Self-Medication Practices, Use of Brand-Name, and Over-the-Counter Medicines by Peruvian Older Adults

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ABSTRACT

Background

Older adults are a particularly vulnerable group to drug use and self-medication. The aim of the study was to evaluate self-medication as a factor associated with the purchase of brand-name and over-the-counter (OTC) drugs in older adults in Peru.

Methods

A secondary analysis was performed using an analytical cross-sectional design of data from a nationally representative survey from 2014 to 2016. The exposure variable was self-medication, defined as the purchase of medicines without a prescription. The dependent variables were purchases of brand-name and OTC drugs, both as a dichotomous response (yes/no). Information of sociodemographic variables, health insurance, and the types of drugs purchased by the participants was collected. Crude prevalence ratios (PR) were calculated and adjusted using generalized linear models of the Poisson family, considering the complex sample of the survey.

Results

In this study, 1,115 respondents were evaluated, with a mean age of 63.8 years and a male proportion of 48.2%. The prevalence of self-medication was 66.6%, while the proportions of purchases of brand-name and OTC drugs were 62.4% and 23.6%, respectively. The adjusted Poisson regression analysis revealed an association between self-medication and the purchase of brand-name drugs (adjusted PR [aPR]=1.09; 95% confidence interval [CI]: 1.01–1.19). Likewise, self-medication was associated with the purchase of OTC medications (aPR=1.97; 95%CI: 1.55–2.51).

Conclusions

This study evidenced a high prevalence of self-medication in Peruvian older adults. Two-thirds of the surveyed people bought brand-name drugs, whereas one-quarter bought OTC drugs. Self-medication was associated with a greater likelihood of buying brand-name and OTC drugs.

Key words: health of the elderly, aged, pharmacies, self-medication, drugs, generic, nonprescription drugs, Peru

Key points

- Self-medication may be associated with adverse effects.
- We evidenced a high prevalence of self-medication in Peruvian older.
- Two-thirds bought brand-name drugs, while one-quarter bought over-the-counter drugs.
- In Peruvian older, self-medication was associated with a greater likelihood of buying the brand-name and over-the-counter drugs.

INTRODUCTION

Aging is a complex phase that includes loss of function, reduced autonomy, and increased morbidity. For older adults, medication is a crucial instrument for maintaining and recovering health.[1,2] However, this population group is subject to polypharmacy due to dysfunctions in different organs caused by aging. This condition increases the probability of adverse effects, mainly if self-medication potentially affects its functional capacities.[3–5]

Self-medication is defined as the use of medications without a prior medical prescription to treat symptoms and self-perceived or identified diseases by a family member6. Various types of self-medication have been identified as follows: nonprescription drugs, drug refills, drug recommendations to friends and family, the use of leftover drugs from previous prescriptions, or altering the dose of prescription drugs.[6] Self-medication also involves the use of traditional home remedies, nutritional supplements, or the use of over-the-counter (OTC) pharmaceutical products,[6–9] which despite being authorized in most countries, may also be associated with adverse effects.[10,11]

Older adults are a particularly vulnerable group to drug use and self-medication. Pharmacology in older adults experiences changes due to aging, like changes in the distributions of muscle mass, fat, and body water; the alteration of liver and kidney metabolism, which hinders the elimination of metabolites; and accumulation of toxic substances,[12] in addition to the interaction of comorbidities.[13] Therefore, the inappropriate prescription of drugs represents a public health problem, given the association with morbidity and the costs of managing adverse reactions.[5] Several studies have shown that self-medication in older adults is a frequent practice worldwide. However, its frequency and characteristics vary depending on national health systems.[14–16]

In Peru, the drug market is highly concentrated and insufficiently regulated.[17] Likewise, the pharmaceutical industry presents high expenses in promoting and advertising products and encourages self-medication with brand-name drugs through stimuli,[18] representing a problem in a country where access to medicines in health centers is ineffective.[19] As observed in the world,[20,21] self-medication in the general population in Peru is frequent. A study showed that the prevalence of inappropriate self-medication was 51%, and was associated with the male sex, ages >40 years, and not having health insurance.[22] As well as this research, other studies have evaluated self-medication with antibiotics and among pregnant women, even during the pandemic;[23–26] however, self-medication and drug consumption patterns in older adults have not been studied. Considering the demographic transition process in Peru, the proportion of older adults increased from 5.7% in 1950 to 12.7% in 2020,[27] reinforcing the interest to study this phenomenon in this growing vulnerable population. Therefore, the objectives of this study was to report the prevalence of self-medication, describe the practices of using brand-name and OTC drugs, and evaluate self-medication as a factor associated with the purchase of brand-name and OTC drugs in older adults in Peru.

METHODS

Study Design

A secondary analysis of data from the fourth questionnaire survey of the National Health User Satisfaction Survey from 2014 to 2016 (ENSUSALUD) of the National Institute of Statistics and Informatics of Peru (INEI) and National Superintendence of Health of Peru (SUSALUD) was conducted. ENSUSALUD was a nationally representative survey designed to collect information on health service provider institutions (IPRESS) through the information provided by the users and providers of these services. The IPRESS are public, private, or mixed institutions whose objective is the provision of health services. These can be polyclinics, medical centers, doctor's offices, clinical laboratories, etc.

