Nazarbayev University School of Medicine
Master of Public Health Program

Knowledge, use and behavior towards antibiotics and antibiotic resistance among residents of Astana, Kazakhstan

Master of Public Health Integrating Experience Project
Professional Publication Framework

by

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May, 2019

Acknowledgements

Abstract

Introduction

Antibiotic resistance is a huge public health issue and it is continuing to increase. It is estimated that by year 2050 it will cost 100 trillion USD and will kill 10 million people each year. Kazakhstan is among the highest consumers of antibiotics in the world and consumes 25,000 standard units per 1000 population.

Aim

To evaluate knowledge about antibiotics and antibiotics resistance, use of antibiotics and behavior towards antibiotics of general population in Astana, Kazakhstan. To find associations between socio-demographic characteristics, use of antibiotics, knowledge and behaviors towards antibiotics and antibiotic resistance.

Methods

The research is a cross-sectional study of the general population of Astana, Kazakhstan of 472 respondents. The questionnaire was designated based on previous standardized questionnaire of WHO World Awareness Survey. It was self-administered questionnaire in Qualtrics. Statistical analysis was performed in STATA.

Results

46% and 35% of respondents do not know that gonorrhea and skin or wound infections, respectively, are treated by antibiotics. 40%, 50% and 58% of participants do not know that HIV/AIDS, Cold or flu and measles, respectively, are not treated by antibiotics. 57% of participants have ever missed their prescribed dose. 56% of respondents have ever stopped to consume antibiotics before prescribed time. 63% of participants have ever self-medicated antibiotics.

Females, people who received advice from medical worker, people in age group of 40-50, those who have children, participants with doctorate degree and those who consumed antibiotics more than a year ago had statistically significantly better knowledge about antibiotics.

Knowledge about antibiotics was positively associated with better knowledge about antibiotics resistance. People in age groups of 40-50, 51-61 and participants with college and bachelor's degrees had statistically significantly lower knowledge about antibiotic resistance.

Females, people who do not have children, participants who received advice from medical worker, respondents with better knowledge about antibiotics and antibiotic resistance had better behavior towards antibiotics.

Conclusion

The study has found significant positive association between knowledge about antibiotics and antibiotic resistance and behavior, thus we should implement interventions to educate the population. Since advices from the medical workers is positively associated with knowledge and behavior towards antibiotics it is important to encourage medical staff to instruct patients. The study identified high risk groups for poor antibiotic behavior to increase effectiveness of targeted intervention to reduce misuse.

Table of contents

1. INTRODUCTION

Antibiotic resistance is a huge public health issue and it is continuing to increase (WHO, 2019; Review on Antimicrobial resistance, 2016). It occurs when bacteria, which was previously succumbed to antibiotic, is now became resistant to it. According to (Review on Antimicrobial resistance, 2016) antimicrobial resistance, which includes antibiotic resistance, now accounts for 700,000 deaths worldwide each year. It is estimated that by year 2050 it will cost 100 trillion USD and will kill 10 million people each year. The key driver of a spread and rise of resistance to antibiotics is an incorrect antibiotic use, overuse of antibiotics in livestock, poor hygiene and sanitation, bad infection control in hospitals (WHO, 2019; Andre et al., 2010; WHO, 2016). Inappropriate use and overuse can lead to the spread of antibiotic resistance, which in turn produce side effects to health and an increase of healthcare service spending (Taha et al., 2016).

There are several factors that also leads to the increased chance of developing antibiotic resistance: poor education of healthcare workers and patients, sell of antibiotics without prescription of a doctor, curing viral diseases with antibiotics, not following the prescription of a medical worker (WHO, 2019; Taha et al., 2016). Actions to prevent and decrease antibiotic resistance can be done at all levels: teaching general public how to correctly use antibiotics and only use them when prescribed by health professional, take the full course prescribed by the medical worker, do not use left-over antibiotics and do not share them with others, also make sure that health workers do not overprescribe antibiotics.

According to The Center for Disease Dynamics, Economics and Policy (resistancemap.cddep.org, 2019) Kazakhstan is among the highest consumers of antibiotics in the world and consumes 25,000 standard units per 1000 population. Additionally, data shows that usage of antibiotics in Kazakhstan from 2005 to 2015 increased by 36%. In Kazakhstan, there is a "Strategic plan to contain antimicrobial resistance in the Republic of Kazakhstan for 2017-2019" (Ministry of Health of the Republic of Kazakhstan, 2017), however, effectiveness of it was not evaluated. Up to our knowledge, no population-based studies were found in Kazakhstan and very little is known about population knowledge, use and behavior towards antibiotics.

There are studies that show association of demographic characteristics such as gender, age, education level and history of taking antibiotics with knowledge and behavior towards antibiotics and antibiotic

resistance. Also, studies demonstrate that there are associations between knowledge about antibiotics and antibiotic resistance and behavior towards antibiotics. (Chan et al. 2012; You et al., 2008; Demore et al., 2017; Anderson, 2018; Salm et al., 2018).

This research aims to evaluate knowledge about antibiotics and antibiotics resistance, use of antibiotics and behavior towards antibiotics of general population in Astana, Kazakhstan. Another goal is to find associations between demographic characteristics, use of antibiotics, knowledge and behaviors towards antibiotics and antibiotic resistance. Also, study will provide information for potential interventions to implement and initiate campaigns to target the most problematic gaps.

2. METHODS

2.1 Study design and settings

The research is a cross-sectional study of the general population of Astana, Kazakhstan. The questionnaire was designated based on previous standardized questionnaire of WHO World Awareness Survey (WHO, 2016). It consists of five parts, focusing on the assessment of knowledge about antibiotics and antibiotics resistance, use of antibiotics and behavior towards antibiotics and socio-demographics characteristics of respondents (gender, age, education, household composition and having children).

2.2 Data collection and cleaning

The data were collected through online survey on Qualtrics online survey platform and was anonymized through Qualtrics. The questionnaire was distributed via internet links through social media (VKontakte social network, Whatsapp, Telegram, Instagram) and snowball method was used. The questionnaire was disseminated in three languages (Kazakh, Russian and English) and for analysis it was translated to English. Data cleaning was performed in Microsoft Excel and then analyzed in STATA. Participants who were younger than 18 were excluded from the study. Finally, 472 participants were eligible for the analysis. Inclusion criteria: person who is older than 18 years old and able to read and write in Kazakh, Russian or English. Exclusion criteria: younger than 18 years old.

2.3 Data Analysis

STATA software was utilized to analyze the data. Univariate analysis was done for each variable. Bivariate analysis was performed using linear and logistic regressions for finding statistically significant unadjusted predictors of knowledge about antibiotics, knowledge about antibiotic resistance and behavior regarding antibiotics. $P < 0.25$ is selected as the level of significance for inclusion for multivariate model. Multivariate analysis was done using linear regression and logistic regression and level of significance was set to $p < 0.05$.

2.4 Variables

Demographics:

1) Age

2) Gender

3) Education level

4) Household composition

5) Number of children

Use of antibiotics:

1) How long ago did participants last take antibiotics

    a. Did participants get the antibiotics (or prescription for them) from doctor or nurse?

    b. Did participants get advice from a doctor or nurse on how to take antibiotics?

    c. Where did participants get the antibiotics?

Knowledge about antibiotics

2) When do participants think they should stop taking antibiotics?

3) On the scale, indicate how much do participants agree with the statement: "It's okay to use antibiotics that were given to a friend or family member, as long as they were used to treat the same illness"?

4) Which conditions can be treated by antibiotics?

Knowledge about antibiotic resistance

1) Have participants heard of the following terms: antibiotic resistance, antimicrobial resistance, drug resistance, antibiotic-resistance bacteria?

a. Where did they heard about the terms?

2) Indicate whether participants think the statements are "true" or "false"?

3) On the scale, how much do participants agree the following actions would help address the problem of antibiotic resistance?

4) On the scale, indicate how much do participants agree with the statements?

Behavior towards antibiotics

1) Have participants ever missed their prescribed dose?

2) Did participants ever stopped to consume antibiotics before prescribed time?

3) Did participants ever self-medicated antibiotics?

4) Did participants take antibiotics to prevent diseases in the past year?

Knowledge about antibiotics was assessed by conducting logistic regression with the outcome of "when to stop consuming antibiotics". Also, knowledge evaluation included assessment of knowledge about which diseases can be treated by antibiotics (7 items) using linear regression.

Assessment of knowledge about antibiotic resistance was done using 8-item questionnaire about various terms regarding antibiotic resistance. Linear regression was used to analyze the data.

Finally, evaluation of behavior was conducted by 4-item questionnaire about behavior towards antibiotics. Linear regression was performed.

2.5 *Ethical considerations*

Ethical approval was obtained from the Institutional Review Board of Nazarbayev University School of Medicine, Astana, Kazakhstan. To be eligible for the study, respondents must provide consent, should be at least 18-year-old and should be able to read and write in Kazakh, Russian or English. Data was anonymized by Qualtrics online survey platform and the risks encountered by respondents were not greater than minimal.

3. **RESULTS**

3.1 Univariate analysis.

3.1.1 Demographic characteristics are presented in Table 1. A total of 472 responses were collected. One quarter of the participants were men (25.27%). The mean age is 33.41(+-11.41) (age range from 18

to 71). Most of the participants (88.5%) have higher education (bachelor's degree or higher). Less than a half of the respondents (41.28%) are single adults and half of them (50.64%) are married. 47.46% of the respondents do not have children. *Use of antibiotics*

Descriptive information about use of antibiotics is presented in Table 2. Only 85.78% claim that they had ever used antibiotics in their life. On that occasion 60.65% of respondents indicated that they received or get the prescription for antibiotics from a doctor or nurse and 71.15% got the advice from doctor, nurse or pharmacist on how to use them. Medical store, pharmacy or physician/medical office was the most frequently used place to get antibiotics (94.69%).

