

# Prevalence of self-medication use of antibiotics among the population in Ernakulam district in Kerala, India<sup>+</sup>

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**Abstract:** Self-medication (SM) of antibiotics has become a prevalent reason for the development of antibiotic resistance. This study aims to assess the use of self-medication practices with antibiotics and related factors among the Ernakulam district, Kerala population. Sore throat (34%) and cough (26%) are found to be the major reasons for the self-usage of antibiotics among people. Various antibiotics commonly used for self-medication were amoxicillin, ciprofloxacin, and azithromycin. Reasons for the use of antibiotic self-medication were cost-saving (3.8%), previous successful experiences (7.7%), and convenience (11.5%). Improper antibiotic use may lead to drug overuse and thereby antibiotic resistance. Hence, it should be taken only under strict supervision by an expert.

**Keywords:** Self-medication, Antibiotics; Antibiotics resistance; Kerala.

## 1. Introduction

SM is the process by which people choose and take medications to cure ailments or symptoms they have recognized for themselves without any medical expert advice [1]. It also includes reusing prescriptions without appropriate expert consultation [2]. Many studies show that self-medication can create delays in obtaining health care in life-threatening situations [3]. The World Health Organization (WHO) declared self-medication and inappropriate usage of antibiotics was due to a lack of proper knowledge of its dosage and time durations leading to adversarial effects and thereby increase in antibiotic resistance [1,5,6]. Antibiotic resistance is a subject of major concern worldwide as it may result in an increased risk of health-related infection and even death [7].

The global dilemma of antibiotic usage has worsened the issue of antibiotic resistance more in countries or places where they are been overused or disposed of without any proper guidelines [8]. The potency of antibiotics may decrease as they are used as primary care for the treatment of various infectious ailments which may be due to an increase in the level of antimicrobial resistance (AMR) throughout the globe [9]. Antibiotic resistance can occur naturally, as bacteria evolve and adapt to their environment. However, frequent use of antibiotics may increase multidrug-resistant infections. Antimicrobial medication without prescription has increased in Asia (58%), Europe (47%), and South America (25%) [8].

In developing countries such as India, self-medication with antibiotics has been a significant issue due to the easy availability of medications and the lack of health facilities. Self-medication usage of antibiotics was found only 3.31% as per the study conducted in the urban area of Kerala compared to the other districts of India which may be due to greater awareness among people with high literacy rates [10]. Developing countries are facing a dilemma of antibiotic resistance as the percentage of antibiotics usage without

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proper doctor consultation is very high. Most of the studies regarding the self-use of antibiotics were conducted within the hospitals and the prevalence and pattern of self-medication with antibiotics were not well documented within the local community in Ernakulum. This study aims to assess the self-medicated usage of antibiotics and their various influencing factors in the Ernakulum district, Kerala.