Population, Sample, and Sampling

The study population was composed of people aged ≥15 years who bought some medicine for themselves, their partner, or their child in a pharmacy or drugstore close to IPRESS nationwide. The sampling was conducted in 181 IPRESS by using a probabilistic, stratified, and two-stage selection method.

The primary sampling units, namely the IPRESS of the Ministry of Health and regional governments, the social health insurance system in Peru (EsSalud), the health-care system of the armed forces and police, and the private sector clinics, were randomly selected. The secondary unit was the users of drugstores and pharmacies, who were selected in a non-probabilistic manner for convenience. Twenty-five strata corresponding to the 25 political regions of Peru were established, based on which expansion factors were estimated. However, the inference was limited to the care provided in outpatient medical consultations of IPRESS in the country.

Eligibility Criteria

The fourth questionnaire survey of the ENSUSALUD from 2014 to 2016 included 11,610 surveyed users. However, users who bought medications for their children or partners, those aged <60 years, and those with missing data in some variables of interest were excluded. Thus, the final sample size was 1,115 participants, representing an expanded population of 355,351 people (Figure 1).

Variables

Two outcomes were considered. First, the use of brand-name drugs was defined as the purchase of at least one brand-name drug. Second, the use of OTC drugs was defined as the purchase of at least one OTC drug. Both variables were constructed from information obtained from the Health Registry of Pharmaceutical Products (https://www.digemid.minsa.gob.pe/rsProductosFarmaceuticos/). In Peru, all drugs are authorized by the Ministry of Health. These are marketed according to the name that identifies them, as a brand and generic drugs. Brand-name

drugs use a name assigned by a pharmaceutical company, while generic drugs have the same name as the active ingredient in the drug. On the other hand, the condition of sales, such as controlled sales and OTC medications, refers to the need to have a prescription or not. Likewise, according to the Peruvian legislation, the health professionals capable of issuing a medical prescription are doctors, dentists, and obstetricians. Two authors independently coded these variables, and discrepancies were resolved with a third author.

Self-medication was operationalized, considering the participants who bought drugs without a prescription and those who did not show the prescription at the survey time.[22] The confounding variables, according to the literature, were sex, age, educational level, language (Spanish or Quechua/other), health insurance (yes or no), type of institution (drugstore, pharmacy), and geographic region of residency (Metropolitan Lima, other areas of Coast region, Highlands, and Jungle).

Ethical Aspects

ENSUSALUD is a free open-access database and belonging to the SUSALUD service, which is available at http://portal.susalud.gob.pe/blog/category/base-de-datos/. All potential participants gave their verbal consent to participate in the survey. No identification was recorded on the identity of each participant to guarantee the confidentiality of the information provided by the participants. As Peru has established only regulation for the execution of clinical trials,[28] with a gap for observational studies, international regulations govern these studies. Therefore, as a secondary analysis of open-access data without identifiers and following the international regulations, this study was exempt from review by an ethics committee.

Statistical Analysis

ENSUSALUD data corresponding to 2014, 2015, and 2016 were downloaded in SPSS format (IBM SPSS Statistics, Armonk, NY), exported, and analyzed with STATA v15.0 (TX, StataCorp LP). All sampling patterns were analyzed according to stratum and weighting factor, taking into account the complex sampling design of ENSUSALUD, using the "svy" command.

In the descriptive analysis, the categorical variables were expressed in frequencies and percentages with their respective 95% confidence intervals (CIs). The numerical variables were presented as mean values with their 95% CIs. The chi-square test with Rao-Scott correction for complex sampling was used to determine whether significant differences existed between the independent variables according to the proposed outcomes. The Wald test was used to determine the differences between the numerical variables. Statistical significance was set at a p value < .05.

