

Medication use by adults in greater Manaus: a population-based cross-sectional study, 2015

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The use of medicines can be an indicator of healthcare access. Our aim was to evaluate the consumption of medicine and associated factors among adults in Manaus Metropolitan Region, located in the north of Brazil. A cross-sectional population-based study was conducted with adults, ≥ 18 years old, selected by probabilistic sampling. The outcome was the use of medicine in the previous 15 days. Poisson regression with robust variance was used to calculate the prevalence ratio (PR) of medicine consumption, with 95% confidence interval (CI). Use of medicines was reported by 29% (95% CI: 28-31%) of the participants. People with good (PR: 0.82, 95% CI: 0.72-0.94) and fair (PR: 0.77, 95% CI: 0.65-0.90) health status were shown to use less medication than those with very good health. People with partners (PR: 1.19, 95% CI: 1.08-1.31), and people who had sought healthcare service in the fortnight (PR: 2.16, 95% CI: 1.97-2.37) showed higher medicine consumption. Medical prescription (80.1%) was the main inductor of consumption; purchasing at a drug store (46.4%), and acquiring through the Brazilian Unified Health System (39.6%) were the main ways to obtain medicines. About one-third of adults in the Metropolitan Region of Manaus used medicines regularly, mainly people with very good health, living with partners, and with recent use of a health service.

Keywords: Medication use. Cross-Sectional Studies. Adult. Manaus.

INTRODUCTION

The use and access to prescription drugs is influenced by several factors that may differ depending on the region in Brazil (Haque, 2017). Socioeconomic inequality is often identified as one of these factors, affecting the rate of medication use nationwide (Hoebert, Laing, Stephens, 2011). In order to cover health expenses, Brazilian citizens have to compromise the family budget; associated with other difficulties to obtain medicines, this constitutes an important barrier

to general access (Garcia, Sant'Anna, Magalhães *et. al*, 2013).

Research on the use of prescription drugs includes examining the practices of prescription, distribution, and consumption of medicine. Additionally, the research area offers interventions that may improve the quality of these practices, incorporating the results into the Brazilian public health context by strengthening health systems and scaling access (Wettermark, Martino, Elseviers, 2016).

The Metropolitan Region of Manaus is characterized by an unequal distribution of wealth, with buying power limited to a small portion of the population. The human development index of the state of Amazonas is medium but some municipalities have poor access to basic sanitation (PNUD 2013; Andrade, Gouveia, D'Ávila *et. al*, 2012).

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In this context, studies that evaluate the consumption of medicine in this region may reveal crucial information to help guide future actions in the area.

With the aim of assessing the use of medications and associated factors among adults in the Metropolitan Region of Manaus, we conducted a cross-sectional population-based study.

MATERIAL AND METHODS

Design and participants

A cross-sectional population-based study was conducted from May to August, 2015. This analysis, with the primary focus on the use of medicine, integrates a larger epidemiological study that evaluates the associated factors to access and use of health supplies and services in Manaus Metropolitan Region (Silva, Galvao, 2017).

Sample composition, sampling procedures and other methodological details of the research are available in an earlier paper (Silva, Galvao, 2017). In brief, the sample was comprised of 4,000 adults (≥ 18 years old), selected by probabilistic sampling in three stages, by clusters, and stratified by sex and age.

Data sources and measurement

The following question was used to assess the outcome of the study: *“In the last 15 days (two weeks), have you taken any medicine?”* (yes, no). If the answer was “yes”, the following questions were asked: *“What is the name of the medicine?”* (free answer); *“For which illness or health problem are you using this medicine?”* (free answer); *“How long have you been taking this medicine?”* (free answer); *“Who recommended it?”* (Doctor, pharmacist, own account, relatives or neighbors, drug store clerk, other); and *“What was the mean of acquisition of the medicine?”* (drug store, Brazil’s Unified Health System, Brazil’s Popular Pharmacy Program, health insurance, other). The name of the medicine was registered as informed by the interviewee, without confirmation by the package leaflet, packaging, or medical prescription.

After data collection, the products informed by the participants were identified according to the Brazilian Common Denomination, and then classified using the World Health Organization’s Anatomical Therapeutic Chemical System (ATC), which consists

of five ranking levels (WHO, 2019). Tabulated drugs that were impossible to categorize, due to the name being indecipherable or unlisted in the anatomical-therapeutic classification system, were labeled as non-codifiable.

