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Antibiotic dispensation by Lebanese pharmacists: A comparison of higher and lower socio-economic levels

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Summary
Introduction: Indiscriminate use of antibiotics contributes to a global spread of antimicrobial resistance. Previous studies showed an excessive consumption of antibiotics purchased without medical prescription from community pharmacies, mainly in developing countries.

There is a shortage of studies revealing the role of community pharmacists in the overuse of antibiotics. Our objective is to study the dispensing policy of non-medical prescription antibiotics in community pharmacies, assessing the possible influence of the socio-economic level of the area over this practice.

Methods: A cross-sectional study was conducted between February and May 2011 among 100 pharmacists working in Beirut's pharmacies and its suburbs. Pharmacies were divided into 2 groups according to the socio-economic level of the population living in the pharmacy area. A self-administered questionnaire was filled by pharmacists.

Results: Over-the-counter antibiotic availability existed in both higher and lower socio-economic areas: on the whole, 32% of antibiotics were dispensed without medical prescription, with higher frequency in lower socio-economic areas ($p = 0.003$). Dispensing injectable antibiotics without medical prescription was significantly higher in lower socio-economic areas ($p = 0.021$), as well as dispensing an association of 2 antibiotics without medical prescription ($p = 0.001$). Pharmacists working in lower socio-economic areas recommended more frequent antibiotics to children and the elderly ($p < 0.001$ and $p = 0.004$, respectively).

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Conclusion: Dispensing antibiotics without medical prescription in Beirut community pharmacies is a common practice, particularly in lower socioeconomic areas. This public health problem should be addressed at the social, educational, and legislative levels.

Introduction

More than 60 years ago, the introduction of penicillin played a decisive role in the treatment of infectious diseases [1]. Over the decades, antibiotic (ATB) overuse and misuse have unfortunately led to an increased rate of adverse side effects, a higher cost of treatment and a higher rate of antimicrobial resistance to community pathogens, a phenomenon which is now a worldwide public health problem [2]. In fact, the World Health Organization (WHO) selected combating antimicrobial resistance as the theme for World Health Day 2011[3].

The ease of obtaining drugs without medical prescriptions can lead to the inappropriate use of ATBs [4], as over 50% of ATBs worldwide are purchased without a medical prescription [5]. The determinants of self-medication with ATBs are well documented: their over-the-counter (OTC) availability [6], the cost of medical consultation, low satisfaction with medical practitioners [7] and misconceptions regarding the efficiency of ATBs [8].

ATB OTC self-medication involves both the community pharmacist and the patient. While many studies have focused on self-medication, few have highlighted the role of the pharmacist in the process.

The cost of a medical consultation is also a determinant of self-medication, and many studies have shown that self-medication rates were inversely correlated to the socio-economic levels in the population.

In this context, we have decided to study the ATB dispensing policy of the community pharmacists in Beirut and its suburbs in the capital of Lebanon. We have also divided the region into high and low socio-economic areas to see if such disparities may have an influence on this policy, as Lebanon is a low- to middle-income country where socio-economic disparities are widespread.

Materials and methods

Study design

We conducted a descriptive cross-sectional study over a period of 4 months from February to May 2011 to assess the dispensing practices of OTC ATBs by community pharmacists. We compared the pharmacists' attitudes and knowledge of ATB use in higher and lower socio-economic population areas in the capital of Beirut and its suburbs.

Study population

The pharmacists in our sample were chosen according to the socio-economic level of the population near the pharmacy. Because there is no official classification of the socioeconomic level areas in Lebanon, we included the districts of Beirut and its suburbs that are commonly known to be higher or lower socio-economic areas, while avoiding areas known to be of medium socio-economic status. In addition, we considered the views of the local pharmacists to ensure that the pharmacy in question does not have mixed socio-economic clientele.