3.1.2 *Knowledge about antibiotics*

Descriptive information about knowledge about antibiotics can be found in Table 3. 73.28% of people know when to stop taking antibiotics once they have begun the treatment (correct answer: "When you have taken antibiotics as directed"). This result is higher than in multi-country average obtained by the survey of WHO (64%).

More than a half of the respondents (61.11%) slightly or strongly disagree with the statement *"It's okay to use antibiotics that were given to a friend or family member, as long as they were used to treat the same illness"*, while 30.56% slightly or strongly agree with it.

54.19% of people think that *Gonorrhea* can be treated with antibiotics, which is correct. 77.12% of the respondents correctly identified that *Bladder infection or urinary tract infection* also can be treated with antibiotics. Big proportion of the respondents (65.19%) correctly answered that *Skin or wound infection* can be cured with antibiotics. 60.42% of respondents know that *HIV/AIDS* is not a condition which can be treated by antibiotics.

On the other hand, many people mistakenly think that some conditions can be treated by antibiotics which, in fact, cannot be treated by antibiotics. Half of the answers about whether *cold or flu* can be treated with antibiotics were incorrect, since 50.23% responded that antibiotics will help to cure cold or flu. Even worse situation is observed in questions about *measles,* where only 42.20% know the correct answer, that measles is not cured by antibiotics.

3.1.3 Knowledge about antibiotic resistance

Descriptive information about knowledge about antibiotic resistance is presented in Tables 4 and 5. Huge amount of the respondents (88.34% and 90.62%) have heard about the terms "Antibiotic resistance" and "Antibiotic-resistant bacteria", respectively. "Drug resistance" is the term known by 78.73% of people, whereas only 63.74% have heard about "Antimicrobial resistance".

The knowledge about antibiotic resistance was measured by asking from participants 8 "true or false" questions from WHO survey regarding the antibiotic resistance and calculating their score. Large quantity of the respondents (61.05%) incorrectly answered that *"Antibiotic resistance occurs when your body becomes resistant to antibiotics and they no longer work as well"* is true, while it is false. However most of the people (88.26%) understand that *"Many infections are becoming increasingly resistant to treatment by antibiotics"* is true. Also, majority of the participants (83.75%) correctly responded for question *"If bacteria are resistant to antibiotics, it can be very difficult or impossible to treat the infections they cause"* that it is true. At the same time, major portion (89.63%) know that statement *"Antibiotic resistance is an issue in other countries but not here"* is incorrect. 69.68% of the respondents identified that statement *"Antibiotic resistance is an issue that could affect me or my family"* is correct. Major part understands that *"Antibiotic-resistant infections could make medical procedures like surgery, organ transplants and cancer treatment much more dangerous"* is true. Only 50% of the participants know that statement *"Bacteria which are resistant to antibiotics can be spread from person to person"* is true. Slightly more than a half of the respondents correctly marked the statement *"Antibiotic resistance is only a problem for people who take antibiotics regularly"* as false.

3.1.4 Behavior towards antibiotic resistance

Descriptive information about behavior towards antibiotics is presented in Table 6. Survey demonstrates that people's behavior towards antibiotics is not proper. Results show that large proportion of the respondents (57.02%) have ever missed their prescribed dose. Similar portion of people have ever stopped consuming antibiotics before prescribed time. Major part of the participants (62.97%) self-medicated antibiotics at least once. 16.52% took antibiotics to prevent diseases (such as common cold) in past year.

3.2 Bivariate analysis

7

Bivariate analysis of unadjusted association between knowledge about antibiotics (when to stop consuming antibiotics) and independent variables, and bivariate analysis of unadjusted association between knowledge about antibiotics (agreement with statement: "*It's okay to use antibiotics that were given to a friend or family member, as long as they were used to treat the same illness*") and independent variables is presented in Table 7.

3.2.1 Knowledge about antibiotics

Gender, education level, children number, advice received from doctor, nurse or pharmacist, and the time past from last incident of consuming antibiotics were found to be statistically significant unadjusted predictors for knowledge of when to stop consuming antibiotics. Males have 55.6% less chance of answering to this question correctly than females. The participants with doctorate degree are 4.55 times more likely to answer correctly than people with school education. Also, those who have two children have 1.77 times higher chance of answering right than people without children. The respondents who had consumed antibiotics less than a year ago have 3.104 higher chance of scoring correctly than those who had never consumed antibiotics. Similar situation in those participants who had consumed antibiotics more than a year ago – they have 3.413 higher chance of answering to this question correctly than those who had never used them. Additionally, people who got advice from doctor, nurse of pharmacist on how to take antibiotics are 2.63 time more likely to respond correctly than people who did not received any advice from medical worker. Independent demographics predictors such as age and household composition are not statistically significant predictors.

Bivariate analysis of unadjusted association between knowledge about antibiotics (which diseases are treated by antibiotics) and independent variables is presented in Table 8. Another way to measure knowledge about antibiotics was indicating how much do the participants agree with the statement on a Likert scale from 'strongly disagree' to 'strongly agree': "*It's okay to use antibiotics that were given to a friend or family member, as long as they were used to treat the same illness*". Answers like 'strongly agree' or 'slightly agree' were indicated as correct while other have been indicated as incorrect. For this question age and children number were the statistically significant predictors. The participants in age category from 40 to 50 years had 44.1% lower chance of answering to this question correctly comparing to reference group of 18-28 years. Also, respondents who have children have 31.2% lower chance of answering correctly to the question.

Next, the participants were tested on the knowledge about which conditions can be treated by antibiotics. There were 7 conditions, thus maximum number of points is equal to 7. Since the outcome was continuous, linear regression was conducted. Bivariate analysis revealed that age, gender, education level, household composition, having children and the time past from last incident of consuming antibiotics are statistically significant predictors. Only advice received from doctor, nurse or pharmacist was found to be not statistically significant predictors. Opposite to the situation in previous question people in age group of 40-50 years scored higher by 1.06 points than people in reference group of 18-28 years. Men score lower than women on average by 0.392 points. The participants who with Master's/Professional's or Doctorate degree obtained higher scores by 1.083 and 1.765 respectively than those who have high school education. Household composition was also significant predictor where married people with children and divorced people scored higher by 0.593 and 0.892 points respectively than single adults. Those respondents who have children got higher scores than people without children by 0.636 points. Another major predictor is the time past from last consumption of antibiotics: if they took antibiotics less than a year ago their scores were higher by 0.985 points than scores of people who never consumed antibiotics and if they took antibiotics more than a year ago their scores were higher by 1.359 points than scores of people who never consumed antibiotics.

3.2.2 Knowledge about antibiotic resistance

Bivariate analysis of unadjusted association between knowledge about antibiotic resistance and independent variables is presented in Table 9. The next outcome was participants' knowledge about antibiotic resistance. There are 8 questions and participants responded whether statements are true or false. Minimum score was 0 and the maximum score was 8. In this case age, gender, education level, household composition, having children, the time past from last incident of consuming antibiotics and advice received from medical workers on how to consume antibiotics were found to be statistically significant predictors of the knowledge regarding antibiotic resistance. It was discovered that people in age group of 40-50 years and 51-61 years scored by -0.507 and -0.818 points lower than participants in age group of 18-28 respectively. Therefore, their awareness about antibiotic resistance is lower. Males scored by 0.475 points higher than females and this is the only outcome where men scored higher than women. Education level of respondents has shown that people with College or Bachelor's degrees tend to receive worse results than people with High school education level. Their scores were lower by -2.13 and -1.27 points, respectively. Also, it was revealed that people who are married or

in domestic partnership and have children have statistically significant lower results than single adults. It was confirmed with the results of bivariate analysis of factor of having children. The participants who have children got worse scores by 0.484 points than respondents without children. If the person used antibiotics more than a year ago, he or she scored by 1.05 points higher than people who never consumed antibiotics. For this outcome, there were no insignficant unadjusted predictors.

3.2.3   Behavior towards antibiotics

Bivariate analysis of unadjusted association between behavior towards antibiotics and independent variables is presented in Table 10. Respondents were asked to answer questions from WHO survey on their behavior about antibiotics. There are 4 questions and the score was summed. Minimum score was 0 and maximum score was 4. Bivariate analysis has shown that gender, education level, having children, the time past from last incident of consuming antibiotics and getting advice from doctor, nurse or pharmacist are statistically significant predictors of behavior. Males tend to score lower by 0.402 points than females. Also, if the person has got Doctorate degree, then that person results were higher by 0.711 points than person who has High school degree. Participants with children had better behavior score than people without children. It was found that people who had consumed antibiotics more than a year ago scored higher by 0.346 points than those who consumed antibiotics less than a year ago. Additionally, if the respondent had received advice from medical worker on how to take antibiotics then that person scored more by 0.485 points comparing to the person who did not get any advice from medical worker.

3.3 Multivariate regression

Testing of associations between dependent variables and statistically significant associated independent variables were conducted using multiple logistic regression and multiple linear regression. Only statistically significant variables were included in the final model.

3.3.1   Knowledge about antibiotics (When to stop consuming antibiotics)

Multivariate analysis of adjusted association between knowledge about antibiotics (when to stop consuming antibiotics) and independent variables is presented in Table 11. Gender and advice taken from the medical doctor, nurse or pharmacist were found to be statistically significant predictors of knowledge about when to

stop taking antibiotics. Adjusted odds of answering the question correctly in males were 51% lower than in females adjusting for advice from medical worker. The odds of knowing when to stop consuming antibiotics was 2.47 times higher in those who received advice from medical worker comparing with those who did not get advice, adjusting for gender.

3.3.2   Knowledge about antibiotics (which diseases are treated by antibiotics)

Multivariate analysis of adjusted association between knowledge about antibiotics (which diseases are treated by antibiotics) and independent variables is presented in Table 12. For the knowledge regarding which diseases can be treated by antibiotics 4 covariates found to be statistically significant variables and were included in the final model: age, educational level, having children and the time passed from last consumption of antibiotics. Score ranges from 0 to 7. Multiple linear regression analysis was performed.