Independent variables were sex (male, female), age (in years), marital status (single or married/stable union), number of people living at the participant’s residence (two, three to five, six or more), education level (higher education, complete high school, complete basic education, incomplete basic education, or illiterate), work status (unemployed or employed), economic classification (A/B [wealthiest], C [middle], D/E [poorest]), self-reported health status (very good, good, fair, poor, very poor), presence of chronic diseases (none, one, two or more), use of health services in the last 15 days (yes, no), need for hospitalization in the last 12 months (yes, no), and health insurance coverage (yes, no).

Statistical methods

In the descriptive analysis, all the variables that characterized the sample and the use of medicines were evaluated. Prevalence ratio (PR) of medicine consumption and 95% confidence interval (CI) were calculated in bivariate analysis to identify the associated factors of medicine consumption. Variables significant at $p < 0.10$ level were included in the adjusted Poisson regression analysis with robust variance, and association with drug consumption was positively determined when $p < 0.05$. Significance of variables was calculated by Wald test. The probability of the results with 95% CI by two significant variables in the adjusted analysis was calculated. This predictive model was calculated by linearized estimate of standard errors. All statistical analyses were performed in Stata software (version 14.2) and took into account the complex sampling of the research (*svy* command). No data was inputted whenever information was missing.

Ethics

The project was submitted and approved by the Research Ethics Committee of the Federal University of Amazonas, through the Opinion 974,428/2015, with the Certificate of Presentation for Ethical Assessment 42203615.4.0000.5020. The participants consented to engage in the research by signing a consent form.

RESULTS

From a total of 4,001 participants, 52.8% were women, and 71% aged between 18 and 45 years old. The majority of the participants (47.6%) had completed high school, reported living with a partner (52.5%), belonged to economic classification C (57.1%), were employed (78.2%), and lived in a house with three to five residents (57%); 86.9% lacked health insurance, 54.4% considered their health to be good, 59.6% had a diagnosis of at least one chronic illness, and 20.9% had resorted to healthcare services in the 15 days prior to the interview (Table I).

TABLE I - Characteristics of the population and frequency of use of medicines in the 15 days prior to data collection, Manaus Metropolitan Region, 2015 (n=4,001)

Variables	N	%	% consumption
Sex			
Female	2,113	52.8	28.0
Male	1,888	47.2	30.9
Age group (years)			
18-25	838	20.9	30.2
26-35	1,152	28.8	30.8
36-45	843	21.1	27.2
46-59	772	19.3	28.9
60 or more	396	9.9	29.3
Marital status			
Single	1,899	47.5	25.8
Married/stable union	2,102	52.5	32.7
Number of residents in household			
Two	854	21.3	25.5

(continuing)

TABLE I - Characteristics of the population and frequency of use of medicines in the 15 days prior to data collection, Manaus Metropolitan Region, 2015 (n=4,001)

Variables	N	%	% consumption
Three to five	2,274	56.8	29.7
Six or more	873	21.8	32.3
Economic classification			
A/B	629	15.7	28.5
C	2,285	57.1	29.5
D/E	1,087	27.2	29.8
Work status			
Unemployed	871	21.8	28.8
Employed	3,130	78.2	29.6
Education			
Higher education	158	4.0	32.3
High school	1,903	47.6	29.3
Middle school	649	16.2	31.1
Elementary school	536	13.4	29.3
Less than elementary	755	18.9	27.7
Health insurance			
No	3,478	86.9	29.4
Yes	523	13.1	29.6
Health status			
Very good	471	11.8	37.6
Good	2,175	54.4	29.0
Fair	1,108	27.7	26.9

(continuing)

TABLE I - Characteristics of the population and frequency of use of medicines in the 15 days prior to data collection, Manaus Metropolitan Region, 2015 (n=4,001)

Variables	N	%	% consumption
Poor	193	4.8	29.0
Very poor	54	1.4	27.8
Chronic diseases			
None	1,617	40.4	31.3
One	1,147	28.7	28.0
Two or more	1,237	30.9	28.2
Use of health services (previous 15 days)			
No	3,163	79.1	23.4
Yes	838	20.9	51.9

Twenty-nine percent (95% CI: 28-31%) had consumed medication 15 days prior to the interview. The average number of medicines consumed per person was 1.50 ± 2.74 , totaling 1,760 drugs. The prevalence of consumption on the day of the interview was 15% (95% CI: 14-17%; data not shown in tables).

