EFFECTS OF THE EXPANSION OF DOCTORS' OFFICES ADJACENT TO PRIVATE PHARMACIES IN MEXICO: ANALYSIS OF A NATIONAL SURVEY

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2013-004669
Article Type:	Research
Date Submitted by the Author:	12-Dec-2013
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Primary Subject Heading:	Health services research
Secondary Subject Heading:	Health policy
Keywords:	Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Organisation of health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PRIMARY CARE

EFFECTS OF THE EXPANSION OF DOCTORS' OFFICES ADJACENT TO PRIVATE PHARMACIES IN MEXICO: ANALYSIS OF A NATIONAL SURVEY

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Running title: Doctors' offices adjacent to private pharmacies in Mexico

Keywords: *Community pharmacy, Physician prescribing patterns, Conflict of interest, Health expenditures, Mexico.*

Word count: 3, 826

ABSTRACT

Background: In Mexico, despite high health insurance coverage by public institutions, a high percentage of self-medication remains and most medicines are being paid for out-of-pocket. In 2010, the Mexican government enacted a policy for antibiotic sales with prescription only. As a consequence, the number of doctors' offices adjacent to private pharmacies (DAPPs) skyrocketed.

Objectives: To understand this phenomenon, we compared the sociodemographic characteristics, reasons for attending these services, perception of quality, and associated out-of-pocket expenditures of DAPPs users with users of Social Security (SS), Ministry of Health (MoH), private doctor's offices independent from pharmacies, and non-users.

Design: A secondary data analysis of the 2012 National Survey of Health and Nutrition was conducted.

Participants: The study population was comprised of 25,852 individuals identified as having had a health problem in the 15 days before the survey, and a random sample of 12,799 ambulatory health services users.

Outcome measures: The outcomes were sociodemographic characteristics, reasons for attending healthcare services, perception of quality, and associated out-of-pocket expenditures.

Results: The distribution of users was as follows: DAPPs (9.2%), SS (16.1%), MoH (20.9%), private providers (15.4%) and 38.5% nonusers; 65% of DAPPs users were affiliated with a public institution (MoH 35%, SS 30%) and 35% reported not having health coverage. DAPPs services were considered

inexpensive, convenient, and with a short waiting time. DAPPs users received ≥3 medications more often (67%) than users of private doctors (56%) and public institutions (SS 54%; MoH 45%). DAPPs users spent more money on medicines than users of public services.

Conclusions: DAPPs have a negative impact on the financial protection policies due to out-of-pocket spending. The high number of medicines prescribed raises questions in regard to the quality of care of DAPPs, which may arise from the conflict of interest implicit in the linkage of prescribing and dispensing processes.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- This study is the first that uses nationally representative household data to analyse the characteristics of users of doctors' offices adjacent to private pharmacies (DAPPs), their reasons to attend, perception of quality, and associated out-of-pocket expenditures, and runs a comparative analysis with users of other healthcare services.
- This study identified that users of DAPPS: paid out-of-pocket for medical visits and medications, therefore counteracting financial protection policies, and received, on average, higher number of medicines prescribed than users of other healthcare institutions, thus signalling poorer quality of care; For DAPPs medical doctors this situation reflects a conflict of interest given that they work for the pharmacies.
- The main limitation is that this study is a secondary data analysis, thus with the available information it was not possible to evaluate in-depth the quality of care.

BACKGROUND

In the past decade in Mexico, recognition of inequity in health, disparities in access and utilization of health services, and differences in resource allocation and health expenditures fuelled the implementation of the System for Social Protection of Health (SSPH). The SSPH aims at achieving universal healthcare coverage and financial protection for the population without Social Security. However, in 2010—8 years after its inception—the Mexican total health expenditure accounted for only 6.2% of the gross domestic product [1] from which more than half (51.7%) is financed through out-of-pocket expenditures. Among OECD countries, Mexico's income inequality is the highest. [2]

The complexity of the Mexican healthcare system challenges the success of health policies because the healthcare sector comprises segmented public and private healthcare systems with little interaction. The public sector covers an estimated 78.6% of Mexico's population (~112 million). All formal labour market and government employees receive healthcare from the Social Security institutions (SS), whereas most of the population without social security receives healthcare from the Ministry of Health (MoH), which comprises each of the 32 decentralized MoH facilities in every Mexican state. The private sector provides care for the uninsured population and for up to 31% of those insured who choose to use this system for ambulatory care.

Reaching universal coverage is expected to improve access and protect the population from the financial burden of healthcare. To accomplish these endeavours, the SSPH, which is a non-contributory social health insurance

program, includes access to ambulatory and hospital healthcare in public institutions and provision of no-cost prescribed medications at the point of care. This represents actual financial protection, particularly for low-income groups. [3] SSPH was launched in 2002. By 2011, the program reached 52.6 million affiliates and the benefit package increased from 91 to 284 interventions. This package covers the treatment of ~95% of the causes of visits in primary care clinics and admissions to general hospitals [4]. During the same period, the proportion of patients reporting complete provision of medications at the MoH facilities increased from 55% to 62%, whereas in the SS the increase was from 70% to 87%.[4]

Despite the progress, Mexican policies on access to healthcare and, in particular, to medications still stand at a crossroad and deserve careful analysis. The availability of medicines is a key determinant of access to and utilization of health services. In Mexico, most medications are being paid for with private resources (mostly out-of-pocket) despite the important public investment in healthcare. A recent report has emphasized that for every Mx$100 spent on medications, Mx$79 is being paid with private resources and only Mx$21 with public funds. [5] Furthermore, in 2010 the Mexican authorities enacted a prescription-only requirement policy to enforce the regulation to sell antibiotics only with a medical prescription. This policy, aimed at mitigating self-medication, had the unintended consequence of boosting private ambulatory healthcare in the form of doctor's offices adjacent to private pharmacies (DAPPs). [6]

Indeed, since a decade ago, a small number of DAPPs began to operate in some low-cost pharmacy chains but soon after the publication of the antibiotics' policy, a growing number of DAPPs have been observed nationwide. This emergent

phenomenon questions the success of current health policies focused on universal coverage for healthcare and signals the unbalance of the supply and demand for ambulatory healthcare and medicines in the public sector. Furthermore, DAPPs challenges current regulations and norms for doctors' offices and private pharmacies.

The policies to improve access to medicines and safe prescriptions face multiple challenges such as the conflict of interest and may have unanticipated results. Until recently, in Japan and United States, [7] Korea [8] and China [9, 10] among other countries, [11] medical doctors and pharmacists were allowed to prescribe and dispense medicines. Such practices contributed to high medicine utilization; almost 50% of the revenues of medical doctors and pharmacists came from pharmaceuticals. [9] Due to the financial incentive, more medicines were dispensed and their selection was influenced by factors other than their quality or cost-effectiveness. The recognition of this problem encouraged the introduction of reforms aimed at separating medicine prescribing and dispensing. In some countries this strategy decreased the irrational use of medicines [12] although in other countries it provoked the practice that health providers hired onsite pharmacists. [13] Because the provider paid a salary to the pharmacists, the provider's incentives and irrational prescription patterns remained unchanged.

In Mexico, expansion of DAPPs indicates that prescribing and dispensing of medicines are strongly related instead of being separated as the international experience suggests. To better understand this situation, the objectives of this study were to compare DAPPs users with users of other services in terms of their

characteristics, reasons for attending specific services, perception of quality, and associated out-of-pocket expenditures.

METHODS

Data source

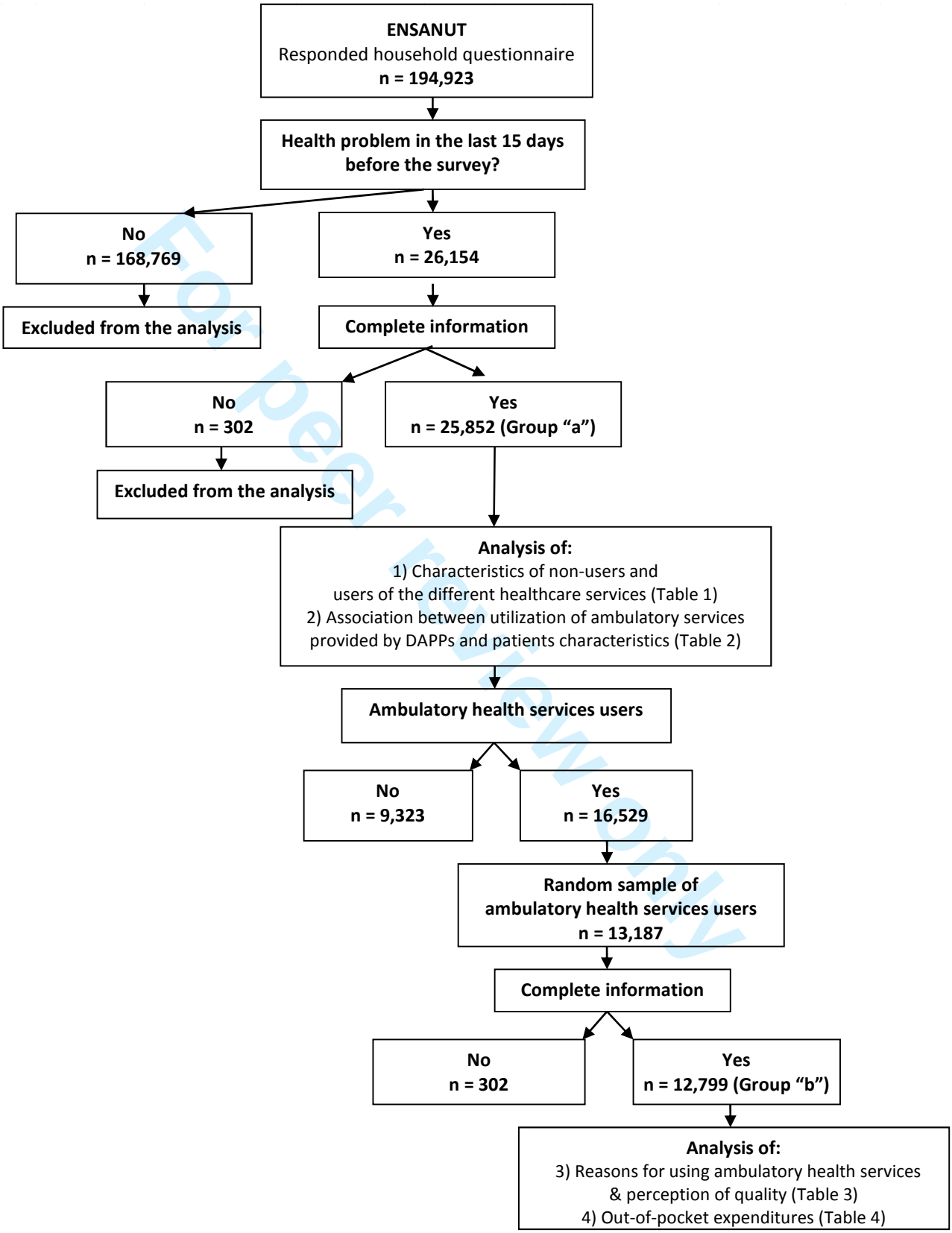
This study is a secondary data analysis of the 2012 National Survey of Health and Nutrition (ENSANUT 2012). [14] ENSANUT is a complex survey, which is representative at the national, state and urban-rural stratum levels. It was designed to collect data on different health and nutrition conditions and the utilization of ambulatory and hospital care services. ENSANUT 2012 was applied to 194,923 individuals in 50,528 households (response rate of 87%). It was sampled through a probabilistic multistage process. The specific details on the sampling approach of ENSANUT 2012 are published elsewhere. [14]

To collect the information for the ENSANUT survey, previously trained interviewers carried out direct, structured face-to-face interviews with key household informants and health services users. The interviewers used the questionnaires that were applied in ENSANUT 2000 and 2006: household, health services use, children, adolescents and adults.

Study population, variables and statistical analysis

The present study analysed the information from the household and health services use questionnaires of ENSANUT 2012. Figure 1 depicts selection of the study population.

Figure 1. Selection of study population



Two groups integrated the study population: a) individuals identified as having had a health problem within 15 days before the survey according to the household questionnaire and b) a random sample of ambulatory health services users who answered the health services questionnaire. The number of individuals who had a health problem was obtained as follows: from the total number of survey participants (194,923 individuals), 26,154 (13.4%) reported having a health problem; after excluding the questionnaires with incomplete information, the final sample was 25,852 individuals. Thus, the non-response rate was 1.2%. Following the same logic, 13,187 health services users were chosen; 12,799 had complete information and 388 (2.9%) did not.

In group "a" we identified five categories of users of healthcare services: 1) doctors' offices adjacent to private pharmacies (DAPPs), 2) SS facilities, 3) MoH facilities, 4) offices of private doctors independent from pharmacies, and 5) non-users or those who reported consulting with a friend, neighbour, family member, homeopaths or other healers.

Data analysis was performed in two stages. In the first stage, the sample "a" served to describe the sociodemographic characteristics and identify the factors associated with the use of DAPPs in comparison to the use of other health services or no use. The analysis included the variables that the literature suggests as related to the use of health services: [15-17] sex (male or female), age group (0-9 years, 10-19 years, 20-64 years and ≥65 years), and years of schooling (0, 1-6, 7-9, and ≥10). The variable of years of schooling was obtained directly from the interview data for subjects 15 years of age and older, and for individuals younger than 15 years the mean of years of schooling of the household members was

used. Other analysed variables were place of residence (rural, urban or metropolitan), ethnicity of the head of household, [18] degree of marginalization (very low/low, middle, high/very high that was based on family reported income), [19] type of medical insurance (SS, SSPH, private or none) and socioeconomic status (SES). The SES was determined classifying the population in quintiles; the information to ascertain the SES included possession of different assets, services and characteristics of the household infrastructure. [20, 21] The SES index was constructed using a principal components analysis with polychoric correlation matrices. Additionally, type of health problem (acute, chronic or other) and perception of severity (mild or moderate/severe) of health problem were analysed.

The factors associated with the use of a specific healthcare provider were modelled using a multinomial logistic regression [22] in which the dependent variable included the five categories of health services users. The non-users, which represented 38.5% of the sample, were used as the reference category. In addition to the sociodemographic characteristics, the model was adjusted for the geographic region of state of residence (Northwest, Northeast, Central-North, East, West, Central-South, Southwest, Southeast). The results were reported in odds ratios (OR). The hypothesis tests on the OR estimated were performed at 1, 5 and 10% confidence levels. We report various statistical goodness of fit and reliability of the estimated models [Akaike criteria (AIC), log-likelihood, LR-χ^2, and R^2-McFadden].

The second stage of the analysis focused on sample "b" of health services users. Participants in this part of the survey were asked about the characteristics of the healthcare received and their perceptions of the quality of care. The descriptive analysis comprised the main reasons for using specific healthcare services, the percentage of users who received information about their diagnosis, number of prescribed medicines (0, 1, 2, or 3 or more), percentage of users who received and understood the information about prescribed medicines, perception regarding the quality of care received, willingness to return to the same healthcare institution in the future, and reasons for dissatisfaction with health care (e.g., lack of improvement in health, high costs, remote services, long waiting time). We also analysed out-of-pocket expenditures for transportation from home to healthcare facilities, healthcare visits and medicines. The amount was reported in local currency (Mexican pesos). To estimate the median and interquartile range (IQR) of waiting time and out-of-pocket expenditures by type of health care provider, the quantile regression model at the population level was utilized. All statistical analyses were performed using the statistical package STATA 12.1.

RESULTS

Table 1 summarizes the characteristics of users of different healthcare services. Overall, 61.5% of participants who were reported to have had a health problem seek care with a health provider according to the following distribution: MoH (20.9%), SS (16.1%), private providers (15.4%) and DAPPs (9.2%).