Participants in age group of 40-50 years had on average by 0.629 higher score (p=0.05) than those in age group of 18-28 years adjusting for education, having children and time passed from last consumption of antibiotics. Respondents with Doctorate degree received higher scores by 1.175 points on average than those with high school education, adjusted for age, having children and time passed from last consumption of antibiotics. Also, factor of having children was an important predictor for knowledge of which illnesses are cured by antibiotics. Thus, those who have children scored higher by 0.502 points on average than people without children, adjusted for age, education and time passed from last consumption of antibiotics. Additionally, participants who had consumed antibiotics more than a year ago scored by 0.981 points higher than those who never took antibiotics, adjusted for age, education and having children.

3.3.3   Knowledge about antibiotics resistance

Multivariate analysis of adjusted association between knowledge about antibiotic resistance and independent variables is presented in Table 13. Knowledge about antibiotic resistance has 6 statistically significant predictors: age, gender, educational level, knowledge about antibiotics assessed in 3 ways (when to stop antibiotics, agreement with the statement, score of knowledge about which diseases are treated by antibiotics). Score ranges from 0 to 8. Multiple linear regression analysis was performed.

Respondents from age group of 40-50 years and 51-61 years scored lower by 0.580 and 0.699 points on average than those in the youngest age group of 18-28 years, adjusted for other covariates. Men had higher scores then women by 0.487 points, adjusted for other variables. Educational level demonstrated that more educated people had lower scores – participants with College or Bachelor's degree scored lower than people with high school degree by 1.8 and 1 point, respectively, adjusting for other variables. Also, model has shown that people who had better knowledge regarding antibiotics also had better knowledge about antibiotic resistance, adjusting for other covariates.

3.3.4 Behavior towards antibiotics

Multivariate analysis of adjusted association between behavior towards antibiotics and independent variables is presented in Table 14. Gender, having children, advice from medical worker, knowledge about antibiotics (when to stop consuming antibiotics and agreement with statement) and knowledge about antibiotic resistance were found to be behavior towards antibiotics. Scores ranges from 0 to 4. Multiple linear regression was used.

Males scored lower than females by 0.276 points on average, adjusted for other variables. Participants with children scored higher by 0.29 points than people who do not have children, adjusting for other covariates. Additionally, receiving advice from doctor, nurse or pharmacist resulted in higher score by 0.323 points than those who did not get any advice from medical workers, adjusted for other variables. Also, respondents behaved better if they achieved higher score in knowledge antibiotics and knowledge antibiotic resistance, adjusting for other covariates.

4. DISCUSSION

It was found that almost all of the participants had ever consumed antibiotics (97.2%). This is a high score in comparison to countries which had participated in the World Antibiotic Awareness Survey conducted by WHO (2016). Also, 60.65% of participants acquired antibiotics from a doctor or nurse. This result is lower than in most countries, not including the Russian Federation (56%). It is similar in the Russian Federation, given the roots of both the Kazakh and Russian health systems originated in the USSR. People in Astana received advice on how take antibiotics in 71% of the cases, which is also almost the lowest percentage among nations which took part in the World Antibiotic Awareness Survey by WHO. Only the Russian Federation have approximately the same results (69%). 90% of respondents acquired antibiotics from a medical store or

pharmacy. This score is similar to the multi-country average. 32% of people believe that "It's okay to use antibiotics that were given to a friend or family member, as long as they were used to treat the same illness" which is higher than the multi-country average (25%). However, there is substantial room for improvement given that some countries like South Africa and Mexico have significantly better results, where the majority of people (87% and 85%, respectively) knew the correct answer. Also, people in Astana lack knowledge of which diseases are treated by antibiotics. The majority of people (77%) knew that bladder and urinary tract infections can be treated by antibiotics and the results in Astana is higher than the multi-country average (72%). 65% of the respondents correctly answered that skin or wound infections can be treated by antibiotics, and the score is lower than the multi-country average (72%). More than a half of the participants identified that gonorrhoea (54%) can be treated and HIV/AIDS (60%) cannot be treated by antibiotics. The scores are better than in multi-country average (51% and 49%, respectively). Half of the respondents believe that cold or flu can be cured by antibiotics, which is not correct, and this result is worse than in the multi-country rate (30%). The score regarding treatment of measles and sore throat are similar to the multi-country average.

It was shown that people in Astana have higher awareness of terms such as "antibiotic resistance" (88%), "antimicrobial resistance" (64%), "drug resistance" (79%), "antibiotic-resistant bacteria" (91%) than the multi-country averages (70%, 44%, 68%, 66%, respectively).

The participants had a better understanding of terms related to antibiotic resistance: only 12% of respondents of the survey by WHO indicated correctly that *"Antibiotic resistance occurs when your body becomes resistant to antibiotics and they no longer work as well"* is false, while in Astana 38% of participants replied correctly. Also, the percentage of the respondents who answered correctly the statement that *"Many infections are becoming increasingly resistant to treatment by antibiotics"*, was higher in Astana than in the WHO study (88% vs 72% respectively). Similarly, the statement *"If bacteria are resistant to antibiotics, it can be very difficult or impossible to treat the infections they cause",* was correctly answered by 84% in Astana vs 70% multi-country wide, and for the statement: *"Antibiotic resistance is an issue in other countries but not here",* which is false – 90% in Astana vs 62% in the multi-country score. Additionally, more participants from Astana understand that *"Antibiotic resistance is an issue that could affect me or my family",* which is true, than the multi-country average (70% vs 64%). Low awareness is observed both in Astana (57%) and in other countries from WHO survey (39%) about the statement: *"Antibiotic resistance is only a problem for people who take*

antibiotics regularly", which is false. Only half of the respondents in Astana were aware that *"Bacteria which are resistant to antibiotics can be spread from person to person"*, however multi-country awareness rate is worse where only 44% of people knew that the statement is true. Approximately same proportion of people (71% vs 67%) knew that *"Antibiotic-resistant infections could make medical procedures like surgery, organ transplants and cancer treatment much more dangerous"* is true.

Self-medication rate in Astana is very high – 63% of participants have ever self-medicated antibiotics. This is higher than in Europe, where self-medication rate ranges from 5% to 45% (Pavyde et al., 2015). The study done in 13 European countries (Francis et al., 2012) reports that self-medication rate is equal to 11.3%, which is 5.6 times lower than in Astana. Another study conducted in Italy (Napolitano et al., 2013) has reported that self-medication rate is 32.7% which is twice lower than in Astana. Thus, there is significant amount of work to do for policymakers in Astana to solve the problem of inappropriate behavior towards antibiotics like self-medication. Other results of our study also do not show positive patterns: 57% and 56% of respondents reported that they have missed prescribed dose or stopped to consume antibiotics earlier, respectively. Incorrect behaviors rates were lower in studies conducted in European countries: in France (Demore et al., 2017) 34% of respondents indicated non-adherence to treatment duration and schedule. Study in Spain (Llor et al., 2013) reported non-adherence rate for duration to be equal to 29% and research in Italy (Marventano, 2012) states that 15% of people did stop taking antibiotics earlier than prescribed.

Knowledge about antibiotics

The study found that higher education (doctorate degree) is associated with better knowledge about antibiotics about which diseases are treated by antibiotics and it is similar in findings to a study conducted in Malaysia. (Lim and Teh, 2012) and in South Korea (Kim, Moon and Kim, 2011). A study in UK (Anderson, 2018) also showed this finding that people with higher levels of education have better knowledge. Additionally, age group of 40-50 years was found to have better knowledge than the youngest age group of 18-28 and similar results were obtained in France (Demore et al., 2017). However, this finding was not consistent with a study in South Korea (Kim, Moon and Kim, 2011), where older age was a predictor for inadequate knowledge. Having children was found to be a positive factor of better knowledge and this is similar to the study in France (Demore et al., 2017). Also, it was found that women have better knowledge about antibiotics than men, which corresponds with findings of a cross-sectional study in France (Demore et al., 2017). History of taking

antibiotics was also positively associated with better knowledge about antibiotics and this is coincided with a study in Berlin, Germany (Salm et al., 2018). Another important predictor of better knowledge about antibiotics is an advice received from a medical worker. This is an important indicator for health policymakers and medical workers which can increase people's awareness.

Knowledge about antibiotic resistance

The study found that the age group of 40-50 years and 51-61 years had lower knowledge about antibiotic resistance than the youngest age group of 18-28 years. This is consistent with research conducted in Sweden (Vallin et al., 2016). However, this result does not match with findings from Norway (Waaseth et al., 2019), where older age was associated with better knowledge. Also, there is no consistency in the association between education and knowledge, where Norway research found a positive association between high educational level and knowledge, while there is opposite association in Astana.

An additional associated factor found is knowledge about antibiotics – if a participant knows more about antibiotics, then the participant knows more about antibiotic resistance. This is a significant factor because increasing the public's knowledge about antibiotics will lead to an increase in knowledge about antibiotic resistance.

Behavior towards antibiotics

This study found that males behave worse than females in proper antibiotic use and these findings correspond with a study in Hong-Kong (You et al., 2008). Also, it was discovered that people who knew more about antibiotics had better antibiotic use. Similar results were observed in the other studies (You et al., 2008; Chan et al., 2012). Additionally, the study showed that participants with children had better behavior towards antibiotics than those without children, contrary to findings from Lithuania (Payde et al. 2015), where parenthood was positively associated with poor behavior.

Additionally, it was detected that knowledge about antibiotics and antibiotic resistance is positively associated with appropriate use of antibiotics --matching findings from the UK (Anderson, 2018). Moreover, advice from the doctor, nurse or pharmacist had a positive impact on respondents' behavior regarding antibiotics, which also

makes it important for policymakers to encourage medical workers to teach patients on proper use of antibiotics in order to improve patients' behavior.

