Extracting low-cost signals of quality control in community pharmacies: a simulated client study in Bogotá

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Abstract

Objectives: Determine whether there is differentiation on service quality accross community pharmacies in Bogota.

Methods: We use the simulated client methodology (N=298) to assess whether Bogota's community pharmacies comply with prescription rules related to contraceptive medications. Simulated clients requested a specific brand of contraceptive pills for their young sister.

Results: One per cent of the staff at the pharmacy asked for a prescription when the pills were requested. Five per cent of the staff made additional questions that signal knowledge or interest in correct delivery of pills (e.g., the sister's age or if the pills were prescribed for acne). We do not find differences by socio-economic level or type of ownership of the pharmacy (large firm *versus* independent). Independent pharmacies were less likely to portray a diploma of their chemist, and the likelihood that their staff wore white coats was also lower.

Conclusions: Bogota's community pharmacies differentiation on quality appears to be related to simple signals associated with a professional image, but not with actual procedures that guarantee the safety of consumers.

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1   Introduction

Community pharmacies are key members of LMICs health systems as they are often the first line of contact of citizens with the health sector (World Health Organization, 1997). In the pursue of universal health coverage, pharmacies need to meet some basic standard of quality, and it is usually hard to measure in LMICs given the absence or quality of administrative data sources (Das et al., 2016). In these contexts, methods such as simulated clients and standardised patients (Madden et al., 1997; Watson et al., 2006; Kwan et al., 2019) can provide measures on quality of healthcare in a first-hand, standardised, and controlled fashion relying on observed behaviour. The use of the simulated client methodology (SCM) is becoming extensively employed to evaluate dispensing and sales of antibiotics, and knowledge and management of diarrhoea and STDs in pharmacies (Smith, 2009; Wafula et al., 2012; Miller and Goodman, 2016).

The general lesson is that quality standards are often deficient. In the South American case, the picture looks more worrying: 78% of antibiotics are supplied without prescription, compared to 62% worldwide average level (Auta et al., 2019). In the Colombian case, Vacca et al. (2011) find that 80% of the sampled pharmacies in Bogotá do not demand a prescription. In a related survey-based study conducted with pharmacy vendors Castro Espinosa and Molineros (2018), 58% of the respondents declared that clients "hardly ever" present the prescription, and 62% directly recommend the use of antibiotics.

The purpose of this study is to explore prescription control in the case of contraceptive pills. Although the prescription is required, we expect less control in the case of contraceptives for two reasons: its excessive use does not pose a global collective problem, as in the case of antibiotics (Hollis and Maybarduk, 2015; Roope et al., 2019); and its regularity in consumption. We implement the SCM in a sample of community pharmacies in Bogotá, a city with more than 3,000 community pharmacies.[1]

We devised a script in which the simulated client enters a pharmacy and asked for a specific brand of contraceptive pills, that was prescribed to her younger sister. We collected information on whether the medical prescription was requested by the vendor, whether the operating banner was placed in a visible place in the pharmacy, whether the vendor wore a white coat, and whether the inventory was handled with a computer, an electronic cash register, or manually (i.e., a notebook or a non-computerized cash register). The first of these metrics is standard in the studies employing the SCM. The remaining three are included in our report because they can be interpreted as additional signals of quality standards in the community pharmacies.

We find very small compliance rates with the request of the prescription of the contraceptive pills (1%). For low-cost signals of quality, associated with a professional image and not with the delivery procedures, we find higher compliance: diplomas for the handling of pharmaceutical products are visible in 32% of the audited pharmacies, and 85% of vendors wore a white coat during the visit.

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[1] https://perma.cc/Y9Q4-UYVY

2   Context: Bogotá community pharmacies market

There are three medicine supply systems in Colombia: the institutional sector (directed to health care providers), the mandatory-insurers sector, and the private sector. Community pharmacies are part of the private sector, a standard retail market which has a single supply chain. Community pharmacies can be fully integrated into a large firm which buys from laboratories and pharmaceutical importers (a *chain*), but and can also be independent but affiliated with large cooperatives which act as single-buyers in the wholesale market (Mendoza-Ruiz et al., 2017). If a consumer has a prescription from their mandatory-insurer (nearly universal coverage of the system), they could visit their insurer pharmacy but also use the prescription to get most medications in their local community pharmacy. Insurer pharmacies, with restricted locations, provide exact quantities, have fixed prices depending on income, and provide no choice between brands of the prescribed medicines. Moreover, they are not allowed to sell over-the-counter medications (OTC) or any other type of product. Therefore the main role of community pharmacies is to act as convenience stores that allow consumers to get medication close to their homes or workplace, and choose between brands of these products. Community pharmacies also sell OTC and often provide other products such as ice-creams or beauty products (Gutiérrez et al., 2020).