To determine the association between self-medication and the outcomes of interest, generalized linear models of
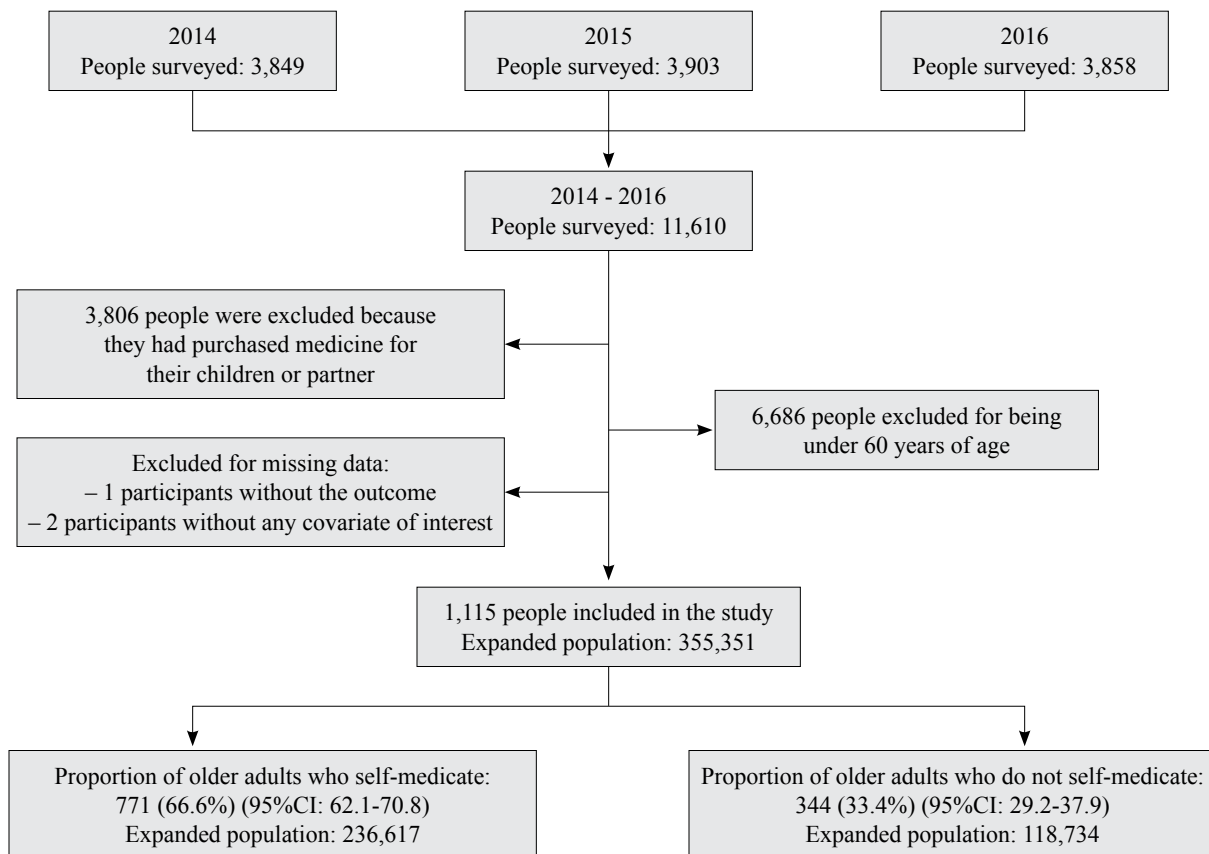

FIGURE 1. Flowchart of the selection of participants included in the analysis, ENSUSALUD 2014–2016

the Poisson family were constructed, reporting prevalence ratios (PR) with their respective 95% CIs. The first model was a crude bivariate regression, while the second model was adjusted for confounding variables according to an epidemiological approach.[22] The variance inflation factors were determined to evaluate collinearity.

RESULTS

The prevalence of self-medication in older adults was 66.6%. The proportions of purchases of brand-name and OTC drugs were 62.4% and 23.6%, respectively. Furthermore, of the participants, 51.8% were women, 33.8% resided in Metropolitan Lima, and 47.3% had higher educational levels. The mean age of the participants was 68.3 years (95%CI: 67.9–68.7). In addition, 76.8% of the participants had health insurance, and 88% bought their medications in pharmacies (Table 1).

Statistically significant differences in self-medication were found between the drug groups. Higher proportions of self-medication were found among the users of gastrointestinal drugs (12.2% vs. 5.8%; $p<.001$) and analgesics/antipyretics/corticosteroids (28.8% vs. 22.1%; $p=.005$). By contrast, the proportions of self-medication with antibiotics (15.1% vs. 19.4%; $p=.039$), for neurological pathologies (4.5% vs. 8.7%; $p=.005$), and with other drugs (13.2% vs. 21.6%; $p<.001$) were lower. In addition, the highest proportion of participants who self-medicated resided in Jungle, while the lowest proportion were those from the Highlands region (Table 2).

The most frequently acquired medications were analgesics/antipyretics/corticosteroids (26.6%), nonsteroidal anti-inflammatory drugs (NSAIDs; 26.1%) and antibiotics (16.6%; Table 3). Some drugs were more likely to be purchased as brand-name rather than generic drugs, such as analgesics/antipyretics/corticosteroids (32.9% vs. 16.1%; $p<.001$), NSAIDs (28.3% vs. 22.5%; $p=.002$), nutritional supplements (10.6% vs. 4.0%; $p<.001$), antihistamines or those for respiratory diseases (10.0% vs. 5.6%; $p=.003$), and other medications (19.9% vs. 9.6%; $p<.001$). By contrast, the drugs that were less likely to be purchased as brand-name drugs were antiparasitics/antivirals/antifungals (2.2% vs. 4.2%; $p=.003$) and those for cardiac pathologies (6.4% vs. 25.9%; $p<.001$; Table 3). Likewise, the drugs that were more likely to be purchased as OTC drugs were analgesics/antipyretics/corticosteroids (35.4% vs. 23.8%; $p<.001$), nutritional supplements (18.2% vs. 5.0%; $p<.001$), gastrointestinal drugs (15% vs. 8.6%; $p<.001$), and antihistamines or those for respiratory diseases (12.3% vs. 7.1%; $p=.011$). By contrast, the probabilities of buying OTC drugs for cardiac pathologies (7.4% vs. 15.7%; $p=.002$), antiparasitics/antivirals/antifungals (1.0% vs. 3.5%; $p=.022$), drugs for metabolic disorders (1.0% vs. 5.3%; $p<.001$), and antibiotics (0.9% vs. 21.4%; $p<.001$) were lower (Table 3).