4.1 Strength and limitations

To our knowledge, this is the first study in Kazakhstan to assess public's knowledge, use and behavior towards antibiotics and antibiotic resistance. This study used validated WHO questionnaire. Risk groups with lower knowledge about antibiotics and antibiotic resistance as well as risk groups with inappropriate behavior were identified, and findings of the current research can serve as a basis for future studies about antibiotics and antibiotic resistance. Additionally, results can help policymakers in Astana to implement interventions to tackle lack of knowledge and misuse of antibiotics.

Despite various positive sides of the study, there are several limitations. Firstly, it is cross-sectional study and thus it cannot identify causal relationships. Also, there is possibility of selection bias due to the snowball method of recruiting participants. Response bias might also exist since it was a self-administered questionnaire.

5. CONCLUSION

The study has found significant positive association between knowledge about antibiotics and antibiotic resistance. Also there is positive association between increased knowledge about both antibiotics and antibiotic resistance with appropriate antibiotic behavior. Therefore, there is a need to implement interventions to increase the general populations' awareness and knowledge about antibiotics in order to enlarge an awareness regarding antibiotic resistance and improved behavior towards antibiotic use. Also, the study identified high risk groups for poor antibiotic behavior to increase an effectiveness of targeted intervention to reduce misuse. This is especially important because Kazakhstan is among top users of antibiotics worldwide.

Since advice from medical workers is positively associated with increased knowledge and behavior towards antibiotics it is important for policymakers in Astana to encourage doctors, nurses and pharmacists to instruct patients on appropriate behavior to avoid misuse of antibiotics and consequently prevent rise of antibiotic resistance.

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TABLES AND FIGURES

Table 1. Demographic characteristics

Age (mean = 33.41); min = 18; max= 71	Quantity	%
18-28	200	42.37
29-39	132	27.97
40-50	89	18.86
51-61	34	7.20
62 and older	17	3.60
Sex		
Male	117	25.27
Female	346	74.73
Education		
No schooling	1	0.21
High school	17	3.62
College degree	36	7.66
Bachelor's degree	250	53.19
Master's/Professional's degree	133	28.30
Doctorate degree	33	7.02
Household composition		
Single adult	194	41.10
Married/Domestic partnership – no children	34	6.78
Married/Domestic partnership – with children	206	43.64
Divorced	35	7.42
Widowed	5	1.06
Children Number		
0	224	47.46
1	93	19.70
2	87	18.43
3	49	10.38
4	12	2.54
5 or more	7	1.48

Table 2. Use of antibiotics.

How long ago did you last take antibiotics?	Quantity	%
Never	13	2.76
In the last month	69	14.65
In the last 3 months	77	16.35
In the last 6 months	69	14.65
In the last year	61	12.95
More than a year ago	128	27.18
Can't remember	54	11.46
On that occasion, did they get the antibiotics (or a prescription for them) from a doctor or nurse		
No	127	27.31
Yes	282	60.65
Can't remember	24	5.16
Other	27	5.81
On that occasion, did you get advice from a doctor, nurse, or pharmacist on how to take them		

No	114	25.11
Yes	323	71.15
Can't remember	17	3.74
From where did you get antibiotics		
Medical store or pharmacy	408	90.27
Physician/medical office	20	4.42
Internet	2	0.44
Friend or family member	9	1.99
Saved them up from a previous time	12	2.65
Other	1	0.22

Table 3. Knowledge about antibiotics. Descriptive.

When do you think you should stop taking antibiotics once you've begun treatment?	Quantity	%
Don't know	5	1.08
When you feel better	57	12.28
When you've taken all of the antibiotics as directed	340	73.28
When you feel sick from the antibiotics	20	4.31
Other	12	2.59
All of the above	30	6.47
How much do you agree with the following statement? *"It's okay to use antibiotics that were given to a friend or family member, as long as they were used to treat the same illness"*		
Strongly disagree	196	41.88
Slightly disagree	90	19.23
Neither agree nor disagree	39	8.33
Slightly agree	113	24.15
Strongly agree	30	6.41
How much do you agree with the following statement? *"It's okay to buy the same antibiotics, or request these from a doctor, if you're sick and they helped you get better when you had the same symptoms before"*		
Strongly disagree	161	34.85
Slightly disagree	83	17.97
Neither agree nor disagree	37	8.01
Slightly agree	139	30.09
Strongly agree	42	9.09
Do you think this condition can be treated with antibiotics? *Gonorrhoea*		
No	27	5.95
Yes	246	54.19
Don't know	181	39.87
Do you think this condition can be treated with antibiotics? *Bladder infection or urinary tract infection (UTI)*		
No	23	5.01
Yes	354	77.12

Don't know	82	17.86
Do you think this condition can be treated with antibiotics? *HIV/AIDS*		
No	261	60.42
Yes	35	8.10
Don't know	136	31.48
Do you think this condition can be treated with antibiotics? *Cold or flu*		
No	223	50.23
Yes	193	43.47
Don't know	28	6.31
Do you think this condition can be treated with antibiotics? *Measles*		
No	184	42.20
Yes	82	18.81
Don't know	170	38.99
Do you think this condition can be treated with antibiotics? *Skin or wound infection*		
No	54	11.97
Yes	294	65.19
Don't know	103	22.84
Do you think this condition can be treated with antibiotics? *Sore throat*		
No	87	19.21
Yes	315	69.54
Don't know	51	11.26

Table 4. Knowledge about antibiotic resistance. Have participants heard about the following terms?

Have you heard about any of the following terms? *Antibiotic resistance*	Quantity	%
No	54	11.66
Yes	409	88.34
Have you heard about any of the following terms? *Antimicrobial resistance*		
No	161	36.26
Yes	283	63.74
Have you heard about any of the following terms? *Drug resistance*		
No	94	21.27
Yes	348	78.73
Have you heard about any of the following terms? *Antibiotic-resistant bacteria*		
No	42	9.38

Yes	406	90.62

Table 5. Knowledge about antibiotic resistance. Descriptive

Please indicate whether you think the following statements are 'true' or 'false'	Quantity	%
"Antibiotic resistance occurs when your body becomes resistant to antibiotics and they no longer work as well (false)"		
False	168	38.27
True	268	61.05
Please indicate whether you think the following statements are 'true' or 'false' *"Many infections are becoming increasingly resistant to treatment by antibiotics (true)"*		
False	52	11.74
True	391	88.26
Please indicate whether you think the following statements are 'true' or 'false' *"If bacteria are resistant to antibiotics, it can be very difficult or impossible to treat the infections they cause (true)"*		
False	71	16.25
True	366	83.75
Please indicate whether you think the following statements are 'true' or 'false' *"Antibiotic resistance is an issue that could affect me or my family (true)"*		
False	131	30.32
True	301	69.68
Please indicate whether you think the following statements are 'true' or 'false' *"Antibiotic resistance is an issue in other countries but not here (false)"*		
False	389	89.63
True	45	10.37
Please indicate whether you think the following statements are 'true' or 'false' *"Antibiotic resistance is only a problem for people who take antibiotics regularly (false)"*		
False	249	57.11
True	187	42.89
Please indicate whether you think the following statements are 'true' or 'false' *"Bacteria which are resistant to antibiotics can be spread from person to person (true)"*		
False	214	49.31
True	220	50.69
Please indicate whether you think the following statements are 'true' or 'false' *"Antibiotic-resistant infections could make medical procedures like surgery, organ transplants and cancer treatment much more dangerous (true)"*		
False	125	28.54

| True | 313 | 71.46 |

Table 6. Behavior towards antibiotics. Descriptive.

Have you ever missed your prescribed dose?	Quantity	%
No	133	29.62
Yes	256	57.02
Can't remember	60	13.36
Did you ever stopped to consume them before prescribed time?		
No	156	34.67
Yes	252	56.00
Can't remember	42	9.33
Did you ever self-medicated antibiotics?		
No	149	33.04
Yes	284	62.97
Can't remember	18	3.99
Did you take antibiotics to prevent diseases (such as common cold) in the past year?		
No	351	78.35
Yes	74	16.52
Can't remember	23	5.13

Table 7. Knowledge about antibiotics. Bivariate analysis

Variable	Odds ratio	P-value
*Age		
18-28	Ref	
29-39	1.461	0.139
40-50	1.431	0.222
51-61	1.538	0.346
62 and older	1.346	0.619
*Sex		
Male	0.447	0.000
Female	ref	
Education level		
High school	Ref	
College degree	0.8712	0.831
Bachelor's degree	1.065	0.910
Master's/Professional's degree	1.630	0.399
Doctorate degree	4.545	0.062
Household composition		
Single adult	Reference	
Married/Domestic partnership – no children	1.343	0.521
Married/Domestic partnership – with children	1.073	0.752
Divorced	2.371	0.090
Widowed	empty	empty
Children number		
0	Ref	
1	1.170	0.580
2	1.768	0.077
3	0.734	0.357
4	1.170	0.818

5 or more	0.292	0.114
How long ago did they use antibiotics?		
Never	Ref	
In the last month	2.286	0.227
In the last 3 months	2.619	0.158
In the last 6 months	5.273	0.02
In the last year	3.357	0.084
More than a year ago	3.413	0.066
Can't remember	1.217	0.776
* How long ago did they use antibiotics?		
Never	Ref	
Less than a year ago	3.104	0.08
More than a year ago	3.413	0.066
Did you get advice from doctor, nurse or pharmacist on how to take antibiotics?		
No	Ref	
Yes	2.627	0.000
Knowledge about antibiotics. Statement Variable	Odds ratio	P-value
*Age		
18-28	Ref	
29-39	1.183	0.479
40-50	0.559	0.024
51-61	0.648	0.258
62 and older	0.816	0.693
*Sex		
Male	0.987	0.953
Female	ref	
Education level		
High school	Ref	
College degree	0.326	0.091
Bachelor's degree	0.359	0.080
Master's/Professional's degree	0.798	0.709
Doctorate degree	0.707	0.614
Household composition		
Single adult	Reference	
Married/Domestic partnership – no children	1.259	0.588
Married/Domestic partnership – with children	0.709	0.096
Divorced	0.771	0.493
Widowed	0.540	0.542
Children number		
0	Ref	
1	1.076	0.782
2	0.658	0.106
3	0.424	0.007
4	0.372	0.101
5 or more	0.390	0.226
No	Ref	
Yes	0.688	0.05
How long ago did they use antibiotics?		
Never	Ref	
In the last month	0.591	0.473
In the last 3 months	0.514	0.360
In the last 6 months	0.495	0.337

In the last year	0.947	0.942
More than a year ago	0.909	0.894
Can't remember	0.559	0.434
Did you get advice from doctor, nurse or pharmacist on how to take antibiotics?		
No	Ref	
Yes	1.369	0.154

Table 8. Knowledge about antibiotics. Which disease are treated by antibiotics. Bivariate analysis.