Because there have been no previous studies in the country or the surrounding area as a whole regarding our objective, we used a pilot sample size of 100 pharmacists to allow for parametric statistical tests. Indeed, 110 pharmacists were approached, which allowed for a margin of 10 participants that may not complete the questionnaire. The questionnaires were filled in by the pharmacists without any intervention from the investigator, except to make sure that the pharmacist answered the whole questionnaire. The pharmacists were not aware of the exact objective of the study to avoid any information bias; they were told that the purpose of the questionnaire was to describe ATB sales in Lebanese community pharmacies.

Questionnaire

The questionnaire was developed by the researchers for the purpose of the study; it has been translated to and from French and English to ensure identical versions of the questionnaire.

We made a clear differentiation between two actions, that of ''dispensing'' and of ''prescribing'' ATBs by the pharmacist. By ''dispensing'' we are referring to the pharmacist's action of delivering the ATB for a medical prescription or upon the

request of the patient for a given ATB or upon his own decision to prescribe an ATB for a certain medical complaint. By ''prescribing'' we are referring to the pharmacist's action of delivering an ATB of his choice following a certain medical complaint (without a medical prescription or a request for an antibiotic, just a medical complaint from the patient). Thus, the action of ''dispensing'' covers the action of ''prescribing'' but not vice versa.

The questionnaire included:

1. Identification of the pharmacist: age, gender, year of graduation, and years of practice.
2. Demographic data to situate the pharmacy.
3. Practice-related data: pharmacists were asked about:
   - The number of ATBs dispensed per day.
   - The frequency of dispensing ATBs without a medical prescription.
   - The frequency of people asking the pharmacist to dispense an ATB without a medical prescription.
   - The reasons for dispensing ATBs without a medical prescription.
   - On what basis they choose a particular ATB for a given health complaint.

     Participants were asked to answer ''Yes'' or ''No'' questions as follows:
   - Do you prescribe injectable forms of ATBs?
   - Do you prescribe 2 ATBs at the same time?
   - Do you prescribe ATBs to infants, children, adults and the elderly?
   - Do you prescribe generics? Do you believe in their efficiency?

     Practice and knowledge related data: pharmacists were asked about the type of infections for which they prescribe antibiotics. They were asked for each health complaint (e.g., urinary or respiratory infections) to indicate whether they give antibiotics or refer to a doctor.

Inclusion criteria

Pharmacists had to be either the owners or employees in the pharmacies. We questioned one pharmacist (the first available) from each pharmacy.

Exclusion criteria

Pharmacy students and pharmacy assistants were excluded. Pharmacists describing the socio-economic status of the area as medium level were also excluded from the study.

Statistical analysis

Data analysis was mainly descriptive and targeted the ATB prescription behavior of Lebanese community pharmacists as well as the differences of these practices between low and high socio-economic areas. Data analysis was performed using SPSS software version 18.0. In all analyses, a p-value <0.05 was considered significant. The tests used included the Chi-square test for dichotomous or multinomial qualitative variables; and when the expected values within cells were <5, the Fisher exact test was used. For continuous variables of normal distribution and homogeneous variances, the Student t-test was used.

Results

Demographic characteristics

Out of 110 pharmacists who were initially approached, a total of 100 pharmacists completed the questionnaire. Table 1 summarizes the social and demographic characteristics of the pharmacists practicing in the higher and lower socio-economic areas. There were significant differences between the 2 groups regarding age, duration of practice, pharmacy location and pharmacy ownership ($p < 0.05$): older age, longer practice duration and pharmacy ownership were significantly more frequent in the low socioeconomic level group. Pharmacies located in higher socioeconomic regions tended to be situated on main roads and close to hospitals or medical clinics compared to the pharmacies in the small districts ($p = 0.009$) (Table 1).