The proportion of brand-name drug purchases was higher in the participants who resided in Metropolitan Lima (68.7%), but lowest among those from the jungle region (58.7%; $p<.05$). On the other hand, the proportion of purchases of brand-name medicines was lower among those who had health insurance (59.8% vs. 70.7%; $p=.002$). Likewise, the proportion of brand-name medicine purchases among those who self-medicated was higher. However, it only had marginal statistical significance (63.9% vs. 59.2%; $p=.074$; Table 4). In the analysis according to the use of OTC medicines, self-medication was associated with a greater purchase of OTC medicines (28.1% vs. 14.5%; $p<.001$). Similarly, those who

TABLE 1.
General characteristics of the elderly users of drugstores and pharmacies, ENSUSALUD 2014–2016 (n = 1,115; N = 355,351)

Characteristics	Absolute Frequency	Weighted Proportion[a]	
	n	%	95% CI
Self-medication			
No	344	33.4	29.2–37.9
Yes	771	66.6	62.1–70.8
Brand-name Drugs			
No	441	37.6	34.5–40.8
Yes	674	62.7	59.1–65.5
Over-the-counter Drugs			
No	862	76.4	73.2–79.4
Yes	253	23.6	20.6–26.8
Sex			
Female	558	51.8	48.4–55.2
Male	557	48.2	44.8–51.6
Age (yrs)			
Mean (95% CI)	68.3		67.9–68.7
Educational Level			
University education	189	17.6	15.5–20.0
Non-university higher education	106	9.6	8.3–11.1
High school	402	37.0	34.7–39.4
Complete elementary education or lower	418	35.8	33.1–38.4
Health Insurance			
No	229	23.2	20.9–25.6
Yes	886	76.8	74.4–79.1
Language			
Spanish	1053	95.3	94.0–96.3
Quechua/other	62	4.7	3.7–5.9
Type of Institution			
Drugstore	154	12.0	10.1–14.2
Pharmacy	961	88.0	85.8–90.0
Geographic Region of Residency			
Metropolitan Lima	179	33.8	28.6–39.3
Other areas in the coastal region	368	24.0	18.7–30.2
Highlands	159	10.4	8.9–12.1
Jungle	409	31.8	28.4–35.5

[a]Weights and the design effect of the complex survey sampling were included.

TABLE 2.
General characteristics of the elderly users of drugstores and pharmacies according to self-medication[a]

Characteristic	Self-Medication n = 771		No Self-Medication n = 344		p value[b]
	n	%	n	%	
Brand-name Drugs					.074
No	293	36.1	148	40.8	
Yes	478	63.9	196	59.2	
Over-the-counter Drugs					<.001
No	565	71.9	297	85.6	
Yes	206	28.1	47	14.4	
Sex					.060
Female	373	50.4	185	54.5	
Male	398	49.6	159	45.5	
Age (yrs)					.743
Mean (95% CI)	68.3	67.8–68.8	68.4	67.8–69.1	
Educational Level					.924
University education	133	17.7	56	17.5	
Non-university higher education	74	9.6	32	9.6	
High school	278	36.4	124	36.4	
Complete elementary education or lower	286	36.3	132	36.3	
Health Insurance					.571
No	162	23.5	67	22.4	
Yes	609	76.5	277	77.6	
Language					.435
Spanish	726	95.0	327	95.8	
Quechua/other	45	5.0	17	4.2	
Type of Institution					.187
Drugstore	101	11.2	53	13.6	
Pharmacy	670	88.8	291	86.4	
Geographic Region of Residency					<.001
Metropolitan Lima	109	30.9	70	39.5	
Other areas in the coastal region	256	24.3	112	23.4	
Highlands	119	11.9	40	7.4	
Jungle	287	32.9	122	29.7	
Type of Medicine Purchased by the Participants					
Antibiotics					.039
No	645	84.9	270	80.6	
Yes	126	15.1	74	19.4	
NSAIDs					.132
No	548	72.6	262	76.5	
Yes	223	27.4	82	23.5	
Gastrointestinal					<.001
No	675	87.8	316	94.2	
Yes	96	12.2	28	5.8	
Analgesics/antipyretics/corticoids					.005
No	552	71.2	271	77.9	
Yes	219	28.8	73	22.1	
Antihistamines/drugs for respiratory pathologies					.430
No	690	91.3	317	92.5	
Yes	81	8.7	27	7.5	

TABLE 2. Continued

Characteristic	Self-Medication n = 771		No Self-Medication n = 344		p value[b]
	n	%	n	%	
Type of Medicine Purchased by the Participants continued					
Nutritional supplement					.291
No	714	91.4	320	93.0	
Yes	57	8.6	24	7.0	
Drugs for cardiac pathologies					.085
No	678	87.6	287	83.6	
Yes	93	12.4	57	16.4	
Antiparasitic/antiviral/antimycotic					.357
No	750	97.4	328	96.4	
Yes	21	2.6	16	3.6	
Metabolic disorders					.295
No	741	96.1	326	94.9	
Yes	30	3.9	18	5.1	
Neurological pathologies					.005
No	736	95.5	313	91.3	
Yes	35	4.5	31	8.7	
Other					<.001
No	673	86.8	276	78.4	
Yes	98	13.2	68	21.6	

[a]Weights and the design effect of the complex survey sampling were included.
[b]Refers to the statistical significance obtained from the comparison of the proportions between the categories of the variables, considering the complex sampling design of the survey.

bought OTC medicines were older on average (69.7 years vs. 67.9 years; p=.001) and were more likely to have health insurance (25.2% vs. 18.1%; p=.026; Table 4).