Knowledge about antibiotics (Which diseases are treated by antibiotics)		
Variable	Coefficient	P-value
Age		
18-28	Ref	
29-39	0.087	0.692
40-50	1.061	0.000
51-61	0.655	0.075
62 and older	-0.077	0.876
Sex		
Female	Ref	
Male	-0.392	0.067
Education level		
High school	Ref	
College degree	0.75	0.203
Bachelor's degree	0.512	0.311
Master's/Professional's degree	1.083	0.037
Doctorate degree		
	1.765	0.003
Household composition		
Single adult	Ref	
Married/Domestic partnership – no children	-0.625	0.094
Married/Domestic partnership – with children	0.593	0.003
Divorced	0.892	0.013
Widowed	-0.85	0.337
Children number		
0	Ref	
1	0.767	0.002
2	0.776	0.002
3	0.206	0.509
4	0.561	0.336
5 or more	0.239	0.751
No	Ref	
Yes	0.636	0.001
How long ago did they use antibiotics?		
Never		
In the last month	Ref	
In the last 3 months	0.805	0.177
In the last 6 months	1.189	0.044
In the last year	1.123	0.060
More than a year ago	0.773	0.198
Can't remember	1.359	0.018

	0.406	0.504
* How long ago did they use antibiotics?		
Never	Ref	
Less than a year ago	0.985	0.076
More than a year ago	1.359	0.017
Did you get advice from doctor, nurse or pharmacist on how to take antibiotics?		
No	Ref	
Yes	-0.232	0.284

Table 9. Knowledge about antibiotic resistance. Bivariate analysis.

Knowledge about antibiotic resistance		
Variable	Coefficient	P-value
Age		
18-28	Ref	
29-39	-0.272	0.198
40-50	-0.507	0.035
51-61	-0.818	0.020
62 and older	-0.252	0.613
Sex		
Female	Ref	
Male	0.475	0.020
Education level		
High school	Ref	
College degree	-2.13	0.000
Bachelor's degree	-1.266	0.007
Master's/Professional's degree	-0.699	0.143
Doctorate degree	0.03	0.955
Household composition		
Single adult	Ref	
Married/Domestic partnership – no children	0.116	0.758
Married/Domestic partnership – with children	-0.349	0.066
Divorced	-0.279	0.422
Widowed	-0.855	0.311
Children number		
0	Ref	
1	-0.293	0.206
2	-0.547	0.024
3	-0.785	0.008
4	-0.202	0.714
5 or more	-0.678	0.341
No	Ref	
Yes	-0.484	0.006
How long ago did they use antibiotics?		
Never	Ref	
In the last month	0.205	0.735
In the last 3 months	0.695	0.246
In the last 6 months	0.528	0.380
In the last year	0.905	0.137
More than a year ago	1.05	0.072
Can't remember	0.915	0.139

* How long ago did they use antibiotics?		
Never	Ref	
Less than a year ago	0.582	0.308
More than a year ago	1.05	0.072

Table 10. Behavior towards antibiotics. Bivariate analysis.

Behavior regarding antibiotics		
Variable	Coefficient	P-value
Age		
18-28	Ref	
29-39	0.188	0.173
40-50	0.127	0.411
51-61	0.129	0.579
62 and older	0.472	0.120
Sex		
Female	Ref	
Male	-0.402	0.003
Education level		
High school	Ref	
College degree	0.404	0.256
Bachelor's degree	0.112	0.708
Master's/Professional's degree	0.475	0.121
Doctorate degree	0.711	0.045
Household composition		
Single adult	Ref	
Married/Domestic partnership – no children	0.184	0.428
Married/Domestic partnership – with children	0.173	0.159
Divorced	0.110	0.621
Widowed	-0.154	0.799
Children number		
0	Ref	
1	0.368	0.015
2	0.141	0.361
3	0.026	0.890
4	0.096	0.787
5 or more	-0.654	0.186
No	Ref	
Yes	0.181	0.108
How long ago did they use antibiotics?		
In the last month		
In the last 3 months	Ref	
In the last 6 months	0.166	0.403
In the last year	-0.052	0.800
More than a year ago	0.444	0.036
Can't remember	0.478	0.008
	0.112	0.609
* How long ago did they use antibiotics?		
Never	Ref	
More than a year ago	0.346	0.008
Did you get advice from doctor, nurse or		
pharmacist on how to take antibiotics?		

No	Ref	
Yes	0.485	0.000

Table 11. Knowledge about antibiotics (when to stop consuming antibiotics). Multivariate analysis.

Variable	Adj.OR	p-value
Gender		
Female	Ref	
Male	0.488	0.004
Did you get advice from doctor, nurse or pharmacist on how to take antibiotics?		
No	Ref	
Yes	2.465	0.000

Table 12. Knowledge about antibiotics (which diseases are treated by antibiotics). Multivariate analysis.

Knowledge about antibiotics. Which diseases are treated by antibiotics?		
Variable	Coefficient	P-value
Age		
18-28	Ref	
29-39	-0.299	0.264
40-50	0.629	0.05
51-61	-0.008	0.985
62 and older	0.137	0.809
Education level		
High school	Ref	
College degree	0.524	0.409
Bachelor's degree	0.086	0.872
Master's/Professional's degree	0.649	0.237
Doctorate degree	1.175	0.059
Having children		
No	Ref	
Yes	0.502	0.046
* How long ago did you use antibiotics?		
Never	Ref	
Less than a year ago	0.704	0.198
More than a year ago	0.981	0.081

Table 13. Knowledge about antibiotic resistance. Multivariate analysis

Knowledge about antibiotic resistance		
Variable	Coefficient	P-value
Age		
18-28	Ref	
29-39	-0.151	0.446

40-50	-0.580	0.014
51-61	-0.699	0.057
62 and older	0.283	0.574
Sex		
Female	Ref	
Male	0.487	0.012
Education level		
High school	Ref	
College degree	-1.80	0.001
Bachelor's degree	-1.00	0.029
Master's/Professional's degree	-0.722	0.125
Doctorate degree	-0.142	0.793
Knowledge about antibiotics (when to stop taking antibiotics)		
Wrong answer	Ref	
Correct answer	0.383	0.042
Knowledge about antibiotics ("*It's okay to use antibiotics that were given to a friend or family member, as long as they were used to treat the same illness*")		
Wrong answer	Ref	
Correct answer	0.311	0.069
Knowledge about antibiotics. Treatment	0.275	0.000

Table 14. Behavior towards antibiotics. Multivariate analysis.

Behavior towards antibiotics		
Variable	Coefficient	P-value
Sex		
Female	Ref	
Male	-0.276	0.037
Having children		
No	Ref	
Yes	0.290	0.009
Did you get advice from doctor, nurse or pharmacist on how to take antibiotics?		
No	Ref	
Yes	0.323	0.011
Knowledge about antibiotic resistance	0.081	0.008
Knowledge about antibiotics (when to stop taking antibiotics)		
Wrong answer	Ref	
Correct answer	0.494	0.000
Knowledge about antibiotics ("*It's okay to use antibiotics that were given to a friend or family member, as long as they were used to treat the same illness*")		
Wrong answer	Ref	
Correct answer	0.592	0.000

ETHICAL APPROVAL

NUSOM-IREC

07-02-2019

The student-driven project "**Knowledge, use and behavior towards antibiotics and antibiotic resistance"** having **Anargul Kuntuganova**, as Principal Investigator, and involving the NUSOM student **Zhanibek Yerubayev**, as a co-Investigators, is part of the MPH curriculum and is a requirement for graduation.

RE: Decision on the project **"Knowledge, use and behavior towards antibiotics and antibiotic resistance".**

The above-mentioned student-driven project was evaluated by the NUSOM-IREC (Nazarbayev University School of Medicine – Institutional Research Ethics Committee) and processed as "**Expedited Review**" by NUSOM-IREC.

*This is to inform you that the aforementioned research project has been **approved from the NUSOM-IREC**.*

Dr. Dimitri Poddighe

Chair of NUSOM-IREC

INFORMED CONSENT

We are conducting a study use of antibiotics. The study is necessary for comparison of the levels of knowledge, use and behavior towards antibiotics and antibiotic resistance in individuals in Astana. The obtained data would be useful for understanding public's knowledge about antibiotics, future investigations and future implementation of policies.

There are no risks involved in the study greater than you would encounter in your everyday life. Data will be reported in aggregated form without any potential hazard to reveal the personal information. If you feel uncomfortable answering any question in the provided questionnaire, feel free to skip it. If at any time you think you would like to withdraw from the study, please, let us know and we'll exclude your answers from the study. There are no direct benefits, however your participation will benefit society, and help to develop programs for intervention in the field of antibiotics resistance. There is no penalty for withdrawal from the study nor for the skipping the questions. Neither your name, nor other personally identifying information would be recorded, data is anonymous, so the confidentiality and the privacy of participants is guaranteed.

