



# Self-medication with antibiotics in the ambulatory care setting within the Euro-Mediterranean region; results from the ARMed project

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## KEYWORDS

Self-medication;  
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**Summary** Anecdotal data from the southern and eastern Mediterranean region suggests that self-medication with antibiotics is commonly practiced in many countries. In order to provide proper information on the situation, we undertook short structured interviews in out-patients clinics or primary health centres in Cyprus, Egypt, Jordan, Lebanon, Libya, Tunisia and Turkey. A total of 2109 interviews were undertaken of which 1705 completed the full questionnaire. Self-medication was reported by 19.1% (<0.1% in Cyprus to 37% in Lebanon) of respondents. Intended self-medication ranged from 1.3% (95% CI 0%, 3%) in Cyprus to 70.7% (95% CI 64%, 77%) in Jordan. Upper respiratory tract symptoms were the most frequent reasons for which respondents indicated they would self-medicate. 48.4% of the whole group replied that they kept antibiotics at home, being highest in Lebanon (60%, 95% CI 51%, 69%). We found a significant association between antibiotic hoarders and intended users of antibiotics for self-medication. Our data confirms that non-prescribed antibiotic use is high within ambulatory care in southern and eastern Mediterranean countries, being almost twice that reported in a similar European study. Corrective efforts are

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clearly required in the region to ensure proper use of antimicrobials so as to reduce pressure for antimicrobial resistance.

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## Introduction

Antimicrobial resistance continues to pose a world-wide challenge to the provision of effective healthcare [1]. This is particularly the case within the southern and eastern Mediterranean region where significant resistance has been documented in both healthcare related pathogens as well as organisms normally associated with infections acquired in the community [2–5]. These are broadly in line with those already reported in centres within other Mediterranean and Middle Eastern countries [6,7]. It is therefore critical to establish the diverse drivers implicated in the generation and dissemination of resistant strains and investigate their epidemiology so as to guide interventions to improve the current situation.

Antibiotic consumption has been strongly linked with the development of resistance [8–10]. Indeed countries with high levels of antibiotic consumption have been also identified to possess concurrently high levels of resistance. Within the complex multifactorial relationship that determines the levels of consumption in a country, patient behavior plays a major contribution. This is particularly the case in ambulatory care. Indeed, levels of patient compliance have been linked to inversely correlate with proportions of resistance in *S. pneumoniae* within European countries [8]. One particularly important facet in patient compliance focuses on the intention and ability to procure antimicrobials without a doctor's prescription and subsequently take them without medical advice. Such self-medication practices are a reality in both Europe and the United States [11–14]. The Mediterranean region appears to be an area of concern, as confirmed by reports from Spain, Greece, Malta and Italy [15–20]. However information on similar practices in the southern and eastern countries of this region remains particularly sparse despite the documented high levels of resistance within these same countries. What little information is available, suggests that self-medication is a relevant reality in this region. A study by Al-Azzam et al., in Jordan [21], reported that 39.5% of their participants had used an antibiotic without a prescription in the previous month. To address this void, the study attempted to identify and document levels and characteristics of antibiotic self-medication

within seven Mediterranean countries participating in the Antibiotic Resistance Surveillance and Control in the Mediterranean (ARMed) project. Antibiotics were legally obtainable without a doctor's prescription in Egypt and Turkey while it was illegal in the rest of the participating countries.

## Methodology

Following a focus group discussion amongst the ARMed project leaders, it was agreed that the most culturally acceptable way to perform the study in this region would be through structured interviews in waiting rooms of hospital out-patient clinics or primary health centres, addressing persons accompanying the patient for the visit. Healthy accompanying persons were selected so as to have a sample that was representative of the general population and therefore reduce selection bias. Short structured interviews were held in chosen centres in Cyprus, Egypt, Jordan, Lebanon, Libya, Tunisia and Turkey. The questionnaire content was adapted from a previously validated and used questionnaire in the Self-Medication with Antibiotics and Resistance (SAR) project [22]. The version used for the ARMed study was pre-tested on a small number of individuals who gave their comments to the co-ordinator who made the necessary changes to make it acceptable for the population under study. The interviews were performed in the local language between November 2004 and July 2005.