The crude analysis did not reveal statistically significant differences between self-medication and the purchase of brand-name drugs (PR=1.08; 95%CI: 0.99–1.18; p=.086). However, in the adjusted analysis, the association became statistically significant (PR=1.09; 95%CI: 1.01–1.19; p=.033). On the other hand, the crude analysis revealed a greater probability of purchasing OTC drugs among the participants who self-medicated than among those who did not self-medicate (PR=1.95; 95%CI: 1.52–2.49; p<.001). In the adjusted analysis, the association remained statistically significant (PR=1.97; 95%CI: 1.55–2.51; p<.001; Table 5).

Additionally, we evaluated the differences between OTC drugs and brand-name drugs. We found that eight out of 10 OTC medications were brand-name (81.50% vs. 18.50%). Only six of 10 controlled sale drugs were brand-name (57.73% vs. 42.27%). These differences were statistically significant.

DISCUSSION

The present findings show that two of three Peruvian older adults self-medicated, two of three bought brand-name drugs, and one of four bought OTC drugs. Self-medication varied according to the type of medication, being more frequent for gastrointestinal medications and analgesics/antipyretics/corticosteroids. Likewise, the purchase of brand-name medications varied according to the type of medication, being more frequent for analgesics/antipyretics/corticosteroids, NSAIDs, nutritional supplements, antihistamines or drugs for respiratory pathologies, and other medications. As well, the most purchased OTC medications were analgesics/antipyretics/corticosteroids, nutritional supplements, gastrointestinal medications, and antihistamines or drugs for respiratory pathologies. Thus, an association was observed between self-medication and the higher probability of buying brand-name and OTC medicines in older adults in Peru.

Self-Medication Prevalence in Older Adults

The frequency of self-medication in older adults has been increasing, as observed in other countries. For example, a study using microdata from the European Survey of Health Interviews (2006–2009) showed that the prevalence of self-medication in older European adults was 26.3%, although with significant variations between countries, reaching 49.4% in Poland but only 7.8% in Spain.[14] Furthermore, a systematic review of studies published up to 2014 found that the prevalence of self-medication in older adults worldwide ranged from 4 to 87%.[15]

On the contrary, the prevalence of self-medication in older adults in the present study was lower than that in a

Table 3.

Types of medicine purchased by the elderly according to the use of brand-name and over-the-counter drugs[a]

Type of Medicine Purchased by Participants	All n = 1,115	Brand-name Drugs n = 674	Generic Drugs n = 441	P value[b]	Over-the-counter Drugs n = 253	Controlled-sale Drugs n = 862	p-value[b]
	n (%)	n (%)	n (%)		n (%)	n (%)	
Antibiotics				.165			<.001
No	915 (83.4)	554 (84.5)	361 (81.7)		251 (99.1)	664 (78.6)	
Yes	200 (16.6)	120 (15.5)	80 (18.3)		2 (0.9)	198 (21.4)	
NSAIDs				.002			.254
No	810 (73.9)	470 (71.7)	340 (77.5)		178 (71.4)	632 (74.7)	
Yes	305 (26.1)	204 (28.3)	101 (22.5)		75 (28.6)	230 (25.3)	
Gastrointestinal				.453			<.001
No	991 (89.9)	596 (89.5)	395 (90.5)		210 (85.0)	781 (91.4)	
Yes	124 (10.1)	78 (10.5)	46 (9.5)		43 (15.0)	81 (8.6)	
Analgesics/antipyretics/corticoids				<.001			<.001
No	823 (73.4)	455 (67.1)	368 (83.9)		157 (64.6)	666 (76.2)	
Yes	292 (26.6)	219 (32.9)	73 (16.1)		96 (35.4)	196 (23.8)	
Antihistamines/drugs for respiratory pathologies				.003			.011
No	1007 (91.7)	594 (90.0)	413 (94.4)		219 (87.7)	788 (92.9)	
Yes	108 (8.3)	80 (10.0)	28 (5.6)		34 (12.3)	74 (7.1)	
Nutritional supplement				<.001			<.001
No	1034 (91.9)	608 (89.4)	426 (96.0)		212 (81.8)	822 (95.0)	
Yes	81 (8.1)	66 (10.6)	15 (4.0)		41 (18.2)	40 (5.0)	
Drugs for cardiac pathologies				<.001			.002
No	965 (86.2)	630 (93.6)	335 (74.1)		234 (92.6)	731 (84.3)	
Yes	150 (13.8)	44 (6.4)	106 (25.9)		19 (7.4)	131 (15.7)	
Antiparasitic/antiviral/antimycotic				.003			<.001
No	1078 (97.1)	655 (97.8)	423 (95.8)		249 (99.0)	829 (96.5)	
Yes	37 (2.9)	19 (2.2)	18 (4.2)		4 (1.0)	33 (3.5)	
Metabolic disorders				.530			.022
No	1067 (95.7)	654 (95.9)	413 (95.3)		250 (99.0)	817 (94.7)	
Yes	48 (4.3)	20 (4.1)	28 (4.7)		3 (1.0)	45 (5.3)	
Neurological pathologies				.596			.446
No	1049 (94.1)	632 (93.8)	417 (94.5)		238 (94.8)	811 (93.8)	
Yes	66 (5.9)	42 (6.2)	24 (5.5)		15 (5.2)	51 (6.2)	
Other				<.001			<.001
No	949 (84.0)	546 (80.1)	403 (90.4)		230 (91.2)	719 (81.8)	
Yes	166 (16.0)	128 (19.9)	38 (9.6)		23 (8.8)	143 (18.2)	