Using the ATC system, 1,703 drugs (97%) were classified, while 57 drugs were non-codifiable. The most commonly used pharmacological groups were analgesics (18.2%), renin-angiotensin system agents (12.5%), anti-inflammatory and antirheumatic drugs (11.6%; Table II). The most consumed drugs were dipyron (13.3%), losartan (6.7%) and diclofenac (4.8%; data not shown in tables).

TABLE II - Medicines used in the 15 days prior to data collection according to pharmacological classes (third level of the anatomical-therapeutic classification system [ATC], N = 1,760 medicines), Manaus Metropolitan Region, 2015

Categorical variables	ATC	n	%
Analgesics	N02	320	18.2
Agents acting on the renin-angiotensin system	C09	220	12.5
Anti-inflammatory and antirheumatic products	M01	204	11.6
Antibacterial for systemic use	J01	144	8.2
Drugs used in diabetes	A10	106	6.0
Drugs for acid related disorders	A02	75	4.3
Beta blocking agents	C07	62	3.5
Vitamins	A11	54	3.1
Antithrombotic agents	B01	49	2.8
Lipid modifying agents	C10	49	2.8
Psycholeptics	N05	43	2.4
Diuretics	C03	40	2.3
Sex hormones and modulators of the genital system	G03	30	1.7
Calcium channel blockers	C08	30	1.7
Others categories	-	277	15.7
ATC not codified	-	57	3.2
Total		1,760	100.0

Note: ATC not codified, classification was not possible

Physicians were the main responsible for recommending medicines, having prescribed 80.1% of the drugs consumed by the participants in the two weeks prior to the interview (n=1,409 medicines), followed by

participant's own account (13.3%; n=234 medicines), and indication of relatives and neighbors (3.7%; n=65 medicines). Recommendation by the pharmacist was

reported in 40 cases (2.3%), and 4 by the drug store clerk (0.2%; Table III).

TABLE III - Responsible for recommendation and form of acquisition of the medicines used in the 15 days prior to data collection, Metropolitan Region of Manaus, 2015 (n=1,760 medicines)

Responsible for recommendation of the medicines	n	%
Physicians	1,409	80.0
Own account	234	13.3
Relatives and neighbors	65	3.7
Pharmacist	40	2.3
Other indication	9	0.5
Drug store clerk	3	0.2
Total	1,760	100.0
Form of acquisition	n	%
Drug stores	817	46.4
Brazilian Unified Health System	697	39.6
Brazilian Popular Pharmacy Program	169	9.6
Other	39	2.2
Health insurance	38	2.2
Total	1,760	100.0

About half of the medicines were purchased directly in drug stores (46.4%), 40% of medicines were obtained from the Brazilian Unified Health System (SUS), and 10% through the Brazilian Popular Pharmacy Program (a program of co-payment or free provision by the government). Medicines obtained through health insurance were in the minority (2.2%; Table III).

In the bivariate analysis unadjusted, the consumption was positively associated with the following variables: males, households with more than three people, people who have a partner, and people who have sought healthcare services in the previous 15 days. Good and fair health status were negatively associated with the use of medicines when compared to the status of a very good health (Table IV).

TABLE IV - Prevalence ratio (PR) of use of medicines in the 15 days prior to data collection (95% CI), Manaus Metropolitan Region, 2015

Characteristics	Unadjusted analysis		Adjusted analysis	
	PR (95% CI)	p-value	PR (95%CI)	p-value
Sex		0.040		0.106
Female	1.00		1.00	
Male	1.11 (1.00-1.22)		1.08 (0.98-1.19)	
Age group (years)		0.501		
18-25	1.00			
26-35	1.02 (0.89-1.16)			
36-45	0.90 (0.77-1.05)			
46-59	0.96 (0.82-1.12)			
60 or more	0.97 (0.81-1.17)			
Marital status		<0.001		
Single	1.00		1.00	
Married/stable union	1.27 (1.15-1.40)		1.19 (1.08-1.31)	<0.001
Number of residents in household		0.008		0.209
Two	1.00		1.00	
Three to five	1.16 (1.02-1.33)		1.07 (0.94-1.22)	
Six or more	1.27 (1.09-1.47)		1.14 (0.99-1.32)	
Economic classification		0.834		
A/B	1.00			
C	1.04 (0.90-1.19)			
D/E	1.05 (0.90-1.22)			
Work status		0.656		
Unemployed	1.00			
Employed	1.03 (0.91-1.16)			