Table 1. Characteristics of users and non-users of the different healthcare services, Mexico 2012*

	National	DAPPs	Social Security	Ministry of Health	Private doctors	Non-users	*p-value corrected by survey design effect*
Observations							
Sample	194,923	2,387	4,148	5,390	3,976	9,951	
%	100	9.2	16.1	20.9	15.4	38.5	
Weighted	115,170,278	1,715,838	2,775,195	2,709,387	2,884,34	5,967,254	
%	100	10.7	17.3	16.9	18.0	37.2	
	Estimation [95% CI]						
Sex							
Female	0.51 [0.51,0.51]	0.55 [0.53,0.58]	0.59 [0.57,0.61]	0.60 [0.58,0.61]	0.55 [0.53,0.57]	0.54 [0.52,0.55]	0.000
Male	0.49 [0.49,0.49]	0.45 [0.42,0.48]	0.41 [0.39,0.43]	0.40 [0.39,0.42]	0.45 [0.43,0.47]	0.46 [0.45,0.48]	
Years of age							
0-9	0.19 [0.19,0.20]	0.35 [0.32,0.38]	0.18 [0.17,0.20]	0.29 [0.27,0.31]	0.31 [0.29,0.33]	0.20 [0.19,0.21]	0.000
10-19	0.20 [0.20,0.20]	0.16 [0.15,0.19]	0.09 [0.08,0.11]	0.14 [0.12,0.15]	0.12 [0.11,0.13]	0.16 [0.16,0.17]	
20-64	0.55 [0.54,0.55]	0.44 [0.41,0.47]	0.56 [0.54,0.59]	0.47 [0.45,0.49]	0.48 [0.46,0.50]	0.56 [0.55,0.57]	
≥65	0.06 [0.06,0.06]	0.05 [0.04,0.06]	0.16 [0.14,0.18]	0.10 [0.09,0.12]	0.10 [0.08,0.11]	0.08 [0.07,0.09]	
Years of schooling							
0	0.12 [0.11,0.12]	0.13 [0.11,0.15]	0.12 [0.11,0.14]	0.20 [0.18,0.21]	0.14 [0.13,0.16]	0.14 [0.13,0.15]	0.000
1-6	0.35 [0.34,0.35]	0.39 [0.36,0.43]	0.35 [0.33,0.37]	0.42 [0.40,0.45]	0.33 [0.31,0.36]	0.36 [0.35,0.38]	
7-9	0.26 [0.25,0.26]	0.24 [0.22,0.27]	0.22 [0.20,0.24]	0.23 [0.21,0.25]	0.18 [0.16,0.20]	0.25 [0.23,0.26]	
≥10	0.17 [0.17,0.18]	0.16 [0.14,0.19]	0.19 [0.17,0.21]	0.11 [0.10,0.13]	0.18 [0.16,0.20]	0.25 [0.23,0.27]	
Place of residence							
Rural	0.23 [0.22,0.23]	0.11 [0.09,0.13]	0.09 [0.08,0.11]	0.39 [0.36,0.42]	0.18 [0.16,0.20]	0.24 [0.22,0.26]	0.000
Urban or metropolitan	0.77 [0.77,0.78]	0.89 [0.87,0.91]	0.91 [0.89,0.92]	0.61 [0.58,0.64]	0.82 [0.80,0.84]	0.76 [0.74,0.78]	
Locality deprivation level							
Very low/low	0.67 [0.65,0.69]	0.81 [0.78,0.84]	0.86 [0.84,0.88]	0.50 [0.47,0.53]	0.73 [0.70,0.75]	0.65 [0.63,0.68]	0.000
Middle	0.11 [0.10,0.13]	0.10 [0.08,0.12]	0.08 [0.06,0.10]	0.14 [0.12,0.16]	0.11 [0.09,0.14]	0.12 [0.10,0.14]	
High/very high	0.22 [0.21,0.24]	0.09 [0.07,0.11]	0.06 [0.05,0.08]	0.36 [0.33,0.39]	0.16 [0.14,0.18]	0.23 [0.21,0.26]	
Ethnicity: Indigenous	0.10 [0.09,0.11]	0.03 [0.02,0.04]	0.04 [0.03,0.05]	0.12 [0.10,0.14]	0.06 [0.05,0.08]	0.09 [0.07,0.10]	0.000
Quintile of socioeconomic status							
1st	0.15 [0.14,0.16]	0.08 [0.06,0.11]	0.04 [0.03,0.05]	0.25 [0.22,0.27]	0.08 [0.07,0.09]	0.17 [0.15,0.18]	0.000
2nd	0.17 [0.16,0.17]	0.19 [0.16,0.21]	0.11 [0.10,0.12]	0.26 [0.24,0.28]	0.12 [0.10,0.13]	0.21 [0.19,0.23]	
3rd	0.19 [0.18,0.20]	0.22 [0.19,0.26]	0.19 [0.18,0.21]	0.20 [0.18,0.22]	0.16 [0.14,0.17]	0.20 [0.19,0.22]	
4th	0.22 [0.21,0.23]	0.26 [0.23,0.30]	0.26 [0.23,0.28]	0.17 [0.15,0.19]	0.25 [0.22,0.27]	0.19 [0.18,0.21]	
5th	0.27 [0.26,0.28]	0.24 [0.21,0.28]	0.40 [0.37,0.43]	0.12 [0.11,0.14]	0.40 [0.37,0.43]	0.23 [0.21,0.25]	
Medical Insurance (MI)							
Social Security	0.37 [0.37,0.38]	0.30 [0.27,0.33]	0.94 [0.93,0.95]	0.07 [0.06,0.08]	0.39 [0.37,0.42]	0.31 [0.30,0.33]	0.000
SSPH	0.37 [0.36,0.38]	0.35 [0.32,0.39]	0.03 [0.02,0.04]	0.81 [0.79,0.83]	0.26 [0.24,0.28]	0.41 [0.40,0.43]	
Private insurance	0.00 [0.00,0.01]	0.00 [0.00,0.00]	0.00 [0.00,0.00]	----	0.02 [0.01,0.03]	0.003 [0.001,0.005]	
No MI	0.25 [0.25,0.26]	0.35 [0.32,0.39]	0.03 [0.02,0.03]	0.12 [0.11,0.14]	0.33 [0.31,0.36]	0.27 [0.26,0.28]	
Type of health problem							
Acute health problems	0.73 [0.72,0.74]	0.80 [0.78,0.83]	0.59 [0.56,0.61]	0.66 [0.64,0.68]	0.71 [0.69,0.73]	0.81 [0.80,0.82]	0.000
Chronic health problems	0.18 [0.17,0.19]	0.14 [0.12,0.16]	0.30 [0.28,0.32]	0.24 [0.23,0.26]	0.20 [0.18,0.22]	0.10 [0.09,0.11]	
Other health problems	0.09 [0.09,0.10]	0.06 [0.04,0.07]	0.12 [0.10,0.13]	0.10 [0.09,0.11]	0.09 [0.08,0.10]	0.09 [0.08,0.10]	
Perception of severity of health problem							
Mild	0.48 [0.47,0.49]	0.44 [0.41,0.47]	0.37 [0.35,0.39]	0.40 [0.38,0.42]	0.36 [0.34,0.38]	0.64 [0.62,0.65]	0.000
Moderate/severe	0.52 [0.51,0.53]	0.56 [0.53,0.59]	0.63 [0.61,0.65]	0.60 [0.58,0.62]	0.64 [0.62,0.66]	0.36 [0.35,0.38]	

Difference estimates performed considering the effect of the survey design.

When the sample was stratified by insurance coverage, the results showed that a significant percentage of users with SS or SSPH insurance attended private services or DAPPs. Among DAPPs users, 30% and 35% reported as having SS or SSPH coverage, respectively. Similarly, among private physician users, 39% had SS and 29% had SSPH coverage.

DAPPs users were economically better off than those who went to MoH facilities. In comparison to the users of other health services and non-users, DAPPs users were younger (51% were between 0 and 19 years old), with higher educational level than MoH users and lower educational level than SS users. Most DAPPs users (89%) lived in urban and metropolitan areas with a low level of deprivation, whereas only 61% of MoH users lived in these areas and 50% had low level of deprivation. 3% of DAPPs users were indigenous vs. 12% of indigenous users receiving care from the MoH. DAPPs users were equally distributed among the different socioeconomic levels. This is in contrast with MoH users who were concentrated according to the poorest quintiles, whereas SS and private services users were in the richest quintiles. Furthermore, acute health problems encouraged more frequent attendance to DAPPs (80%) in comparison with other groups. The users sought healthcare in the institutions in which they were affiliated if they perceived that the problem was moderate to severe.

Table 2 shows the multinomial model that confirms that users of DAPPs were younger, mostly from urban and metropolitan areas and presented an acute condition. Furthermore, those with SSPH insurance were more likely to visit DAPPs than private clinics.

Table 2. Multinomial model of the association between utilization of services provided by DAPPs and patient characteristics, Mexico 2012

	Reference category: Non- users Odds ratios (95% CI) reported			
	DAPPs	**Social Security**	**Ministry of Health**	**Private doctors**
Sex (Ref.: female)				
Male	0.863**	0.872**	0.798**	0.920*
	[0.786,0.947]	[0.798,0.952]	[0.742,0.859]	[0.850,0.996]
Years of age (Ref.: ≥65)				
≤9	3.739**	1.320**	2.061**	2.264**
	[2.986,4.683]	[1.114,1.562]	[1.771,2.398]	[1.932,2.654]
10-19	1.761**	0.623**	1.104	0.676**
	[1.388,2.235]	[0.514,0.754]	[0.939,1.298]	[0.566,0.808]
20-64	1.249*	0.769**	0.880+	0.653**
	[1.008,1.547]	[0.665,0.890]	[0.770,1.006]	[0.566,0.753]
Years of schooling (Ref.: 0 years)				
1-6	1.236+	1.067	1.051	0.917
	[0.981,1.558]	[0.887,1.282]	[0.921,1.200]	[0.780,1.078]
7-9	1.334*	1.069	1.050	1.264**
	[1.046,1.702]	[0.875,1.307]	[0.904,1.221]	[1.059,1.509]
≥10	1.309*	1.054	1.057	1.581**
	[1.017,1.685]	[0.860,1.291]	[0.891,1.253]	[1.316,1.898]
Place of residence (Ref.: urban or metropolitan)				
Rural	0.637**	0.838*	1.358**	1.025
	[0.552,0.736]	[0.732,0.959]	[1.234,1.494]	[0.918,1.145]
Locality deprivation level (Ref.: low, very low level)				
Middle	0.818**	1.084	1.051	1.421**
	[0.703,0.952]	[0.936,1.256]	[0.936,1.180]	[1.254,1.611]
High, very high	0.551**	0.858+	0.978	1.278**
	[0.464,0.655]	[0.720,1.022]	[0.869,1.102]	[1.116,1.464]
Ethnicity (Ref.:non-indigenous)				
Indigenous	0.647**	0.959	1.171**	1.014
	[0.519,0.806]	[0.782,1.175]	[1.039,1.319]	[0.870,1.182]
Quintile of socioeconomic status (Ref.: 5th)				
1st	0.497**	0.669**	1.120	0.224**
	[0.406,0.608]	[0.546,0.818]	[0.957,1.311]	[0.189,0.264]
2nd	0.834*	0.886	1.176*	0.345**
	[0.712,0.977]	[0.764,1.028]	[1.016,1.361]	[0.301,0.396]
3rd	0.949	0.966	1.088	0.462**
	[0.819,1.100]	[0.846,1.103]	[0.940,1.258]	[0.408,0.524]
4th	1.080	1.034	1.157+	0.711**
	[0.936,1.246]	[0.915,1.169]	[0.996,1.343]	[0.633,0.799]
Medical insurance (Ref.: no insurance)				
Social Security	0.676**	27.495**	0.514**	0.871**
	[0.597,0.765]	[22.495,33.607]	[0.440,0.599]	[0.785,0.966]
SSPH	0.769**	0.802+	3.822**	0.596**
	[0.686,0.862]	[0.625,1.029]	[3.444,4.241]	[0.539,0.659]
Type of health problem (Ref.: chronic health problems)				
Acute	0.730**	0.298**	0.364**	0.425**
	[0.630,0.847]	[0.264,0.336]	[0.327,0.405]	[0.380,0.476]
Other	0.566**	0.502**	0.435**	0.530**
	[0.451,0.710]	[0.424,0.595]	[0.376,0.504]	[0.451,0.623]
Perception of health problem (Ref.: mild health problem)				
Moderate/severe	2.336**	2.663**	2.192**	3.044**
	[2.123,2.571]	[2.430,2.918]	[2.032,2.364]	[2.802,3.307]
Observations				*25,620*
AIC				*61,461*
Log likelihood				*-30,618*
LR $\chi 2$				*15,399*
Prob >$\chi 2$				*0.000*
McFadden R^2				*0.201*

Note: Persons with private medical insurance were excluded.

**p<0.01,*p<0.05;+p<0.10.

The reasons for using specific health services and perception of quality of care are presented in Table 3. The top three reasons for using DAPPs were that these services were inexpensive, conveniently located and had a short waiting time; whereas the main reason to use SS and MoH services was to have an affiliation with such institutions. Users of private doctors mentioned more often (29%) that they knew the doctor and liked the care provided as the main reasons for attending the private doctor's office.

Regarding the average number of medicines per encounter, DAPPs users received ≥3 medicines more often (67%) than users of private doctors (56%) and public institutions (SS 54%; MoH 45%). A higher percentage of DAPPs and private practice users received information about the diagnosis and prescribed medicines than those of public institutions. DAPPs users also had better perception of the quality of healthcare (good/very good quality: DAPPs 89%, private doctor 93%) than other users (SS 78%; MoH 83%) and would return to the same healthcare provider. The main reason for not returning to DAPPs was lack of health improvement. For the SS and MoH, the reasons were long waiting time, inconsiderate healthcare providers and incomplete provision of prescribed medicines.

Table 3. Reasons for using ambulatory health services of different providers and perception of quality, Mexico 2012*

	DAPPs	Social Security	Ministry of Health	Private doctors	*p-value corrected by survey design effect*
Observations					
Sample	1,778	3,840	4,569	2,612	
%	13.89	30.00	35.70	20.41	
Weighted	1,504,746	2,912,390	2,602,144	2,128,578	
%	16.45	31.84	28.45	23.27	
	Estimation [95% CI]				
Main reasons for using specific healthcare services					
Having insurance	0.01 [0.01,0.02]	0.88 [0.87,0.90]	0.59 [0.57,0.62]	0.03 [0.02,0.04]	0.000
Convenient to home	0.33 [0.29,0.36]	0.06 [0.05,0.07]	0.25 [0.23,0.27]	0.17 [0.14,0.19]	0.055
Inexpensive	0.34 [0.30,0.37]	0.10 [0.09,0.12]	0.22 [0.20,0.24]	0.05 [0.04,0.06]	0.000
Familiar with the doctor	0.08 [0.06,0.11]	0.02 [0.01,0.03]	0.03 [0.02,0.04]	0.29 [0.26,0.32]	0.000
User likes care provided	0.16 [0.13,0.19]	0.06 [0.05,0.07]	0.08 [0.07,0.09]	0.28 [0.26,0.31]	0.000
Short waiting time	0.27 [0.24,0.30]	0.02 [0.02,0.03]	0.03 [0.02,0.03]	0.22 [0.20,0.24]	0.684
Other	0.19 [0.16,0.21]	0.05 [0.04,0.06]	0.10 [0.09,0.12]	0.24 [0.22,0.27]	0.000
Quality of health care					
Number of prescribed medicines					
0	0.02 [0.01,0.03]	0.10 [0.09,0.12]	0.11 [0.10,0.12]	0.05 [0.04,0.04]	0.000
1	0.08 [0.07,0.10]	0.11 [0.09,0.12]	0.12 [0.11,0.13]	0.10 [0.08,0.12]	
2	0.23 [0.20,0.26]	0.25 [0.23,0.27]	0.32 [0.30,0.34]	0.29 [0.27,0.32]	
≥3	0.67 [0.64,0.70]	0.54 [0.52,0.56]	0.45 [0.42,0.47]	0.56 [0.53,0.59]	
% of users who received information about their diagnosis	0.90 [0.88,0.92]	0.84 [0.83,0.86]	0.84 [0.83,0.86]	0.93 [0.91,0.94]	0.000
% of users who received information about prescribed medications	0.92 [0.90,0.94]	0.85 [0.84,0.87]	0.87 [0.85,0.88]	0.94 [0.92,0.95]	0.000
Perception about the quality of health care services					
Good/Very good	0.89 [0.86,0.91]	0.78 [0.75,0.80]	0.83 [0.81,0.85]	0.93 [0.92,0.95]	0.000
Regular	0.10 [0.08,0.13]	0.17 [0.15,0.19]	0.13 [0.12,0.15]	0.06 [0.05,0.07]	
Bad/very bad	0.01 [0.00,0.02]	0.06 [0.05,0.07]	0.04 [0.03,0.04]	0.01 [0.00,0.02]	
Users who will return to the same place for healthcare	0.90 [0.87,0.92]	0.82 [0.80,0.84]	0.88 [0.86,0.89]	0.93 [0.92,0.95]	0.000
Reasons for not returning					
Inconsiderate healthcare providers	0.05 [0.02,0.10]	0.32 [0.27,0.37]	0.25 [0.20,0.32]	0.09 [0.04,0.20]	0.000
Disagree with the diagnosis or treatment	0.16 [0.10,0.25]	0.19 [0.15,0.24]	0.16 [0.12,0.20]	0.24 [0.15,0.36]	0.438
Lack of health improvement	0.28 [0.17,0.42]	0.19 [0.15,0.24]	0.17 [0.13,0.22]	0.32 [0.22,0.45]	0.033
High cost of healthcare services	0.10 [0.04,0.21]	0.01 [0.00,0.02]	0.01 [0.01,0.03]	0.20 [0.11,0.32]	0.000
Failure to provide or incomplete provision of prescribed medications	0.03 [0.01,0.09]	0.21 [0.16,0.26]	0.21 [0.16,0.27]	0.002 [0.00,0.01]	0.000
Failure to provide information about the health problem & treatment	0.11 [0.06,0.21]	0.14 [0.11,0.18]	0.09 [0.05,0.14]	0.04 [0.02,0.08]	0.037
Long waiting time	0.02 [0.01,0.07]	0.41 [0.35,0.47]	0.32 [0.26,0.38]	0.02 [0.01,0.06]	0.000
Other reasons	0.05 [0.03,0.11]	0.11 [0.08,0.15]	0.08 [0.06,0.12]	0.02 [0.01,0.06]	0.009
Waiting time (in minutes) Median of [IQR]**	10.0 [5.00-25.0]	30.0 [15.0,90.0]	60.0 [15.0,120]	10.0 [5.00,30.0]	0.000

*Difference estimates performed considering the effect of the survey design.