[a]Weights and the design effect of the complex survey sampling were included.
[b]Refers to the statistical significance obtained from the comparison of the proportions between the categories of the variables, considering the complex sampling design of the survey.

Brazilian study which found a prevalence of 80.5% in older adults who attended a referral hospital.[16] These differences may be related to various factors, including the year of evaluation, representativeness of the sample, and definition of self-medication. For example, in the systematic review, the mean prevalence of self-medication was 38%. However, various criteria were used to measure self-medication, where some studies identified periods of up to one year, increasing the probability of self-medication or memory biases in older adults over a longer period.[15] Similarly, the frequency of self-medication may vary depending on the health systems and the probability that they meet the needs of the insured. This study did not monitor older adults, but only assessed self-medication on the basis of whether a medical prescription was presented during the purchase of medicines in drugstores and pharmacies in Peru.

In Peru, although the population covered by health insurance increased from 60.5% to 76.4% between 2008 and 2017,[29] a study that included a national representative sample showed that 30.6% of the population had ineffective access to the medications prescribed by their treating physicians in the pharmacies of the health establishments covered by their medical insurance.[19] In Peru, this may explain the increase in the average out-of-pocket expenditure on drugs from USD 8.14 in 2007 to USD 9.68 in 2016.[30]

Older adults are most affected by ineffective access to medicines, which probably also explains the 56.5% out-of-pocket expenses for health care in 2017.[31] Therefore, the Peruvian government should consider self-medication as a problem considering its adverse effects in older adults[5] and economic effects in this often economically vulnerable population.

The increase in health insurance coverage has not been homogeneous. Universal health insurance represents >40% of the insurance coverage nationwide. This coverage in the

TABLE 4.
General characteristics of elderly users of drugstores and pharmacies according to the use of brand-name and over-the-counter drugs[a]

Characteristic	Brand-name drugs n = 674			Generic drugs n = 441			p value[b]	Over-the-counter drugs n = 253			Controlled-sale drugs n = 862			p value[b]
	n	%	95% CI	n	%	95% CI		n	%	95% CI	n	%	95% CI	
Self-medication							.074							<.001
No	196	59.2	53.8–64.4	148	40.8	35.6–46.2		47	14.5	11.5–18.0	297	85.5	82.0–88.5	
Yes	478	63.9	60.6–67.1	293	36.1	32.9–39.4		206	28.1	24.6–32.0	565	71.9	68.0–75.4	
Sex							.845							.573
Female	328	62.0	56.9–66.9	230	38.0	33.1–43.1		130	24.3	20.3–28.8	428	75.7	71.2–79.7	
Male	346	62.8	57.7–67.6	211	37.2	32.4–42.3		123	22.8	19.1–26.9	434	77.2	73.1–80.9	
Age (yrs)							.878							.001
Mean (95% CI)	68.4		67.9–68.9	68.3		67.5–69.1		69.7		68.9–70.6	67.9		67.4–68.4	
Educational Level							.888							.472
University education	111	61.4	54.2–68.1	78	38.6	31.9–45.8		49	26.7	20.3–34.1	140	73.3	65.9–79.7	
Non-university higher education	62	61.9	51.8–71.1	44	38.1	28.9–48.2		26	26.9	19.3–36.2	80	73.1	63.7–80.7	
High school	236	61.8	57.4–65.9	166	38.2	34.1–42.6		79	21.8	17.3–27.1	323	78.2	72.9–82.7	
Complete elementary education or lower	265	63.6	59.8–67.2	153	36.4	32.8–40.2		99	23.0	19.2–27.1	319	77.0	72.9–80.7	
Health Insurance							.002							.026
No	156	70.7	65.3–75.6	73	29.3	24.4–34.7		41	18.1	13.4–23.9	188	81.9	76.1–86.6	
Yes	518	59.8	55.9–63.6	368	40.2	36.4–44.1		212	25.2	21.9–28.8	674	74.8	71.1–78.1	
Language							.969							.339
Spanish	638	62.4	59.0–65.6	415	37.6	34.4–41.0		238	23.3	20.3–26.6	815	76.7	73.4–79.7	
Quechua/other	36	62.5	54.2–70.2	26	37.5	29.8–45.8		15	29.0	18.3–42.8	47	71.0	57.2–81.7	
Type of Institution							.608							.754
Drugstore	92	63.8	57.6–69.5	62	36.2	30.5–42.3		35	24.7	18.2–32.7	119	75.3	67.3–81.8	
Pharmacy	582	62.2	58.8–65.4	379	37.8	34.6–41.2		218	23.4	20.1–27.1	743	76.6	72.9–79.9	
Geographic Region of Residency							.017							.151
Metropolitan Lima	123	68.7	61.6–75.0	56	31.3	25.0–38.4		42	23.5	17.3–30.9	137	76.5	69.0–82.7	
Other areas in the coastal region	218	59.5	55.7–63.2	150	40.5	36.8–44.3		77	23.4	19.6–27.7	291	76.6	72.3–80.4	
Highlands	90	59.5	54.9–63.9	69	40.5	36.1–45.1		31	15.9	11.3–21.9	128	84.1	78.1–88.7	
Jungle	243	58.7	54.6–62.7	166	41.3	37.3–45.4		103	26.3	22.8–30.1	306	73.7	69.9–77.2	