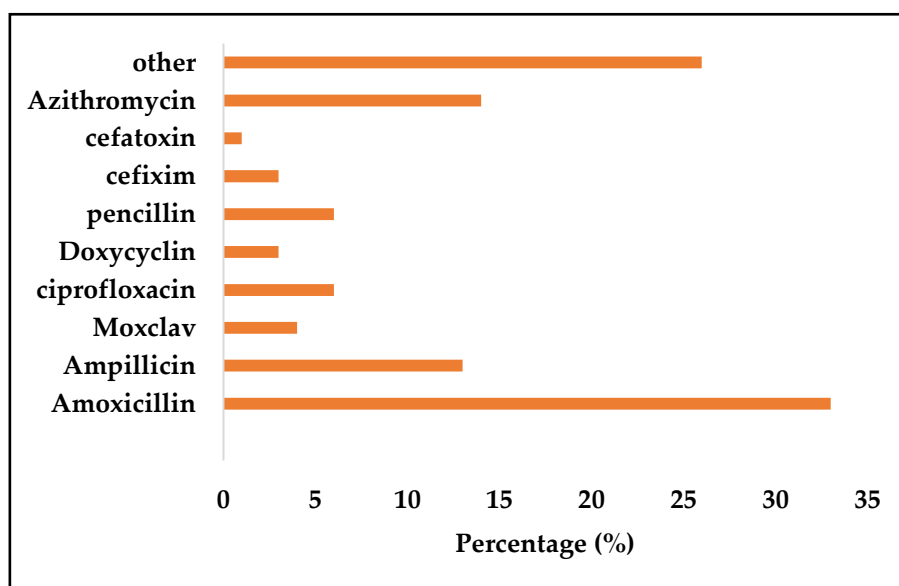
### 2. Materials and Methods

The area selected for the study represents the central part of Kerala with a high literacy rate and urbanization with 9% of Kerala's population. A literature review was conducted during the months of January to August 2023 and based on it a cross-sectional survey was conducted to evaluate self-medicated usage of antibiotics and its related issues in the Ernakulum district, Kerala. The SM survey was completed within the period from July 2023 to August 2023. 200 participants aged above 18 years who could read and write the local language (Malayalam) or English were randomly selected from both urban and rural areas for the study. A questionnaire was prepared and all information regarding antibiotic usage was obtained through a survey. The survey tool included questions regarding age, gender, education, occupation, disease, name of antibiotics, frequency of antibiotic usage in the past 6 months, the reason for stopping antibiotics, source of antibiotics, the reason for antibiotics self-medication, disposal method of leftover antibiotics, etc. Participants were briefed about the objective of the study and their consent was verbally obtained before the administration of the questionnaire.

Data collected were entered into a database system using Microsoft Excel. All data were statistically analyzed by using Origin Pro. The chi-square test was used to evaluate the statistical significance of associations of self-medication with various independent variables. *P* value less than .05 was considered to be statistically significant.

### 3. Results and Discussion

A total of 200 participants were selected for the questionnaire survey which included participants from both rural and urban communities of Ernakulum district. 63% of the participants were female as shown in Table 1. SM is very common among people all over the world. Only 18% of participants reported that they have taken antibiotics by themselves in the present study compared to the result of other studies done in Uttar Pradesh (88.6%) [11], "which may be due to the high literacy rate in Kerala as compared to other states of India". The most common antibiotics used were Amoxicillin (34%), Azithromycin (14%), and ampicillin (12%) are shown in Figure 1.



**Figure 1.** Antibiotics used by participants in Ernakulum district.

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**Table 1.** Demographic characteristics of Participants.

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| Age                    | Total (n = 200) (%) |
|------------------------|---------------------|
| 18-29                  | 103(51.5)           |
| 30-39                  | 41(20.5)            |
| 40-49                  | 26(13)              |
| 50-59                  | 28(14)              |
| Above 60               | 2(1)                |
| <b>Gender</b>          |                     |
| Female                 | 127(63.5)           |
| Male                   | 73(36.5)            |
| <b>Education Level</b> |                     |
| 12 <sup>th</sup>       | 35(17.5)            |
| Graduation             | 78(39)              |
| Post-Graduation        | 87(43)              |

\*N of valid cases=200.

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Amoxicillin was the most common type of antibiotic used similar to other studies [12,13]. Sore throat (34%), and cough (26%) are one of the main symptoms of the self-usage of antibiotics. Figure 2 shows that about 33% of the participants completed the antibiotics course as suggested by the doctor whereas 42% discard the leftover antibiotics to the environment and 25% store it for later use. This study also revealed that 67% of participants didn't complete the full course of antibiotics as they stopped it once the symptoms disappeared. Poor dosing, incomplete courses, and hap0-hazard drug usage have further led to the development and extent of AMR. The participants stated the reason for antibiotics SM was a previous successful experience (7.7%), saving time (11%), and convenience (11.5%) to quick relief of symptoms without visiting a doctor which saved their time and money as shown in Figure 3. Participants used antibiotics by themselves based on pharmacist (57.3%), prescription of previous illness (21.5%), friends (12.5%), and internet (5.5%).