**p value estimated from quantile regression models.

Table 4 shows out-of-pocket expenditures for attending ambulatory care. DAPPs and MoH users were less likely to pay for transportation (41% and 39%) than SS and private doctors' users (58% and 51%). Also, DAPPs users spent less on transportation (MXN25.00) when compared to other users. The probability of spending on consultations (88% and 87%) and on medicines (97% and 89%) was much higher for DAPPs and private clinic users when compared to other users; the lowest probability was for users affiliated with the SS (12%). DAPPs users spent less on consultation and medicines (average cost of consultation was Mx$30; average cost of medicines was Mx$200) than private doctors' users (consultation Mx$200, medicines MX$350).

Table 4. Out-of-pocket expenditures to attend ambulatory healthcare, Mexico 2012

	Transportation expenditures		Medical visit expenditures		Medicine expenditures	
	Probability [CI]	Median [IQR] Mexican currency	Probability [CI]	Median [IQR] Mexican currency	Probability [CI]	Median [IQR] Mexican currency
DAPPs users	0.41 [0.37,0.44]	25.0 [14.0,50.0]	0.88 [0.86,0.90]	30.0 [25.0,35.0]	0.97 [0.96,0.98]	200 [115.0,280.0]
Social Security users	0.58 [0.55,0.60]	28.0 [15.0,50.0]	0.02 [0.02,0.03]	60.0 [40.0,125.0]	0.12 [0.11,0.14]	300.0 [120.0,740.0]
Ministry of Health users	0.39 [0.37,0.42]	30.0 [14.0,60.0]	0.11 [0.09,0.12]	42.0 [20.0,85.0]	0.32 [0.30,0.34]	200 [79.0,400.0]
Private medical doctor users	0.51 [0.48,0.54]	50.0 [20.0,100.0]	0.87 [0.85,0.89]	200.0 [100.0,350.0]	0.89 [0.87,0.90]	350.0 [200.0,600.0]
p value corrected by survey design effect	0.941	0.000	0.000	0.000	0.000	0.000

Note: Weighted estimations; p value estimated from linear regression models for the probability reported and quantile regression models in the case of the median expenditure.

DISCUSSION

The main results show that DAPPs resulted in being an important key player in the healthcare sector. The positive effect is the wide acceptance of the public to attend these services because it facilitates access to ambulatory care. However, DAPPs poses a series of challenges to reach the objectives of the current health policies: (i) users pay out-of-pocket for medical visits and medications, counteracting financial protection policies; (ii) the high rate of prescribed medications alarms potential flaws in the quality of care in these facilities, undermining the efforts to improve quality of care; (iii) represents a conflict of interest for healthcare providers given that the medical doctors work for the pharmacies, jeopardizing both financial protection and quality of care.

The public has demonstrated a favourable response for attending DAPPs facilities despite the fact that according to the authorities, almost 98% of the population is affiliated with a public institution. [4] DAPPs enjoy popularity. Two-thirds of DAPPs users were affiliated with a public healthcare system and only one third responded that they were not affiliated with any public healthcare system. This phenomenon can have different interpretations. The rapid increase of DAPPs indicates the magnitude of the gap of the public healthcare sector to fulfil the demand in urban and metropolitan areas. DAPP users were willing to pay because these services were apparently inexpensive, conveniently located and with immediate access; also, by attending DAPPs, users avoided long waiting times, inconsiderate

healthcare providers and the incomplete provision of prescribed medicines with the public healthcare sector.

DAPPs promote inequity and out-of-pocket expenditures because its users pay for the medications and often for the visit. This undermines the potential gains of the public policy of financial protection. Between 2003 and 2010, the public health spending aimed at people without social security protection increased 81%, whereas the percentage of total health expenditures from out-of-pocket expenditures decreased by 3%, from 52% to 49%. This means that for every percentage point increase in public spending for persons without social security, there was a reduction of 0.04% in out-of-pocket spending. [23] This suggests that despite the increase in public resources for persons without social security, this has not yet reduced out-of-pocket expenditures, which is one of the main objectives of the financial reform. Our data shows that the probability of spending on medicine was higher for DAPP users than for users of other providers. Although the amount they spent is not as large as the out-of-pocket spending of users of private physicians, for those affiliated with a public institution it means additional financial burden. This could be a wake-up call to put into practice innovative and efficient patient-centred health service models focused on providing financial protection.

The presence of DAPPs in the health sector sends the signal that the Mexican regulation has a double standard for private doctors. Current norms forbid direct communication between pharmacies and doctors' offices. [24] The results points

out that the regulation is imprecise and there is weakness of the health authority to enforce it. This situation could be interpreted as an unspoken public policy of laissez faire to deal with the dilemma of favouring access to healthcare vs. reinforcing the observance of the regulations.

Despite the fact that ENSANUT 2012 did not gather in-depth quality of care information, the results show that DAPPs users were prescribed an excessive number of medicines. Almost two thirds of users received, on average, three or more medications, despite the fact that most were young and sought ambulatory care for acute health problems, mainly mild acute respiratory illnesses (ARI). Globally, most incidences of inappropriate use of antibiotics occur in ARI. Given the large number of medicines prescribed in DAPPs consultations, it is likely that this may be derived from over-prescription of antibiotics. This requires in-depth analyses.

DAPPs represent a conflict of interest because the pharmacies hire the medical doctors to run the pharmacy-owned examining rooms and link the processes of prescription and sale of medications. According to Brody, "*conflicts of interest, whether individual or organizational, occur when one enters into arrangements that reasonably tempt one to put aside one's primary obligations (patients' safety) in favor of secondary interests, such as financial self-interest".* [25] The staff of DAPPs is being paid a salary plus commissions derived from the prescriptions. [26] This may encourage unjustified prescribing. This assumption is supported by studies from other countries where the merge of medicine prescribing and

dispensing [13, 27] or exposure to information from pharmaceutical companies [28] affected prescription choices, prompting physicians to not necessarily act in the best interest of patients, resulting in higher prescribing frequency, higher costs, and lower prescribing quality. The high number of prescribed medications indicates that medical doctors working for DAPPs may have financial incentives to prescribe certain products. The problem of overprescribing results in poly-pharmacy, increased out-of-pocket expenditures, increased risk of adverse medication reactions and, in the case of antibiotics, resistance. This complex situation jeopardizes the objectives of the policy to sell antibiotics only with a medical prescription.

The growing presence of DAPPs contributes to distort the market in the Mexican context. The main health policies are focused on promoting the demand-side of the services that the public sector provides; little attention is being paid to developing policies aimed at regulating and taking advantage of the role of the private market to enhance competition and improve the quality of healthcare. Patients are usually poorly informed consumers who fail to recognize high quality service; for example, in the present study, the interviewees attended DAPPs because it seemed to be convenient, rather than for the high quality of care offered. Apparently, the public sector has an unrecognized conflict between reinforcing the regulation, promoting high quality care and proper use of medications vs. allowing the growing supply of this type of ambulatory care providers to absorb the spill-over of the demand for consultations and medicines, regardless of the quality and cost. The findings support the assumption that is necessary to strengthen the stewardship of the MoH

in the private sector, along with the urgent need to consolidate a national pharmaceutical policy.

The study has several limitations. It is a secondary data analysis of a cross-sectional study; thus, no longitudinal data are available to ascertain the changes of DAPPs services over time. Also, the available information did not allow in-depth evaluation of the quality of prescriptions. The information was gathered through interviews during home visits; therefore, the quality of the data depends on user recall. To mitigate this potential bias, the questions only addressed the prior 15-day period. Further and detailed information about the contracts and remunerations of DAPPs physicians is necessary in order to better evaluate the magnitude of the conflict of interest.

CONCLUSION

DAPPs have become an important player in Mexican healthcare, but they are an "elephant in the room." The fact that more than half of DAPPs users were enrolled in a public health insurance program suggests dissatisfaction with these services. DAPPs users reported high satisfaction with the health services provided. However, the operation of DAPPs raise questions about its impact on 1) out-of-pocket spending at the expense of the financial protection policies in health established in Mexico, and 2) the quality of care, which could arise from the conflict of interest implicit in the linkage of prescribing and dispensing processes. It is necessary to monitor the quality of care provided by DAPPs and strengthen its regulation and relationship with the remainder of the health sector.

CONTRIBUTORS

RPC, MHA, SVD, VJW, AD conceptualized the study. SVD, AD conducted the literature review. ESM, VJW, SVD, RPC, MHA designed the study. ESM analysed the data. RPC, SVD, VJW, ESM, AD, MHA interpreted the data, wrote the manuscript and approved the final draft.

FUNDING

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

COMPETING INTERESTS

There is no financial interest to disclose.

ETHICS STATEMENT

This study is a secondary data analysis of the ENSANUT 2012. The data for the analysis were requested and obtained from the surveys public repository hosted at the National Institute of Public Health webpage at: http://ensanut.insp.mx/. This repository has the data already de-identified; thus it is not possible to trace any of the data to the actual individual. In accordance to the Internal Regulation of the Research Ethics Committee of the National Institute of Public Health, this secondary analysis was considered exempt of approval.

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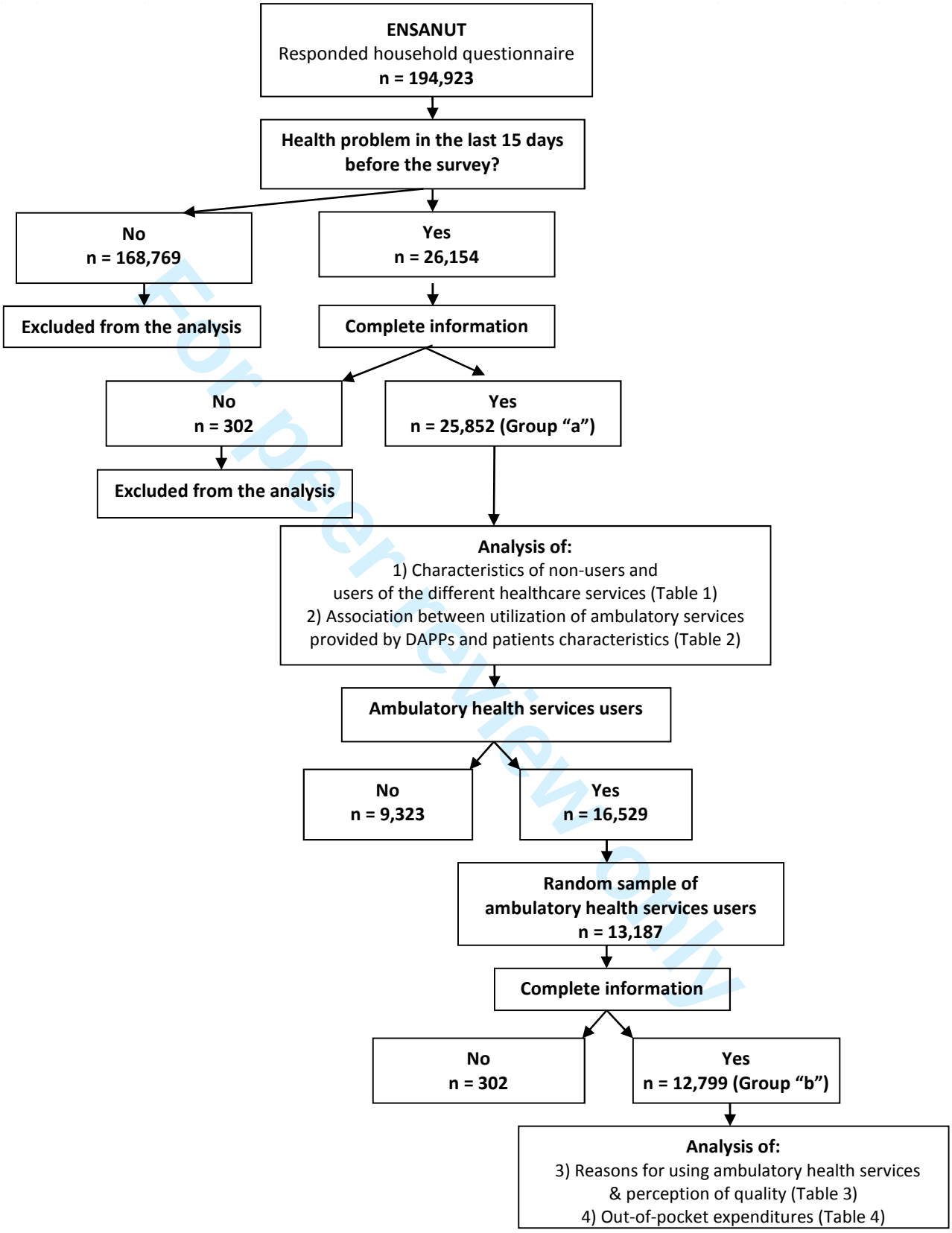

BMJ Open

EFFECTS OF THE EXPANSION OF DOCTORS' OFFICES ADJACENT TO PRIVATE PHARMACIES IN MEXICO: SECONDARY DATA ANALYSIS OF A NATIONAL SURVEY

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2013-004669.R1
Article Type:	Research
Date Submitted by the Author:	17-Apr-2014
Complete List of Authors:	Pérez-Cuevas, Ricardo; Inter-American Development Bank, Division of Social Protection and Health Doubova, Svetlana; Mexican Institute of Social Security, Epidemiology and Health Services Research Unit, CMN Siglo XXI Wirtz, Veronika; Boston University, Center for Global Health and Development ; National Institute of Public Health, Centre for Health Systems Research Serván-Mori, Edson; National Institute of Public Health, Centre for Health Systems Research Dreser, Anahí; National Institute of Public Health, Center for Health Systems Research Hernández-Ávila, Mauricio; National Institute of Public Health, General Direction
Primary Subject Heading:	Health services research
Secondary Subject Heading:	Health policy
Keywords:	Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Organisation of health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PRIMARY CARE

EFFECTS OF THE EXPANSION OF DOCTORS' OFFICES ADJACENT TO PRIVATE PHARMACIES IN MEXICO: SECONDARY DATA ANALYSIS OF A NATIONAL SURVEY

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Running title: Doctors' offices adjacent to private pharmacies in Mexico

Keywords: *Community pharmacy, Physician prescribing patterns, Conflict of interest, Health expenditures, Mexico.*

Word count: 3, 826

ABSTRACT

Objectives: To compare the sociodemographic characteristics, reasons for attending, perception of quality, and associated out-of-pocket (OOP) expenditures of doctors' offices adjacent to private pharmacies (DAPPs) users with users of Social Security (SS), Ministry of Health (MoH), private doctor's offices independent from pharmacies, and non-users.

Setting: Secondary data analysis of the 2012 National Survey of Health and Nutrition of Mexico.

Participants: The study population comprised 25,852 individuals identified as having had a health problem 15 days before the survey, and a random sample of 12,799 ambulatory health services users.

Outcome measures: Sociodemographic characteristics, reasons for attending healthcare services, perception of quality and associated OOP expenditures.

Results: The distribution of users was as follows: DAPPs (9.2%), SS (16.1%), MoH (20.9%), private providers (15.4%), and nonusers (38.5%); 65% of DAPPs users were affiliated with a public institution (MoH 35%, SS 30%) and 35% reported not having health coverage. DAPPs users considered the services inexpensive, convenient, and with a short waiting time, yet they received ≥3 medications more often (67.2%, 95% Confidence intervals (CI): 64.2-70.1) than users of private doctors (55.7%, 95%CI: 52.5-58.6) and public institutions (SS 53.8%, 95%CI: 51.6-55.9); MoH 44.7%, 95%CI: 42.5-47.0). The probability of spending on consultations (88%, 95%CI: 86-89) and on medicines (97%, 95%CI: 96-98) was much higher for DAPPs users when compared to SS (2%, 95%CI: 2-3

and 12%, 95%CI: 11-14, respectively) and MoH users (11%, 95%CI: 9-12 and 32%, 95%CI:30-34, respectively).

