Self-medication with antibiotics in WHO Eastern Mediterranean Region: A Systematic Review and Meta-analysis

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Abstract

Objective This review sought to assess the prevalence of antibiotic self-medication, common antibiotics and reasons for self-medication in the Eastern Mediterranean Region of World Health Organization (EMRWHO).

Results We report on data from 45 articles and 29606 participants in this review. The overall prevalence of self-medication with antibiotics in EMRWHO was 49.7% (95% CI 49.2% – 50.2%). Yemen has the highest rate with a rate of 69.6% (95% CI 68.1% - 71.1%), whilst Kuwait has the lowest rate with a prevalence of 27.5%. The most common illnesses implicated in antibiotic self-medication were upper-respiratory infections and the most common antibiotic was Amoxicillin-Clavulanic acid. The commonest reasons for antibiotic self-medication include: saving time and money. Pharmacies pointed out as a most common source of obtaining antibiotics for self-medication.

Background

Self-medication is defined as taking of medication to treat self-diagnosed diseases or symptoms, or the intermittent or continued use of a prescribed medication for chronic or recurrent disease or symptoms (1).

It is estimated that two-thirds of all oral antibiotics worldwide are obtained without a prescription (2). Recently, inappropriate use of antibiotics has been correlated with life-threatening side-effects such as adverse effects, increased cost of treatment and higher rate of microbial resistance. (3). Using antibiotics irrationally not only leads to wastage of resources but also can lead to serious life-threatening adverse effects for the users(4). Many studies found a direct correlation between the irrational use of antibiotics and antibiotics resistance (5). Taking antibiotics without prescription of certified professional may lead to inappropriate use of antibiotics in the form of incorrect medication for wrong diagnosis, taking over or lower dose and incorrect course of treatment. In addition, self-medication with antibiotics can lead to increased severity of disease, prolonged duration of disease, increased mortality rate, and rising health care cost (6).

World Health Organization (WHO) confirmed that inappropriate use of antibiotics is an important contributor of microbial resistance development (7). In the USA, 23,000 die each year from the complications of antibiotic resistance and medical cost of patients with antibiotics resistance ranges from \$18,588 to \$29069 (8).

In developing nations where the prevalence of infectious diseases is still high, treating bacterial infection fails on daily basis and more lives are lost (9). Evidence indicated that self-medication with antibiotics is a common practice in financially deprived communities. According to the study done in Pakistan, any medication available in the market can be purchased over the counter without any prescription (7). Studies reported that countries

with the highest level of antibiotics consumption have the highest level of microbial resistance (10).

The prevalence of self-medication with antibiotics varies in different countries due to differences in socio-demographic, cultural, financial situation and various health systems. In Europe, it is reported to be 3% and 4-75% in Asia (11).

Various studies have cited different factors facilitating self-medication with antibiotics, such as; accessibility of antibiotics in over-the-counter, left-over antibiotics at home, lack of awareness, expensive health care services, lack of accessibility of health services, influence by their relatives and friends, and perceived saving time and money (7).

Although various empirical studies have been done in regard of self-medication with antibiotics in countries located in the Eastern Mediterranean Region of World Health Organization (EMR WHO), there was no systematic review in this setting on antibiotic self-medication. Evidence is needed with regards to anti-self-medication in this Region. Such evidence could guide decision makers to plan strategies and interventions aimed at preventing antibiotic-self-medication. In so doing, this could reduce microbial resistance. This study sought to determine the prevalence and associated factors of self-medication with antibiotics we did a systematic review of published articles from Eastern Mediterranean Region of WHO.

Review Question

The following question guided our review

What is the prevalence of self-medication with antibiotics, common antibiotics and reasons for self-medication in the Eastern Mediterranean Region of World Health Organization (EMRWHO)?

Methods

Protocol: This review conforms to the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) statement. To ensure that there wasn't any similar study to ours, we did a preliminary scoping search in Prosper systematic review and registry (PROSPERO), Cochrane library and Google scholar.

Eligibility criteria: studies that reported on the prevalence of self-medication with antibiotics and its related factors published in the English language in peer-review journals in EMRWHO were included (Table 1).

Table 1 Inclusion and exclusion criteria applied to selected articles

Inclusion criteria	Exclusion criteria
The study reported on the prevalence of self-medication with antibiotics and its related factors.	The study did not report on the prevalence of self-medication with antibiotics and its related factors.
The study reported in the English language	The study not reported in the English language
The study was done in EMRWHO	The study was not done in EMRWHO
The study was published between 2000 up to 2018	The study was not published between 2000 up to 2018.
The study was an empirical study published in a peer-review journal	The study published in Magazines, Newspapers, Conference papers, Viewpoint articles, Letters to editors, and Commentaries.