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The chi-square test was used to find the association between SM usage of antibiotics with certain independent variables such as age, gender, and area and it was found that participants from urban areas were more likely to use antibiotics by themselves than participants from rural areas (p value= 0.0001). Gender and age of participants (P value= 0.71, 0.76 respectively) were not significantly associated with SM use of antibiotics similar to other studies [14,15] depicted in Tables 2 and 3. When the participant was asked about antibiotic resistance only 5% was aware of it this may be due to a lack of awareness about it.

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**Table 2.** Pearson correlation between Gender and self-medication use of antibiotics.

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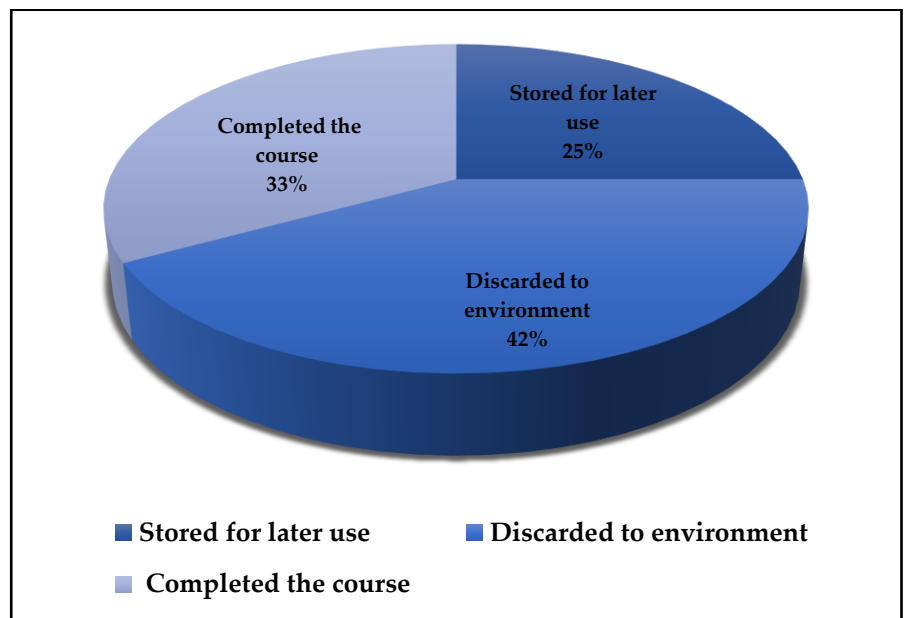
| Gender         | Yes          | No        | Total                      |
|----------------|--------------|-----------|----------------------------|
| <b>Female</b>  |              |           |                            |
| count          | 83           | 45        | 128                        |
| Expected count | 83.8         | 44.2      | 128                        |
| <b>Male</b>    |              |           |                            |
| count          | 44           | 28        | 72                         |
| Expected count | 43.2         | 28.8      | 72                         |
| <b>Total</b>   |              |           |                            |
| Count          | 127          | 73        | 200                        |
| Expected count | 127          | 73        | 200                        |
|                | <b>Value</b> | <b>df</b> | <b>Asymp.sig.(2-sided)</b> |

|                           |         |   |         |
|---------------------------|---------|---|---------|
| <b>Pearson Chi-Square</b> | 0.13679 | 1 | 0.71149 |
| <b>Likelihood ratio</b>   | 0.13854 | 1 | 0.70973 |
| <b>Linear Association</b> | 0.13565 | 1 | 0.88969 |

\*N of valid cases=200.