Conclusions: DAPPs counteract current financial protection policies since a significant percentage of its users were affiliated with a public institution, reported higher OOP spending and higher number of medicines prescribed than users of other providers. The overprescription should prompt studies to learn about DAPPs' quality of care, which may arise from the conflict of interest implicit in the linkage of prescribing and dispensing processes.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- This study is the first that uses nationally representative household data to analyze the characteristics of users of doctors' offices adjacent to private pharmacies (DAPPs), their reasons to attend, perception of quality, and associated out-of-pocket expenditures, and runs a comparative analysis with users of other healthcare services.
- This study identified that users of DAPPS: paid out-of-pocket for medical visits and medications, therefore counteracting financial protection policies, and received, on average, higher number of medicines prescribed than users of other healthcare institutions, thus signaling poorer quality of care; For DAPPs medical doctors this situation might reflect a conflict of interest given that they work for the pharmacies.
- The main limitation is that this study is a secondary data analysis, thus with the available information it was not possible to evaluate in-depth the quality of care.

BACKGROUND

In the past decade in Mexico, recognition of inequity in health, disparities in access and utilization of health services, and differences in resource allocation and health expenditures fuelled the implementation of the System for Social Protection of Health (SSPH). The SSPH aims at achieving universal healthcare coverage and financial protection for the population without Social Security. However, in 2010—8 years after its inception—the Mexican total health expenditure accounted for only 6.2% of the gross domestic product [1] from which more than half (51.7%) is financed through out-of-pocket expenditures. Among OECD countries, Mexico's income inequality is the highest. [2]

The complexity of the Mexican healthcare system challenges the success of health policies because the healthcare sector comprises segmented public and private healthcare systems with little interaction. The public sector covers an estimated 78.6% of Mexico's population (~112 million). All formal labour market and government employees receive healthcare from the Social Security institutions (SS), whereas most of the unemployed or self-employed population receives healthcare from the Ministry of Health (MoH), which comprises each of the 32 decentralized MoH facilities in every Mexican state. The private sector provides care for the uninsured population and for up to 31% of those insured who choose to use this system for ambulatory care.

Reaching universal coverage is expected to improve access and protect the population from the financial burden of healthcare. To accomplish these endeavours, the SSPH, which is a non-contributory social health insurance

program, includes access to ambulatory and hospital healthcare in public institutions and provision of no-cost prescribed medications at the point of care. This represents actual financial protection, particularly for low-income groups. [3] SSPH was launched in 2002. By 2011, the program reached 52.6 million affiliates and the benefit package increased from 91 to 284 interventions. This package covers the treatment of ~95% of the causes of visits in primary care clinics and admissions to general hospitals [4]. During the same period, the proportion of patients reporting complete provision of medications at the MoH facilities increased from 55% to 62%, whereas in the SS the increase was from 70% to 87%.[4]

Despite the progress, Mexican policies on access to healthcare and, in particular, to medications still stand at a crossroad and deserve careful analysis. The availability of medicines is a key determinant of access to and utilization of health services. In Mexico, most medications are being paid for with private resources (mostly out-of-pocket) despite the important public investment in healthcare. A recent report has emphasized that for every Mx$100 spent on medications, Mx$79 is being paid with private resources and only Mx$21 with public funds. [5] Furthermore, in 2010 the Mexican authorities enacted a prescription-only requirement policy to enforce the regulation to sell antibiotics only with a physician´s prescription. This policy, aimed at mitigating self-medication, had the unintended consequence of boosting private ambulatory healthcare in the form of doctor's offices adjacent to private pharmacies (DAPPs). [6]

Indeed, since a decade ago, a small number of DAPPs began to operate in some low-cost pharmacy chains but soon after the publication of the antibiotics' policy, a growing number of DAPPs have been observed nationwide. Currently, there are

10,000 DAPPs in the country that provide 250,000 medical visits every day. [7] This emergent phenomenon questions the success of current health policies focused on universal coverage for healthcare and signals the unbalance of the supply and demand for ambulatory healthcare and medicines in the public sector. Furthermore, DAPPs challenges current regulations and norms for doctors' offices and private pharmacies.

The policies to improve access to medicines and safe prescriptions face multiple challenges such as the conflict of interest and may have unanticipated results. Until recently, in Japan and United States, [8] Korea [9] and China [10, 11] among other countries, [12] medical doctors and pharmacists were allowed to prescribe and dispense medicines. Such practices contributed to high medicine utilization; for example, in China almost 50% of the revenues of medical doctors and pharmacists came from pharmaceuticals. [10] Due to the financial incentive, more medicines were dispensed and their selection was influenced by factors other than their quality or cost-effectiveness. The recognition of this problem encouraged the introduction of reforms aimed at separating medicine prescribing and dispensing. In some countries this strategy decreased the irrational use of medicines [13] although in other countries it provoked the practice that health providers hired onsite pharmacists. [14] Because the provider paid a salary to the pharmacists, the provider's incentives and irrational prescription patterns remained unchanged.

In Mexico, expansion of DAPPs indicates that prescribing and dispensing of medicines are related instead of being separated as the international experience suggests. To better understand this situation, the objectives of this study were to compare DAPPs users with users of other services in terms of their characteristics,

reasons for attending specific services, perception of quality, and associated out-of-pocket expenditures.

METHODS

Data source

This study is a secondary data analysis of the 2012 National Survey of Health and Nutrition (ENSANUT 2012). [15] ENSANUT is a complex survey, which is representative at the national, state and urban-rural stratum levels. It was designed to collect data on different health and nutrition conditions and the utilization of ambulatory and hospital care services. ENSANUT 2012 was applied to 194,923 individuals in 50,528 households (response rate of 87%). It was sampled through a probabilistic multistage process. The specific details on the sampling approach of ENSANUT 2012 are published elsewhere. [15]

To collect the information for the ENSANUT survey, previously trained interviewers carried out direct, structured face-to-face interviews with key household informants and health services users. The interviewers applied the 5-questionnaire set that ENSANUT 2000 and 2006 used: household, health services use, children, adolescents and adults

Study population, variables and statistical analysis

The present study analyzed the information from the household and health services use questionnaires of ENSANUT 2012. Figure 1 depicts selection of the study population.

[Figure 1. Selection of study population goes here]

The study population comprised: a) individuals identified as having had a health problem within 15 days before the survey according to the household questionnaire and b) a random sample of ambulatory health services users who answered the health services use questionnaire [14]. The number of individuals who had a health problem was obtained as follows: from the total number of survey participants (194,923 individuals), 26,154 (13.4%) reported having a health problem; after excluding the questionnaires with incomplete information, the final sample was 25,852 individuals. Thus, the non-response rate was 1.2%. Following the same logic, 13,187 health services users were chosen; 12,799 had complete information and 388 (2.9%) did not.

In group "a" we identified five categories of users of healthcare services: 1) doctors' offices adjacent to private pharmacies (DAPPs), 2) SS facilities, 3) MoH facilities, 4) offices of private doctors independent from pharmacies, and 5) non-users or those who reported consulting with a friend, neighbour, family member, homeopaths or other healers. This was the dependent variable.

Data analysis was performed in two stages. In the first stage, the sample "a" served to describe the sociodemographic characteristics and identify the factors associated with the use of DAPPs in comparison to the use of other health services or no use. The analysis included the following independent variables that the literature suggests as related to the use of health services: [16-18] sex (male or female), age group (0-9 years, 10-19 years, 20-64 years and ≥65 years), and years of schooling (0, 1-6, 7-9, and ≥10). The variable of years of schooling was obtained directly from the interview data for subjects 15 years of age and older, and for individuals younger than 15 years the mean of years of schooling of the household

members was used. Other analyzed variables were place of residence (rural, urban or metropolitan); ethnicity of the head of household; [19] degree of marginalization (very low/low, middle, high/very high) following the 2010 marginalization index (based on access to basic infrastructure services, housing conditions, education attainment, and wage earnings) at locality level [20]; type of medical insurance (SS, SSPH, private or none); and socioeconomic status (SES). The SES was determined classifying the population in quintiles; the information to ascertain the SES included possession of different assets, services and characteristics of the household infrastructure. [21, 22] The SES index was constructed using a principal components analysis with polychoric correlation matrices. Additionally, type of health problem (acute, chronic or other) and perception of severity (mild or moderate/severe) of health problem were analyzed.

The factors associated with the use of a specific healthcare provider were modeled using a multinomial logistic regression [23] in which the dependent variable included the five categories of health services users described before. The non-users, which represented 38.5% of the sample, were used as the reference category. In addition to the sociodemographic characteristics, the model was adjusted for the geographic region of state of residence (Northwest, Northeast, Central-North, East, West, Central-South, Southwest, Southeast). The results were reported in odds ratios (OR). The hypothesis tests on the OR estimated were performed at 1, 5 and 10% confidence levels. We report various statistical goodness of fit and reliability of the estimated models [Akaike criteria (AIC), log-likelihood, LR-χ^2, and R^2-McFadden].

The second stage of the analysis focused on sample “b” of health services users. Participants in this part of the survey were asked about the characteristics of the healthcare received and their perceptions of the quality of care. The descriptive analysis comprised the main reasons for using specific healthcare services, the percentage of users who received information about their diagnosis, number of prescribed medicines (0, 1, 2, or 3 or more), percentage of users who received and understood the information about prescribed medicines, perception regarding the quality of care received, willingness to return to the same healthcare institution in the future, and reasons for dissatisfaction with health care (e.g., lack of improvement in health, high costs, remote services, long waiting time). We also analyzed out-of-pocket expenditures for transportation from home to healthcare facilities, healthcare visits and medicines. The amount was reported in local currency (Mexican pesos). To estimate the median and interquartile range (IQR) of waiting time and out-of-pocket expenditures by type of health care provider, the quantile regression model at the population level was utilized. All statistical analyses were performed using the statistical package STATA 12.1.

RESULTS

Table 1 summarizes the characteristics of users of different healthcare services. Overall, 61.5% of participants who were reported to have had a health problem seek care with a health provider according to the following distribution: MoH (20.9%), SS (16.1%), private providers (15.4%) and DAPPs (9.2%).

Table 1. Characteristics of users and non-users of the different healthcare services, Mexico 2012*

	DAPPs	Social Security	Ministry of Health	Private doctors	Non-users	
Observations						
Sample	2,387	4,148	5,390	3,976	9,951	***p-value corrected by survey design effect***
%	9.2	16.1	20.9	15.4	38.5	
Weighted	1,715,838	2,775,195	2,709,387	2,884,34	5,967,254	
%	10.7	17.3	16.9	18.0	37.2	
			Estimation [95% CI]			
Male (vs. female)	44.7 [42.0,47.5]	41.0 [39.0,43.0]	40.3 [38.6,42.2]	45.0 [42.8,47.2]	46.4 [45.1,47.7]	0.00
Years of age						
0-9	35.3 [32.3,38.4]	18.2 [16.5,20.1]	29.1 [27.3,31.0]	30.6 [28.6,32.7]	19.6 [18.5,20.8]	0.00
10-19	16.5 [14.5,18.7]	9.2 [8.1,10.5]	13.7 [12.5,15.0]	11.9 [10.7,13.2]	16.4 [15.5,17.4]	
20-64	43.5 [40.6,46.5]	56.4 [54.2,58.7]	46.8 [45.0,48.6]	48.0 [45.9,50.1]	56.0 [54.6,57.4]	
≥65	4.8 [3.6,6.2]	16.1 [14.4,17.9]	10.4 [9.3,11.7]	9.5 [8.4,10.7]	8.0 [7.2,8.8]	
Years of schooling						
0	3.8 [2.9,4.9]	7.1 [6.1,8.3]	11.1 [10.0,12.4]	6.5 [5.6,7.5]	8.1 [7.4,8.9]	0.00
1-6	46.2 [43.0,49.4]	36.9 [34.5,39.4]	54.1 [52.0,56.3]	36.3 [34.0,38.7]	42.7 [41.0,44.4]	
7-9	28.8 [26.1,31.7]	25.6 [23.5,27.8]	22.0 [20.2,23.8]	25.5 [23.7,27.4]	25.6 [24.3,26.8]	
≥10	21.3 [18.7,24.1]	30.4 [28.3,32.5]	12.8 [11.4,14.4]	31.7 [29.3,34.2]	23.6 [22.1,25.2]	
Rural residence (vs. Urban or metropolitan)	10.6 [8.9,12.5]	9.5 [8.0,11.2]	39.0 [36.3,41.7]	18.1 [16.4,20.0]	24.0 [22.2,25.8]	0.00
Locality deprivation level						
Very low/low	81.2 [78.3,83.8]	85.8 [83.8,87.7]	50.2 [47.0,53.4]	72.8 [70.2,75.3]	65.1 [62.5,67.6]	0.00
Middle	9.7 [7.7,12.1]	8.0 [6.4,9.8]	13.8 [11.8,16.2]	11.4 [9.5,13.8]	11.7 [9.8,13.9]	
High/very high	9.1 [7.3,11.3]	6.2 [5.0,7.7]	36.0 [32.8,39.3]	15.7 [13.8,18.0]	23.3 [21.0,25.7]	
Ethnicity: Indigenous	2.9 [2.2,3.9]	3.5 [2.7,4.6]	11.9 [10.0,14.1]	6.2 [4.9,7.9]	8.8 [7.4,10.3]	0.00
Quintile of socioeconomic status						
1st	8.3 [6.5,10.5]	4.1 [3.3,5.1]	24.5 [22.4,26.9]	8.1 [7.0,9.4]	16.7 [15.3,18.2]	0.00
2nd	18.5 [15.9,21.5]	10.9 [9.6,12.3]	26.2 [24.3,28.2]	11.8 [10.4,13.4]	21.0 [19.4,22.6]	
3rd	22.4 [19.4,25.7]	19.3 [17.6,21.2]	20.1 [18.3,22.0]	15.7 [14.1,17.4]	20.3 [18.9,21.8]	
4th	26.3 [22.9,30.1]	25.6 [23.4,27.9]	16.8 [15.0,18.7]	24.7 [22.3,27.1]	19.4 [17.9,21.1]	
5th	24.5 [21.1,28.2]	40.1 [37.3,42.8]	12.5 [10.7,14.5]	39.8 [37.0,42.7]	22.5 [20.7,24.5]	
Medical Insurance (MI)						
Social Security	29.5 [26.6,32.7]	94.3 [93.2,95.3]	6.8 [5.7,8.1]	39.1 [36.6,41.8]	31.5 [29.7,33.3]	0.00
SSPH	35.4 [32.1,38.8]	3.0 [2.3,3.8]	81.1 [79.3,82.9]	25.6 [23.6,27.8]	41.4 [39.6,43.1]	
Private insurance	0.0 [0.0,0.2]	0.1 [0.0,0.3]	0.0 [0.0,1.7]	1.0 [2.9,0.3]	0.1 [0.5,0.0]	
No MI	35.1 [31.6,38.7]	2.6 [2.0,3.4]	12.1 [10.7,13.6]	33.5 [31.0,36.1]	26.9 [25.6,28.3]	
Type of health problem						
Acute health problems	80.4 [77.7,83.0]	58.5 [56.3,60.6]	65.7 [63.7,67.7]	71.0 [68.9,73.1]	81.0 [79.7,82.3]	0.00
Chronic health problems	14.1 [12.0,16.5]	29.8 [27.7,32.0]	24.3 [22.5,26.1]	20.1 [18.4,22.0]	10.2 [9.4,11.1]	
Other health problems	5.5 [4.3,7.0]	11.8 [10.4,13.3]	10.0 [8.9,11.3]	8.9 [7.8,10.1]	8.8 [8.0,9.6]	
Perception of severity of health problem						
Mild	44.2 [41.1,47.4]	37.1 [34.9,39.4]	40.4 [38.3,42.5]	36.2 [34.0,38.5]	63.6 [61.9,65.2]	0.00
Moderate/severe	55.8 [52.6,58.9]	62.9 [60.6,65.1]	59.6 [57.5,61.7]	63.8 [61.5,66.0]	36.4 [34.8,38.1]	

Difference estimates performed considering the effect of the survey design.

1 The variable of years of schooling was obtained directly from the interview data for subjects 15 years of age and older, and for individuals younger than 15 years the mean of years of schooling of the household members was used.

When the sample was stratified by insurance coverage, the results showed that a significant percentage of users with SS or SSPH insurance attended private services or DAPPs. Among DAPPs users, 30% and 35% reported as having SS or SSPH coverage, respectively. Similarly, among private physician users, 39% had SS and 26% had SSPH coverage.