To minimise the possibility of errors arising from individual referring to other medicinals, the questionnaire was only completed in the case of respondents who showed a knowledge of what antibiotics were and for what they were used. Interviewers asked the subjects if they had ever heard of antibiotics and if in the affirmative, for what purposes were they used. If individuals replied incorrectly, the name of an antibiotic commonly used in the country was mentioned as an aide memoir. Respondents were deemed to have sufficient knowledge of antibiotics if they correlated them with the treatment of infections. However, if this information was not forthcoming, the interview was ended there.

## Statistical analysis

The outcome measures of interest included reported antibiotic use by adults and their children in the previous 12 months, an indication if this had been prescribed or not and in the case of the latter, the source of the non-prescribed antibiotic. Associations were also evaluated between self-medication and any of the possible determining factors, such as age, sex, education and symptoms for which antibiotics might be taken. Data at country level, was entered in MS Access database and after it was cleaned and validated, all data files were combined and analysed using SPSS 14 for Windows (SPSS Inc, USA) and Intercooled STATA version 6 (STATA Corporation, Texas, USA).

## Results

### Demographics

A total of 2109 interviews were undertaken, of which 1705 completed the full questionnaire (Table 1). The demographics of the respondents per country are shown in Table 2. These include gender, age group, education level and area of residence.

### Prescription patterns

Fig. 1 shows the proportion of antibiotic use amongst respondents in each country, both for prescribed use and self-medication. With the exception of Cyprus and Turkey, 50% or more of those respondents who were able to correctly identify antibiotics in the first part of the interview, had taken these pharmaceuticals in the previous 12 months. The overall proportion of self-medication was 19.1%, ranging from <0.1% in Cyprus to 37% in Lebanon. The most common indication for self-medication in nearly all countries were for upper

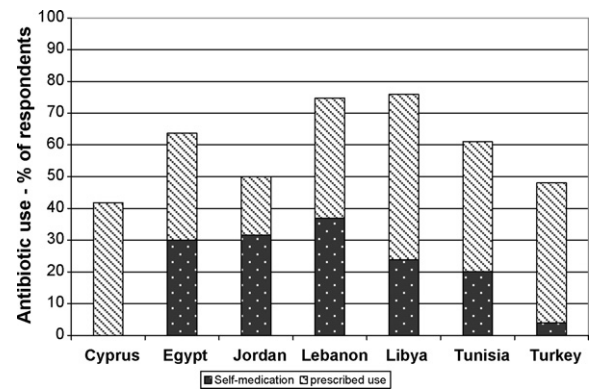


Figure 1 Percentage antibiotic use for each country in the ARMed project.

respiratory tract symptoms (Table 3), with the most common antibiotic used being either amoxicillin or ampicillin.

No association was identified between self-medication and either gender, age and level of education in the group of antibiotic users interviewed, but an association ( $p=0.011$ ) was present with area of residence (Table 4). At country level, self-medication was associated with age in Lebanon ( $p=0.018$ ) where rates of self-medication rose with increasing age. After the age of 36 years in Lebanon self-medication was much more frequent than prescribed use.

Most respondents who admitted self-medication said they had taken antibiotics without a medical prescription because they had been cured by that same product previously (Fig. 2). This was followed by an impression that they did not need any prescription for taking antibiotics. Almost half of those interviewed admitted to having stored some type of antibiotic at home which was not for current use. This varied slightly per country and ranged from 34% in Cyprus to 60% in Lebanon (Fig. 3). An overall proportion of 43.1% of respondents (ranging from 1.3% in Cyprus to 70.7% in

Table 1 Details of the number of questionnaires received at the co-ordinating centre and those that were used for analyses.

