

## ORIGINAL ARTICLE

**Sociodemographic Aspects of Antibiotic Consumption Practices in Residents of Wah**Hina Shan<sup>1</sup>, Ayesha Javaid<sup>2</sup>, Anam Zeb<sup>3</sup>, Saadia Maqbool<sup>4</sup>**ABSTRACT**

**Objective:** To assess the frequency of antibiotic use with or without prescription and the source of purchasing antibiotics in relation to social determinants among residents of Wah, Pakistan.

**Study Design:** Cross sectional.

**Place and Duration of Study:** The study was carried out in the community of Wah Cantt from January 2017 to December 2017.

**Materials and Methods:** A two stage cluster random sampling technique was used. 400 participants aged 16 years and older, completed the validated questionnaire. Chi-square test of significance was applied to determine the relationship between categorical variables and a p-value < 0.05 was considered significant.

**Results:** Use of antibiotics in the preceding month was reported by 110 (27.6%) participants, 101 (25.3%) reported having taken antibiotics in the last six months. Use of antibiotics was more in males in all categories as compared to females (chi-square= 15.778,  $p = 0.008$ ). The analysis showed that individuals between 55-64 years of age had taken antibiotics in last month (69.2%). Government employees showed the highest percentage (36.5%) of respondents who consumed antibiotics in last one month as compared to any other profession. Overall, most respondents 277 (82.7%) reported that they got their antibiotics on a prescription from doctors.

**Conclusion:** Effective education along with close vigilance for the judicious use of antibiotic prescribing should be aimed at both the prescribers and the public. Better knowledge is associated with correct behavior of antibiotic/antimicrobial use.

**Key Words:** *Antibiotics, Antibiotic Consumption, Antibiotic Prescription, Antibiotic Resistance, Antimicrobial Resistance.*

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**Introduction**

Antibiotics are the most commonly prescribed antimicrobial medicines for prevention and treatment of bacterial infections. The increase in antimicrobial resistance is multifactorial, but irrational use along with higher consumption of antibiotic are considered chief determinants in

development of antibiotic resistance worldwide, including Pakistan.<sup>1-4</sup> The global menace of antibiotic resistance results in lengthier hospital stays, higher medical costs and increased mortality.<sup>1,3,5,6</sup> Due to accelerated phenomenon of antibiotic resistance, world is heading to a post-antibiotic era, in which infections and minor injuries will once again kill.<sup>1,4,7-9</sup>

The conventional antibiotic pipeline remains thin with only few new antibiotics in development to treat the most dangerous infections making antibiotic resistance a big public health concern with threats to food security and development.<sup>9-11</sup>

Worldwide, more than two million people become infected with bacteria that are resistant to antibiotics and 700,000 deaths per year occur due to infections that are resistant to antibiotics.<sup>6</sup> Pakistan is one of the many low and middle income countries (LMICs) where diseases like pneumonia, acute respiratory tract infections and gonorrhoea, have become difficult to treat.<sup>12</sup> Extensively drug-resistant

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tuberculosis (XDR-TB) has become resistant to at least four of the principal anti-tuberculosis drugs.<sup>13</sup> Drug-resistant tuberculosis is killing 250,000 people annually in over hundred countries.<sup>14,15</sup> Multidrug resistance is a grave concern in Pakistan as more than 90% of participants were positive when tested for multidrug-resistant bacteria in a study conducted by the World Health Organization (WHO).<sup>16</sup> High connectivity between countries have resulted in the spread of resistant bacteria. Much of the overuse of antimicrobials, chiefly antibiotics, is reported in LMICs, especially in BRICS (Brazil, Russia, India, China, & South Africa) nations.<sup>17,18</sup> Pakistan's close proximity with China and India makes it more vulnerable to this leading global health issue. Pakistan and other LMICs will be facing a massive challenge of the double burden of disease due to antibiotic resistance.<sup>17,19,20</sup> Achievements of modern medicine are threatened because of the fact that these medicines will not be able to provide successful prevention and treatment to various communicable and non-communicable diseases (NCDs).<sup>1,8,17,20</sup>