Databases: Articles were searched in PubMed, Scopus, Embase, and Web of Science

Search strategy: keywords included ‘antimicrobial’, ‘antibacterial’, ‘antibiotic’, ‘self-medication’, ‘non-prescription’ (see table 2). The search in Scopus was done using Keywords included ‘self-medication’, ‘antibiotics’, ‘un-prescribed’, ‘antimicrobial’, ‘antibacterial’. Limited to: “Saudi Arabia”, “Pakistan”, “Lebanon”, “Jordan”, “Iran”, “Iraq”, “Egypt”, “Kuwait”, “Libya”, “Sudan”, “Qatar”, “Yemen”, “Afghanistan”, “Bahrain”, “United Arab Emirate”, “Djibouti”, “Palestine”, “Morocco”, “Syria”, “Somalia”, “Tunisia” and “Oman” and English language. The initial search was done on 15/07/2018 (Table 2).

Table 2 Database search strategy

database	search term syntax	x
Pubmed	((((antimicrobial) and antibacterial) and antibiotics) and self-medication) and non-prescription	10
web of science	topic: (self-medication with antibiotics) refined by: publication years: (2018 or 2017 or 2016 or 2015 or 2014 or 2013) and countries/regions: (saudi arabia or pakistan or lebanon or jordan or iran or iraq or israel or egypt or kuwait or libya or sudan or qatar or yemen or afghanistan or bahrain) and publication years: (2018 or 2016 or 2014 or 2013 or 2017 or 2015)	74
Scopus	title-abs-key (self-medication and with and antibiotics or unprescribed and antibiotics or antimicrobial or antibacterial) and (limit-to (affilcountry , "pakistan") or limit-to (affilcountry , "saudi arabia") or limit-to (affilcountry , "iran") or limit-to (affilcountry , "jordan") or limit-to (affilcountry , "egypt") or limit-to (affilcountry , "united arab emirates") or limit-to (affilcountry , "lebanon") or limit-to (affilcountry , "sudan") or limit-to (affilcountry , "kuwait") or limit-to (affilcountry , "israel") or limit-to (affilcountry , "palestine") or limit-to (affilcountry , "iraq") or limit-to (affilcountry , "libyan arab jamahiriya") or limit-to (affilcountry , "syrian arab republic") or limit-to (affilcountry , "yemen") or limit-to (affilcountry , "bahrain") or limit-to (affilcountry , "qatar")) and (limit-to (pubyear , 2018) or limit-to (pubyear , 2017) or limit-to (pubyear , 2016) or limit-to (pubyear , 2015) or limit-to (pubyear , 2014) or limit-to (pubyear , 2013)) and (limit-to (language , "english"))	86
Embase	'self-medication with antibiotics and (2013:py or 2014:py or 2015:py or 2016:py or 2017:py or 2018:py)	73

X: Number of matches

Study selection:

The search of Web of Sciences, PubMed, Embase and Scopus databases resulted a total of 243 articles. After removing duplication, 177 records remained. Of these 115 articles were discarded since after reviewing their title and abstract, they did not meet the criteria. The full text of the remaining articles was reviewed in details from which 80 articles did not meet the criteria. 27 studies met the criteria. The references of the included articles were hand searched for related studies which we found 18 articles. Totally, we had 45 studies for this systematic review and meta-analysis.

Two reviewers independently searched for the articles, compared them, discussed and always reached consensus on studies to exclude and include based on criteria for inclusion described above.

Data collection process: for articles which met the inclusion criteria, information was extracted and recorded in a piloted dataset in excel; spreadsheet. For included studies, we

assessed the main outcome of the study findings as the prevalence of self-medication with antibiotics and its correlates such as sources, common reasons for antibiotic self-medication and illness. Selected articles were kept for future narrative and excluded articles were also kept in a separate file for future reference where applicable.

Data items: The following items were extracted from studies: author, country, year, study design, sample size, self-medication prevalence, study population, recall time, illness, reason of self-medication with antibiotics, most common inappropriate drug practice, most common antibiotics for self-medication and Source of drugs for self-medication.

Risk of bias in individual studies: the studies were appraised based on the selection criteria (table 1) and the Joanna Briggs Institute (JBI) critical appraisal tool for systematic reviews. The review was limited to inclusion criteria that were mentioned above.