**Table 3.** Pearson correlation between Age and self-medication use of antibiotics.

| Age                | Yes     | No     | Total               |
|--------------------|---------|--------|---------------------|
| 18-29              |         |        |                     |
| count              | 20      | 83     | 103                 |
| Expected count     | 20.825  | 82.175 | 103                 |
| 30-39              |         |        |                     |
| Count              | 6       | 35     | 41                  |
| Expected count     | 5.075   | 35.925 | 41                  |
| 40-49              |         |        |                     |
| Count              | 5       | 21     | 26                  |
| Expected count     | 4.625   | 21.375 | 26                  |
| 50-59              |         |        |                     |
| Count              | 5       | 23     | 28                  |
| Expected count     | 4.65    | 23.35  | 28                  |
| Above 60           |         |        |                     |
| Count              | 0       | 2      | 2                   |
| Expected count     | 0.825   | 1.175  | 2                   |
| Total              |         |        |                     |
|                    | Value   | df     | Asymp.sig.(2-sided) |
| Pearson Chi-Square | 1.81364 | 4      | 0.76999             |
| Likelihood ratio   | 2.63376 | 4      | 0.62085             |
| Linear Association | 0.15398 | 1      | 0.69476             |



**Figure 2.** Future of Leftover antibiotics as revealed by participants.

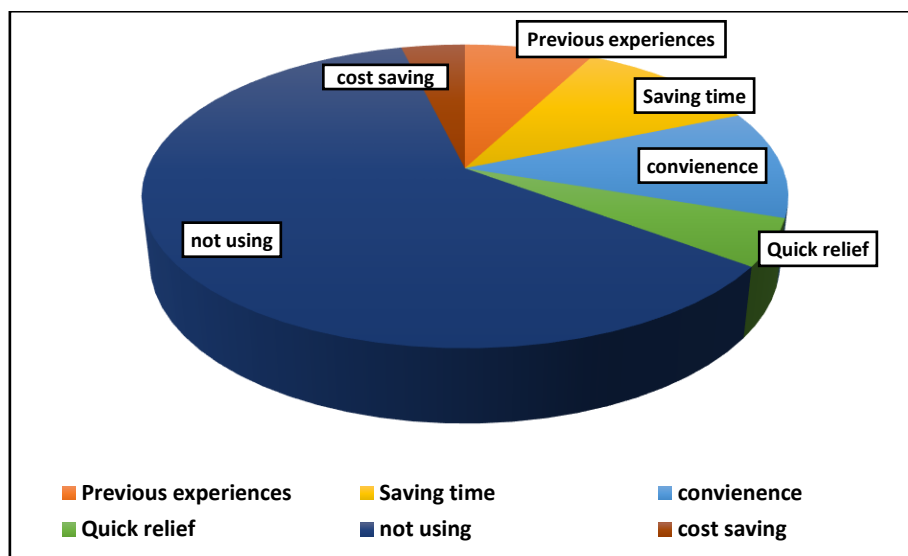


Figure 3. Participants' reasons for antibiotics self-medicated usage.

#### 4. Conclusions

The study showed that 18% of the people of Ernakulum district are using antibiotics without prescriptions. The findings proved that there is a lack of knowledge among people about the proper usage of antibiotics. The most common class of antibiotics used were Amoxicillin (34%), Azithromycin (14%), and ampicillin (12%). Usage of antibiotics without a prescription is influenced by pharmacies, relatives, and social media. The public should understand that proper dosage and frequency of antibiotic use cause the development of antibiotic resistance that damages humans and the environment. Public awareness campaigns can educate people about the dangers of self-medication and antibiotic resistance. Healthcare providers should educate patients and the general public about the appropriate use of antibiotics, emphasizing the importance of completing the full course even if symptoms improve. Enforce strict rules and regulations on the sale of antibiotics, ensuring that they are only available by prescription from a qualified healthcare professional. Continue monitoring and researching the prevalence of antibiotic resistance and self-medication to inform local healthcare policies and interventions.

#### 5. Study limitations

A specific study was conducted among the population of Ernakulum district (aged between 18-45 years common people). As a result, more investigations in other contexts with greater sample sizes might be beneficial in further validating the findings. Because of the sampling technique utilized (i.e. convenience sampling), there may be an under or over-representation of the population.