A recently published study indicates that in many countries (Australia, France, Italy, Hungary, Malta, New Zealand, Norway, Netherlands, Poland) community dispensing covers approximately 85%-95% of the total antibacterial supply.<sup>21</sup> Evidence from previous studies suggests that in health care settings, antibacterial medications are usually used for the treatment of diseases of viral origin that cannot respond to antibiotics.<sup>22</sup> Over prescription from clinicians, just to be 'on the safe side' and sometimes in response to patients' demand result in the development of the perception in the general public that antibiotics are necessary and safe for symptoms of nonbacterial diseases.<sup>23</sup> Furthermore, injudicious use of antibiotics in developing countries is the result of patients' past experiences, high cost of health care, non-regulatory sale, insufficient knowledge, demanding unneeded antibiotics, misperception and also self-medication.<sup>4,16,17,24-26</sup> Sources of self-medication may comprise taking leftover drugs from treatment courses prescribed earlier or using antibiotics given to friends family for similar symptoms.<sup>27</sup> Antibiotic use without medical direction or advice is inappropriate because inadequate dosages, incorrect dosage interval and

not completing the duration of therapy increases the risk of the spread of antibiotic resistance.<sup>28</sup>

It is imperative to evaluate the relative magnitude of community antibacterial consumption in a country like Pakistan because of increased antibacterial consumption, easy access, availability, along with irrational prescription of antibiotics due to lack of laboratory facilities, non-adherence to clinical practice guidelines, incompetency of health care professionals, and cultural beliefs.<sup>16,27,29,30</sup> In addition, little information exists on factors that put persons at risk for self-medication. The WHO has stressed on the significant role of the public as well as the prescribers in the effective management of antibiotic resistance.<sup>31</sup>

This study explored the factors that are linked with general publics' practice of antibiotic consumption. The aim was to estimate the extent, prevalence, attitude, and trends in the use of non-prescription antibiotics and sources of acquiring/purchasing antibiotics in Wah, Pakistan.

### Materials and Methods

This cross-sectional study was conducted using two stage cluster random sampling technique in four sectors (randomly chosen out of the total 27 sectors) of Wah Cantt from January to December 2017. WHO sample size calculator was used, with the following assumptions of antibiotics usage of 57%, confidence level of 95% and 5%, absolute precision required. The sampling frame was obtained from station headquarters, Wah Cantt after taking permission from local authorities. Systematic data collection was done from every fifth house and the first person contacted who fulfilled the eligibility criteria. Inclusion criteria was of participants who were 16 years old or older, were able to read Urdu or English language, and were mentally and physically capable of answering. A validated, closed-ended WHO questionnaire, previously used by WHO in a multi-country survey was administered both in English and Urdu languages (Urdu translation was evaluated using the standard forward and backward method).<sup>32</sup> Institutional ethical approval was taken from Ethical Review Committee of Army Medical College, National University of Medical Sciences, Rawalpindi. A total of 400 participants completed the questionnaire with written informed consent. Data was entered and analyzed using IBM SPSS (version

22.0). Mean and standard deviation were calculated for continuous variables. Categorical variables were presented by frequency and percentage. Cross-tabulation was done to determine the association between level of knowledge around the appropriate use of antibiotics, when to discontinue antibiotics course and the conditions/illnesses antibiotics treat. To determine the relationship between other categorical variables, chi-square test of significance was applied, and a  $p$ -value  $< 0.05$  was significant.

## Results

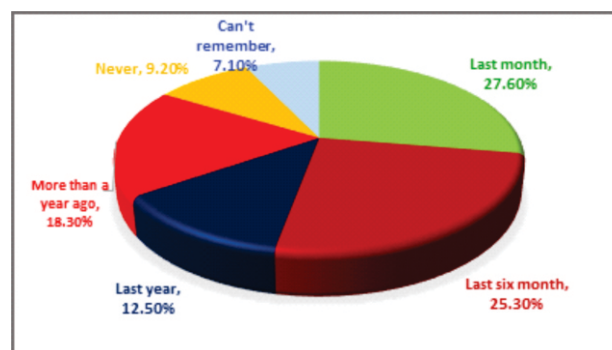
A sample of adults aged 16 to 72 years were included in the survey with a total of 400 respondents. Of the total, 239 (59.8%) were males. Mean age was 37.52  $\pm$  10.09 years (Table 1).