Country	No. of subjects interviewed	Individuals who provided evidence of knowledge of antibiotics and their use, <i>n</i> (%)
Cyprus	200	158 (79.0)
Egypt	348	300 (86.2)
Jordan	304	174 (57.2)
Lebanon	119	119 (100.0)
Libya	318	286 (89.9)
Tunisia	300	264 (88.0)
Turkey	520	404 (77.7)
Total	2109	1705 (80.8)

**Table 2** Demographics and characteristics of the participants that completed the interview in each country.

	Cyprus, <i>n</i> (%)	Egypt, <i>n</i> (%)	Jordan, <i>n</i> (%)	Lebanon, <i>n</i> (%)	Libya, <i>n</i> (%)	Tunisia, <i>n</i> (%)	Turkey, <i>n</i> (%)
<b>Gender</b>							
Male	57 (36.1)	143(47.7)	118(67.8)	59 (49.6)	114(39.9)	119(45.1)	160(39.6)
Female	100(63.3)	150(50.0)	56 (32.2)	50 (42.0)	171 (59.8)	145(54.9)	242 (59.9)
Unknown	1 (0.6)	7 (2.3)	0 (0.0)	10(8.4)	1 (0.3)	0 (0.0)	2 (0.5)
<b>Age group</b>							
18–25 years	5 (3.2)	79 (26.3)	104(59.8)	28 (23.5)	106(37.1)	56 (21.2)	81 (20.0)
26–35 years	12(7.6)	82 (27.3)	27(15.5)	30 (25.2)	75 (26.2)	89 (33.7)	154(38.1)
36–45 years	24(15.2)	62 (20.7)	21 (12.1)	26 (21.8)	45(15.7)	66 (25.0)	106(26.2)
46–55 years	37 (23.4)	43(14.3)	17(9.8)	24 (20.2)	34 (11.9)	37(14.0)	49(12.1)
56–65 years	67 (42.4)	26 (8.7)	3(1.7)	4 (3.4)	13(4.5)	14(5.3)	10(2.5)
>65 years	13(8.2)	6 (2.0)	1 (0.6)	7 (5.9)	10(3.5)	2 (0.8)	2 (0.5)
Unknown	0 (0.0)	2 (0.7)	1 (0.6)	0 (0.0)	3(1.0)	0 (0.0)	2 (0.5)
<b>Level of education</b>							
Not completed primary education	1 (0.6)	48(16.0)	0 (0.0)	11 (9.2)	47(16.4)	29 (11.0)	25 (6.2)
Completed primary education	7 (4.4)	40(13.3)	9 (5.2)	20(16.8)	25 (8.7)	42(15.9)	100(24.8)
Secondary education	76 (48.1)	61 (20.3)	33(19.0)	41 (34.5)	92 (32.2)	45(17.0)	131 (32.4)
Higher educational training	72 (45.6)	151 (50.3)	132(75.9)	46 (38.7)	112(39.2)	148(56.1)	146(36.1)
Unknown	2(1.3)	0 (0.0)	0 (0.0)	1 (0.8)	10(3.5)	0 (0.0)	2 (0.5)
<b>Area of residence</b>							
Urban	137(86.7)	220 (73.3)	124(71.3)	95 (79.8)	130(45.5)	252 (95.5)	378 (93.6)
Rural	17(10.8)	80 (26.7)	50 (28.7)	24 (20.2)	154(53.8)	12(4.5)	25 (6.2)
Unknown	4 (2.5)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.7)	0 (0.0)	1 (0.2)

**Table 3** Most common indications and antibiotic used for self-medication per country.

Country	Indication	Antibiotic
Egypt	Respiratory tract symptoms	Amoxicillin/ampicillin
Jordan	Respiratory tract symptoms	Amoxicillin/ampicillin
Lebanon	Urinary tract infection	Fluoroquinolones
Libya	Respiratory tract symptoms	Amoxicillin/ampicillin
Tunisia	Respiratory tract symptoms	Amoxicillin
Turkey	Respiratory tract symptoms	Amoxicillin + enzyme inhibitor