Data analysis: We used a DerSimonian-laird Random Effects model to estimate the pooled prevalence by using Stata command “metan”. The result was displayed in a forest plot and shown the high heterogeneity. The prevalence of self-medication with antibiotics was reported as the proportion of self-medicated person numbers among the sample. The prevalence was pooled with 95% confidence interval and stratified by country and characteristics of study population. Analysis was done using STATA version 14 (college station, Texas 77845 USA). Associated data items were extracted and reported in the format of tables.

Result

Characteristics of studies included

In this review, 45 articles (4-6, 8, 9, 11 and 21-58) were included; these were identified from 13 countries of Eastern Mediterranean Region of World Health Organization (EMRWHO). They differed with respect to setting, sample size recall period and study subjects. Recall period varied from one month to 12 months across studies. For some studies recall period was not available. 11 articles were identified from SA. Kuwait, Libya, Syria, UAE and Palestine each with one article. We couldn't find any article from 9 countries of EMRWHO (see table 5).

Total studies participants in 13 countries were 29606 people. Saudi Arabia with 7702 and Syria with 430 participants had the highest and lowest number, respectively. The study Mohana (2010) in Yemen contributed the highest number (N = 2000) and the study Ali et al. in Pakistan contribute lowest number (N = 160). All studies used a cross-sectional study design (see table 3). The study population of 16 articles was from the general public (N= 12568), 11 articles among visitors of clinics and pharmacies (N= 6505), 10 articles among

university students (N= 5551), 3 articles among university and school teachers (N=2281), and two articles among refugees (N=758). Most of the studies from Yemen were done among outpatients and pharmacy visitors.

Prevalence of Self-Medication with antibiotics and its related factors

Overall prevalence of self-medication with antibiotics in EMRWHO is 49.7% (95% CI 49.2% - 50.2%). With regards to country level pooled prevalence, Yemen had the highest prevalence with a prevalence of 69.6% (95% CI 68.1% - 71.1%). This was followed by Saudi Arabia with 57.8% (95% CI 56.7% - 58.8%), Pakistan 54.1% (95% CI 52.4% - 55.9%), Sudan 50.8% (95% CI 49% - 52.6%), four countries are with lower level such as Egypt 37.9% (95% CI 35.5% - 40.3%), Jordan 37.5% (95% CI 36.2% - 38.9%), Iran 37.1% (95% CI 34.8% - 39.3%) and Lebanon 26.9 (24.5% - 29.6%).

Prevalence in countries with one study were including Syria 57%, UAE 46%, Palestine 44.7% and Libya 44.5% (see table 5). Pooled prevalence based on study population characteristics are varied, it ranges from 62.6% (95% CI 56.3% - 61.4%), among visitors of clinics and pharmacies followed by school and university teachers with a prevalence of 58.8% (95% CI 56.3% - 61.4%), students had a prevalence of 55.4% (95% CI 54.1% - 56.8%) general public 43.1% (95% CI 42.2% - 43.9%) and refugees 40.1% (95% CI 36.6% - 43.6%).

Common illnesses rendering self-medication

The most common illness for self-medication with antibiotics were upper-respiratory problems including sore throat, runny nose, cough, nasal congestion and common cold. Gastro-intestinal problem such as abdominal pain, digestive disease, diarrhea and vomiting was the second most common problems followed by urinary tract infection, fever, dental problems, skin problems and ear problems.

Common reasons for self-medication

Various reasons were reported for self-medication with antibiotics, the three most important reasons were saving time, saving money and previous successful experience with antibiotics. Other reasons included lack of trust in physicians, common disease not being worthy consultation, unavailability of medical services, feasibility of usage, accessibility of medicines and having the knowledge of antibiotics.

Common antibiotics used for self-medication and sources

Amoxicillin-clavulanic (Amoxy-clav) was reported in all of the articles and was the commonest medicine used to self-medicate. This was followed by penicillin, cephalosporin and metronidazole. Other common antimicrobials included: Erythromycin, Tetracycline, Ciprofloxacin and Co-trimoxazole. Various sources were used to get medicines, pharmacies

were the most common source of drugs followed by leftover medicines, and taking medicine from relatives and friends. 22 articles reported inappropriate usage of antibiotics, the most common way of irrational use of antimicrobials was not completing the course of antibiotics followed by changing dose during self-medication. Other ways included: shifting antibiotics, sharing antibiotics and keeping leftover.