DAPPs users were economically better off than those who went to MoH facilities. In comparison to the users of other health services and non-users, DAPPs users were younger (51% were between 0 and 19 years old), with higher educational level than MoH users and lower educational level than SS users. Most DAPPs users lived in urban and metropolitan areas with a low level of deprivation (89% for the former and 81% for the latter), whereas only 61% of MoH users lived in these areas and 50% had low level of deprivation. 3% of DAPPs users were indigenous vs. 12% of indigenous users receiving care from the MoH. DAPPs users were equally distributed among the different socioeconomic levels. This is in contrast with MoH users who were concentrated according to the poorest quintiles, whereas SS and private services users were in the richest quintiles. Furthermore, acute health problems encouraged more frequent attendance to DAPPs (80%) in comparison with other groups. The users sought healthcare in the institutions in which they were affiliated if they perceived that the problem was moderate to severe.

Table 2 shows the multinomial model that confirms that users of DAPPs were younger, mostly from urban and metropolitan areas and presented an acute

condition. Furthermore, those with SSPH insurance were more likely to visit DAPPs than private clinics.

Table 2. Multinomial model of the association between utilization of services provided by DAPPs and patient characteristics, Mexico 2012

	Reference category: Non- users Odds ratios (95% CI) reported			
	DAPPs	**Social Security**	**Ministry of Health**	**Private doctors**
Sex (Ref.: female)				
Male	0.863** [0.786,0.947]	0.872** [0.798,0.952]	0.798** [0.742,0.859]	0.920* [0.850,0.996]
Years of age (Ref.: ≥65)				
≤9	3.739** [2.986,4.683]	1.320** [1.114,1.562]	2.061** [1.771,2.398]	2.264** [1.932,2.654]
10-19	1.761** [1.388,2.235]	0.623** [0.514,0.754]	1.104 [0.939,1.298]	0.676** [0.566,0.808]
20-64	1.249* [1.008,1.547]	0.769** [0.665,0.890]	0.880+ [0.770,1.006]	0.653** [0.566,0.753]
Years of schooling (Ref.: 0 years)				
1-6	1.236+ [0.981,1.558]	1.067 [0.887,1.282]	1.051 [0.921,1.200]	0.917 [0.780,1.078]
7-9	1.334* [1.046,1.702]	1.069 [0.875,1.307]	1.050 [0.904,1.221]	1.264** [1.059,1.509]
≥10	1.309* [1.017,1.685]	1.054 [0.860,1.291]	1.057 [0.891,1.253]	1.581** [1.316,1.898]
Place of residence (Ref.: urban or metropolitan)				
Rural	0.637** [0.552,0.736]	0.838* [0.732,0.959]	1.358** [1.234,1.494]	1.025 [0.918,1.145]
Locality deprivation level (Ref.: low, very low level)				
Middle	0.818** [0.703,0.952]	1.084 [0.936,1.256]	1.051 [0.936,1.180]	1.421** [1.254,1.611]
High, very high	0.551** [0.464,0.655]	0.858+ [0.720,1.022]	0.978 [0.869,1.102]	1.278** [1.116,1.464]
Ethnicity (Ref.:non-indigenous)				
Indigenous	0.647** [0.519,0.806]	0.959 [0.782,1.175]	1.171** [1.039,1.319]	1.014 [0.870,1.182]
Quintile of socioeconomic status (Ref.: 5th)				
1st	0.497** [0.406,0.608]	0.669** [0.546,0.818]	1.120 [0.957,1.311]	0.224** [0.189,0.264]
2nd	0.834* [0.712,0.977]	0.886 [0.764,1.028]	1.176* [1.016,1.361]	0.345** [0.301,0.396]
3rd	0.949 [0.819,1.100]	0.966 [0.846,1.103]	1.088 [0.940,1.258]	0.462** [0.408,0.524]
4th	1.080 [0.936,1.246]	1.034 [0.915,1.169]	1.157+ [0.996,1.343]	0.711** [0.633,0.799]
Medical insurance (Ref.: no insurance)				
Social Security	0.676** [0.597,0.765]	27.495** [22.495,33.607]	0.514** [0.440,0.599]	0.871** [0.785,0.966]
SSPH	0.769** [0.686,0.862]	0.802+ [0.625,1.029]	3.822** [3.444,4.241]	0.596** [0.539,0.659]
Type of health problem (Ref.: chronic health problems)				
Acute	0.730** [0.630,0.847]	0.298** [0.264,0.336]	0.364** [0.327,0.405]	0.425** [0.380,0.476]
Other	0.566** [0.451,0.710]	0.502** [0.424,0.595]	0.435** [0.376,0.504]	0.530** [0.451,0.623]
Perception of health problem (Ref.: mild health problem)				
Moderate/severe	2.336** [2.123,2.571]	2.663** [2.430,2.918]	2.192** [2.032,2.364]	3.044** [2.802,3.307]
Observations				*25,620*
AIC				*61,461*
Log likelihood				*-30,618*
LR $\chi 2$				*15,399*
Prob >$\chi 2$				*0.000*
McFadden R^2				*0.201*

Note: Persons with private medical insurance were excluded.

**p<0.01,*p<0.05;+p<0.10.

The reasons for using specific health services and perception of quality of care are presented in Table 3. The top three reasons for using DAPPs were that these services were inexpensive, conveniently located and had a short waiting time; whereas the main reason to use SS and MoH services was to have an affiliation with such institutions. Users of private doctors mentioned more often (29%) that they knew the doctor and liked the care provided as the main reasons for attending the private doctor's office.

Regarding the average number of medicines per encounter, DAPPs users received ≥3 medicines more often (67%) than users of private doctors (56%) and public institutions (SS 54%; MoH 45%). A higher percentage of DAPPs and private practice users received information about the diagnosis and prescribed medicines than those of public institutions. DAPPs users also had better perception of the quality of healthcare (good/very good quality: DAPPs 89%, private doctor 93%) than other users (SS 78%; MoH 83%) and would return to the same healthcare provider. The main reason for not returning to DAPPs was lack of health improvement. For the SS and MoH, the reasons for not returning were long waiting time, inconsiderate healthcare providers and incomplete provision of prescribed medicines.

Table 3. Reasons for using ambulatory health services of different providers and perception of quality, Mexico 2012*

	DAPPs	Social Security	Ministry of Health	Private doctors	*p-value corrected by survey design effect*
Observations					
Sample	1,778	3,840	4,569	2,612	
%	13.89	30	35.7	20.41	
Weighted	1,504,746	2,912,390	2,602,144	2,128,578	
%	16.45	31.84	28.45	23.27	
	Estimation [95% CI]				
Main reasons for using specific healthcare services					
Having insurance	1.5 [0.7,2.2]	88.5 [86.8,90.2]	59.4 [57.0,61.8]	2.7 [1.9,3.6]	0.00
Convenient to home	32.5 [29.1,36.0]	6.3 [5.1,7.4]	25.2 [23.3,27.2]	16.6 [14.4,18.8]	0.06
Inexpensive	33.6 [30.0,37.2]	10.2 [8.6,11.9]	22.1 [20.2,24.0]	4.7 [3.7,5.8]	0.00
Familiar with the doctor	8.1 [5.5,10.7]	2.1 [1.4,2.7]	2.7 [1.8,3.6]	29.1 [26.2,31.9]	0.00
User likes care provided	16.0 [12.9,19.1]	6.0 [5.0,7.1]	8.2 [7.1,9.4]	28.2 [25.7,30.8]	0.00
Short waiting time	26.5 [23.5,29.6]	2.3 [1.6,3.0]	2.8 [2.1,3.4]	22.1 [19.7,24.5]	0.68
Other	18.7 [16.0,21.4]	4.8 [3.7,5.9]	10.2 [8.7,11.8]	24.2 [21.6,26.7]	0.00
Quality of health care					
Number of prescribed medicines					
0	1.6 [0.9,2.8]	10.3 [9.0,11.8]	11.1 [9.8,12.5]	5.4 [4.2,6.8]	0.00
1	8.3 [6.7,10.3]	10.7 [9.4,12.3]	12.0 [10.8,13.3]	9.9 [8.3,11.6]	
2	22.9 [20.3,25.7]	25.2 [23.2,27.3]	32.2 [30.2,34.3]	29.1 [26.7,31.6]	
≥3	67.2 [64.2,70.1]	53.8 [51.6,55.9]	44.7 [42.5,47.0]	55.7 [52.8,58.6]	
% of users who received information about their diagnosis	90.3 [87.8,92.3]	84.3 [82.5,85.9]	84.5 [82.9,85.9]	92.7 [90.9,94.1]	0.00
% of users who received information about prescribed medications	92.3 [90.0,94.0]	85.5 [83.8,87.0]	86.8 [85.3,88.2]	93.7 [92.1,95.0]	0.00
Perception about the quality of health care services					
Good/Very good	88.8 [86.4,90.8]	77.7 [75.5,79.7]	83.1 [81.4,84.7]	93.2 [91.5,94.5]	0.00
Regular	10.2 [8.2,12.5]	16.7 [14.9,18.6]	13.4 [12.0,14.9]	5.7 [4.6,7.1]	
Bad/very bad	1.1 [0.6,1.9]	5.7 [4.6,7.0]	3.5 [2.8,4.5]	1.1 [0.5,2.4]	
Users who will return to the same place for healthcare	90.1 [87.3,92.4]	81.8 [79.8,83.7]	87.7 [86.1,89.1]	93.4 [91.8,94.7]	0.00
Reasons for not returning					
Inconsiderate healthcare providers	4.7 [2.3,9.7]	32.0 [27.1,37.3]	25.4 [20.0,31.7]	9.1 [3.9,19.8]	0.00
Disagree with the diagnosis or treatment	16.4 [10.4,25.0]	18.9 [14.6,24.1]	15.7 [12.1,20.1]	23.7 [14.6,36.1]	0.44
Lack of health improvement	27.9 [17.1,41.9]	18.7 [14.6,23.8]	16.9 [12.6,22.3]	32.0 [21.5,44.6]	0.03
High cost of healthcare services	9.8 [4.4,20.5]	0.5 [0.1,1.6]	1.4 [0.7,2.6]	19.7 [11.3,32.2]	0.00
Failure to provide or incomplete provision of prescribed medications	3.3 [1.2,8.6]	20.6 [16.1,25.9]	20.8 [16.0,26.5]	0.2 [0.0,1.3]	0.00
Failure to provide information about the health problem & treatment	11.4 [5.9,21.1]	14.0 [10.8,18.0]	8.6 [5.1,14.1]	4.0 [1.9,8.1]	0.04
Long waiting time	2.4 [0.8,7.1]	40.5 [34.6,46.7]	31.7 [25.9,38.1]	2.2 [0.8,6.2]	0.00
Other reasons	5.3 [2.6,10.6]	11.1 [7.9,15.3]	8.4 [5.8,12.2]	2.3 [0.9,6.0]	0.01
Waiting time (in minutes) Median of [IQR]**	10.0 [5.0-25.0]	30.0 [15.0,90.0]	60.0 [15.0,120]	10.0 [5.0,30.0]	0.00

*Difference estimates performed considering the effect of the survey design.

**p value estimated from quantile regression models.

Table 4 shows out-of-pocket expenditures for attending ambulatory care. DAPPs and MoH users were less likely to pay for transportation (41% and 39%) than SS and private doctors' users (58% and 51%). Also, DAPPs users spent less on transportation (MXN25.00) when compared to other users. The probability of spending on consultations (88% and 87%) and on medicines (97% and 89%) was much higher for DAPPs and private clinic users when compared to other users; the lowest probability was for users affiliated with the SS (2% and 12% respectively). DAPPs users spent less on consultation and medicines (average cost of consultation was Mx$30; average cost of medicines was Mx$200) than private doctors' users (consultation Mx$200, medicines MX$350).

Table 4. Out-of-pocket expenditures to attend ambulatory healthcare, Mexico 2012

	Transportation expenditures		Medical visit expenditures		Medicine expenditures	
	Probability [CI]	Median [IQR] Mexican currency	Probability [CI]	Median [IQR] Mexican currency	Probability [CI]	Median [IQR] Mexican currency
DAPPs users	0.41 [0.37,0.44]	25.0 [14.0,50.0]	0.88 [0.86,0.90]	30.0 [25.0,35.0]	0.97 [0.96,0.98]	200 [115.0,280.0]
Social Security users	0.58 [0.55,0.60]	28.0 [15.0,50.0]	0.02 [0.02,0.03]	60.0 [40.0,125.0]	0.12 [0.11,0.14]	300.0 [120.0,740.0]
Ministry of Health users	0.39 [0.37,0.42]	30.0 [14.0,60.0]	0.11 [0.09,0.12]	42.0 [20.0,85.0]	0.32 [0.30,0.34]	200 [79.0,400.0]
Private medical doctor users	0.51 [0.48,0.54]	50.0 [20.0,100.0]	0.87 [0.85,0.89]	200.0 [100.0,350.0]	0.89 [0.87,0.90]	350.0 [200.0,600.0]
p value corrected by survey design effect	0.941	0.000	0.000	0.000	0.000	0.000

Note: Weighted estimations; p value estimated from linear regression models for the probability reported and quantile regression models in the case of the median expenditure.

DISCUSSION

The main results show that DAPPs resulted in being an important key player in the healthcare sector. The positive effect is the wide acceptance of the public to attend these services because it facilitates access to ambulatory care. However, DAPPs poses a series of challenges to reach the objectives of the current health policies: (i) users pay out-of-pocket for medical visits and medications, counteracting financial protection policies; (ii) the high rate of prescribed medications alarms potential flaws in the quality of care in these facilities, undermining the efforts to improve quality of care; (iii) represents a conflict of interest for healthcare providers given that the medical doctors work for the pharmacies, jeopardizing both financial protection and quality of care.

The public has demonstrated a favourable response for attending DAPPs facilities despite the fact that according to the authorities, almost 80% of the population is affiliated with a public medical insurance. [24] This is congruent with the finding in our study that 25% did not have medical insurance, and this proportion was higher among DAPP users.

The fact that two thirds of DAPP users have medical insurance can have different interpretations. The rapid increase of DAPPs indicates the magnitude of the gap of the public healthcare sector to fulfill the demand in urban and metropolitan areas. DAPP users were willing to pay because these services were apparently inexpensive, conveniently located and with immediate access; also, by attending DAPPs, users avoided long waiting times, inconsiderate healthcare providers and the incomplete provision of prescribed medicines with the public healthcare sector.

DAPPs promote inequity and out-of-pocket expenditures because its users pay for the medications and often for the visit. This undermines the potential gains of the public policy of financial protection. Between 2003 and 2010, the public health spending aimed at people without social security protection increased 81%, whereas the percentage of total health expenditures from out-of-pocket expenditures decreased by 3%, from 52% to 49%. This means that for every percentage point increase in public spending for persons without social security, there was a reduction of 0.04% in out-of-pocket spending. [25] This suggests that despite the increase in public resources for persons without social security, this has not yet reduced out-of-pocket expenditures, which is one of the main objectives of the financial reform. Our data shows that the probability of spending on medicine was higher for DAPP users than for users of other providers. Although the amount they spent is not as large as the out-of-pocket spending of users of private physicians, for those affiliated with a public institution it means additional financial burden. This could be a wake-up call to put into practice innovative and efficient patient-centered health service models focused on providing financial protection.

The presence of DAPPs in the health sector sends the signal that the Mexican regulation has a double standard for private doctors. Current regulations of the Ministry of Health for private pharmacies literally forbid their “direct communication, through windows, doors or aisles, with other businesses, such as doctor’s offices […]” [26]. The rapid expansion of DAPPs shows that this regulation is either imprecise or subject to interpretations, or there is weakness of the health authority to enforce it. This situation could be interpreted as an unspoken public policy of

laissez faire to deal with the dilemma of favoring access to healthcare vs. reinforcing the observance of the regulations.

Despite the fact that ENSANUT 2012 did not gather in-depth quality of care information, the results show that DAPPs users were prescribed an excessive number of medicines. Almost two thirds of users received, on average, three or more medications, despite the fact that most were young and sought ambulatory care for acute health problems, mainly mild acute respiratory illnesses (ARI). Globally, most incidences of inappropriate use of antibiotics occur in ARI. Given the large number of medicines prescribed in DAPPs consultations, it is likely that this may be derived from over-prescription of antibiotics. This requires in-depth analyses.

DAPPs represent a conflict of interest because the pharmacies hire the medical doctors to run the pharmacy-owned examining rooms and link the processes of prescription and sale of medications. According to Brody, "*conflicts of interest, whether individual or organizational, occur when one enters into arrangements that reasonably tempt one to put aside one's primary obligations (patients' safety) in favor of secondary interests, such as financial self-interest".* [27] The staff of DAPPs is being paid a salary plus commissions derived from the prescriptions. [28] This may encourage unjustified prescribing. This assumption is supported by studies from other countries where the merge of medicine prescribing and dispensing [14, 29] or exposure to information from pharmaceutical companies [30] affected prescription choices, prompting physicians to not necessarily act in the best interest of patients, resulting in higher prescribing frequency, higher costs, and lower prescribing quality. The high number of prescribed medications indicates that

medical doctors working for DAPPs may have financial incentives to prescribe certain products. The problem of overprescribing results in poly-pharmacy, increased out-of-pocket expenditures, increased risk of adverse medication reactions and, in the case of antibiotics, resistance. This complex situation jeopardizes the objectives of the policy to sell antibiotics only with a physician's prescription.