**Author Contributions:** Divya Nair screened titles, abstracts and conducted the survey, and wrote the manuscript. Girish participated in the planning of the study, checked the extracted data, and contributed to the manuscript. Dr. Gayathri contributed to the final editing of the manuscript. All authors have read and agreed to the published version of the manuscript.

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**Appendix A:** Questionnaire of Self-medication survey: A small survey of antibiotic use in Kochi

#### References

1. World Health Organization.. Guidelines for the regulatory assessment of medicinal products for use in self-medication (No. WHO/EDM/QSM/00.1). World Health Organization. 2000  
<https://asksource.info/resources/guidelines-regulatory-assessment-medicinal-products-use-self-medication> 140
2. Eticha, T.; Mesfin, K. Self-Medication Practices in Mekelle, Ethiopia. PLOS ONE 2014, 9, e97464,  
<https://doi.org/10.1371/journal.pone.0097464>. 141
3. Bennadi, D. Self-medication: A current challenge. Journal of basic and clinical pharmacy 2013, 5, 19. 142
4. McElnay, J.; Hughes, C.; Flemming, G. F.. Benefits and risks of self-medication. Drug Saf. 2001, 24, 1027-1037. 143
5. WHO. Antimicrobial Resistance. Availabe online: <http://www.who.int/mediacentre/factsheets/fs194/en/>  
(accessed on 20 October 2020). 144
6. World Health Organization. Antimicrobial Resistance Fact Sheet February. Available online:  
<http://www.who.int/world-health-day/2011> (accessed on 1 January 2019). 145
7. Centers for Disease Control and Prevention. Antibiotic resistance threats in the United States, 2013. CDC.,  
Atlanta, GA, United States. <https://stacks.cdc.gov/view/cdc/20705> 146
8. Morgan, D.J.; Okeke, I.N.; Laxminarayan, R.; Perencevich, E.N.; Weisenberg, S. Non-prescription antimicrobial  
use worldwide: a systematic review. Lancet Infect. Dis. 2011, 11, 692–701, [https://doi.org/10.1016/s1473-3099\(11\)70054-8](https://doi.org/10.1016/s1473-3099(11)70054-8). 147
9. Levy, S.B. . Antibiotic resistance – the problem intensifies. Advanced drug delivery reviews 2005, 57, 1446-1450. 148
10. Rajendran, A.; Kulirankal, K.G.; Rakesh, P.S.;George, S. Prevalence and pattern of antibiotic self-medication  
practice in an urban population of Kerala, India: A cross-sectional study. Indian Journal of Community  
Medicine: Official Publication of Indian Association of Preventive & Social Medicine, 2019, 44(Suppl 1), S42. 149
11. Pankaj, C.K.; Arvind, M.K.; Atul, J.; Neha, S.; Ajitesh, M. Self medication practices with antibiotics among health  
care professional in Uttar Pradesh, India: A questionnaire based study. Indo Am J Pharm Research, 2015, 5, 752-  
9. 150
12. Gunawardhana, C.; Sakeena, M.; Sivayoganthan, C. Awareness of Rational Medication Use and Antibiotic Self-  
Medication Practices among Undergraduate Students in a University in Sri Lanka. Trop. J. Pharm. Res. 2015,  
14, 723, <https://doi.org/10.4314/tjpr.v14i4.23>. 151
13. Abasaheed, A.; Vlcek, J.; Abuelkhair, M.; Kubena, A. Self-medication with antibiotics by the community of Abu  
Dhabi Emirate, United Arab Emirates. J. Infect. Dev. Ctries. 2009, 3, 491–497, <https://doi.org/10.3855/jidc.466>. 152
14. Donkor, E.S.; Tetteh-Quarcoo, P.B.; Nartey, P.; Agyeman, I.O. Self-Medication Practices with Antibiotics among  
Tertiary Level Students in Accra, Ghana: A Cross-Sectional Study. Int. J. Environ. Res. Public Heal. 2012, 9,  
3519–3529, <https://doi.org/10.3390/ijerph9103519>. 153
15. Shah, S.J.; Ahmad, H.; Rehan, R.B.; Najeeb, S.; Mumtaz, M.; Jilani, M.H.; Rabbani, M.S.; Alam, M.Z.; Farooq, S.;  
Kadir, M.M. Self-medication with antibiotics among non-medical university students of Karachi: a cross-  
sectional study. BMC Pharmacol. Toxicol. 2014, 15, 74, <https://doi.org/10.1186/2050-6511-15-74>. . 154