Dispensing antibiotics

As shown in Table 2, a significant difference ($p = 0.032$) was found between the different types of regions in the number of total ATBs dispensed per day: in higher socio-economic regions, 16.6% ($n = 8$) of the pharmacists declared that they dispensed more than 30 ATBs per day versus only 3.8% ($n = 2$) in the lower socio-economic regions. In contrast, in lower socio-economic regions, 63% ($n = 33$) of the pharmacists admitted dispensing between 10 and 30 ATBs per day versus 42% ($n = 20$) in higher socio-economic regions.

In lower socio-economic regions, pharmacists were asked to dispense non-medical ATB prescription many times a day significantly more frequently than in higher areas (82.7% ($n = 43$) versus 50% ($n = 24$), respectively, $p = 0.001$). The mean share of

Table 1 Socio-demographic characteristics of the 100 pharmacists.

Characteristics	Socio-economic level of the area		*p*-Value
	Lower (*n* = 52)	Higher (*n* = 48)	
Age, mean (SD)[a]	40.08 (11.50)	32.48 (8.02)	<0.001
Sex, *n* (%)			
Male	26 (50)	21 (43.7)	NS[a]
Female	26 (50)	27 (56.3)	
Diploma, *n* (%)			
BS pharmacy	34 (65.4)	33 (68.7)	NS
PharmD	18 (34.6)	15 (31.3)	
Graduation year, mean (SD)	1995 (11.54)	2002 (7.78)	0.001
Experience (years), mean (SD)	15.15 (9.86)	8.25 (6.96)	<0.001
Owner of the pharmacy, *n* (%)			
No	13 (25)	33 (68.7)	<0.001
Yes	39 (75)	15 (31.3)	
Area of the pharmacy (m^2), mean (SD)	60.06 (30.12)	89.62 (62.59)	0.007
The pharmacy's location, *n* (%)			
On a main road	24 (46.1)	24 (50)	
In a small district	20 (38.5)	7 (14.6)	0.009
In proximity to hospitals or medical clinics	8 (15.4)	17 (35.4)	

[a] SD: standard deviation; NS: non-significant. Difference is considered significant for *p*-value <0.05. The classification of the pharmacies is based on the socio-economic level of the area.

Table 2 Dispensing antibiotic characteristics in Lebanese community pharmacies.

	Socio-economic level of the area		*p*-Value
	Lower (*n* = 52)	Higher (*n* = 48)	
Number of total ATBs[a] dispensed per day, *n* (%)			
Less than 10	17 (32.7)	20 (41.7)	
Between 10 and 30	33 (63.5)	20 (41.7)	0.032
More than 30	2 (3.8)	8 (16.6)	
The frequency of asking for an ATB to be dispensed without medical prescription, *n* (%)			
Many times a day	43 (82.7)	24 (50)	
Once a day	2 (3.8)	14 (29.2)	0.001
2—3 times per week	5 (9.7)	5 (10.4)	
Less than 2—3 times per week	2 (3.8)	5 (10.4)	
The share of non-prescription ATBs[b], mean (SD)	36.73 (18.12)	26.74 (13.87)	0.003
The pharmacist's dispensing policy (in the absence of medical prescription) is based on, *n* (%)			
Decision/knowledge	19 (36.5)	14 (29.2)	
Patient's request	1 (1.9)	3 (6.3)	NS[a]
Both	32 (61.6)	30 (62.5)	
Prescription of injectable forms of ATBs, *n* (%)	15 (29)	5 (10)	0.021
Prescription of 2 ATBs at the same time, *n* (%)	16 (30.7)	2 (4.2)	0.001
Prescription of ATBs for infants[c], *n* (%)	7 (13.5)	2 (4.2)	NS
Prescription of ATBs for children[d], *n* (%)	36 (69.2)	13 (27.1)	<0.001
Prescription of ATBs for elderly, *n* (%)	25 (48)	10 (21)	0.004
The belief in generic medications' efficiency, *n* (%)	46 (88.5)	29 (60.4)	0.001
Share of generics[e], *n* (%)			
Less than 25%	9 (17.3)	32 (66.7)	<0.001
More than 25%	33 (63.4)	7 (14.6)	

[a] ATBs: antibiotics; NS: non-significant. Difference is considered significant for *p*-value <0.05.
[b] The share of non-prescription antibiotics from the overall dispensed antibiotics.
[c] Less than 1 year.
[d] Children are aged between 1 and 12 years.
[e] The share of generics versus brands from the overall antibiotics consumption.

