	N	%
In the last 12 months, Do you remember getting any information about not taking any antibiotics unnecessarily, for example, messages about not taking antibiotics in case of cold or flu? (n=811)		
Yes	379	46.7
No	432	53.3
Where did you first get this information about not taking any antibiotics unnecessarily? (n=379)		
A physician told me	100	26.4
A pharmacist told me	30	7.9
Another health professional (e.g. nurse, physical therapist) told me	25	6.6
A family member or friend told me	23	6.1
I saw it on a TV advertisement	56	14.8
I saw it in a leaflet or on a poster	98	25.9
I read it in a newspaper or I saw it on the TV news	7	1.8
I heard it on the radio	23	6.1
I saw it on the Internet	17	4.5
Other	0	0.0
Don't know	0	0.0
Did the information that you received change your views on antibiotics? (n=379)		
Yes	123	32.5
No	156	41.2
Don't know	100	26.4

Table 4. Which of the following sources of information would you use in order to get trustworthy information on antibiotics?		
	N	%
A physician	408	50.3
A health related magazine	109	13.4
A newspaper or magazine	89	11.0
A nurse	88	10.9
The Internet site from the national Institute of Public Health of Kosovo	32	3.9
A pharmacy	28	3.5
A hospital	19	2.3
A Health Medical Encyclopaedia	16	2.0
The Internet site on Public Health from the European Union	8	1.0
Family or friends	5	0.6
The Internet site from the Ministry of Health	3	0.4
Another health care facility	2	0.2
A national, independent public health body or organisation	2	0.2
Another health related Internet site	1	0.1
Don't know	1	0.1
Total:	811	100.0

Respondents were asked if they remembered receiving any information about the unnecessary use of antibiotics in the last 12 months. 46.7% of respondents said that they received such information (Table 3).

Regarding the source of information, more than half of the subset of respondents receiving information (53.1%) said they received information from media or communication campaigns. The most common media source was leaflet and poster, cited by 25.9% of respondents. A further 14.8% of respondents say they found out via TV advertisements or the television news. 50.9% of all respondents say they received information about antibiotics from a professional (physicians 26.4% and pharmacists 7.9%). Only 1% of respondents say they got information from family or friends

Almost one-third of Kosovars reported that they changed their views after receiving information on antibiotics (32.5%).

Only 10.6% of respondents said they will no longer take antibiotics without a prescription from a physician. 7.3% said they will no longer self-medicate, while 12.2% said they will no longer use left-over antibiotics.

Respondents were asked to give their opinion on which sources of information about antibiotics are the most trustworthy. The significant majority of respondents see physicians as a trustworthy source of information on antibiotics; 67.2% of respondents see medical professionals or health care facilities as the most trustworthy sources of information (Table 4).

## DISCUSSION

This is the first study on public knowledge, attitudes and practices of antibiotics in Kosovo. The methodology used for this survey was based on a European Commission Eurobarometer survey on antimicrobial resistance.

More than half of respondents in Kosovo received antibiotics in oral form at any time during the previous year (58.7%), substantially higher compared to 35% for the Eurobarometer results for the EU 2013.<sup>16</sup> The results for Kosovo are also higher compared to the Southern part of Europe- Malta (48%), Cyprus (47%) and Romania (47%), and

dramatically higher than Sweden (24%) Poland (26%) and Germany (27%).<sup>16</sup>

The majority of Kosovo population obtained antibiotics from a medical prescription (70.4%), compared to EU average of 87%. The lowest levels for the EU are registered in Romania (80%) and Greece (83%), whereas in Finland the coverage was 100%.<sup>16</sup> Antibiotic misuse and resistance presents a challenge for health care system in Kosovo. The main problems in Kosovo remain the over the counter sale of antibiotics, aggressive promotion by pharmaceutical industry, low level of awareness and education of population, corruption and self-medication.

In Kosovo, more than one in four of respondents received antibiotics without a prescription compared to the 3% average for the EU. The proportion of respondents receiving antibiotics without prescriptions varies in the EU and is significantly higher in Romania (17%), Greece (15%) and Cyprus (10%)<sup>16</sup> and in regional countries- Macedonia (17.8%)<sup>17</sup>, and Turkey (19.1%).<sup>18</sup> Kosovo has a law that prohibits the use of antibiotics without a prescription, but it is not implemented in practice. The main source of over-the-counter sales are private pharmacies, demonstrating the need for stricter supervision by the authorities of Pharmaceutical Inspectorate. This variation in the non-prescription access to antibiotics corresponds to the differences in total antibiotic consumption among these countries. Antibiotic consumption (expressed in defined daily doses per 1,000 inhabitants per day; DID) in Kosovo was 26.3 DID, compared to the countries with highest consumption in Greece (38.2 DID) and Turkey (42.3 DID).<sup>11</sup> Kosovo has the highest proportional total parenteral use of ceftriaxone in Europe (53.9) and this has had an impact on antimicrobial resistance.<sup>11,34</sup>