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## Appendix A: Questionnaire of Self-medication survey: A small survey of antibiotic use in Kochi

1. Name 182
2. Age (Years) 183
  - a. <18 years 184
  - b. 18–29 years 185
  - c. 30–39 years 186
  - d. 40–49 years 187
  - e. 50–59 years 188
  - f. >60 years 189
3. Gender 190
  - a. Male 191
  - b. Female 192
  - c. Other 193
4. Education 194
  - a. 12 th 195
  - b. graduation 196

---

|     |   |            |
|-----|---|------------|
| c.  | diploma   | 197        |
| d.  | Other   | 198        |
| 5.  | Location  | 199        |
| a.  | Gram Panchayat / Municipality   | 200        |
| b.  | Corporation   | 201        |
| 6.  | Residential Area/address  | 202        |
| 7.  | Occupation  | 203        |
| 8.  | Marital status  | 204        |
| a.  | Single  | 205        |
| b.  | Married   | 206        |
| 9.  | Job   | 207        |
| a.  | Medical field   | 208        |
| b.  | Non-medical field   | 209        |
| c.  | Other   | 210        |
| 10. | Pattern of antibiotic self-medication   | 211        |
| 11. | Usage of antibiotics without prescription (self-medication) is growing globally and is associated with increased bacterial resistance, ineffective treatment and adverse reactions. | 212<br>213 |
| 12. | Multiple responses Illness for which antibiotic consumed  | 214        |
| a.  | Sore throat   | 215        |
| b.  | Fever   | 216        |
| c.  | Cough   | 217        |
| d.  | Running nose  | 218        |
| e.  | Nasal congestion  | 219        |
| f.  | Aches   | 220        |
| g.  | No disease  | 221        |
| h.  | Diarrhea  | 222        |
| i.  | Vomiting  | 223        |
| j.  | Skin wounds   | 224        |
| k.  | Never   | 225        |
| l.  | Other   | 226        |
| 13. | Name of antibiotic. If used any?  | 227        |
| a.  | Ampilicin   | 228        |
| b.  | cefixim   | 229        |
| c.  | ceftazidime   | 230        |
| d.  | ceftriaxone   | 231        |
| e.  | vancomycin  | 232        |
| f.  | piptaz  | 233        |
| g.  | moxclov   | 234        |
| h.  | amoxicillin   | 235        |
| i.  | doxycycline   | 236        |
| j.  | piperacillin  | 237        |
| k.  | taxim   | 238        |

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|     |   |     |
|-----|---|-----|
| l.  | gentamicin  | 239 |
| m.  | ciprofloxacin   | 240 |
| n.  | norfloxacin   | 241 |
| o.  | penicillin  | 242 |
| p.  | Azithromycin  | 243 |
| q.  | clindamycin   | 244 |
| r.  | metronidazole   | 245 |
| s.  | sulfamethoxazole and trimethoprim                             | 246 |
| t.  | clavulanate   | 247 |
| u.  | Never   | 248 |
| v.  | Other   | 249 |
| 14. | How many days did you use this antibiotics?                   | 250 |
| a.  | One day to two days, if necessary                             | 251 |
| b.  | Three to seven days   | 252 |
| c.  | More than week  | 253 |
| d.  | Never   | 254 |
| 15. | When did you last take antibiotics?                           | 255 |
| a.  | In the last month   | 256 |
| b.  | In the last 6 months  | 257 |
| c.  | In the last year  | 258 |
| d.  | More than a year ago  | 259 |
| e.  | Never   | 260 |
| f.  | Can't remember  | 261 |
| 16. | Number of times antibiotics administered in the past 6 months | 262 |
| a.  | Once  | 263 |
| b.  | Twice   | 264 |
| c.  | Thrice  | 265 |
| d.  | More than three times   | 266 |
| e.  | Not using   | 267 |
| f.  | Other   | 268 |
| 17. | Reason for stopping antibiotics                               | 269 |
| a.  | At the completion of course                                   | 270 |
| b.  | After symptoms disappeared                                    | 271 |
| c.  | After a few days regardless of the outcome                    | 272 |
| d.  | A few days after the recovery                                 | 273 |
| e.  | Not using   | 274 |
| f.  | Other   | 275 |
| 18. | Source of antibiotics   | 276 |
| a.  | Family or friends   | 277 |
| b.  | From pharmacy   | 278 |
| c.  | Leftover from previous prescription                           | 279 |
| d.  | Hospital  | 280 |