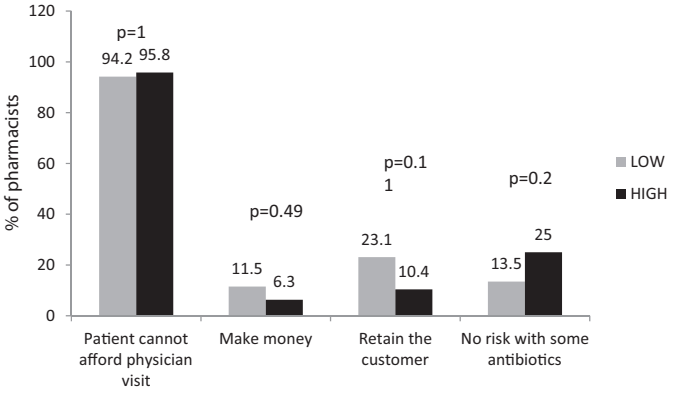

Figure 1 Reasons behind dispensing antibiotics without medical prescription. Gray and black bars represent respectively pharmacists working in lower and higher socio-economic areas. The *X*-axis represents reasons behind the delivery of ATBs without medical prescription by the pharmacists and the *Y*-axis represents the percentage of pharmacists among the 100 participating in the study. Difference between the 2 groups is considered significant for *p*-value <0.05.

non-medical ATB prescription from the overall number of ATBs dispensed was significantly higher in the lower socio-economic regions (36.73% ± 18.12 versus 26.74 ± 13.87, $p = 0.003$).

Pharmacists reported that their dispensing policy in the absence of a medical prescription was mainly based on scientific knowledge and experience as well as on the patients' requests in both areas with no significant difference. Pharmacists reported prescribing OTC injectable antibiotics in lower socio-economic areas (29%; $n = 15$) more frequently than in higher socio-economic areas (10%; $n = 5$) ($p = 0.021$). The situation was similar when it came to prescribing two ATBs at the same time for one symptomatic patient (30.7% ($n = 16$) versus 4.2% ($n = 2$), $p = 0.001$).

In lower socio-economic areas, the proportion of pharmacists reporting prescribing ATBs for children and the elderly was significantly higher compared to those in higher socio-economic areas (69.2% ($n = 36$) versus 27.1% ($n = 13$), respectively, $p < 0.001$and 48% ($n = 25$) versus 21% ($n = 10$), respectively, $p = 0.004$). Similar results were found for the prescription of more than 25% of ATBs as generic drugs ($p < 0.001$): 63.4% ($n = 33$) in lower versus 14.6% ($n = 7$) in higher socio-economic areas. In the latter areas, pharmacists believed less in the efficiency of generic medication (60%, $n = 29$) compared to lower socio-economic areas (88.4%, $n = 46$) ($p = 0.001$) (Table 2).

The pharmacists' professional practice

There was no significant difference in the reported ATB dispensing practices in the 2 areas. The majority of pharmacists reported dispensing ATBs without medical prescription for the main reason that patients could not afford a medical visit, 94% ($n = 49$) and 96% ($n = 46$) in lower and higher socio-economic regions, respectively (Fig. 1).

When pharmacists were asked on what basis they choose a particular ATB; those working in lower socio-economic areas were found to be significantly more influenced by the patient's socio-economic level (75% ($n = 39$) versus 54% ($n = 26$), respectively) ($p = 0.037$) and by the ATB country of manufacture (52% ($n = 27$) versus 27% ($n = 13$), respectively) ($p = 0.01$) compared to those working in higher socio-economic areas (Fig. 2).