Do you agree to anonymously participate and provide answers to the questions in the questionnaire?

☐   I give consent and I agree to continue the survey.

☐ I do not give consent and do not agree to continue the survey.

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If you need further information or have any concern, you can contact the NU Institutional Research Ethics Committee (E-mail: resethics@nu.edu.kz)

Демография

1. **Информированное согласие**
   a. Да
   b. Нет

2. **Укажите Ваш пол**
   a. Мужской
   b. Женский

3. **Укажите ваш возраст**
   ___

4. **Уровень вашего образования?**
   Если в настоящее время обучаетесь, то укажите высшую полученную степень на данный момент
   a. Не закончил(а) школу
   b. Среднее образование
   c. Среднее специальное (колледж)
   d. Высшее (бакалавр)
   e. Магистратура
   f. Докторантура
   g. Другое, пожалуйста укажите ____

5. **Какой вариант из ниже перечисленных лучше всего описывает ваше семейное положение?**
   a. Только 1 взрослый
   b. Женат/замужем/гражданский брак (только взрослые)
   c. Женат/замужем/гражданский брак (есть дети)

6. **Если у вас есть дети, пожалуйста, укажите сколько?**
   ___

Основной опросник

Использование антибиотиков

7. **Как давно вы в последний раз принимали антибиотики? Пожалуйста, укажите время**
   a. ___
   b. Никогда

Если вы ответили "никогда" в 7, сразу переходите к вопросу 11.

8. **В этом случае вы получили антибиотики (или рецепт на них) от врача или медсестры?**
   a. Да
   b. Нет
   c. Другое, пожалуйста укажите ____
   d. Не могу вспомнить

9. **В этом случае вы получили совет от врача, медсестры или фармацевта о том, как их принимать?**

a. Да, я получил советы, как их принимать (например, с едой, в течение 7 дней)
b. Нет
c. Не могу вспомнить

10. Где вы их приобрели/получили?
a. Аптека
b. У врача/в кабинете врача
c. Интернет
d. Друг или член семьи
e. Я сохранил их с прошлого приема.
f. Другое, пожалуйста укажите ____

ЗНАНИЯ ОБ АНТИБИОТИКАХ

11. Как вы думаете, когда вы должны прекратить принимать антибиотики, после того, как вы начали лечение?
a. Когда вам стало лучше
b. Когда вы приняли все антибиотики в соответствии с указаниями
c. Когда вы чувствуете себя плохо от антибиотиков
d. Другое, пожалуйста укажите ____
e. Все выше перечисленное
f. Не знаю

12. В приведенной ниже шкале укажите, насколько вы согласны с этими утверждениями? 1 – полностью не согласен, 5 – полностью согласен

		Полностью согласен	Частично согласен	Нейтрален	Частично не согласен	Полностью не согласен
1	*«Можно использовать антибиотики, которые давались другу или члену семьи, если они использовались для лечения той же болезни»*	5	4	3	2	1

13. В приведенной ниже шкале укажите, насколько вы согласны с этими утверждениями? 1 – полностью не согласен, 5 – полностью согласен

		Полностью согласен	Частично согласен	Нейтрален	Частично не согласен	Полностью не согласен
1	*«Можно купить те же самые антибиотики или попросить их у врача, если вы заболели, и они помогли вам выздороветь, когда у вас раньше были такие же симптомы»*	5	4	3	2	1

14. Как вы думаете, эти заболевания можно лечить с помощью антибиотиков?

Заболевание	Да	Нет
Гонорея		
Инфекции мочевого пузыря или инфекции мочевыводящих путей		
Диарея/понос		
ВИЧ/СПИД		
Простуда и грипп		
Лихорадка		
Малярия		
Корь		
Кожные инфекции и инфекция раны		
Боль в горле/ангина		
Боль/ломота в теле		
Головные боли		

ЗНАНИЯ ОБ УСТОЙЧИВОСТИ К АНТИБИОТИКАМ

15. Слышали ли вы о каком-либо из следующих терминов

Термин	**Да**	**Нет**
Устойчивость к антибиотикам/резизтентность к антибиотикам		
Устойчивость к противомикробным препаратам (УПП)/антимикробная резизтентность		
Устойчивость к лекарствам		
Бактерии, устойчивые к антибиотикам		

16_1. Если вы слышали о термине «Устойчивость к антибиотикам/резистентность к антибиотикам», откуда вы о нем знаете? Вы можете выбрать несколько ответов
- a. Врач или медсестра
- b. Фармацевт
- c. Друг или член семьи
- d. СМИ (ТВ, радио, газеты)
- e. Специальная кампания
- f. Интернет
- g. Другое
- h. Не могу вспомнить

16_2. Если вы слышали о термине «Устойчивость к противомикробным препаратам (УПП)/антимикробная резизтентность», откуда вы о нем знаете? Вы можете выбрать несколько ответов
- a. Врач или медсестра
- b. Фармацевт
- c. Друг или член семьи
- d. СМИ (ТВ, радио, газеты)
- e. Специальная кампания
- f. Интернет
- g. Другое
- h. Не могу вспомнить

16_3. Если вы слышали о термине «Устойчивость к лекарствам», откуда вы о нем знаете? Вы можете выбрать несколько ответов
- a. Врач или медсестра
- b. Фармацевт
- c. Друг или член семьи
- d. СМИ (ТВ, радио, газеты)
- e. Специальная кампания
- f. Интернет
- g. Другое
- h. Не могу вспомнить

16_4. Если вы слышали о термине «Бактерии, устойчивые к антибиотикам», откуда вы о нем знаете? Вы можете выбрать несколько ответов
- a. Врач или медсестра
- b. Фармацевт
- c. Друг или член семьи
- d. СМИ (ТВ, радио, газеты)
- e. Специальная кампания
- f. Интернет
- g. Другое
- h. Не могу вспомнить

17. Пожалуйста, укажите, считаете ли вы следующие утверждения «верными» или «ложными»

Утверждение	Верное	Ложное
Устойчивость к антибиотикам возникает, когда ваше тело становится устойчивым к		

антибиотикам, и они больше не работают		
Многие инфекции становятся более устойчивыми к лечению антибиотиками		
Если бактерии устойчивы к антибиотикам, то может быть очень трудно или невозможно лечить инфекции, которые они вызывают		
Устойчивость к антибиотикам – это проблема, которая может повлиять на меня или мою семью		
Устойчивость к антибиотикам является проблемой в других странах, но не здесь (в Казахстане)		
Устойчивость к антибиотикам является проблемой только для людей, которые регулярно принимают антибиотики		
Бактерии, устойчивые к антибиотикам, могут передаваться от человека к человеку		
Устойчивые к антибиотикам инфекции могут сделать медицинские процедуры, такие как хирургия, пересадка органов и лечение рака, намного более опасными		

18. В какой степени вы согласны с тем, что следующие действия помогут решить проблему устойчивости к антибиотикам? 1 – полностью не согласен, 5 – полностью согласен

		Полностью согласен	Частично согласен	Нейтрален	Частично не согласен	Полностью не согласен
1	Люди должны использовать антибиотики только тогда, когда они назначены врачом или медсестрой	5	4	3	2	1
2	Фермеры должны давать меньше антибиотиков животным, производящим пищу/используемых как пища	5	4	3	2	1
3	Люди не должны хранить антибиотики и использовать их позже для других болезней	5	4	3	2	1
4	Родители должны убедиться, что все прививки их детей сделаны своевременно	5	4	3	2	1
5	Люди должны регулярно мыть руки	5	4	3	2	1
6	Врачи должны назначать антибиотики только тогда, когда они необходимы	5	4	3	2	1
7	Правительства должны поощрять разработку новых антибиотиков	5	4	3	2	1
8	Фармацевтические компании должны разработать новые антибиотики	5	4	3	2	1

19. В приведенной ниже шкале укажите, насколько вы согласны с этими утверждениями? 1 – полностью не согласен, 5 – полностью согласен

		Полностью согласен	Частично согласен	Нейтрален	Частично не согласен	Полностью не согласен
1	Устойчивость к антибиотикам - одна из самых больших проблем в мире	5	4	3	2	1
2	Медицинские эксперты решат проблему устойчивости к антибиотикам, прежде чем она станет слишком серьезной	5	4	3	2	1
3	Каждый должен ответственно относиться к использованию	5	4	3	2	1

	антибиотиков					
4	Такие люди вроде меня не могут сделать много, чтобы остановить устойчивость к антибиотикам	5	4	3	2	1
5	Я беспокоюсь о влиянии устойчивости к антибиотикам на мое здоровье и здоровье моей семьи.	5	4	3	2	1
6	У меня нет риска получить инфекцию, устойчивую к антибиотикам, если я правильно принимаю антибиотики.	5	4	3	2	1

ПОВЕДЕНИЕ В ОТНОШЕНИИ УСТОЙЧИВОСТИ К АНТИБИОТИКАМ

20. Вы когда-нибудь принимали антибиотики
    a. Да
    b. Нет
    c. Не могу вспомнить
21. Вы когда-нибудь пропускали предписанную дозу?
    a. Да
    b. Нет
    c. Не могу вспомнить
22. Вы когда-нибудь прекращали употреблять антибиотиков до окончания назначенного времени?
    a. Да
    b. Нет
    c. Не могу вспомнить
23. Вы когда-нибудь самостоятельно принимали антибиотики (без назначения)?
    a. Да
    b. Нет
    c. Не могу вспомнить
24. Вы просили назначить вам антибиотики, если вы не получали их от врача во время консультации?
    a. Да
    b. Нет
    c. Не могу вспомнить
25. Принимали ли вы антибиотики для профилактики заболеваний (например, простуды) в прошлом году?
    a. Да
    b. Нет
    c. Не могу вспомнить

KAZAKH

Демография

1. **Хабардар етілген келісім**
   a. Иә
   b. Жоқ
2. **Жынысыңызды көрсетіңіз**
   a. Ер
   b. Әйел

3. **жасыңызды көрсетіңіз**

   ___

4. **Біліміңіздің деңгейі?**
   Егер қазір оқып жатсаңыз, осы кезеңдегі біліміңіздің жоғары шегін көрсетіңіз
   a. Мектеп бітірмегенмін
   b. Орта білім
   c. Арнаулы орта (колледж)
   d. Жоғары (бакалавр)
   e. Магистратура
   f. Докторантура
   g. Басқа болса көрсетіңіз____

5. **Төменде көрсетілген қай нұсқа сіздің отбасылық жағдайыңызды толығырақ көрсетеді?**
   a. Тек 1 ересек
   b. Үйленген/тұрмыста/азаматтық неке (тек ересектер)
   c. Үйленген/тұрмыста/азаматтық неке (балалар бар)

6. **Егер балаларыңыз болса, санын көрсетіңіз?**

   ___

Негізгі сауалнама

Антибиотиктерді пайдалану

7. **Сіз антибиотикті соңғы рет қашан қабылдадыңыз? Уақытын көрсетіңіз**
   a. ___
   b. Ешқашан

Егер сіз «ешқашан» деп жауап берсеңіз, бірден 11 сұраққа көшіңіз.