(continuing)

TABLE IV - Prevalence ratio (PR) of use of medicines in the 15 days prior to data collection (95% CI), Manaus Metropolitan Region, 2015

Characteristics	Unadjusted analysis		Adjusted analysis	
	PR (95% CI)	p-value	PR (95%CI)	p-value
Education		0.681		
Higher education	1.00			
High school	0.91 (0.72-1.16)			
Middle school	0.97 (0.75-1.25)			
Elementary school	0.92 (0.71-1.19)			
Less than elementary	0.87 (0.67-1.12)			
Health insurance		0.944		
No	1.00			
Yes	1.01 (0.87-1.16)			
Health status		<0.001		0.019
Very good	1.00		1.00	
Good	0.77 (0.67-0.88)		0.82 (0.72-0.94)	
Fair	0.71 (0.61-0.83)		0.77 (0.65-0.90)	
Poor	0.77 (0.60-0.98)		0.78 (0.60-1.02)	
Very poor	0.74 (0.47-1.15)		0.78 (0.49-1.25)	
Chronic diseases		0.097		0.341
None	1.00		1.00	
One	0.90 (0.80-1.01)		0.92 (0.82-1.03)	
Two or more	0.90 (0.80-1.01)		0.99 (0.87-1.12)	
Use of health services (previous 15 days)		<0.001		<0.001
No	1.00		1.00	
Yes	2.2 (2.02-2.42)		2.16 (1.97-2.37)	

The use of medicines adjusted for the significant variables in the bivariate analysis was higher among people who had a partner (PR: 1.19; 95% CI: 1.08-1.31), and people who had sought healthcare services in the previous 15 days (PR: 2.16; 95% CI: 1.97-2.37). People with good (PR: 0.82; 95% CI: 0.72-0.94) and fair (PR: 0.77; 95% CI: 0.65-0.90) perception of health status used less medication than those reporting very good health. Male and number of residents per household lost significance in the adjusted analysis. The age, education level, income and health insurance variables were not associated with the use of medicines in this research.

The probability of medicine use was 64% (95% CI: 56-72%, $p < 0.001$) in people with very good health status that had used health services in the previous 15 days, and 22% (95% CI: 12-32%, $p < 0.001$; Figure I) in adults with very poor health that had not used health services in the same period.

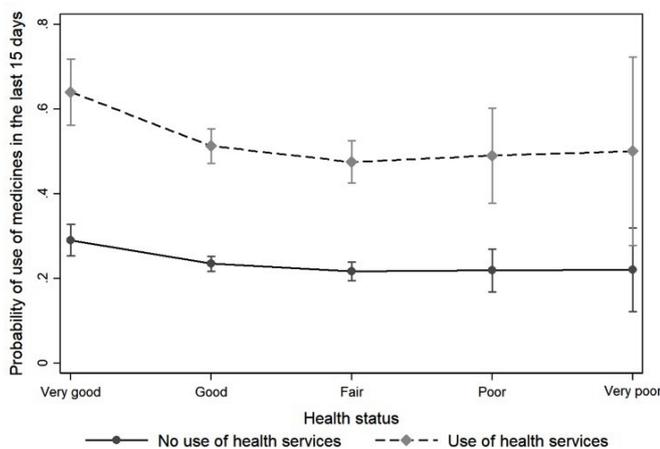


FIGURE 1 - Predictive probability of use of medicines according to the health status and use of health services in the 15 days prior to data collection.

DISCUSSION

About one third of the adults in the Metropolitan Region of Manaus had consumed medicines in the 15 days previous to the research. The consumption was significantly higher among people with very good health status, people who have a partner, and people who have used healthcare services in the period. Age, number of residents, economic class, occupation, education level, health insurance, and chronic disease showed no association with the use of medicines.

Cross-sectional studies based on self-reports have limitations, particularly on the reliability of the information. The affirmative responses to the use of medication were not confronted with package leaflet inserts, prescriptions, packages or any other evidence of consumption, in order to avoid underreporting (Wettermark, Martino, Elseviers, 2016). Although this decision may represent a risk of measurement bias, it is often adopted in these situations.

The present research was based on previous drug utilization population-based studies held in Brazil, which employ more frequent variables and recall periods (Gomes, Silva, Galvão, 2017). Previous analyses of this outcome in this region were absent. The representative sampling adopted allows the generalization of the results for the population of this region.