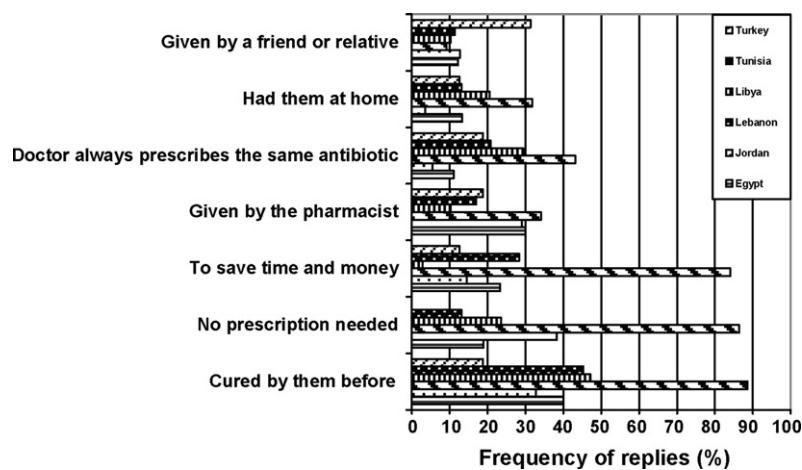
**Table 4** Statistical significance (*p*-values for Chi<sup>2</sup> test) for factors associated with self-medication, for the total group of antibiotics users and also stratified by country.

	Factors associated with self-medication			
	Gender	Age	Education level	Area of residence
All interviewed	0.052	0.171	0.061	0.011*
Country specific				
Egypt	0.482	0.387	0.434	0.470
Jordan	0.485	0.157	0.065	0.157
Lebanon	0.890	0.018*	<0.001*	0.018*
Libya	0.485	0.222	0.016*	0.018*
Tunisia	0.813	0.732	0.060	0.732
Turkey	0.486	0.262	0.840	0.262

\* Statistically significant.

Jordan) admitted that they would take antibiotics for their own use without a prescription if they believe that they needed to. However, the proportion of respondents who indicated similar intended self-medication to the children in their family was significantly lower ( $p < 0.0001$ ) at 26% (0% in Cyprus to 62.1% in Jordan). There was a statistically significant association between hoarding antibiotics and intended self-medication in each of the participating countries except for Cyprus where the lowest rates were registered.

The most commonly reported symptoms for which respondents would self-medicate were mainly those for signs related to colds and upper respiratory tract infections (Fig. 4). Fever was also commonly cited as a reason to self-medicate, particularly in children. In all the participating countries with the exception of Turkey, more than half of respondents believed that it was possible to get antibiotics from the pharmacy without a prescription (Table 5). Acquiring antibiotics from stocks kept at home by friends and relatives

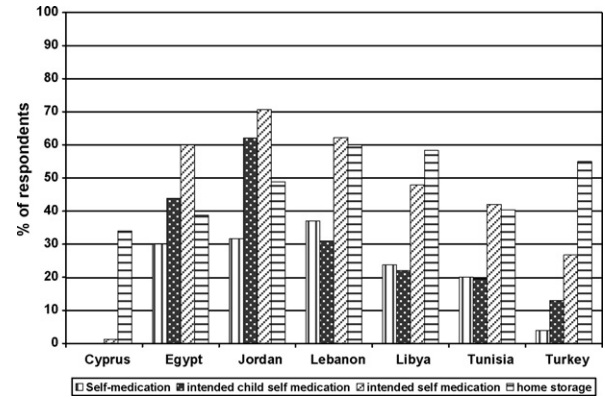


**Figure 2** Reasons reported by each country why no prescription was obtained.

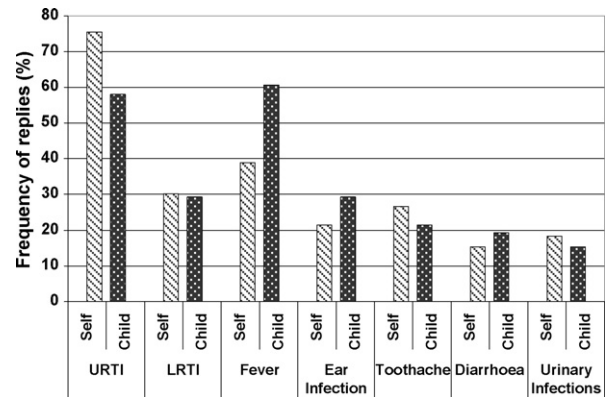
**Table 5** Accessibility of antibiotics in three specific situations presented to the interviewees.