**Table 1: Summary of Sociodemographic Characteristics of Study Participants (N=400)**

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Variable	Number (N)	Percentage (%)
<b>Gender</b>		
Male	239	59.8
Female	161	40.2
<b>Age groups (years)</b>		
16-24	29	7.2
25-34	145	36.3
35-44	127	31.8
45-54	79	19.8
55-64	13	3.3
65 plus	7	1.8
<b>House hold composition</b>		
Single adult only	70	17.5
Single adult and at least one child under 16	11	2.8
Married adults only	71	17.8
Married and at least one child under 16	132	33.0
Multiple adults aged 16 and above	55	13.8
Multiple adults and at least one child under 16	61	15.3
<b>Education</b>		
Primary or middle	73	18.3
Secondary or higher secondary	140	35.0
Bachelor's or equivalent	126	31.5
Master's or equivalent	61	15.3
<b>Occupation</b>		
Government employees	140	35.0
Businessmen/private employees	109	27.3
Doctors	23	5.8
Other professionals (teachers, engineers etc.)	69	17.3
Students	32	8.0
Jobless/retired/housewives	27	6.8

Monthly Household Income in Pakistani Rupees (PKR)	Number	Percentage (%)
First\poorest Quintile (< 20000 PKR)	88	22.0
Second Quintile ( $\geq$ 20000 < 30000 PKR)	178	44.5
Third Quintile ( $\geq$ 30000 < 40000 PKR)	48	12.0
Fourth Quintile ( $\geq$ 40000 < 65000 PKR)	40	10.0
Fifth\richest Quintile ( $\geq$ 65000 PKR)	46	11.5

Antibiotic consumption practices were assessed by asking when the last time antibiotics were used (in the last one month, six months back, last year or a year before) by the respondents. Also, how the antibiotics were obtained (prescription or non-prescription medication), and the source of purchasing or acquiring antibiotics (pharmacy, doctors, friends or relatives, online purchase). Use of antibiotics in the last month was reported by 110 (27.6%) of the participants, 101 (25.3%) reported having taken antibiotics in the last six months. Fifty (12.5%) of the respondents reported of having used antibiotics in the last year. A total of 65 participants never used antibiotics or did not remember using antibiotics (9.20 %, 7.10% respectively). The details are shown in figure 1.



**Fig 1: Responses showing the Last Time of Antibiotics Consumption**

Some significant differences were identified in antibiotic consumption among various sociodemographic groups/strata. In comparison with gender, 68 (28.4%) males and 42 (26%) females consumed antibiotics in the last one month out of the total of 110. Overall previous use of antibiotics was more in males in all the categories as compared to females and this difference in consumption of antibiotics based on gender was found to be statistically significant (chi-square= 15.778,  $p = 0.008$ ).

The analysis showed that in the in last month

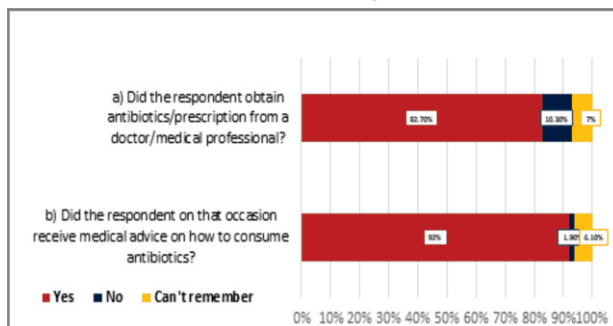
category, the 55-64 year age group used more antibiotics 9 (69.2%). In terms of the last six months 49 (38%) of 35-44 year old reported using antibiotics. The 35-44 year age category reported the highest percentage of antibiotic use in the last year. The respondents in the 16-24 year age group were the highest (55%) in not remembering the last time they used antibiotics. Government employees showed the highest percentage (36.5%) out of the total 110 respondents who consumed antibiotics in last one month as compared to any other profession. The relationship of last use of antibiotics with household composition was statistically significant (chi-square = 43.221,  $p = 0.013$ ). The details are shown in Table 2. Significant differences, in terms of antibiotic consumption, were identified among various socioeconomic groups and among varying education levels. In the category of secondary or