[a]Weights and the design effect of the complex survey sampling were included.
[b]Refers to the statistical significance obtained from the comparison of the proportions between the categories of the variables, considering the complex sampling design of the survey.

TABLE 5.
Crude prevalence ratio and adjustment for the use of brand-name and over-the-counter drugs
according to self-medication in older adults

Variable		Crude Model[a]		Adjusted Model[a,b]	
		PR (95% CI)	p value	PR (95% CI)	p value
Brand-name Drugs					
Self-medication	No	Ref.	---	Ref.	---
	Yes	1.08 (0.99–1.18)	.086	1.09 (1.01–1.19)	.033
Over-the-counter Drugs					
Self-medication	No	Ref.	---	Ref.	---
	Yes	1.95 (1.52–2.49)	<.001	1.97 (1.55–2.51)	<.001

[a]A generalized linear model of the Poisson family was used with link log, considering the effect of the design and weights of the complex sampling design of the survey.
[b]Adjusted for age, sex, educational level, language, health insurance, geographic region of residence, and type of institution.

Jungle region has not changed significantly from 2009 to 2017.[29] In addition, the region is more likely to have ineffective access to medicines.[19] This antecedent could explain the present finding in this region that showed a higher probability of self-medication. Similarly, people from this region have problems accessing intercultural health services, despite the advances made to address this issue in the country,[32] limiting the access of Quechua-speaking patients even though they have health insurance.

Though with some similarities, the type of drugs also varies between countries. In Brazil, the most widely used drugs for self-medication were centrally acting muscle relaxants, analgesics and antipyretic agents, NSAIDs, and antirheumatic drugs.[14] In the systematic review that included studies from various countries, including Latin American and Caribbean countries such as Brazil and Mexico, it was found that the most frequent medications were analgesics and antipyretics, followed by anti-inflammatory drugs, cardiovascular agents, dietary supplements, and alternative medicine components.[15] These differences may be related to differences in the burden of diseases in the countries and to the sensitivity, severity, perceived barriers, and patient educational levels, as suggested by some authors.[33] Similarly, the type of drug varies depending on other aspects not evaluated in this research, such as depression, functional dependence, recent hospitalization, activity restriction, and physical inactivity.[15]

Purchase of Generic and Brand-Name Drugs

The findings from this study indicate that although older adults with health insurance buy brand-name drugs, this may be related to the perception of the efficacy of these drugs in the study population. A nationwide study in Peruvian hospitals showed that 46.7% of the participants agreed that generic drugs are less effective than brand-name drugs, and 49.3% have recommended using generic drugs to other people.[34] Even people with the lowest income in Metropolitan Lima hold this perception. A study of the acceptance of generic drugs by users from the low-income sectors of Metropolitan Lima showed that, despite the high consumption of generic drugs, this acceptance was linked more to economic capacity than to trust toward this type of medication, as there are doubts about its safety and efficacy.[35]

These results are a cause for concern when the public market for medicines represents 71% of the national market and where increasing access to generic medicines has been proposed as a strategy to improve access to medicines in Peru.[36] However, in spite of the possible mistrust, the annual evolution of generic prescription drug sales has demonstrated a progressive increase globally since 2010, and the strategies for their acceptance have been successful.[37]

The prices of drugs vary according to the type of pathology, and this variation could explain the more frequent use of generics for cardiovascular diseases in this study. For example, in 2019, the brand-name box of Enalapril 10 mg with 30 tablets cost USD 2.9, while the prices of the same box of generics with an international nonproprietary name ranged from USD 0.7 to 2.[38]

Purchase of OTC Medications

Self-medication is not always considered as a negative behavior when practiced using OTC drugs. Therefore, it can signify a sign of self-care that emphasizes the role of each individual in their health care.[7] However, the list of supply OTC drugs varies by country, and the patterns of their use may depend on national health insurance systems and regulations. For example, in the UK and many other European countries, OTC drugs are only available in pharmacies where they are dispensed at the pharmacist's discretion and only in small amounts. The list of OTC medications is established by the General Directorate of Medicines, Supplies, and Drugs, which also supervises the compliance with their supply.[39]