The prevalence of medication use in the 15 days period was lower than the Brazilian prevalence calculated in the meta-analysis of studies with population representativeness (Gomes, Silva, Galvão, 2017), and in the National Survey on Access, Use and Promotion of Rational Use of Medicines (PNAUM) (Bermudez, Barros, 2016), which observed use of medication by about half of adults in a month prior. This difference may be due to the methodological and regional differences, as well as to the pharmaceutical policies of the period.

The use of medication in the previous 15 days was not associated with sex in this research. Previous population studies found higher consumption among women when compared to men (Gomes, Silva, Galvão, 2017; Pons, Knauth, Vigo *et. al*, 2017). However, although inferior when compared to women, drug consumption by men is also influenced by age, so much so that from the age of 40, their consumption can be compared to that of the elderly (Prado, Francisco, Bastos *et. al*, 2016).

Physicians were the main inducers of use of medication in the Metropolitan Region of Manaus, which is the same conclusion found in a population study conducted in Brasilia, where 90% of the use of medicines in the seven days prior to the interview was prescribed by a physician (Galvao, Silva, Gross *et. al*, 2014). Educational and prescriptive actions aimed at prescribers seem to be strategic to promote rational use of medication in that region. Physicians are often persuaded by the pharmaceutical industry, which results in higher rate of prescription of pharmaceutical products (DeJong, Aguilar, Tseng *et. al*, 2016; Fadare, Oshikoya, Ogunleye *et. al*, 2018).

Two in ten medicines used in the fortnight period were self-prescribed (i.e. self-medication). A systematic review of representative surveys conducted in Brazil revealed that self-medication is frequent in one-third of the adult population (Domingues, Galvão, de Andrade *et. al*, 2015), appearing as an alternative to difficulties in access to healthcare services (Naves, Castro, Carvalho *et. al*, 2010). These results corroborate the national rate found in PNAUM, which showed that 16% of the population had used at least one medication without medical prescription in the fortnight (Arrais, Fernandes, Pizzol *et. al*, 2016).

Approximately half of the medicines consumed in the fortnight were obtained through public programs (Brazilian Unified Health System – SUS – and Brazilian Popular Pharmacy Program). Similarly, the 2008 National Sample Household Survey found that 45% of the population regularly access to medicines prescribed in SUS, and that the main reason for not obtaining the medicines was lack of money (52%) (Boing, Bertoldi, Boing *et. al*, 2013).

The reduction in the list of medicines provided by the Brazilian Popular Pharmacy Program will likely impact access to medication by the Brazilian population (BRASIL, 2017). This and other austerity policies directed to SUS will potentially deteriorate the access and use of healthcare services and supplies, including medicines. A systematic review by Parmar, Stavropoulou, Ioannidis, 2016, assessed health outcomes of the economic crisis in Europe between 2008 and 2015, indicating an increase in the number of people who did not have access to medical services after the implementation of austerity measures.

Situations such as lack of diligence in the use of public funds, expenditures that do not meet the community's demand, investments limited to the Basic Component of Pharmaceutical Assistance, and exhaustion of the financing model weakened the basic healthcare system, corroborating the deficit generated by the cuts in SUS funding (Faleiros, Acurcio, Álvares *et. al*, 2017).

A higher rate of medicine use had a consistent positive association with the presence of a partner. This factor appears as an affective influence when seeking treatment and care (Duarte, Gianini, Ferreira *et. al*, 2012). People who reported very good health used more medicines, similar to the results of PNAUM, from 12,725 surveyed people in 2014: the ones with greater access to medicines evaluated their health status as good or very

good (Oliveira, Luiza, Tavares *et. al*, 2016). Another survey conducted in 2017 in Rio Grande do Sul, Brazil, also presented a similar pattern (Cavalcanti, Doring, Portella *et. al*, 2017). People that consume medicines may present higher demand for healthcare services, as to prevent and treat diseases, which reflects in better health status.

In conclusion, we found that the use of medicines is associated with better health status, living with a partner, and usage of healthcare services. Medical prescription was the main indicator of the medicines consumed, thus, actions focused at prescribers may be effectively guide pharmaceutical assistance in the region. Half of the medicines were purchased directly by the user, reflecting economic constraints that may impact on the pharmacological treatment of this population. Moreover, future research should prioritize issues of inequity in access to medicines, as well as the impact of austerity measures on the population of the region.

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