higher secondary degree, 37 (33.6%) reported having taken antibiotics within the last month as compared to 19 (17.2%) of the most educated. Respondents classified as having Bachelor's degree were more likely to have taken antibiotics in the last year with the percentage of 54.0%, this association is statistically significant (chi-square= 27.953,  $p = 0.022$ ) as shown in Table 2. The detailed comparison of antibiotics consumed last time in relation to socioeconomic status is shown in Table 2. The highest percentage of antibiotic use in the last month (42%) and last 6 months (51.4%) was in the income category of second wealth quintile ( $\geq 20000 < 30000$ ). The difference between the antibiotic consumption practices and monthly income is statistically significant (chi-square = 36.583,  $p = 0.013$ ).

**Table 2: Last Use of Antibiotics in Relation to Social Determinants**

Household Composition	Use of Antibiotics						Total (N = 400)
	In last month	In last 6 months	In last year	More than a year ago	Never	Can't remember	
Single adult only	25	11	3	12	11	8	70
Single adult & at least one child < 16	4	1	2	2	2	0	11
Married adults only	15	25	7	17	6	1	71
Married & at least one child < 16	40	34	18	24	11	5	132
Multiple adults aged 16 and above	15	15	8	10	3	4	55
Multiple adults & at least 1 child < 16	11	15	12	9	4	10	61
Total (N = 400)	110 (27.5%)	101 (25.2%)	50 (12.5%)	74 (18.5%)	37 (9.3%)	28 (7%)	400
Chi-square = 43.221, $p = 0.013$							
Level of Education	In last month	In last 6 months	In last year	More than a year ago	Never	Can't remember	Total (N = 400)
Primary/middle	21	23	3	14	5	7	73
Secondary/higher secondary	37	31	10	33	19	10	140
Bachelor's or equivalent	33	31	27	17	10	8	126
Master's or equivalent	19	16	10	10	3	3	61
Total (N = 400)	111 (27.8%)	101 (25.2%)	50 (12.5%)	74 (18.5%)	37 (9%)	28 (7%)	400
Chi-square = 27.953, $p < 0.022$							
Monthly Household Income in Rupees	In last month	In last 6 months	In last year	More than a year ago	Never	Can't remember	Total (N = 400)
< 20000 rupees (1 <sup>st</sup> quintile)	21	22	6	19	10	10	88
$\geq 20000 < 30000$ rupees (2 <sup>nd</sup> quintile)	46	52	20	35	14	11	178
$\geq 30000 < 40000$ rupees (3 <sup>rd</sup> quintile)	16	10	4	9	6	3	48
$\geq 40000 < 65000$ rupees (4 <sup>th</sup> quintile)	13	10	5	3	6	3	40
$\geq 65000$ rupees (5 <sup>th</sup> quintile)	14	7	15	8	1	1	46
Total (N = 400)	111 (27.8%)	101 (25.2%)	50 (12.5%)	74 (18.5%)	37 (9%)	28 (7%)	400
Chi square = 36.583, $p = 0.013$							

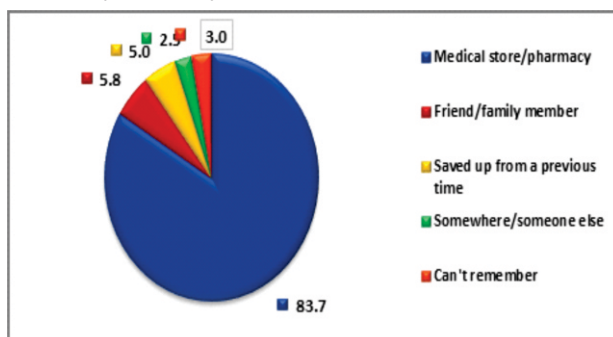
Participants who reported having taken antibiotics (N = 335) were asked whether they had obtained antibiotics from health professionals through prescription or was it non-prescription i.e. (e.g., friends or family, online purchase, previously used/saved antibiotics, etc.). This was followed by asking whether they received advice on how to consume/take them (e.g., with food, for five days). Overall, most respondents 277 (82.7%) reported that they got their antibiotics on a prescription from doctors and 308 (92%) gave a relatively continuous spread of answers that they did receive advice from a doctor on how to take them, (Figure 2).