The pharmacists' behavior toward specific disease conditions

Pharmacists reported prescribing ATBs for diarrheal diseases, urinary infections and respiratory symptoms (Tables 3 and 4). In our total sample, 65% ($n = 65$) of pharmacists would prescribe ATBs for adult patients with feverish diarrhea and 28% ($n = 28$) for children with the same symptoms. We found that 61% ($n = 61$) of pharmacists would prescribe ATBs for adults suffering from burning urination and 52% ($n = 52$) for burning urination plus fever and flank pain. A large proportion of the participants (71%, $n = 71$) would prescribe ATBs for adults suffering from sore throat and fever while 43% ($n = 43$) of them would do the same for children. On whole, 64% ($n = 64$) of pharmacists would prescribe ATBs for adults with sore throat, high fever and exudation in the absence of cough, 44% ($n = 44$) would prescribe ATBs for adults with cough and fever, and 46% ($n = 46$) for cough, fever, chest pain and shortness of breath. When comparing the lower and higher socio-economic levels, a significant difference in the number of pharmacists who would prescribe ATBs was detected

Table 3 Pharmacists' behavior regarding the most common disease conditions in adults.

Disease condition	Pharmacists' behavior	Socio-economic level of the area		*p*-Value	OR (95% CI)
		Lower ($n = 52$)	Higher ($n = 48$)		
Gastro-intestinal symptoms					
Diarrhea	A	8	7	NS	1.09
	B	43	41		(0.362–3.277)
Diarrhea with fever	A	35	30	NS	1.313
	B	16	18		(0.571–3.014)
Diarrhea with blood	A	15	3	**0.004**	6.25
	B	36	45		(1.678–23.275)
Genito-urinary symptoms					
Burning with urination	A	36	25	**0.042**	2.366
	B	14	23		(1.024–5.467)
Burning with urination + fever and flank pain	A	32	20	**0.027**	2.489
	B	18	28		(1.103–5.618)
Burning with urination + vaginal discharges	A	14	7	NS	2.171
	B	35	38		(0.785–6.003)
Respiratory symptoms					
Sore throat	A	6	2	NS	3.067
	B	45	46		(0.588–16.004)
Sore throat + fever	A	35	36	NS	0.729
	B	16	12		(0.302–1.76)
Sore throat + cough	A	16	14	NS	1.012
	B	36	34		(0.426–2.406)
Sore throat + fever + exudation + no cough	A	35	29	NS	1.529
	B	15	19		(0.662–3.53)
Cough with fever	A	23	21	NS	1.056
	B	28	27		(0.478–2.335)
Cough with expectorations	A	15	21	NS	0.536
	B	36	27		(0.234–1.228)
Cough + high fever + chest pain + shortness of breath	A	25	21	NS	1.236
	B	26	27		(0.56–2.728)

OR: odds ratio; NS: non significant for *p*-value >0.05.
A: the pharmacist prescribes an antibiotic.
B: the pharmacist does not prescribe any antibiotic or refers the patient to a doctor.

Table 4 Pharmacists' behavior regarding the most common disease conditions in children.