Flu and sore throat are the most common reasons for taking antibiotics in Kosovo, with 23.8% and 20.2%, respectively. In the EU, the most common responses were flu (18%) and bronchitis (18%) and only 11% of respondents took antibiotics to treat a sore throat. In Bulgaria, one third (34%) of respondents take antibiotics to combat flu, followed by Cyprus (31%) and Malta (30%). At the other extreme, only 6% of respondents in the Netherlands and Sweden take antibiotics in these circumstances.<sup>16</sup> In Malaysia, 38% of the respondents would take antibiotics



for a cold<sup>19</sup>, compared to 27% in US (20), 17% in Hong Kong<sup>21</sup> and 3% in Australia.<sup>22</sup>

Only 25.9% of Kosovar respondents gave the correct answer that antibiotics are not effective against cold and flu, compared to 52% in the EU. Based on the EU Eurobarometer, the percentage of respondents who gave correct answers was as follows: in Sweden 77%, Denmark 75%, Finland 74% and the Netherlands 73%. Lower proportions of respondents in southern European countries correctly answered this question. In Spain, less than half give the correct answer (44%), in Malta (37%), Greece (34%), Cyprus (24%), and Portugal (27%).<sup>16</sup>

Four in ten (39.8%) of Kosovar respondents gave the wrong answer to the question "Does unnecessary use of antibiotics make them become ineffective?" This compares to 8% in the EU. Sweden and Denmark had the highest rate of correct answer with 98% and 97% respectively. The lowest rate responding correctly was measured in Romania (58%), with a similar result to Kosovo (60.2%).

Two-thirds of Kosovars know that frequent use of antibiotics can lead to side effects (64.4%), which is close to the EU average (66.1%).

Insufficient public knowledge of antibiotics has been previously reported in various countries and regions.<sup>23-27</sup> There are significant differences in overall knowledge about antibiotics among individual countries in the area. In Sweden, 43% of respondents gave correct answers to all questions, followed by Finland (39%) and Denmark (38%). At the other extreme, these percentages were much lower in Romania (4%) and Portugal (9%). In Kosovo, the result for overall knowledge was 11.9%.

Based on results of this first survey to be conducted in Kosovo, majority of Kosovars agree that everyone has a role to play in maintaining the effectiveness of antibiotics.

Almost half of Kosovars reported that they had received information about unnecessary use of antibiotics (46.7%), which is higher than the EU average of 33% (16). In France, 65% of respondents received information about the unnecessary use of antibiotics, followed by Luxembourg (59%) and Belgium (52%). At the other end of the spectrum are Portugal (12%), Hungary (17%) and Spain (20%).

Various studies have described local, national, and regional educational programs and public campaigns designed to increase antibiotic awareness, with varying success rates.<sup>28-30</sup>

Educational programs and public campaigns should be considered by health care authorities in order to improve rational antibiotic use and decrease self-medication rates in Kosovo. More attention should be focused on the rural public, and parents in particular, to reduce pressure to prescribe antibiotics to their children.

The majority of Kosovars surveyed see medical professionals as a trustworthy source of information for antibiotics (67.2%). In the EU, 94% of respondents share

this opinion. About 50.3% of Kosovar respondents identify physicians as important sources of information about antibiotics, compared to 88% in the EU. Only 10.9% of Kosovars feel that pharmacies are a trustworthy information source compared to 47% in the EU. Only 5.4% see health-related internet sites as good sources of information compared to 16% in the EU.<sup>16</sup> Since medical professionals play an important role in the public's knowledge about antibiotics, they must be taken into consideration as powerful tool to improve prudent use, both in the community and in hospitals. Antimicrobial stewardship programs should be encouraged in academic levels.<sup>31-33</sup>

Limitations of this study include: in many instances the data are based on respondents' memory and are therefore subjective. Also, some key factors were not analysed as covariates associated with knowledge of antibiotics (family income, marital status and health status).

## CONCLUSIONS

This study revealed a high percentage of inappropriate antibiotic knowledge and a high rate of self-medication with antibiotics among the Kosovo population. The key findings of this study will help policy makers in Kosovo to plan and establish future interventions to improve the appropriate use of antibiotics. The following measures should be included: (a) development of education programs for both the public and for health care workers, focusing on prudent use of antibiotics; (b) use of evidence-based guidelines and protocols on antibiotic consumption in health care facilities; (c) prohibit the over-the-counter sale of antibiotics in pharmacies and implement penalties for non-compliance with regulations; (d) surveillance of pharmaceutical companies' implementation of the code of conduct during promotional activities; (e) use of social media in information and promotion of rational use of antibiotics.

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## CONFLICT OF INTEREST

There are no conflicts of interest to declare.

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