**Fig 2: Percentage of Responses from Study Participants (N = 335)**

**a) Obtained Antibiotics through a Medical Professional**  
**b) Received Medical Advice on how to take Antibiotics**

Majority of the respondents (83.7%) reported having purchased/obtained the antibiotics from a medical store or pharmacy. Only 5.8% of the respondents received antibiotics from friends or family as shown in Figure 3, and these results were not statistically significant. The only significant finding was the comparison with the level of education. Respondents having basic education and higher secondary education obtained/purchased the antibiotics (21.4% & 21.4 %) other than a medical store or pharmacy.



**Fig 3: Distribution of Sources from where Antibiotics were Purchased /Acquired by Percentage**

## Discussion

High prevalence of antibiotic use is a public health concern for many communities and have been documented in countries like China, India, Greece, Saudi Arabia, and Australia.<sup>33-34</sup> The results of our study regarding frequency of antibiotic consumption demonstrated that 25.3% participants consumed antibiotics within the past six months, while 27.5% used them within the previous month. A survey conducted by WHO in Egypt reported that 76% of the participants had used antibiotics in the last six months, whereas, a study conducted in Saudi Arabia reported 71% of the respondents had used an antibiotic in the last six months.<sup>23,32</sup>

In a similar multi-country survey the country in which respondents reported the lowest use in the past six months was Barbados where the number stands at 35%.<sup>32</sup> The prevalence of antibiotic use is highly relevant to public campaigns on antibiotic resistance as high levels of consumption contribute to the problem of antimicrobial resistance. The participants of the older age groups were more likely to use antibiotics especially in the 45-54 year old (63.2%) and 55-64 year old (69.2%) year age group. The lower the level of education, higher was the frequency of antibiotic use.

The majority of the people (82.7%) reported obtaining antibiotics on a prescription from a doctor, compared to India showed (90%), Sudan (91%), though the findings in a survey done in Russian Federation were different where only 56% of the respondents reported obtaining their antibiotics this way.<sup>32</sup> El Zowalaty et al. found that 63.6 % of participants purchased antibiotics without a prescription from pharmacies in Saudi Arabia.<sup>33</sup> In a household survey of 'in-home drug storage and self-medication' in Iraq, 78% of participating families admitted self-medication with antibiotics. Worldwide, 50% of antibiotics used are non-prescribed and are sourced from local medical stores or pharmacies.<sup>26</sup>

Most of our respondents 368 (92%) reported that they received advice on how to consume antibiotics from a medical professional. Almost 69% of the respondents from the Russian Federation, 95% from South Africa, and 95% from Mexico reported getting advice on how to consume antibiotics.<sup>32</sup> A sizeable majority of people 83.8% in this study obtained



antibiotics from a medical store, or pharmacy and results were similar in a survey done by WHO in which 86% from Nigeria and 83% from China had obtained antibiotics from a medical stall or store.<sup>32</sup> No respondent in our study mentioned online purchase of medicines, which is being done in India and China but on a small scale. Our findings indicate that antibiotics are more likely to be taken to treat an appropriate condition or illness and in the prescribed manner, both of which are essential in the context of tackling antibiotic resistance. Incorrectly prescribed antibiotics contribute to the promotion of resistant bacteria.<sup>35</sup> Another of our notable finding indicates to a practice of obtaining antibiotics other than from a medical store especially in the lower level of education strata.

### Conclusion

Effective education along with close vigilance to the judicious use and antibiotic prescribing should be aimed at both the prescribers and the public as better knowledge is associated with correct behavior of antibiotic/antimicrobial use.

### Recommendation

Suitable and sustainable interventions along with creating awareness in general population should be implemented to fight the global battle against antimicrobial resistance which has become a silent pandemic. Health workers under effective leadership should promote the rational use of antibiotics that must work across Sustainable Development Goals (SDGs) to efficiently manage this unavoidable phenomenon.

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