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|     |   |     |
|-----|---|-----|
| e.  | Clinic  | 281 |
| f.  | Never   | 282 |
| g.  | Other   | 283 |
| 19. | Basis of selecting antibiotics  | 284 |
| a.  | Doctor's previous prescription  | 285 |
| b.  | Own experience  | 286 |
| c.  | Opinion of family members   | 287 |
| d.  | Recommended by pharmacists  | 288 |
| e.  | Other   | 289 |
| 20. | Habit of checking instructions on the package before taking medicine.                               | 290 |
| a.  | Always  | 291 |
| b.  | Sometimes   | 292 |
| c.  | Never   | 293 |
| 21. | Ever obtained antibiotics without prescription.   | 294 |
| a.  | Yes   | 295 |
| b.  | No  | 296 |
| 22. | Reasons for antibiotic self-medication.   | 297 |
| a.  | Convenience   | 298 |
| b.  | Illness is minor  | 299 |
| c.  | Lack of time  | 300 |
| d.  | Cost saving   | 301 |
| e.  | Not using   | 302 |
| f.  | Others (easier, doctors tend to prescribe the same antibiotic, recommended by health professionals) | 303 |
| g.  | Never used without prescription   | 304 |
| h.  | Previous successful experiences   | 305 |
| i.  | Other   | 306 |
| 23. | Disposal of leftover method   | 307 |
| a.  | Household rubbish bin   | 308 |
| b.  | Flush into toilet bowl  | 309 |
| c.  | Return to pharmacist or doctor  | 310 |
| d.  | Previous successful experiences   | 311 |
| e.  | Stored for later use  | 312 |
| f.  | Returned to shop  | 313 |
| g.  | Other   | 314 |
| 24. | Ever save or retained leftover antibiotics for future use   | 315 |
| a.  | Yes   | 316 |
| b.  | No  | 317 |
| 25. | Knowledge of the functions of antibiotics   | 318 |
| a.  | Yes   | 319 |
| b.  | No  | 320 |
| 26. | Awareness of bacterial resistance due to antibiotic use   | 321 |
| a.  | Yes   | 322 |

- 
- b. No 323
27. Respondents' opinion about antibiotic self-medication practice 324
- a. Good practice 325
- b. Acceptable practice 326
- c. Not an acceptable practice 327
- d. Other 328
28. If a person feels better after partially completing an antibiotic course, one can discontinue therapy immediately. 329
- a. Yes 330
- b. No 331
29. The remaining antibiotics can be stored for personal future use or given to someone else. 332
- a. Totally agree 333
- b. Don't agree at all 334
- c. Don't know 335
- d. Other 336
30. Leftover antibiotics should be taken back to the pharmacy. \* 337
- a. Totally agree 338
- b. Don't agree at all 339
- c. Don't know 340
- d. Other 341
31. The more antibiotics we use in society, the higher is the risk of resistance develops and spreads. 342
- a. Yes 343
- b. No 344
- c. Don't know 345
32. Have you ever heard about Antibiotic resistance? 346
- a. Yes 347
- b. No 348
- c. Maybe 349
- 350