Discussion

The findings of this review indicate that the prevalence of antibiotic self-medication in the EMRWHO's countries is significantly high. The pooled prevalence of self-medication with antibiotics varied across countries, it ranges from 26.9% in Lebanon to 69.6% in Yemen. The reasons for this difference may be due to different political, social, economic and cultural situations. Characteristics of studies included in this review could also have contributed to the difference in the prevalence across countries. Elsewhere, a similar systematic review in Southeast Asian Region of World Health Organization (SARWHO) reported that overall prevalence of self-medication with antibiotics varied from 7.3% to 85.59% (12). Another systematic review of self-medication which was carried out in Middle East shown a difference in the overall prevalence ranging from 19% to 82% (13). The findings of this study are similar to those from the review conducted in SARWHO's countries which showed an overall prevalence of 42.64% (12). Conversely, it lower than that of a review from Euro-Mediterranean Region of WHO that reported overall prevalence 38.8% (14). This difference may be due to strict regulation of over-the-counter antibiotics and other socio-economic determinants in the Euro-Mediterranean Region of WHO.

According to our review, prevalence of self-medication with antibiotics is very high among educated people than the general public. This finding differs from that reported from SARWHO region findings (12). This could in part be attributed to significant differences in literacy rates in these two WHO regions. Elsewhere, in different parts of the world, studies have reported higher prevalence of antibiotic medication use the less educated participants compared to their more educated counterparts(15). This may be due to their knowledge regarding antibiotics and disease(16).

The reasons behind self-mediation with antibiotics in various studies have indicated similar findings to our review. These include: time and money saving, previous successful experience with antibiotic and perceived mildness of disease. Notwithstanding, inappropriate usage of antibiotics has also been reported across studies. This is commonly in form of sharing antibiotics, taking antibiotics without completion of the course and keeping leftover which.

Our review revealed that the main sources of antibiotics for self-medication were pharmacies, family and friend, and leftover. Educational activities with the purpose of

educating communities regarding every aspect of self-medication with antibiotics could be helpful to struggle with this twenty-first century public health problem. The reasons behind self-medication with antibiotics vary in different geographical area. This could be partly attributed to differences in socio-economic characteristics, and the health system of a given country(17). In some region, people do not have even access to health services compared to other countries in EMRWHO. This is in part due to unstable health systems due to political insurgencies.

Upper-respiratory problems were the most common illnesses that were self-medicated with antibiotics.. Other disorders included gastro-intestinal problems, fever, UTI, pain, skin and ear problem. This in line with findings from studies elsewhere (18, 19). Such reported sentiments could be attributed to the fact that these problems occur frequently. Therefore, having experience of treating them may lead to the practice self-medication with antibiotics. And also due to the common occurrence of such illnesses gives the perception to the people that they are mild and do not need physician consultation. However, patient should be informed that taking antibiotics for frequently occurring illness without consultation of healthcare professionals may lead to life-threatening consequences. The symptoms may be a sign of a dangerous disease. Moreover, self-medication would prevent from early detection and treatment of the other major diseases.

Furthermore, our review reported similar findings to those in previous reviews with regards to the most commonly reported antibiotic used for self-medication(12). The high usage of Amoxicillin-Calvulanic may be due to low cost, availability, popularity and low side effect profiles. Nonetheless, inappropriate use of these drugs may lead to adverse effects; the most problematic would be microbial resistance. Easy availability of antibiotics is the sign of lack of regulations on usage of antimicrobials in some health care systems. We have seen in Europe that by having a strong health system somehow controls this twenty-first century public health problem. Irrational use of antibiotics may happen in many situations including the prescription of medicine without evidence of a prescription from a healthcare provider. Self-medication is one of the consequences of to lack of guidance and supervision of health practitioners in some systems. Our review has shown many inappropriate practices of taking medicine including incomplete course of antibiotics treatment, keeping leftover, changing dose during self-medication and shifting antibiotics. The most commonly reported one was the incomplete course of antibiotics. This could be attributed to the fact that lay persons lack the knowledge on the complete course of antibiotics, they stop taking antibiotic whenever the symptoms disappear(20). Shifting antibiotics is the sign of uncertainty of a disease diagnosis, the type of antibiotic for disease and the right dose. Keeping antibiotics predicts the future intent of self-medication and anticipated re-occurrence of the disorder being self-managed. These irrational practices of self-medication may lead to many life-threatening adverse effects, particularly microbial resistance. We

recommend educational programs for communities regarding judicious usage of antibiotics.