The growing presence of DAPPs contributes to the healthcare market failure in the Mexican context. The main health policies are focused on promoting a supplier-induced demand of public health sector services. Although, the quantity of ambulatory healthcare (medical visits and medications) demanded does not equate to the supply by the public health sector. A contributing factor is the asymmetry of information between consumers and providers, which is a feature of health markets and recognised as a cause of market failure. [31] Patients are usually poorly informed consumers who fail to recognize high quality service; for example, in the present study, the interviewees attended DAPPs because it seemed to be convenient, rather than for the high quality of care offered. Availability of Information about healthcare effectiveness and quality of the services is necessary for rational decision-making. It is advisable to collect data and provide to the consumers this type of information in order to enable them to make an informed choice to meet their own individual needs.

Apparently, the public sector has an unrecognized conflict between reinforcing the regulation, promoting high quality care and proper use of medications vs. allowing the growing supply of this type of ambulatory care providers to absorb the spill-over of the demand for consultations and medicines, regardless of the quality and cost.

Little attention is being paid to developing policies aimed at regulating and taking advantage of the role of the private market to enhance competition and improve the quality of healthcare. The findings support the assumption that is necessary to strengthen the stewardship of the MoH in the private sector, along with the urgent need to consolidate a national pharmaceutical policy.

The study has several limitations. It is a secondary data analysis of a cross-sectional study; thus, no longitudinal data are available to ascertain the changes of DAPPs services over time. Also, the available information did not allow in-depth evaluation of the quality of prescriptions. The information was gathered through interviews during home visits; therefore, the quality of the data depends on user recall. To mitigate this potential bias, the questions only addressed the prior 15-day period. Further and detailed information about the contracts and remunerations of DAPPs physicians is necessary in order to better evaluate the magnitude of the conflict of interest.

CONCLUSION

DAPPs have become an important player in Mexican healthcare, but they are an "elephant in the room." This metaphor indicates an obvious truth that is either being ignored, or goes on unaddressed. As was mentioned earlier, DAPPs have been functioning for more than a decade; their number reach 10,000, providing 250,000 medical visits every day. However, their functioning and regulation have been unaddressed by health policies. It was very recently (late 2013), that COFEPRIS (Spanish acronym for the Federal Commission for Protection against Sanitary Risks) issued "Guidelines for good practices" for pharmacies with doctor's offices. These guidelines compile a list of current regulations for pharmacies, on the one

hand, and for ambulatory health services, on the other, but do not address the central issues of preventing conflict of interest, or assessing quality of care. The findings of this study support the notion that DAPPs counteract current financial protection policies since a significant percentage of users were affiliated with a public institution and reported higher out-of-pocket spending and higher number of medicines prescribed than users of other providers. Additionally, these results should prompt to learn more about the quality of care of DAPPs, which may arise from the conflict of interest implicit in the linkage of prescribing and dispensing processes. Addressing these aspects through rigorous studies can provide evidence pertinent to improve the current pharmaceutical policies in Mexico.

CONTRIBUTORS

RPC, MHA, SVD, VJW, AD conceptualized the study. SVD, AD conducted the literature review. RPC, SVD, ESM, VJW, MHA designed the study. ESM analysed the data. RPC, SVD, VJW, ESM, AD, MHA interpreted the data, wrote the manuscript and approved the final draft.

FUNDING

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

COMPETING INTERESTS

There is no financial interest to disclose.

ETHICS STATEMENT

This study is a secondary data analysis of the ENSANUT 2012. The data for the analysis were requested and obtained from the surveys public repository hosted at the National Institute of Public Health webpage at: http://ensanut.insp.mx/. This repository has the data already de-identified; thus it is not possible to trace any of the data to the actual individual. In accordance to the Internal Regulation of the Research Ethics Committee of the National Institute of Public Health, this secondary analysis was considered exempt of approval.

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EFFECTS OF THE EXPANSION OF DOCTORS' OFFICES ADJACENT TO PRIVATE PHARMACIES IN MEXICO: SECONDARY DATA ANALYSIS OF A NATIONAL SURVEY

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Running title: Doctors' offices adjacent to private pharmacies in Mexico

Keywords: *Community pharmacy, Physician prescribing patterns, Conflict of interest, Health expenditures, Mexico.*

Word count: 3, 826

ABSTRACT

Objectives: To compare the sociodemographic characteristics, reasons for attending, perception of quality, and associated out-of-pocket (OOP) expenditures of doctors' offices adjacent to private pharmacies (DAPPs) users with users of Social Security (SS), Ministry of Health (MoH), private doctor's offices independent from pharmacies, and non-users.

Setting: Secondary data analysis of the 2012 National Survey of Health and Nutrition of Mexico.

Participants: The study population comprised 25,852 individuals identified as having had a health problem 15 days before the survey, and a random sample of 12,799 ambulatory health services users.

Outcome measures: Sociodemographic characteristics, reasons for attending healthcare services, perception of quality and associated OOP expenditures.

Results: The distribution of users was as follows: DAPPs (9.2%), SS (16.1%), MoH (20.9%), private providers (15.4%), and nonusers (38.5%); 65% of DAPPs users were affiliated with a public institution (MoH 35%, SS 30%) and 35% reported not having health coverage. DAPPs users considered the services inexpensive, convenient, and with a short waiting time, yet they received ≥3 medications more often (67.2%, 95% Confidence intervals (CI): 64.2-70.1) than users of private doctors (55.7%, 95%CI: 52.5-58.6) and public institutions (SS 53.8%, 95%CI: 51.6-55.9); MoH 44.7%, 95%CI: 42.5-47.0). The probability of spending on consultations (88%, 95%CI: 86-89) and on medicines (97%, 95%CI: 96-98) was much higher for DAPPs users when compared to SS (2%, 95%CI: 2-3

and 12%, 95%CI: 11-14, respectively) and MoH users (11%, 95%CI: 9-12 and 32%, 95%CI:30-34, respectively).

Conclusions: DAPPs counteract current financial protection policies since a significant percentage of its users were affiliated with a public institution, reported higher OOP spending and higher number of medicines prescribed than users of other providers. The overprescription should prompt studies to learn about DAPPs' quality of care, which may arise from the conflict of interest implicit in the linkage of prescribing and dispensing processes.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- This study is the first that uses nationally representative household data to analyze the characteristics of users of doctors' offices adjacent to private pharmacies (DAPPs), their reasons to attend, perception of quality, and associated out-of-pocket expenditures, and runs a comparative analysis with users of other healthcare services.
- This study identified that users of DAPPS: paid out-of-pocket for medical visits and medications, therefore counteracting financial protection policies, and received, on average, higher number of medicines prescribed than users of other healthcare institutions, thus signaling poorer quality of care; For DAPPs medical doctors this situation might reflect a conflict of interest given that they work for the pharmacies.
- The main limitation is that this study is a secondary data analysis, thus with the available information it was not possible to evaluate in-depth the quality of care.

BACKGROUND

In the past decade in Mexico, recognition of inequity in health, disparities in access and utilization of health services, and differences in resource allocation and health expenditures fuelled the implementation of the System for Social Protection of Health (SSPH). The SSPH aims at achieving universal healthcare coverage and financial protection for the population without Social Security. However, in 2010—8 years after its inception—the Mexican total health expenditure accounted for only 6.2% of the gross domestic product [1] from which more than half (51.7%) is financed through out-of-pocket expenditures. Among OECD countries, Mexico's income inequality is the highest. [2]

The complexity of the Mexican healthcare system challenges the success of health policies because the healthcare sector comprises segmented public and private healthcare systems with little interaction. The public sector covers an estimated 78.6% of Mexico's population (~112 million). All formal labour market and government employees receive healthcare from the Social Security institutions (SS), whereas most of the unemployed or self-employed population receives healthcare from the Ministry of Health (MoH), which comprises each of the 32 decentralized MoH facilities in every Mexican state. The private sector provides care for the uninsured population and for up to 31% of those insured who choose to use this system for ambulatory care.

Reaching universal coverage is expected to improve access and protect the population from the financial burden of healthcare. To accomplish these endeavours, the SSPH, which is a non-contributory social health insurance

program, includes access to ambulatory and hospital healthcare in public institutions and provision of no-cost prescribed medications at the point of care. This represents actual financial protection, particularly for low-income groups. [3] SSPH was launched in 2002. By 2011, the program reached 52.6 million affiliates and the benefit package increased from 91 to 284 interventions. This package covers the treatment of ~95% of the causes of visits in primary care clinics and admissions to general hospitals [4]. During the same period, the proportion of patients reporting complete provision of medications at the MoH facilities increased from 55% to 62%, whereas in the SS the increase was from 70% to 87%.[4]

Despite the progress, Mexican policies on access to healthcare and, in particular, to medications still stand at a crossroad and deserve careful analysis. The availability of medicines is a key determinant of access to and utilization of health services. In Mexico, most medications are being paid for with private resources (mostly out-of-pocket) despite the important public investment in healthcare. A recent report has emphasized that for every Mx$100 spent on medications, Mx$79 is being paid with private resources and only Mx$21 with public funds. [5] Furthermore, in 2010 the Mexican authorities enacted a prescription-only requirement policy to enforce the regulation to sell antibiotics only with a physician´s prescription. This policy, aimed at mitigating self-medication, had the unintended consequence of boosting private ambulatory healthcare in the form of doctor's offices adjacent to private pharmacies (DAPPs). [6]

Indeed, since a decade ago, a small number of DAPPs began to operate in some low-cost pharmacy chains but soon after the publication of the antibiotics' policy, a growing number of DAPPs have been observed nationwide. Currently, there are

10,000 DAPPs in the country that provide 250,000 medical visits every day. [7] This emergent phenomenon questions the success of current health policies focused on universal coverage for healthcare and signals the unbalance of the supply and demand for ambulatory healthcare and medicines in the public sector. Furthermore, DAPPs challenges current regulations and norms for doctors' offices and private pharmacies.

The policies to improve access to medicines and safe prescriptions face multiple challenges such as the conflict of interest and may have unanticipated results. Until recently, in Japan and United States, [8] Korea [9] and China [10, 11] among other countries, [12] medical doctors and pharmacists were allowed to prescribe and dispense medicines. Such practices contributed to high medicine utilization; for example, in China almost 50% of the revenues of medical doctors and pharmacists came from pharmaceuticals. [10] Due to the financial incentive, more medicines were dispensed and their selection was influenced by factors other than their quality or cost-effectiveness. The recognition of this problem encouraged the introduction of reforms aimed at separating medicine prescribing and dispensing. In some countries this strategy decreased the irrational use of medicines [13] although in other countries it provoked the practice that health providers hired onsite pharmacists. [14] Because the provider paid a salary to the pharmacists, the provider's incentives and irrational prescription patterns remained unchanged.

In Mexico, expansion of DAPPs indicates that prescribing and dispensing of medicines are related instead of being separated as the international experience suggests. To better understand this situation, the objectives of this study were to compare DAPPs users with users of other services in terms of their characteristics,

reasons for attending specific services, perception of quality, and associated out-of-pocket expenditures.

METHODS

Data source

This study is a secondary data analysis of the 2012 National Survey of Health and Nutrition (ENSANUT 2012). [15] ENSANUT is a complex survey, which is representative at the national, state and urban-rural stratum levels. It was designed to collect data on different health and nutrition conditions and the utilization of ambulatory and hospital care services. ENSANUT 2012 was applied to 194,923 individuals in 50,528 households (response rate of 87%). It was sampled through a probabilistic multistage process. The specific details on the sampling approach of ENSANUT 2012 are published elsewhere. [15]

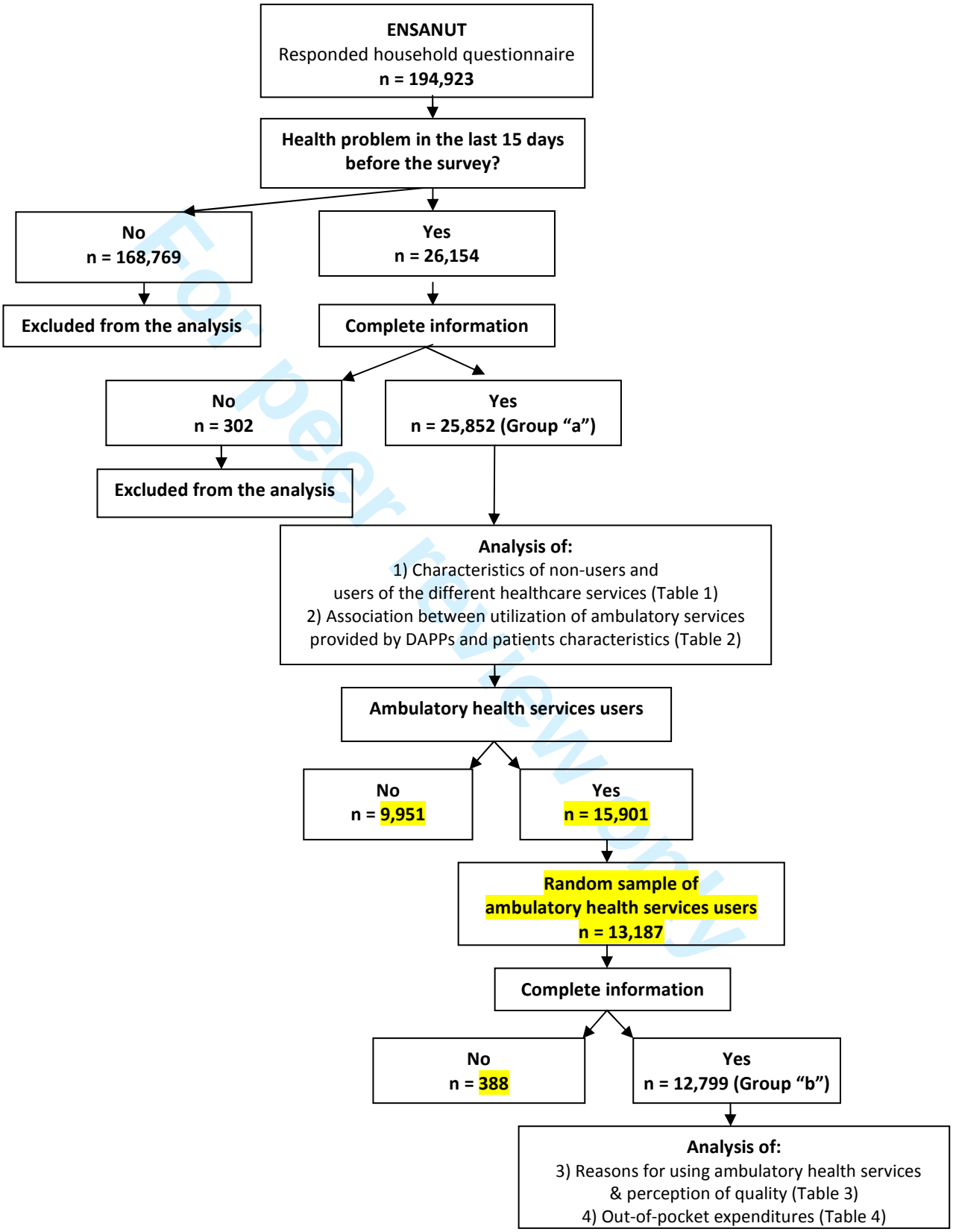
To collect the information for the ENSANUT survey, previously trained interviewers carried out direct, structured face-to-face interviews with key household informants and health services users. The interviewers applied the 5-questionnaire set that ENSANUT 2000 and 2006 used: household, health services use, children, adolescents and adults

Study population, variables and statistical analysis

The present study analyzed the information from the household and health services use questionnaires of ENSANUT 2012. Figure 1 depicts selection of the study population.

[Figure 1. Selection of study population goes here]

Figure 1. Selection of study population



The study population comprised: a) individuals identified as having had a health problem within 15 days before the survey according to the household questionnaire and b) a random sample of ambulatory health services users who answered the health services use questionnaire [14]. The number of individuals who had a health problem was obtained as follows: from the total number of survey participants (194,923 individuals), 26,154 (13.4%) reported having a health problem; after excluding the questionnaires with incomplete information, the final sample was 25,852 individuals. Thus, the non-response rate was 1.2%. Following the same logic, 13,187 health services users were chosen; 12,799 had complete information and 388 (2.9%) did not.