Country	Directly from the pharmacy without prescription		From a friend or relative		Using an old prescription given for a previous disease episode	
	Yes easily, n (%)	Yes sometimes, n (%)	Yes easily, n (%)	Yes sometimes, n (%)	Yes easily, n (%)	Yes sometimes, n (%)
Cyprus	10 (6.3)	69 (43.7)	0 (0.0)	18 (11.4)	0 (0.0)	0 (0.0)
Egypt <sup>a</sup>	122 (40.7)	54 (18.0)	34 (11.3)	45 (15.0)	54 (18.0)	74 (24.7)
Jordan	121 (69.5)	19 (10.9)	65 (37.4)	38 (21.8)	3 (1.7)	9 (5.2)
Lebanon	58 (48.7)	42 (35.3)	28 (23.5)	40 (33.6)	22 (18.5)	9 (7.6)
Libya	130 (45.5)	30 (10.5)	105 (36.4)	46 (16.1)	45 (15.7)	19 (6.6)
Tunisia	128 (48.5)	63 (23.9)	95 (36.0)	66 (25.0)	52 (19.7)	62 (23.5)
Turkey <sup>a</sup>	93 (23.0)	26 (6.4)	44 (10.9)	30 (7.4)	73 (10.6)	20 (5.0)

<sup>a</sup> OTC acquisition of antibiotics is legal in these countries.



**Figure 3** Percentage of actual self-medication and intended self-medication for the respondents themselves and their children together with proportion of home storage of antibiotics per country.



**Figure 4** Symptoms reported for possible use of antibiotics without a prescription (intended self-medication).

was also common, especially in Tunisia, Jordan, Lebanon and Libya. On the other hand it was less likely for respondents to use old left over prescriptions.

Awareness of possible unwanted health problems related to taking antibiotics was generally present, ranging from 27% in Jordan to 74.6% in Tunisia. However, when asked to specify what type of health problems they were referring to, the majority referred mainly to side effects or allergies (59.5%) with only a minority of responses (30.2%) focusing on resistance.

## Discussion

The results of our study suggest that rates of antibiotic use in ambulatory care, whether prescribed or self-medication, is quite substantial in the studied southern and eastern Mediterranean countries. This is quite evident when the data is compared

with that published by the Self-Medication with Antibiotics and Resistance (SAR) project in European countries [22]. Median prescribed antibiotic use in the European countries was 28.8% (interquartile range (IQR): 19.9–35.3%) whereas the countries in our study exhibited a median of 40.9% (IQR: 33.7–44.12%) ( $p=0.07$ ). Furthermore the SAR study reported an overall median proportion of self-medication amongst study countries of 1.5% (IQR: 0.9–5.6%), the median in the ARMed study was 23.8% (IQR: 4–31.6%) ( $p=0.02$ ). The European results are significantly lower than those reported in our study, with the only exceptions being Cyprus, where strict regulations are in place for checking antibiotic dispensing in the pharmacies, and Turkey.