Conclusions

Self-medication with antibiotics is significantly high in the countries making up the EMRWHO region. Intervention such as educational program for communities' members to change their behaviors, policy on the mechanism of distribution of antibiotic is called for in this area. Inappropriate use of antibiotics is a public health problem with many faces rooted in individual behaviors to collective decision making. The crisis of self-medication in EMRWHO can be controlled interventions occur at various levels. Educational programs should target communities and policies should target the mechanism of dispensing health care resources, and equity in distribution of resources. Lastly and most important, collaboration of countries and non-governmental organization in EMRWHO could be seminal in controlling self-medication and distribution of antibiotics.

More researches need to be done in those countries with limited evidence including Kuwait, Libya, Palestine, Syria and UAE, and in those with no evidence including Bahrain, Djibouti, Iraq, Morocco, Afghanistan, Oman, Qatar, Somalia and Tunisia.

Limitations

Owing to the significant differences in settings across the EMRWHO countries specifically with regards to stability of health systems, studies identified included in this study were skewed to a few countries. In fact, we did not identify significant studies in some countries that prevent us to compare the true prevalence of self-medication with antibiotics between these countries. This could have partly contributed to the relatively high prevalence in some countries such as Yemen relative to others.

Abbreviations

WHO: World Health Organization; EMRWHO: Eastern Mediterranean Region of World Health Organization (EMRWHO); UAE: United Arab Emirates; SA: Saudi Arabia; SARWHO: Southeast Asian Region of World Health Organization.

Declarations

Ethics approval and consent to participate

Not applicable to this study.

Consent for Publication

Not applicable for this study

Availability of data and materials

Figshare: shayan, shah jahan; Frank, Kiwanuka; Negarandeh, Reza; Rad, Sanaz Akhavan; Nazari, Rajab (2018): Tables for Self-medication with antibiotics in WHO Eastern Mediterranean Region: A Systematic Review and Meta-analysis. figshare. Journal contribution. <https://doi.org/10.6084/m9.figshare.7325033.v1>

Competing Interests

The Authors declare that they have no competing interests

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Authors Contribution

SJS & RN contributed to curation, RN, contributed to methodology. SJS, RN,FK & SA contributed to methodology, database search, data extraction & writing the final manuscript. All authors have read and approved the manuscript.

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Not applicable

Tables

TABLE 3: Key characteristics of Included Countries

Study	Country	Year	Design	Recall time	Sample size	Subjects	SMA prevalence (%)
Al-Hawry et al. (21)	Egypt	2017	Cross-sectional	12 months	359	General Public	64%
Elmasry et al. (22)	Egypt	2013	Cross-sectional	3 months	1057	General public	29.8%
Farahroodi et al. (23)	Iran	2009	Cross-sectional	3 months	160	Students	53%
Hasseinzadeh et al. (24)	Iran	2017	Cross-sectional	12 months	950	General Public	31.1%
Shokri et al. (25)	Iran	2012	Cross-sectional	12 months	442	University and school teachers	43.7%
Farahroodi et al. (26)	Iran	2010	Cross-sectional	3 months	200	Medical and non-medical students	Medical 42.2% Non-medical 48%
Al-Jawair et al. (27)	Jordan	2009	Cross-sectional	6 months	477	Visitors of Dental clinic	40.7%
Al-Aifan et al. (28)	Jordan	2012	Cross-sectional	12 months	679	Medical and non-medical students	28%
Al-Azzam et al. (29)	Jordan	2007	Cross-sectional	One month	1943	household	39.5%
Al-Farwish et al. (30)	Jordan	2014	Cross-sectional	12 months	508	Iraqi refugees community	37%
Al-Baz et al. (31)	Jordan	2018	Cross-sectional	3 months	250	Palestine refugees community	47%
Al-Shef et al. (32)	Jordan	2017	Cross-sectional	2 months	1060	General public	38%
Al-Adad et al. (33)	Kuwait	2015	Cross-sectional	12 months	770	General public	27.5%
Al-Hadaito et al. (34)	Lebanon	2014	Cross-sectional	Current	319	Pharmacies visitor	42%
Al-Anhour et al. (35)	Lebanon	2017	Cross-sectional	3 months	400	General Public	23.75%
Al-Huhieddine et al. (36)	Lebanon	2015	Cross-sectional	One year	495	General public	22.4%
Al-Jaith et al. (37)	Libya	2015	Cross-sectional	12 months	665	Student	44.5%
Al-Zaidi et al. (38)	Pakistan	2013	Cross-sectional		210	Student	77.03%
Al-Shah et al. (39)	Pakistan	2014	Cross-sectional	6 months	431	Student	47.6%