Disease condition	Pharmacists' behavior	Socio-economic level of the area		*p*-Value	OR (95% CI)
		Lower ($n = 52$)	Higher ($n = 48$)		
Gastro-intestinal symptoms					
Diarrhea	A	6	5	NS	1.147
	B	45	43		(0.326–4.035)
Diarrhea with fever	A	16	12	NS	1.333
	B	35	35		(0.551–3.224)
Diarrhea with blood	A	10	1	**0.009**	10.976
	B	41	45		(1.346–89.515)
Genito-urinary symptoms					
Burning with urination	A	9	0	**0.003**	0
	B	41	47		
Burning with urination + fever and flank pain	A	6	4	NS	1.5
	B	44	44		(0.396–5.685)
Respiratory symptoms					
Sore throat	A	5	0	NS	0
	B	46	48		
Sore throat + fever	A	23	20	NS	1.109
	B	28	27		(0.499–2.466)
Sore throat + cough	A	11	9	NS	1.192
	B	40	39		(0.445–3.192)
Sore throat + fever + exudation + no cough	A	24	15	NS	1.969
	B	26	32		(0.861–4.503)
Cough with fever	A	13	14	NS	0.806
	B	38	33		(0.332–1.958)
Cough with expectorations	A	9	10	NS	0.793
	B	42	37		(0.291–2.162)
Cough + high fever + chest pain + shortness of breath	A	10	5	NS	2.098
	B	41	43		(0.66–6.662)

OR: odds ratio; NS: non significant for *p*-value >0.05.
A: the pharmacist prescribes an antibiotic.
B: the pharmacist does not prescribe any antibiotic or refers the patient to a doctor.

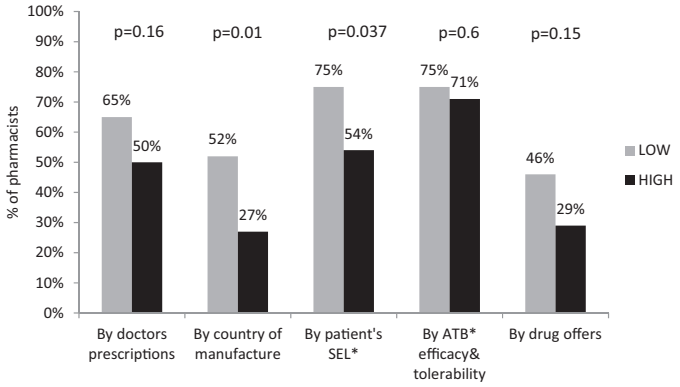

Figure 2 Factors influencing the pharmacists' antibiotic choice. Gray and black bars represent respectively pharmacists working in lower and higher socio-economic areas. The *X*-axis represents the factors on which the pharmacist is based to choose a certain antibiotic and the *Y*-axis represents the percentage of pharmacists. Difference between the 2 groups is considered significant for *p*-value <0.05. *SEL: socio-economic level, ATB: antibiotic.

for the following health complaints: bloody diarrhea in adults and children (respectively $p = 0.004$; $p = 0.009$), burning with urination in adults and children (respectively $p = 0.042$; $p = 0.003$), and burning with urination plus fever and flank pain in adults ($p = 0.027$). In these situations, pharmacists working in lower socio-economic areas prescribed ATBs more frequently compared to those in higher socio-economic areas (Tables 3 and 4).

Discussion

To our knowledge, this is the first study of OTC ATB availability in Lebanon that highlights the role of the community pharmacist. We found that there is a lack of regulation concerning ATB dispensation [9]. Although by law ATBs are prescription drugs only, we found that their OTC availability is highly prevalent; this practice was widespread among community pharmacists. On the whole, pharmacists report that approximately 32% of the ATBs delivered were dispensed without any medical prescription. The OTC availability of ATBs has been reported in many countries in Asia (62% in Vietnam [10]), Europe (44% in Greece [11], 3.5% in Denmark [12], and 22% in Lithuania [13]), the Middle East (46% in Jordan [14]), Africa (100% in Nigeria [10], Uganda [15]) and America [16].

We found that the frequency of dispensing ATBs without a medical prescription and the frequency of prescribing ATBs for children and the elderly are significantly higher in lower socio-economic areas. This also applies to the prescription of injectable forms of ATBs and ATBs combinations. This is in accordance with the findings of other researchers, who state that substantial variations in the prevalence rates of self-medication (a direct result of OTC availability of ATBs) were linked to socioeconomic factors, disparities in health care systems affecting access to health care, as well as drug dispensing policies [17]. We believe these findings should be investigated further as they may result in an irrational use of ATBs among vulnerable groups such as children and the elderly and may contribute to ATB allergies, side effects and ATB future resistance. Moreover, the administration of injectable ATBs by non-qualified persons may expose patients to major injuries.