8. **Бұл жағдайда сіз антибиотикті (немесе оны алуға рецептіні) дәрігерден немесе медбикеден алдыңыз ба?**
   a. Иә
   b. Жоқ
   c. Басқа болса көрсетіңіз ____
   d. Есіме түспей тұр

9. **Бұл жағдайда сіз дәрігерден, медбикеден немесе фармацевтен оларды қабылдау туралы кеңес алдыңыз ба?**
   a. Иә, мен оларды қабылдау тәртібі бойынша ережені алдым (мысалы, тамақпен, апта бойына)
   b. Жоқ
   c. Есіме түспей тұр

10. Сіз оларды қайдан алдыңыз?

a. Дәріхана
b. Дәрігерден/дәрігер кабинетінен
c. Интернет
d. Досымнан немесе отбасы мүшесінен
e. Мен оларды алдыңғы қабылдаудан сақтап қалдым.
f. Басқа болса көрсетіңіз ____

АНТИБИОТИКТЕР ТУРАЛЫ БІЛГЕНІМ

11. Сіз ем бастағаннан соң антибиотиктер қабылдауды қашан тоқтату керек деп есептейсіз?

a. Сіздің жағдайыңыз жақсарды
b. Сіз антибиотиктерді нұсқамаға сәйкес қашан қабылдадыңыз
c. Сіз қашан антибиотиктерден өзіңізді жайсыз сезіндіңіз
d. Басқа болса көрсетіңіз ____
e. Жоғарыда аталғандардың бәрі
f. Білмеймін

12. Мына пікірлермен қаншалықты келісетініңізді төменде берілген шәкілде көрсетіңіз. 1- толықтай келіспеймін, 5- толықтай келісемін

		Толық келісемін	Ішінара келісемін	бейтарап	Ішінара келіспеймін	Толық келіспеймін
1	*«Досыма немесе отбасы мүшесіне берілген антибиотиктерді, егер дәл сондай ауруды емдеу үшін қолданылса, қабылдауға болады»*	5	4	3	2	1

13. Мына пікірлермен қаншалықты келісетініңізді төменде берілген шәкілде көрсетіңіз. 1- толықтай келіспеймін, 5- толықтай келісемін

		Толық келісемін	Ішінара келісемін	бейтарап	Ішінара келіспеймін	Толық келіспеймін
1	*«Егер науқастанып қалсаңыз, және де бұрын сізде сырқаттың осындай белгілері болғанда сауығуға көмектескен болса, дәл сол антибиотиктерді сатып алуға немесе дәрігерден сұрап алуға болады»*	5	4	3	2	1

14. Сіз қалай ойлайсыз, бұл сырқаттарды антибиотиктердің көмегімен емдеуге бола ма?

Сырқаттың түрі	Иә	Жоқ
Соз ауруы		
Қуық немесе несеп жолдары инфекция		
Диарея/ Іш өту		
АИТВ/ЖИТС		

Суық тию және тұмау		
Қызба		
Безгек		
Қызылша		
Тері инфекциясы және жарақат инфекциясы		
Тамақ ауруы/баспа		
Ауру/дененің сырқырауы		
Бас аурулары		

АНТИБИОТИКТЕРГЕ ТҰРАҚТЫЛЫҚ ТУРАЛЫ БІЛІМДЕР
15. Мына терминдердің біреуі туралы естідіңіз бе?

Термин	Иә	Жоқ
Антибиотиктерге тұрақтылық/антибио тикке төзімділік		
Микробтарға қарсы препараттарға тұрақтылық (МПТ)/ микробтарға қарсы төзімділік		
Дәрілерге төзімділік		
Антибиотиктерге тұрақты бактериялар		

16_1. Егер сіз «Антибиотиктерге тұрақтылық/антибиотикке төзімділік»**терминін естісеңіз**, ол туралы қайдан білесіңіз? Сіз бірнеше жауапты таңдауыңызға болады

    a. Дәрігер немесе медбикеден
    b. Фармацевттен
    c. Досымнан немесе отбасы мүшесінен
    d. БАҚ (ТВ, радио, газеттер)
    e. Арнайы науқан
    f. Интернет
    g. Басқалардан
    h. Есіме түспей тұр

16_2. Егер сіз «Микробтарға қарсы препараттарға тұрақтылық (МПТ)/ микробтарға қарсы төзімділік »**терминін естісеңіз**, ол туралы қайдан білесіңіз? Сіз бірнеше жауапты таңдауыңызға болады

    a. Дәрігер немесе медбикеден
    b. Фармацевттен
    c. Досымнан немесе отбасы мүшесінен
    d. БАҚ (ТВ, радио, газеттер)
    e. Арнайы науқан
    f. Интернет
    g. Басқалардан

h. Есіме түспей тұр

16_3. Егер сіз «Дәрілерге төзімділік»**терминін естісеңіз**, ол туралы қайдан білесіңіз? Сіз бірнеше жауапты таңдауыңызға болады
    a. Дәрігер немесе медбикеден
    b. Фармацевттен
    c. Досымнан немесе отбасы мүшесінен
    d. БАҚ (ТВ, радио, газеттер)
    e. Арнайы науқан
    f. Интернет
    g. Басқалардан
    h. Есіме түспей тұр

16_4. Егер сіз «Антибиотиктерге тұрақты бактериялар» **терминін естісеңіз**, ол туралы қайдан білесіңіз? Сіз бірнеше жауапты таңдауыңызға болады
    a. Дәрігер немесе медбикеден
    b. Фармацевттен
    c. Досымнан немесе отбасы мүшесінен
    d. БАҚ (ТВ, радио, газеттер)
    e. Арнайы науқан
    f. Интернет
    g. Басқалардан
    h. Есіме түспей тұр

17. Сіз аталған пайымдауларды «шын» және «жалған» деп есептейсіз бе, онда жауабыңызды көрсетіңіз?

Пайымдау	Шын	Жалған
Антибиотикке тұрақтылық сіздің ағзаңыз антибиотикке тұрақты болғанда пайда болады, және олар әсер етпейді		
Көптеген инфекция антибиотиктермен емдеуде тұрақты болады		
Егер бактериялар антибиотиктерге тұрақты болса, онда олар қоздыратын инфекцияларды емдеу мүмкін емес немесе өте қиын болуы мүмкін		
Антибиотиктерге тұрақтылық - бұл маған немесе менің отбасыма әсер ететін мәселе		
Антибиотиктерге тұрақтылық өзге елдердегі мәселе, тек осында емес (Қазақстанда)		
Антибиотиктерге тұрақтылық оларды үнемі қабылдайтын адамдар үшін өзекті болып табылады		
Антибиотиктерге тұрақты бактериялар адамнан адамға берілуі мүмкін		

	Антибиотиктерге тұрақты инфекциялар хирургия, мүшелерді ауыстыру мен обырды емдеу сияқты медициналық емдеу шараларын аса қауіпті етуі мүмкін		

18. Келесі әрекеттер антибиотикке тұрақтылық мәселесін шешуге көмектеседі деген пікірмен қаншалықты келісесіңіз? 1 – толық келіспеймін, 5 – толықтай келісемін

		Толық келісемін	Ішінара келісемін	бейтарап	Ішінара келіспеймін	Толық келіспеймін
1	Адамдар антибиотикті дәрігер немесе медбике тағайындаған жағдайда қолдануы керек	5	4	3	2	1
2	Фермерлер тамақ ретінде қолданылатын/ өндірілетін жануарларға неғұрлым аз мөлшерде антибиотик беруі тиіс	5	4	3	2	1
3	Адамдар антибиотиктерді сақтамау және оларды өзге ауруларды емдеуге қолданбау керек	5	4	3	2	1
4	Ата-аналар балаларына екпелердің мерзімінде салынуын қадағалауы тиіс	5	4	3	2	1
5	Адамдар ұдайы қолдарын жуып отыруы тиіс	5	4	3	2	1
6	Дәрігерлер қажет болған жағдайда ғана антибиотикті тағайындауы тиіс	5	4	3	2	1
7	Үкімет жаңа антибиотиктерді дайындаушыларды ынталандырып отыруы тиіс	5	4	3	2	1
8	Фармацевтикалық компаниялар жаңа антибиотиктерді әзірлеп отыруы тиіс	5	4	3	2	1

19. Мына пікірлермен қаншалықты келісетініңізді төменде берілген шәкілде көрсетіңіз. 1- толықтай келіспеймін, 5- толықтай келісемін

		Толық келісемін	Ішінара келісемін	бейтарап	Ішінара келіспеймін	Толық келіспеймін
1	Антибиотиктерге тұрақтылық – әлемдегі маңызды мәселелердің бірі	5	4	3	2	1