In this study, a quarter of older adults self-medicated with OTC. On the contrary, a Brazilian study showed that 52.6% of older adults self-medicated.[16] The most widely used OTC medications were analgesics/antipyretics/corticosteroids, nutritional supplements, gastrointestinal medications, and antihistamines or drugs for respiratory pathologies. OTC medications are usually considered to have fewer adverse

effects than prescription medication drugs. However, recent studies have warned about the risks associated with their use. In France, a study investigated the main adverse drug reactions by using data from a pharmacovigilance database and found that they were mainly caused by NSAIDs, analgesics, and benzodiazepines.[40] A multicenter study that covered an area of hospital influence found that NSAIDs mainly caused adverse reactions in adults who self-medicated with OTC medications, and most adverse drug reactions occurred in women aged 70 to 79 years and men aged 60 to 69 years during the period from 2000 to 2008.[41] Moreover, pharmacists documented problems related to medications, of which the most common were those reported with the use of NSAIDs and analgesics.[42]

On the other hand, a 2015 study found that in the United States, around half of all adults had used at least one dietary supplement in the past month.[43] This translates into a lucrative industry, with an estimated 40 billion USD for this country alone,[44] even though vitamin supplements have shown no clinical benefits in the general population.[45] A study in 63 emergency departments in the United States found that 2,154 hospitalizations between 2004 and 2013 were due to adverse effects of nutritional supplements.[43] Among older adults, pill-induced asphyxia or dysphagia accounted for 37.6% of all emergency visits for adverse events related to nutritional supplements. The use of micronutrients was involved in 83.1% of these visits.[43]

The potential risk from self-medication to which older adults are exposed is evident. Thus, interventions and public policies must be developed to integrate the commitments of those involved, the health insurance system, and pharmacies. Thus, this study highlights one of the potential interventions that have been developed to reduce the frequency of harmful self-medication in older adults. Integrated care for older people (iCOPE) is a proposal for care adapted to older adults at different levels of care.[46] In addition, the iCOPE nursing manual proposes educational interventions such as self-care practices, self-medication, and promotion of continence and health examinations.[47] Therefore, the involvement of older adults in their medical care could substantially reduce various health complications related to self-medication.

Implications for Public Health

In Peru, health insurance coverage increased among patients over 65 at 21.2%, from 2009 to 2017, with the consequent increase in the probability of seeking medical care.[29] Despite the improvement in health coverage, monetary poverty in this population still limits access to health services, which, together with distrust,[48] promotes self-medication.[49,50] Additionally, problems in the supply of medicines in health facilities are a problem that affects all Peruvians,[51] even more than older adults, whose average pocket expenditure for 2017 was more than USD 180, and even more for those who suffer from chronic diseases.[31] These problems, together with distrust in generic drugs, require policies that improve drug supply in health facilities in the country and improve trust in generic drugs.[34] Some strategies for the first point have been suggested that include the programming and acquisition of strategic drugs in the Pan American Health Organization (PAHO) according to the prioritized population.[36] Likewise, strategies for financing according to programming, and coordination with regional governments and health institutions to ensure distribution and application throughout the sector. [36] Finally, strengthen execution monitoring mechanisms throughout the sector.[36] Regarding improving confidence in generic drugs, PAHO proposes to develop a comprehensive strategy that includes appropriate regulation; promotion of the marketing of generic drug lists of essential drugs, and promotion of extended use of the international common denomination.[52] Additionally, PAHO suggests guaranteeing the quality of all medicines marketed; establishment of economic incentives for the supply and demand of generic drugs; development of mechanisms of acceptance of generic medicines between health professionals and society; and the promotion of prescription by generic name and responsible substitution in pharmacies.[52]

Our results showed that the majority of OTC drugs were brand-name. Therefore, strategies must also be directed towards the regulation and availability of more OTC and non-OTC medicines that are generic medicines in order to reduce out-of-pocket costs when there is no access to health insurance.

This study has limitations. First, as a secondary analysis, questions pre-established in the survey were used for the study variables. However, these questions have been elaborated by experts from the National Institute of Statistics and Informatics of Peru. Likewise, the formulation of the ENSUSALUD questions required a period of validation and adaptation to the Peruvian population. Second, as a cross-sectional study, the evaluation of the association between self-medication and the proposed outcomes is not necessarily causal. However, the study design allowed assessment of this association with adjustment for potential confounding factors, following an epidemiological model. Third, selection bias might have resulted from the inclusion of patients who went to pharmacies, even though selecting the first sampling unit was probabilistic. Finally, some variables, such as family members at home, comorbidities, and cognitive impairment, could be addressed in future research to better understand self-medication and the purchase of brand-name and OTC drugs.

CONCLUSION

Self-medication was present in two-thirds of the Peruvian older adults in this study. A quarter of them bought OTC drugs, and two-thirds bought brand-name drugs. Self-medication with gastrointestinal medications and analgesics/antipyretics/corticosteroids was more frequent. Analgesics/antipyretics/corticosteroids, NSAIDs, nutritional supplements, antihistamines/respiratory pathologies, and other medications were the most purchased brand-name medications. At the same time, the most purchased OTC drugs were analgesics/antipyretics/corticosteroids, nutritional supplements, gastrointestinal

medications, and antihistamines or drugs for respiratory pathologies. Thus, self-medication with brand-name and OTC drugs was more likely in the older adults in Peru.

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CONFLICT OF INTEREST DISCLOSURES

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