			sectional	months			
al et al.(5)	Pakistan	2016	Cross-sectional	6 months	400	General public	81.25%
azir et al. (9)	Pakistan	2017	Cross-sectional		527	General public	26%
llani et al. (1)	Pakistan	2017	Cross-sectional	6 months	727	Students	45%
et al. (6)	Pakistan	2016	Cross-sectional		160	Students	52.7%
unif et al. (2)	Pakistan	2016	Cross-sectional	12 months	152	Students	76%
walha et al. (1)	Palestine	2008	Cross-sectional	6 months	1039	School teachers	44.7%
ghadeer et (8)	Saudi Arabia	2018	Cross-sectional		1264	General public	34%
istafa et al. (2)	Saudi Arabia	2017	Cross-sectional	12 months	1046	Students	65.6%
Rasheed et (9)	Saudi Arabia	2016	Cross-sectional	6 months	681	Clinic visitors	78.7%
n Nafisah et (43)	Saudi Arabia	2017	Cross—sectional		473	General public	48%
neka et al. (4)	Saudi Arabia	2014	Cross-sectional	2 months	463	General public	73.7%
alil et al. (5)	Saudi Arabia	2013	Cross-sectgional		793	Dental clinic visitors	80%
ar-Odeh et (46)	Saudi Arabia	2018	Cross-sectional		501	Dental clinic visitors	27%
walaty et (47)	Saudi Arabia	2016	Cross-sectional	6 months	1310	General public	63.6%
Qahtani et (48)	Saudi Arabia	2016	Cross-sectional		519	Clinic visitors	40.8%
lkina et al. (9)	Saudi Arabia	2014	Cross-sectional	3 months	400	General education teacher	48%
alogy et al. (2)	Saudi Arabia	2017	Cross-sectional		252	Mothers in primary health care center	39.3%
vad et al. (1)	Sudan	2005	Cross-sectional	One month	1750	General public	48.1%
vad et al. (2)	Sudan	2007	Cross-sectional	2 month	1121	Student	55%
rah et al. (3)	Syria	2010	Cross-section	One month	430	General public	57%
asaeed et al (4)	United Arab Emirates	2009	Cross-sectional	12 months	860	General public	46%

Alkhalaf et al. (59)	Yemen	2013	Cross-sectional	3 months	400	General education teachers	78%
Alshawarbi et al. (55)	Yemen	2017	Cross-sectional	6 months	363	Pharmacy visitors	87.1%
Almadhoun et al. (56)	Yemen	2017	Cross-sectional	Study period	400	Pharmacy visitors	61.75
Alkhalaf et al. (57)	Yemen	2013	Cross-sectional	6 months	200	Patients	82%
Alhanna (58)	Yemen	2010	Cross-sectional	15 days	2000	Out Patients	60%

Table 4 prevalence of self-medication according to study population characteristics

No	Participants	Prevalence	CI 95%
1	General public	43.1%	42.2% - 43.9%
2	Student	55.4%	54.1% - 56.8%
3	School and university teachers	58.8%	56.3% - 61.4%
4	Visitors of clinic and pharmacy	62.6%	61.5% - 63.7%
5	Refugee	40.1%	36.6% - 43.6%

Table 5 prevalence of self-medication with antibiotics in EMRWHO countries

No	Country	Prevalence	CI 95%
1	Egypt	37.9%	35.5% - 40.3%
2	Iran	37.1%	34.8% - 39.3%
3	Jordan	37.5%	36.2% - 38.9%
4	Lebanon	26.9%	24.5% - 29.4%
5	Pakistan	54.1%	52.4% - 55.9%
6	Saudi Arabia	57.8%	56.7% - 58.8%
7	Yemen	69.6%	68.1% - 71.1%
8	Sudan	50.8%	49% - 52.6%
9	Kuwait	27.5%	X
10	Libya	44.5%	X
11	Palestine	44.7%	X
12	Syria	57%	X
13	United Arab Emirate	46%	X
14	Bahrain	N	N
15	Djibouti	N	N
16	Iraq	N	N
17	Morocco	N	N
18	Afghanistan	N	N
19	Oman	N	N
20	Qatar	N	N
21	Somalia	N	N
22	Tunisia	N	N

X: single study

N: no study

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