In group "a" we identified five categories of users of healthcare services: 1) doctors' offices adjacent to private pharmacies (DAPPs), 2) SS facilities, 3) MoH facilities, 4) offices of private doctors independent from pharmacies, and 5) non-users or those who reported consulting with a friend, neighbour, family member, homeopaths or other healers. This was the dependent variable.

Data analysis was performed in two stages. In the first stage, the sample "a" served to describe the sociodemographic characteristics and identify the factors associated with the use of DAPPs in comparison to the use of other health services or no use. The analysis included the following independent variables that the literature suggests as related to the use of health services: [16-18] sex (male or female), age group (0-9 years, 10-19 years, 20-64 years and ≥65 years), and years of schooling (0, 1-6, 7-9, and ≥10). The variable of years of schooling was obtained directly from the interview data for subjects 15 years of age and older, and for

individuals younger than 15 years the mean of years of schooling of the household members was used. Other analyzed variables were place of residence (rural, urban or metropolitan); ethnicity of the head of household; [19] degree of marginalization (very low/low, middle, high/very high) following the 2010 marginalization index (based on access to basic infrastructure services, housing conditions, education attainment, and wage earnings) at locality level [20]; type of medical insurance (SS, SSPH, private or none); and socioeconomic status (SES). The SES was determined classifying the population in quintiles; the information to ascertain the SES included possession of different assets, services and characteristics of the household infrastructure. [21, 22] The SES index was constructed using a principal components analysis with polychoric correlation matrices. Additionally, type of health problem (acute, chronic or other) and perception of severity (mild or moderate/severe) of health problem were analyzed.

The factors associated with the use of a specific healthcare provider were modeled using a multinomial logistic regression [23] in which the dependent variable included the five categories of health services users described before. The non-users, which represented 38.5% of the sample, were used as the reference category. In addition to the sociodemographic characteristics, the model was adjusted for the geographic region of state of residence (Northwest, Northeast, Central-North, East, West, Central-South, Southwest, Southeast). The results were reported in odds ratios (OR). The hypothesis tests on the OR estimated were performed at 1, 5 and 10% confidence levels. We report various statistical goodness of fit and reliability of the estimated models [Akaike criteria (AIC), log-likelihood, LR-χ^2, and R^2-McFadden].

The second stage of the analysis focused on sample “b” of health services users. Participants in this part of the survey were asked about the characteristics of the healthcare received and their perceptions of the quality of care. The descriptive analysis comprised the main reasons for using specific healthcare services, the percentage of users who received information about their diagnosis, number of prescribed medicines (0, 1, 2, or 3 or more), percentage of users who received and understood the information about prescribed medicines, perception regarding the quality of care received, willingness to return to the same healthcare institution in the future, and reasons for dissatisfaction with health care (e.g., lack of improvement in health, high costs, remote services, long waiting time). We also analyzed out-of-pocket expenditures for transportation from home to healthcare facilities, healthcare visits and medicines. The amount was reported in local currency (Mexican pesos). To estimate the median and interquartile range (IQR) of waiting time and out-of-pocket expenditures by type of health care provider, the quantile regression model at the population level was utilized. All statistical analyses were performed using the statistical package STATA 12.1.

RESULTS

Table 1 summarizes the characteristics of users of different healthcare services. Overall, 61.5% of participants who were reported to have had a health problem seek care with a health provider according to the following distribution: MoH (20.9%), SS (16.1%), private providers (15.4%) and DAPPs (9.2%).

Table 1. Characteristics of users and non-users of the different healthcare services, Mexico 2012*

	DAPPs	Social Security	Ministry of Health	Private doctors	Non-users	
Observations						
Sample	2,387	4,148	5,390	3,976	9,951	*p-value corrected by survey design effect*
%	9.2	16.1	20.9	15.4	38.5	
Weighted	1,715,838	2,775,195	2,709,387	2,884,34	5,967,254	
%	10.7	17.3	16.9	18.0	37.2	
			Estimation [95% CI]			
Male (vs. female)	44.7 [42.0,47.5]	41.0 [39.0,43.0]	40.3 [38.6,42.2]	45.0 [42.8,47.2]	46.4 [45.1,47.7]	0.00
Years of age						
0-9	35.3 [32.3,38.4]	18.2 [16.5,20.1]	29.1 [27.3,31.0]	30.6 [28.6,32.7]	19.6 [18.5,20.8]	0.00
10-19	16.5 [14.5,18.7]	9.2 [8.1,10.5]	13.7 [12.5,15.0]	11.9 [10.7,13.2]	16.4 [15.5,17.4]	
20-64	43.5 [40.6,46.5]	56.4 [54.2,58.7]	46.8 [45.0,48.6]	48.0 [45.9,50.1]	56.0 [54.6,57.4]	
≥65	4.8 [3.6,6.2]	16.1 [14.4,17.9]	10.4 [9.3,11.7]	9.5 [8.4,10.7]	8.0 [7.2,8.8]	
Years of schooling						
0	3.8 [2.9,4.9]	7.1 [6.1,8.3]	11.1 [10.0,12.4]	6.5 [5.6,7.5]	8.1 [7.4,8.9]	0.00
1-6	46.2 [43.0,49.4]	36.9 [34.5,39.4]	54.1 [52.0,56.3]	36.3 [34.0,38.7]	42.7 [41.0,44.4]	
7-9	28.8 [26.1,31.7]	25.6 [23.5,27.8]	22.0 [20.2,23.8]	25.5 [23.7,27.4]	25.6 [24.3,26.8]	
≥10	21.3 [18.7,24.1]	30.4 [28.3,32.5]	12.8 [11.4,14.4]	31.7 [29.3,34.2]	23.6 [22.1,25.2]	
Rural residence (vs. Urban or metropolitan)	10.6 [8.9,12.5]	9.5 [8.0,11.2]	39.0 [36.3,41.7]	18.1 [16.4,20.0]	24.0 [22.2,25.8]	0.00
Locality deprivation level						
Very low/low	81.2 [78.3,83.8]	85.8 [83.8,87.7]	50.2 [47.0,53.4]	72.8 [70.2,75.3]	65.1 [62.5,67.6]	0.00
Middle	9.7 [7.7,12.1]	8.0 [6.4,9.8]	13.8 [11.8,16.2]	11.4 [9.5,13.8]	11.7 [9.8,13.9]	
High/very high	9.1 [7.3,11.3]	6.2 [5.0,7.7]	36.0 [32.8,39.3]	15.7 [13.8,18.0]	23.3 [21.0,25.7]	
Ethnicity: Indigenous	2.9 [2.2,3.9]	3.5 [2.7,4.6]	11.9 [10.0,14.1]	6.2 [4.9,7.9]	8.8 [7.4,10.3]	0.00
Quintile of socioeconomic status						
1st	8.3 [6.5,10.5]	4.1 [3.3,5.1]	24.5 [22.4,26.9]	8.1 [7.0,9.4]	16.7 [15.3,18.2]	0.00
2nd	18.5 [15.9,21.5]	10.9 [9.6,12.3]	26.2 [24.3,28.2]	11.8 [10.4,13.4]	21.0 [19.4,22.6]	
3rd	22.4 [19.4,25.7]	19.3 [17.6,21.2]	20.1 [18.3,22.0]	15.7 [14.1,17.4]	20.3 [18.9,21.8]	
4th	26.3 [22.9,30.1]	25.6 [23.4,27.9]	16.8 [15.0,18.7]	24.7 [22.3,27.1]	19.4 [17.9,21.1]	
5th	24.5 [21.1,28.2]	40.1 [37.3,42.8]	12.5 [10.7,14.5]	39.8 [37.0,42.7]	22.5 [20.7,24.5]	
Medical Insurance (MI)						
Social Security	29.5 [26.6,32.7]	94.3 [93.2,95.3]	6.8 [5.7,8.1]	39.1 [36.6,41.8]	31.5 [29.7,33.3]	0.00
SSPH	35.4 [32.1,38.8]	3.0 [2.3,3.8]	81.1 [79.3,82.9]	25.6 [23.6,27.8]	41.4 [39.6,43.1]	
Private insurance	0.0 [0.0,0.2]	0.1 [0.0,0.3]	0.0 [0.0,1.7]	1.0 [2.9,0.3]	0.1 [0.5,0.0]	
No MI	35.1 [31.6,38.7]	2.6 [2.0,3.4]	12.1 [10.7,13.6]	33.5 [31.0,36.1]	26.9 [25.6,28.3]	
Type of health problem						
Acute health problems	80.4 [77.7,83.0]	58.5 [56.3,60.6]	65.7 [63.7,67.7]	71.0 [68.9,73.1]	81.0 [79.7,82.3]	0.00
Chronic health problems	14.1 [12.0,16.5]	29.8 [27.7,32.0]	24.3 [22.5,26.1]	20.1 [18.4,22.0]	10.2 [9.4,11.1]	
Other health problems	5.5 [4.3,7.0]	11.8 [10.4,13.3]	10.0 [8.9,11.3]	8.9 [7.8,10.1]	8.8 [8.0,9.6]	
Perception of severity of health problem						
Mild	44.2 [41.1,47.4]	37.1 [34.9,39.4]	40.4 [38.3,42.5]	36.2 [34.0,38.5]	63.6 [61.9,65.2]	0.00
Moderate/severe	55.8 [52.6,58.9]	62.9 [60.6,65.1]	59.6 [57.5,61.7]	63.8 [61.5,66.0]	36.4 [34.8,38.1]	

Difference estimates performed considering the effect of the survey design.

1 The variable of years of schooling was obtained directly from the interview data for subjects 15 years of age and older, and for individuals younger than 15 years the mean of years of schooling of the household members was used.

When the sample was stratified by insurance coverage, the results showed that a significant percentage of users with SS or SSPH insurance attended private services or DAPPs. Among DAPPs users, 30% and 35% reported as having SS or SSPH coverage, respectively. Similarly, among private physician users, 39% had SS and 26% had SSPH coverage.

DAPPs users were economically better off than those who went to MoH facilities. In comparison to the users of other health services and non-users, DAPPs users were younger (51% were between 0 and 19 years old), with higher educational level than MoH users and lower educational level than SS users. Most DAPPs users lived in urban and metropolitan areas with a low level of deprivation (89% for the former and 81% for the latter), whereas only 61% of MoH users lived in these areas and 50% had low level of deprivation. 3% of DAPPs users were indigenous vs. 12% of indigenous users receiving care from the MoH. DAPPs users were equally distributed among the different socioeconomic levels. This is in contrast with MoH users who were concentrated according to the poorest quintiles, whereas SS and private services users were in the richest quintiles. Furthermore, acute health problems encouraged more frequent attendance to DAPPs (80%) in comparison with other groups. The users sought healthcare in the institutions in which they were affiliated if they perceived that the problem was moderate to severe.

Table 2 shows the multinomial model that confirms that users of DAPPs were younger, mostly from urban and metropolitan areas and presented an acute

condition. Furthermore, those with SSPH insurance were more likely to visit DAPPs than private clinics.

Table 2. Multinomial model of the association between utilization of services provided by DAPPs and patient characteristics, Mexico 2012

	Reference category: Non- users Odds ratios (95% CI) reported			
	DAPPs	**Social Security**	**Ministry of Health**	**Private doctors**
Sex (Ref.: female)				
Male	0.863**	0.872**	0.798**	0.920*
	[0.786,0.947]	[0.798,0.952]	[0.742,0.859]	[0.850,0.996]
Years of age (Ref.: ≥65)				
≤9	3.739**	1.320**	2.061**	2.264**
	[2.986,4.683]	[1.114,1.562]	[1.771,2.398]	[1.932,2.654]
10-19	1.761**	0.623**	1.104	0.676**
	[1.388,2.235]	[0.514,0.754]	[0.939,1.298]	[0.566,0.808]
20-64	1.249*	0.769**	0.880+	0.653**
	[1.008,1.547]	[0.665,0.890]	[0.770,1.006]	[0.566,0.753]
Years of schooling (Ref.: 0 years)				
1-6	1.236+	1.067	1.051	0.917
	[0.981,1.558]	[0.887,1.282]	[0.921,1.200]	[0.780,1.078]
7-9	1.334*	1.069	1.050	1.264**
	[1.046,1.702]	[0.875,1.307]	[0.904,1.221]	[1.059,1.509]
≥10	1.309*	1.054	1.057	1.581**
	[1.017,1.685]	[0.860,1.291]	[0.891,1.253]	[1.316,1.898]
Place of residence (Ref.: urban or metropolitan)				
Rural	0.637**	0.838*	1.358**	1.025
	[0.552,0.736]	[0.732,0.959]	[1.234,1.494]	[0.918,1.145]
Locality deprivation level (Ref.: low, very low level)				
Middle	0.818**	1.084	1.051	1.421**
	[0.703,0.952]	[0.936,1.256]	[0.936,1.180]	[1.254,1.611]
High, very high	0.551**	0.858+	0.978	1.278**
	[0.464,0.655]	[0.720,1.022]	[0.869,1.102]	[1.116,1.464]
Ethnicity (Ref.:non-indigenous)				
Indigenous	0.647**	0.959	1.171**	1.014
	[0.519,0.806]	[0.782,1.175]	[1.039,1.319]	[0.870,1.182]
Quintile of socioeconomic status (Ref.: 5th)				
1st	0.497**	0.669**	1.120	0.224**
	[0.406,0.608]	[0.546,0.818]	[0.957,1.311]	[0.189,0.264]
2nd	0.834*	0.886	1.176*	0.345**
	[0.712,0.977]	[0.764,1.028]	[1.016,1.361]	[0.301,0.396]
3rd	0.949	0.966	1.088	0.462**
	[0.819,1.100]	[0.846,1.103]	[0.940,1.258]	[0.408,0.524]
4th	1.080	1.034	1.157+	0.711**
	[0.936,1.246]	[0.915,1.169]	[0.996,1.343]	[0.633,0.799]
Medical insurance (Ref.: no insurance)				
Social Security	0.676**	27.495**	0.514**	0.871**
	[0.597,0.765]	[22.495,33.607]	[0.440,0.599]	[0.785,0.966]
SSPH	0.769**	0.802+	3.822**	0.596**
	[0.686,0.862]	[0.625,1.029]	[3.444,4.241]	[0.539,0.659]
Type of health problem (Ref.: chronic health problems)				
Acute	0.730**	0.298**	0.364**	0.425**
	[0.630,0.847]	[0.264,0.336]	[0.327,0.405]	[0.380,0.476]
Other	0.566**	0.502**	0.435**	0.530**
	[0.451,0.710]	[0.424,0.595]	[0.376,0.504]	[0.451,0.623]
Perception of health problem (Ref.: mild health problem)				
Moderate/severe	2.336**	2.663**	2.192**	3.044**
	[2.123,2.571]	[2.430,2.918]	[2.032,2.364]	[2.802,3.307]
Observations				*25,620*
AIC				*61,461*
Log likelihood				*-30,618*
LR $\chi 2$				*15,399*
Prob >$\chi 2$				*0.000*
McFadden R^2				*0.201*

Note: Persons with private medical insurance were excluded.

**p<0.01,*p<0.05;+p<0.10.

The reasons for using specific health services and perception of quality of care are presented in Table 3. The top three reasons for using DAPPs were that these services were inexpensive, conveniently located and had a short waiting time; whereas the main reason to use SS and MoH services was to have an affiliation with such institutions. Users of private doctors mentioned more often (29%) that they knew the doctor and liked the care provided as the main reasons for attending the private doctor's office.

Regarding the average number of medicines per encounter, DAPPs users received ≥3 medicines more often (67%) than users of private doctors (56%) and public institutions (SS 54%; MoH 45%). A higher percentage of DAPPs and private practice users received information about the diagnosis and prescribed medicines than those of public institutions. DAPPs users also had better perception of the quality of healthcare (good/very good quality: DAPPs 89%, private doctor 93%) than other users (SS 78%; MoH 83%) and would return to the same healthcare provider. The main reason for not returning to DAPPs was lack of health improvement. For the SS and MoH, the reasons for not returning were long waiting time, inconsiderate healthcare providers and incomplete provision of prescribed medicines.