2	Медициналық сарапшылар решат проблему антибиотиктерге тұрақтылық мәселесін, ол аса маңызды болмай тұрып шешеді	5	4	3	2	1
3	Әркім антибиотиктерді қолдануға жауапкершілікпен қарауы тиіс	5	4	3	2	1
4	Мен сияқты адамдар антибиотикке тұрақтылықты тоқтату үшін көп нәрсе істей алмайды	5	4	3	2	1
5	Мен антибиотикке тұрақтылықтың менің және отбасымның денсаулығына тигізер әсеріне алаңдаймын.	5	4	3	2	1
6	Егер антибиотикті дұрыс қабылдасам, менде антибиотиктерге тұрақты инфекцияны қабылдау қаупі жоқ.	5	4	3	2	1

АНТИБИОТИКТЕРГЕ ТҰРАҚТЫЛЫҚҚА ҚАТЫСТЫ ТӘРТІП

20. Сіз бұрында антибиотиктер қабылдадыңыз ба?
   a. Иә
   b. Жоқ
   c. Есіме түспей тұр

21. Сіздің тағайындалған мөлшерді ішпеген кезіңіз болды ма?
   a. Иә
   b. Жоқ
   c. Есіме түспей тұр

22. Сіз антибиотиктерді тағайындаған мерзімінен бұрын тоқтатқан кезіңіз болды ма?
   a. Иә
   b. Жоқ
   c. Есіме түспей тұр

23. Сіздің өз бетіңізбен антибиотиктер қабылдаған кезіңіз болды ма (дәрігердің тағайындауынсыз)?
   a. Иә
   b. Жоқ
   c. Есіме түспей тұр

24. Егер кеңес беру кезінде дәрігер бермеген жағдайда, Сіз өзіңізге антибиотиктер тағайындауды өтінген кезіңіз болды ма?
   a. Иә
   b. Жоқ
   c. Есіме түспей тұр

25. Өткен жылы аурулардың (мәселен, суық тиюдің) алдын алу үшін антибиотиктер қабылдадыңыз ба?
   a. Иә
   b. Жоқ

c. Есіме түспей тұр

DEMOGRAPHICS

1. **Informed Consent**
   a. Yes
   b. No

2. **To begin, please record gender**
   a. Male
   b. Female

3. **What is your age?**

   ____

4. **What is the highest degree or level of school you have completed?**
   If currently enrolled, highest degree received.

   Single Code

   a. No schooling
   b. Middle school
   c. High school
   d. College degree
   e. Currently studying
   f. Bachelor's degree
   g. Master's/Professional degree
   h. Doctorate degree
   Other, please specify ____

5. **Which of these best describes your household composition?**
   a. 1 Single adult only
   b. Married / domestic partnership - adults only
   c. Married / domestic partnership and having children.
   d. Divorced
   e. Widowed
   f. Other

6. **If you have children, please specify how many?**
   a. **0**
   b. **1**
   c. **2**
   d. **3**
   e. **4**
   f. **5 or more**

MAIN QUESTIONNAIRE

USE OF ANTIBIOTICS

7. How long ago did you last take antibiotics? Please indicate time

a. In the last month

b. In the last 3 months
c. In the last 6 months
d. In the last year
e. More than a year ago
f. Can't remember
g. Never

If 'Never' code 5, go straight to Question 10.

8. On that occasion, did you get the antibiotics (or a prescription for them) from a doctor or nurse?

a. Yes
b. No
c. Other, please specify ____
d. Can't remember

9. On that occasion, did you get advice from a doctor, nurse, or pharmacist on how to take them?

a. Yes, I received advice on how to take them (e.g. with food, for 7 days)
b. No
c. Can't remember

10. On that occasion, where did you get the antibiotics?
a. Medical store or pharmacy
b. Physician/medical office
c. Stall or hawker
d. The internet
e. Friend or family member
f. I had them saved up from a previous time
g. Other, please specify ____

KNOWLEDGE ABOUT ANTIBIOTICS

11. When do you think you should you stop taking antibiotics once you've begun treatment?
a. When you feel better
b. When you've taken all of the antibiotics as directed
c. When you feel sick from the antibiotics
d. Other, please specify ____
e. All of the above
f. Don't know

12. On the scale below, please indicate how much do you agree with this statement?

		Strongly agree	Slightly agree	Neither agree nor disagree	Slightly Disagree	Strongly Disagree
1	*"It's okay to use antibiotics that were given to a friend or family member,*	5	4	3	2	1

		Strongly agree	Slightly agree	Neither agree nor disagree	Slightly Disagree	Strongly Disagree
	as long as they were used to treat the same illness"					

13. On the scale below, please indicate how much do you agree with this statement?

		Strongly agree	Slightly agree	Neither agree nor disagree	Slightly Disagree	Strongly Disagree
1	*"It's okay to buy the same antibiotics, or request these from a doctor, if you're sick and they helped you get better when you had the same symptoms before"*	5	4	3	2	1

14. **Do you think this condition can be treated with antibiotics?**

Condition	Yes	No	I don't know
Gonorrhoea			
Bladder infection or urinary tract infection (UTI)			
Diarrhoea			
HIV/AIDS			
Cold and flu			
Fever			
Malaria			
Measles			
Skin or wound infection			
Sore throat			
Body aches			
Headaches			

KNOWLEDGE ABOUT ANTIBIOTIC RESISTANCE

15. **Have you heard of any of the following terms**

Term	Yes	No
Antibiotic resistance		
Antimicrobial resistance		
Drug resistance		
Antibiotic-resistant bacteria		

16_1. Ask if answered YES @ 14) to 'Antibiotic Resistance' Where did you hear about the term: **'Antibiotic Resistance'? You can select several answers**

a. Doctor or nurse
b. Pharmacist
c. Family member or friend
d. Media (newspaper, TV, radio)
e. Specific campaign
f. Internet
g. Other
h. Can't remember

16_2. Ask if answered YES @ 14) to 'Antimicrobial Resistance' Where did you hear about the term: **'Antimicrobial resistance'? You can select several answers**

a. Doctor or nurse
b. Pharmacist
c. Family member or friend
d. Media (newspaper, TV, radio)
e. Specific campaign
f. Internet
g. Other
h. Can't remember

16_3. Ask if answered YES @ 14) to 'Drug resistance' Where did you hear about the term: **'Drug resistance'? You can select several answers**

a. Doctor or nurse
b. Pharmacist
c. Family member or friend
d. Media (newspaper, TV, radio)
e. Specific campaign
f. Internet
g. Other
h. Can't remember

16_4. Ask if answered YES @ 14) to 'Antibiotic-resistant bacteria' Where did you hear about the term: **'Antibiotic-resistant bacteria'? You can select several answers**

a. Doctor or nurse
b. Pharmacist

- c. Family member or friend
- d. Media (newspaper, TV, radio)
- e. Specific campaign
- f. Internet
- g. Other
- h. Can't remember

17. Please indicate whether you think the following statements are 'true' or 'false'

Term	True	False
Antibiotic resistance occurs when your body becomes resistant to antibiotics and they no longer work as well		
Many infections are becoming increasingly resistant to treatment by antibiotics		
If bacteria are resistant to antibiotics, it can be very difficult or impossible to treat the infections they cause		
Antibiotic resistance is an issue that could affect me or my family		
Antibiotic resistance is an issue in other countries but not here		
Antibiotic resistance is only a problem for people who take antibiotics regularly		
Bacteria which are resistant to antibiotics can be spread from person to person		
Antibiotic-resistant infections could make medical procedures like surgery, organ transplants and cancer		

	treatment much more dangerous		

18. On the scale shown, how much do you agree the following actions would help address the problem of antibiotic resistance?

		Strongly agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Strongly disagree
1	People should use antibiotics only when they are prescribed by a doctor or nurse	5	4	3	2	1
2	Farmers should give fewer antibiotics to food-producing animals	5	4	3	2	1
3	People should not keep antibiotics and use them later for other illnesses	5	4	3	2	1
4	Parents should make sure all of their children's vaccinations are up-to-date	5	4	3	2	1
5	People should wash their hands regularly	5	4	3	2	1
6	Doctors should only prescribe antibiotics when they are needed	5	4	3	2	1
7	Governments should reward the development of new antibiotics	5	4	3	2	1
8	Pharmaceutical companies should develop new antibiotics	5	4	3	2	1

19. On the scale shown, how much do you agree with following statements?

		Agree Strongly	Agree Slightly	Neither agree nor disagree	Disagree Slightly	Disagree Strongly
1	Antibiotic resistance is one of the biggest problems the world faces	5	4	3	2	1
2	Medical experts will solve the problem of antibiotic resistance before it becomes too serious	5	4	3	2	1
3	Everyone needs to take responsibility for using antibiotics responsibly	5	4	3	2	1
4	People like me can't do much to stop antibiotic resistance	5	4	3	2	1
5	I am worried about the impact that antibiotic resistance will have on my health, and that of my family	5	4	3	2	1

6	I am not at risk of getting an antibiotic- resistant infection, as long as I take my antibiotics correctly.	5	4	3	2	1

BEHAVIOR ABOUT ANTIBIOTIC RESISTANCE

20. Have you ever taken antibiotics
    a. Yes
    b. No
    c. Can't remember
21. Have you ever missed your prescribed dose?
    a. Yes
    b. No
    c. Can't remember
22. Did you ever stopped to consume them before prescribed time?
    a. Yes
    b. No
    c. Can't remember
23. Did you ever self-medicated antibiotics?
    a. Yes
    b. No
    c. Can't remember
24. Did you ask for an antibiotic if you did not receive one from a clinician during the consultation?
    a. Yes
    b. No
    c. Can't remember
25. Did you take antibiotics to prevent diseases (such as common cold) in the past year?
    a. Yes
    b. No
    c. Can't remember