The latter is an interesting case since antibiotics are legally available over-the-counter in pharmacies, yet self-medication remains at a comparative low rate. Studies into socio-cultural factors in these countries could provide useful guidance. Deschepper et al. explored whether cross-national differences in use of antibiotics, prescribed and self-medication, are associated with differences between national cultures as described by the Hofstede's model of cultural dimensions [23]. It was found that Power Distance is a cultural aspect associated with antibiotic use, suggesting that the culture-specific way people deal with authority is an important factor in explaining cross-national differences in antibiotic use. It is therefore critical that more research is undertaken into possible drivers that could be playing a role in this Mediterranean phenomenon. It has been shown that self-medication rates tend to be higher in countries with lower gross domestic product [24]. Indeed Mediterranean countries as a whole, and especially those in its southern and eastern shores, are significantly less affluent than those in western Europe. Socio-cultural factors have also been suggested as important drivers for antibiotic self-medication. Nevertheless these factors would not explain self-medication practices in well-off expatriates who retire to the warmer climes of the region. Vaananen and colleagues have reported a study in expatriates from Finland (a country with very stringent antibiotic practices) who moved to Spain. The authors found that 41% of respondents who had taken an antibiotic over the previous 6 months had obtained it without a prescription [14].

One possible answer could focus on the availability of antibiotics in the region. Our study highlighted a general view amongst participants in most of the countries that it was relatively easy to obtain antibiotics without a medical prescription from pharmacies and to a less extent from relatives and acquaintances. Orero and colleagues

found that one or more antibiotic packets were present in 42% of interviewed Spanish households, and in only 19% of these households (8% of the total) was a member of the family under antibiotic treatment [16]. In two thirds of cases this antibiotic was obtained with a doctor's prescription, the rest was following self-medication. A follow-up study by the same authors found that 37% of households had antibiotics at home, 30% of which was for current use [25]. In a Greek study, 98 pharmacists were visited by actress-researchers who played clients requesting antibiotics without a physician's prescription. Antibiotics were more likely to be offered when they were less likely to be clinically indicated; 69% of these pharmacists gave antibiotics for high-grade fever rhinosinusitis when compared with 86% for low-grade fever [17].

A 6% self-medication rate reported from Italy was used predominantly for respiratory infection and dental pain especially in the younger population with the mean age of those that self-medicate being 38 years [18]. Al-Azzam et al. also found an association with age and also level of education when they examined the situation of self-medication with antibiotics in Jordan [21]. This is somewhat similar to our findings in that we found an association with age and level of education in some countries but also with area of residence. Antibiotic use was more common in urban areas but the percentage of self-medication was higher than that of prescribed use in rural areas.

Our study identified the most common symptoms for which the respondents would self-medicate themselves (intended self-medication) were mainly those related to symptoms of the common cold and other upper respiratory tract infections (URTI). These are predominantly viral in origin and therefore not treatable by antibiotics. Furthermore, the majority of the respondent who self-medicated indicated that they had followed such a practice because they had been given antibiotics for similar symptomatology by a physician. Whilst a degree of patient misrepresentation is likely to be at play, such findings suggest that a proportion of physicians in these countries could possibly be prescribing antimicrobials for predominantly viral respiratory infections. This is not a novel finding. The SAR study found that prescribed use for symptoms/diseases of URTI, such as cough, sneezing/nasal congestion, throat symptom, sinusitis, upper respiratory infection, acute tonsillitis, influenza and strep throat, increased the likelihood of self-medication with leftover antibiotics for these symptoms/diseases [26]. Prescribing behavior of general practitioners in Istanbul, Turkey, was investigated particularly in the treatment of childhood upper and lower respi-

ratory tract infections [27]. Almost 60% of parents had self-medicated their children prior to consulting the doctor. The majority of these children received a prescription for antibiotics, mainly penicillin with a beta lactamase inhibitor.

It is therefore apparent that further research is required into antibiotic use in ambulatory care within the Mediterranean, especially in the southern and eastern countries of this region. Such studies could look at the mentioned socio-cultural issues that have been highlighted by our study, in order to provide a knowledge base to inform possible interventions. These will need to address a multitude of factors including education of the general public, reduced availability of antibiotics from pharmacies as well as emphasis on medical doctors to avoid prescribing antimicrobials for predominantly viral upper respiratory tract infections. Such initiatives are vitally needed to improve current trends of community antibiotic consumption as well as resistance.

## Conflict of interest

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**Competing interests:** None declared.

**Ethical approval:** Not required.

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