We also found interrelated results about pharmacists working in lower socio-economic areas, i.e., they choose ATBs (for a given situation) according to the country of manufacture; and they choose generics more frequently as they declare that they trust generic efficiency much more than their counterparts working in higher socio-economic areas. This might be explained by the fact that in Lebanon, the quality and bioequivalence of generics are difficult to demonstrate because there is no governmental institution that could ensure this. Thus, while pharmacists recommend generics because of their lower cost, they take into consideration the country of manufacture to ensure their quality. In fact, ATBs manufactured in developed countries are perceived to be of higher quality compared to those manufactured in developing countries.

The surprising finding was that in both groups, the main reason behind dispensing ATBs without a medical prescription is the inability of many people to afford a medical visit. It seems that even if they were rich, people in Beirut choose to go directly to the pharmacist because this option is possible, and less expensive. It is noteworthy that 38% of

participating pharmacists declared they choose treatment according to sales offers and discounts made to them by pharmaceutical companies. This high percentage is alarming as profit-seeking can mislead the pharmacist drug prescription policy.

Pharmacists reported prescribing ATBs for gastro-intestinal, urinary, and respiratory infections; while simple diarrhea or a sore throat may also be treated with ATBs. The study also shows the impact of fever on the prescription policy, especially for respiratory infections. In our study, 93% of pharmacists relied on the presence of fever in addition to a cough or sore throat in prescribing an ATB. This reflects a large gap in knowledge. Expectoration or wet cough was also declared to be an indicator of bacterial bronchitis by 76% of pharmacists. However, in all of the guidelines [18,19], in regard to diagnosing a bacterial lower respiratory infection, expectoration is never mentioned as a pathognomonic sign. Moreover, bronchitis is mainly viral in origin. As for the rare cases of bacterial bronchitis, they often heal without the need of an ATB [19]. In our study, 41% of the ATBs prescribed by pharmacists seemed unnecessary because the disease is most likely of a viral or non-infectious origin. This quite high percentage indicates an overuse of ATBs in many unnecessary cases, especially in respiratory conditions and diarrhea. In comparison, we found a study conducted in Riyadh, Saudi Arabia, where a high percentage of retailers prescribed unnecessary ATBs for diarrhea, respiratory infections and urinary tract infections [20].

We are aware of the limitations of our study: considering that our study is observational and of a small sample size, all our results should be observed as suggestive and non-conclusive. Our sample was not a random: it may not represent the pharmacist population. A classification bias may have led to the misclassification of pharmacists in the 2 socio-economic groups because pharmacies close to hospitals or medical clinics attract people from all socio-economic classes and thus would be difficult to classify. Another limitation was the difficulty in finding similar studies for the sake of comparison. There might also be an information bias because pharmacists questioned may not have been completely honest in regard to the percentage of ATBs that they dispense without prescription or the reasons behind their behavior. A larger sample and a stratified analysis are needed to assess if the disparities between low and high socioeconomic areas were only observed because the pharmacists in the lower socio-economic region were older, more experienced, and mainly owners of their pharmacies.

Conclusions

This study revealed high rates of dispensing ATBs without medical prescriptions by community pharmacists in Beirut and its suburbs. These rates were in many cases higher in lower socioeconomic areas. Larger studies on a national level are needed to better investigate our findings. Multiple strategies should be adopted to avoid inappropriate ATB availability and consumption, while focusing on lower socioeconomic areas: public-awareness campaigns, pharmacist continuous education and law enforcement regarding ATB dispensation.

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The study was conducted with in-house resources.

Competing interests

None declared.

Ethical approval

Not required.

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