Table 3. Reasons for using ambulatory health services of different providers and perception of quality, Mexico 2012*

	DAPPs	Social Security	Ministry of Health	Private doctors	*p-value corrected by survey design effect*
Observations					
Sample	1,778	3,840	4,569	2,612	
%	13.89	30	35.7	20.41	
Weighted	1,504,746	2,912,390	2,602,144	2,128,578	
%	16.45	31.84	28.45	23.27	
	Estimation [95% CI]				
Main reasons for using specific healthcare services					
Having insurance	1.5 [0.7,2.2]	88.5 [86.8,90.2]	59.4 [57.0,61.8]	2.7 [1.9,3.6]	0.00
Convenient to home	32.5 [29.1,36.0]	6.3 [5.1,7.4]	25.2 [23.3,27.2]	16.6 [14.4,18.8]	0.06
Inexpensive	33.6 [30.0,37.2]	10.2 [8.6,11.9]	22.1 [20.2,24.0]	4.7 [3.7,5.8]	0.00
Familiar with the doctor	8.1 [5.5,10.7]	2.1 [1.4,2.7]	2.7 [1.8,3.6]	29.1 [26.2,31.9]	0.00
User likes care provided	16.0 [12.9,19.1]	6.0 [5.0,7.1]	8.2 [7.1,9.4]	28.2 [25.7,30.8]	0.00
Short waiting time	26.5 [23.5,29.6]	2.3 [1.6,3.0]	2.8 [2.1,3.4]	22.1 [19.7,24.5]	0.68
Other	18.7 [16.0,21.4]	4.8 [3.7,5.9]	10.2 [8.7,11.8]	24.2 [21.6,26.7]	0.00
Quality of health care					
Number of prescribed medicines					
0	1.6 [0.9,2.8]	10.3 [9.0,11.8]	11.1 [9.8,12.5]	5.4 [4.2,6.8]	0.00
1	8.3 [6.7,10.3]	10.7 [9.4,12.3]	12.0 [10.8,13.3]	9.9 [8.3,11.6]	
2	22.9 [20.3,25.7]	25.2 [23.2,27.3]	32.2 [30.2,34.3]	29.1 [26.7,31.6]	
≥3	67.2 [64.2,70.1]	53.8 [51.6,55.9]	44.7 [42.5,47.0]	55.7 [52.8,58.6]	
% of users who received information about their diagnosis	90.3 [87.8,92.3]	84.3 [82.5,85.9]	84.5 [82.9,85.9]	92.7 [90.9,94.1]	0.00
% of users who received information about prescribed medications	92.3 [90.0,94.0]	85.5 [83.8,87.0]	86.8 [85.3,88.2]	93.7 [92.1,95.0]	0.00
Perception about the quality of health care services					
Good/Very good	88.8 [86.4,90.8]	77.7 [75.5,79.7]	83.1 [81.4,84.7]	93.2 [91.5,94.5]	0.00
Regular	10.2 [8.2,12.5]	16.7 [14.9,18.6]	13.4 [12.0,14.9]	5.7 [4.6,7.1]	
Bad/very bad	1.1 [0.6,1.9]	5.7 [4.6,7.0]	3.5 [2.8,4.5]	1.1 [0.5,2.4]	
Users who will return to the same place for healthcare	90.1 [87.3,92.4]	81.8 [79.8,83.7]	87.7 [86.1,89.1]	93.4 [91.8,94.7]	0.00
Reasons for not returning					
Inconsiderate healthcare providers	4.7 [2.3,9.7]	32.0 [27.1,37.3]	25.4 [20.0,31.7]	9.1 [3.9,19.8]	0.00
Disagree with the diagnosis or treatment	16.4 [10.4,25.0]	18.9 [14.6,24.1]	15.7 [12.1,20.1]	23.7 [14.6,36.1]	0.44
Lack of health improvement	27.9 [17.1,41.9]	18.7 [14.6,23.8]	16.9 [12.6,22.3]	32.0 [21.5,44.6]	0.03
High cost of healthcare services	9.8 [4.4,20.5]	0.5 [0.1,1.6]	1.4 [0.7,2.6]	19.7 [11.3,32.2]	0.00
Failure to provide or incomplete provision of prescribed medications	3.3 [1.2,8.6]	20.6 [16.1,25.9]	20.8 [16.0,26.5]	0.2 [0.0,1.3]	0.00
Failure to provide information about the health problem & treatment	11.4 [5.9,21.1]	14.0 [10.8,18.0]	8.6 [5.1,14.1]	4.0 [1.9,8.1]	0.04
Long waiting time	2.4 [0.8,7.1]	40.5 [34.6,46.7]	31.7 [25.9,38.1]	2.2 [0.8,6.2]	0.00
Other reasons	5.3 [2.6,10.6]	11.1 [7.9,15.3]	8.4 [5.8,12.2]	2.3 [0.9,6.0]	0.01
Waiting time (in minutes) Median of [IQR]**	10.0 [5.0-25.0]	30.0 [15.0,90.0]	60.0 [15.0,120]	10.0 [5.0,30.0]	0.00

*Difference estimates performed considering the effect of the survey design.

**p value estimated from quantile regression models.

Table 4 shows out-of-pocket expenditures for attending ambulatory care. DAPPs and MoH users were less likely to pay for transportation (41% and 39%) than SS and private doctors' users (58% and 51%). Also, DAPPs users spent less on transportation (MXN25.00) when compared to other users. The probability of spending on consultations (88% and 87%) and on medicines (97% and 89%) was much higher for DAPPs and private clinic users when compared to other users; the lowest probability was for users affiliated with the SS (2% and 12% respectively). DAPPs users spent less on consultation and medicines (average cost of consultation was Mx$30; average cost of medicines was Mx$200) than private doctors' users (consultation Mx$200, medicines MX$350).

Table 4. Out-of-pocket expenditures to attend ambulatory healthcare, Mexico 2012

	Transportation expenditures		Medical visit expenditures		Medicine expenditures	
	Probability [CI]	Median [IQR] Mexican currency	Probability [CI]	Median [IQR] Mexican currency	Probability [CI]	Median [IQR] Mexican currency
DAPPs users	0.41 [0.37,0.44]	25.0 [14.0,50.0]	0.88 [0.86,0.90]	30.0 [25.0,35.0]	0.97 [0.96,0.98]	200 [115.0,280.0]
Social Security users	0.58 [0.55,0.60]	28.0 [15.0,50.0]	0.02 [0.02,0.03]	60.0 [40.0,125.0]	0.12 [0.11,0.14]	300.0 [120.0,740.0]
Ministry of Health users	0.39 [0.37,0.42]	30.0 [14.0,60.0]	0.11 [0.09,0.12]	42.0 [20.0,85.0]	0.32 [0.30,0.34]	200 [79.0,400.0]
Private medical doctor users	0.51 [0.48,0.54]	50.0 [20.0,100.0]	0.87 [0.85,0.89]	200.0 [100.0,350.0]	0.89 [0.87,0.90]	350.0 [200.0,600.0]
p value corrected by survey design effect	0.941	0.000	0.000	0.000	0.000	0.000

Note: Weighted estimations; p value estimated from linear regression models for the probability reported and quantile regression models in the case of the median expenditure.

DISCUSSION

The main results show that DAPPs resulted in being an important key player in the healthcare sector. The positive effect is the wide acceptance of the public to attend these services because it facilitates access to ambulatory care. However, DAPPs poses a series of challenges to reach the objectives of the current health policies: (i) users pay out-of-pocket for medical visits and medications, counteracting financial protection policies; (ii) the high rate of prescribed medications alarms potential flaws in the quality of care in these facilities, undermining the efforts to improve quality of care; (iii) represents a conflict of interest for healthcare providers given that the medical doctors work for the pharmacies, jeopardizing both financial protection and quality of care.

The public has demonstrated a favourable response for attending DAPPs facilities despite the fact that according to the authorities, almost 80% of the population is affiliated with a public medical insurance. [24] This is congruent with the finding in our study that 25% did not have medical insurance, and this proportion was higher among DAPP users.

The fact that two thirds of DAPP users have medical insurance can have different interpretations. The rapid increase of DAPPs indicates the magnitude of the gap of the public healthcare sector to fulfill the demand in urban and metropolitan areas. DAPP users were willing to pay because these services were apparently inexpensive, conveniently located and with immediate access; also, by attending DAPPs, users avoided long waiting times, inconsiderate healthcare providers and the incomplete provision of prescribed medicines with the public healthcare sector.

DAPPs promote inequity and out-of-pocket expenditures because its users pay for the medications and often for the visit. This undermines the potential gains of the public policy of financial protection. Between 2003 and 2010, the public health spending aimed at people without social security protection increased 81%, whereas the percentage of total health expenditures from out-of-pocket expenditures decreased by 3%, from 52% to 49%. This means that for every percentage point increase in public spending for persons without social security, there was a reduction of 0.04% in out-of-pocket spending. [25] This suggests that despite the increase in public resources for persons without social security, this has not yet reduced out-of-pocket expenditures, which is one of the main objectives of the financial reform. Our data shows that the probability of spending on medicine was higher for DAPP users than for users of other providers. Although the amount they spent is not as large as the out-of-pocket spending of users of private physicians, for those affiliated with a public institution it means additional financial burden. This could be a wake-up call to put into practice innovative and efficient patient-centered health service models focused on providing financial protection.

The presence of DAPPs in the health sector sends the signal that the Mexican regulation has a double standard for private doctors. Current regulations of the Ministry of Health for private pharmacies literally forbid their “direct communication, through windows, doors or aisles, with other businesses, such as doctor’s offices […]” [26]. The rapid expansion of DAPPs shows that this regulation is either imprecise or subject to interpretations, or there is weakness of the health authority to enforce it. This situation could be interpreted as an unspoken public policy of

laissez faire to deal with the dilemma of favoring access to healthcare vs. reinforcing the observance of the regulations.

Despite the fact that ENSANUT 2012 did not gather in-depth quality of care information, the results show that DAPPs users were prescribed an excessive number of medicines. Almost two thirds of users received, on average, three or more medications, despite the fact that most were young and sought ambulatory care for acute health problems, mainly mild acute respiratory illnesses (ARI). Globally, most incidences of inappropriate use of antibiotics occur in ARI. Given the large number of medicines prescribed in DAPPs consultations, it is likely that this may be derived from over-prescription of antibiotics. This requires in-depth analyses.

DAPPs represent a conflict of interest because the pharmacies hire the medical doctors to run the pharmacy-owned examining rooms and link the processes of prescription and sale of medications. According to Brody, "*conflicts of interest, whether individual or organizational, occur when one enters into arrangements that reasonably tempt one to put aside one's primary obligations (patients' safety) in favor of secondary interests, such as financial self-interest".* [27] The staff of DAPPs is being paid a salary plus commissions derived from the prescriptions. [28] This may encourage unjustified prescribing. This assumption is supported by studies from other countries where the merge of medicine prescribing and dispensing [14, 29] or exposure to information from pharmaceutical companies [30] affected prescription choices, prompting physicians to not necessarily act in the best interest of patients, resulting in higher prescribing frequency, higher costs, and lower prescribing quality. The high number of prescribed medications indicates that

medical doctors working for DAPPs may have financial incentives to prescribe certain products. The problem of overprescribing results in poly-pharmacy, increased out-of-pocket expenditures, increased risk of adverse medication reactions and, in the case of antibiotics, resistance. This complex situation jeopardizes the objectives of the policy to sell antibiotics only with a physician's prescription.

The growing presence of DAPPs contributes to the healthcare market failure in the Mexican context. The main health policies are focused on promoting a supplier-induced demand of public health sector services. Although, the quantity of ambulatory healthcare (medical visits and medications) demanded does not equate to the supply by the public health sector. A contributing factor is the asymmetry of information between consumers and providers, which is a feature of health markets and recognised as a cause of market failure. [31] Patients are usually poorly informed consumers who fail to recognize high quality service; for example, in the present study, the interviewees attended DAPPs because it seemed to be convenient, rather than for the high quality of care offered. Availability of Information about healthcare effectiveness and quality of the services is necessary for rational decision-making. It is advisable to collect data and provide to the consumers this type of information in order to enable them to make an informed choice to meet their own individual needs.

Apparently, the public sector has an unrecognized conflict between reinforcing the regulation, promoting high quality care and proper use of medications vs. allowing the growing supply of this type of ambulatory care providers to absorb the spill-over of the demand for consultations and medicines, regardless of the quality and cost.

Little attention is being paid to developing policies aimed at regulating and taking advantage of the role of the private market to enhance competition and improve the quality of healthcare. The findings support the assumption that is necessary to strengthen the stewardship of the MoH in the private sector, along with the urgent need to consolidate a national pharmaceutical policy.

The study has several limitations. It is a secondary data analysis of a cross-sectional study; thus, no longitudinal data are available to ascertain the changes of DAPPs services over time. Also, the available information did not allow in-depth evaluation of the quality of prescriptions. The information was gathered through interviews during home visits; therefore, the quality of the data depends on user recall. To mitigate this potential bias, the questions only addressed the prior 15-day period. Further and detailed information about the contracts and remunerations of DAPPs physicians is necessary in order to better evaluate the magnitude of the conflict of interest.

CONCLUSION

DAPPs have become an important player in Mexican healthcare, but they are an "elephant in the room." This metaphor indicates an obvious truth that is either being ignored, or goes on unaddressed. As was mentioned earlier, DAPPs have been functioning for more than a decade; their number reach 10,000, providing 250,000 medical visits every day. However, their functioning and regulation have been unaddressed by health policies. It was very recently (late 2013), that COFEPRIS (Spanish acronym for the Federal Commission for Protection against Sanitary Risks) issued "Guidelines for good practices" for pharmacies with doctor's offices. These guidelines compile a list of current regulations for pharmacies, on the one

hand, and for ambulatory health services, on the other, but do not address the central issues of preventing conflict of interest, or assessing quality of care. The findings of this study support the notion that DAPPs counteract current financial protection policies since a significant percentage of users were affiliated with a public institution and reported higher out-of-pocket spending and higher number of medicines prescribed than users of other providers. Additionally, these results should prompt to learn more about the quality of care of DAPPs, which may arise from the conflict of interest implicit in the linkage of prescribing and dispensing processes. Addressing these aspects through rigorous studies can provide evidence pertinent to improve the current pharmaceutical policies in Mexico.

CONTRIBUTORS

RPC, MHA, SVD, VJW, AD conceptualized the study. SVD, AD conducted the literature review. RPC, SVD, ESM, VJW, MHA designed the study. ESM analysed the data. RPC, SVD, VJW, ESM, AD, MHA interpreted the data, wrote the manuscript and approved the final draft.

FUNDING

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

COMPETING INTERESTS

There is no financial interest to disclose.

ETHICS STATEMENT

This study is a secondary data analysis of the ENSANUT 2012. The data for the analysis were requested and obtained from the surveys public repository hosted at the National Institute of Public Health webpage at: http://ensanut.insp.mx/. This repository has the data already de-identified; thus it is not possible to trace any of the data to the actual individual. In accordance to the Internal Regulation of the Research Ethics Committee of the National Institute of Public Health, this secondary analysis was considered exempt of approval.

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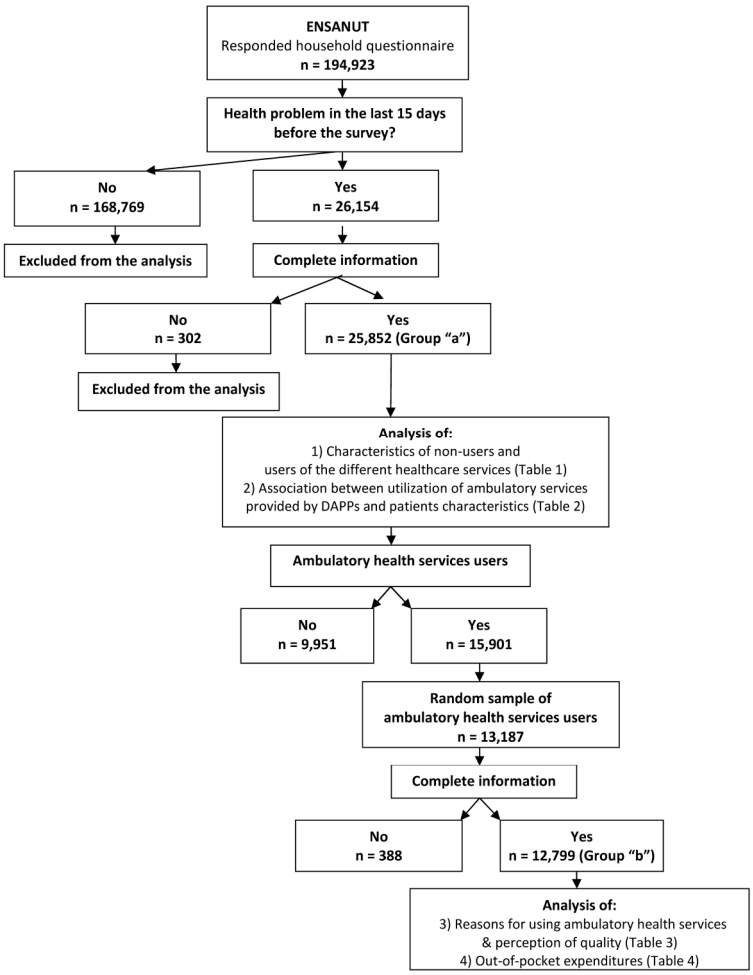

Selection of study population
173x231mm (300 x 300 DPI)