Regulation makes clear that medication should be sold under clear and non-amended prescriptions (*Decreto 1950 de 1964*), except if the box has a clear sign indicating that the product is OTC. In terms of personnel, pharmacies require a licensed technical director (community pharmacist) trained in either pharmaceutical chemistry or pharmacy management, which could be obtained after formal vocational or professional college-level studies (*Decreto 780 de 2016*). Qualification requirements are stricter if the pharmacy sells medication under special controls (e.g.. opiates) of for inpatient treatment.

Territorial Health Entities are in charge of inspection, monitoring and control with the purpose of increasing coverage without sacrificing safety. In the case of Bogotá, pharmacies must have an approval from the local environmental regulation agency, as well as clear written procedures manuals concerning storage and inventories, medication handling and dispensation, and waste handling. Spatial requirements on pharmacies include *(i)* floors, roofs and walls, resistant to humidity; *(ii)* a physical area of at least 20 m2, including a designated restricted area non-accessible to clients; and *(iii)* the presence of an outdoor signage.

Compliance with the rules described above depends largely on the audit capacity. The spatial requirements mentioned above, including the minimum physical area and the presence of outdoor signage, are typically met (Gutiérrez et al., 2020). By contrast, there is a low compliance with procedures such as selling non-OTC medication without a prescription, given the considerably large monitoring costs. For instance, for a sample of pharmacies in Bogotá, antibiotics were sold without the need for a prescription, without discussions about potential allergies (Vacca et al., 2011).

Although is not mandatory, the pharmacies' managers place in a visible area the diploma in a degree related to pharmaceutical chemistry or other certifications for handling pharmaceutical products. The evidence that pharmacies sell non-OTC medication without prescription contrasts with their engagement with these non-mandatory signals of quality.

3 Methods

The use of the SCM allows us to present the same case to multiple pharmacies in a blinded fashion. An evident advantage is the reduction of Hawthorne effects and social desirability biases in behaviour or survey responses (Kwan et al., 2019). We developed a standardized script to detect whether the prescription was demanded when acquiring contraceptive pills. The simulated client entered the pharmacy, when there was at least one available vendor to minimize the cost on actual customers, and said that the Physician prescribed to her/his younger sister a specific brand of contraceptive pills.[2] The simulated clients were instructed to collect information on whether the prescription was requested, whether a diploma or any other certification for handling pharmaceutical products was visible, whether the vendor wore a lab coat, and whether a computer or an electronic cash register was visible. In total we had 23 simulated clients, 11 men and 12 women, all of them roughly between 20 and 35 years old. Each of them visit on average 12.4 pharmacies.

We developed a sampling strategy based on the distance of pharmacies to the stations of the mass transportation system in the city. Our purpose was to include, in a systematic manner, pharmacies located in areas with a considerable influx of visitors. Figure 1 displays the geographic location of the originally sampled pharmacies. The original sampling of pharmacies was completed using Google Maps. Some of the registered stores were moved or were permanently closed. We also skipped the audit of the drug stores assigned to 10 of the 143 stations of the transportation system in Bogotá for security reasons. We audited a total of 298 drug stores out of an initial list of 354 locations. All the simulated client visits took place in December 2019.

The audit visits to community pharmacies were performed by 23 different research assistants in the role of simulated clients (11 men and 12 women). All the simulated clients were in an age range of 20 to 35 years old. They were assigned, in pairs, to different lines of the mass transportation system. The pharmacies in a zone (or subzone) were randomly assigned to the two simulated clients in each pair. On average, each person visited 12.4 pharmacies (std. dev. 8.43).

4 Results

4.1 Characteristics of the audited pharmacies

Table 1 summarizes the characteristics of the 298 audited pharmacies. We divided the stations of the transportation system, Transmilenio, into three geographic areas accounting for roughly the same proportion of visited pharmacies. The high socioeconomic strata[3] (SES) are concentrated in the North and West zones. Thirty-nine per cent of the visited pharmacies are located in areas classified as being of High SES. Regarding other characteristics of the visited pharmacies, 62% of

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[2]Community pharmacies were randomly assigned to two different treatments differing in the high-end brand that was requested. Each brand has a different active component, *Dienogest* and *Drosperinona* in the other, and both are typically prescribed in case of acne. We explore the brand differences in a related study, in which the SCM is employed to study the effects of a contraceptive price cap regulation.

[3]Municipalities in Colombia have a stratification system that classify districts from Stratum 1 (the poorest), to Stratum 6 (the richest), to provide cross-class subsidies in the utilities and to focalize government programs. We grouped Strata 4, 5 and 6 as "High" and Strata 2 and 3 as "Low."

Figure 1: Geographic location of the sample of pharmacies
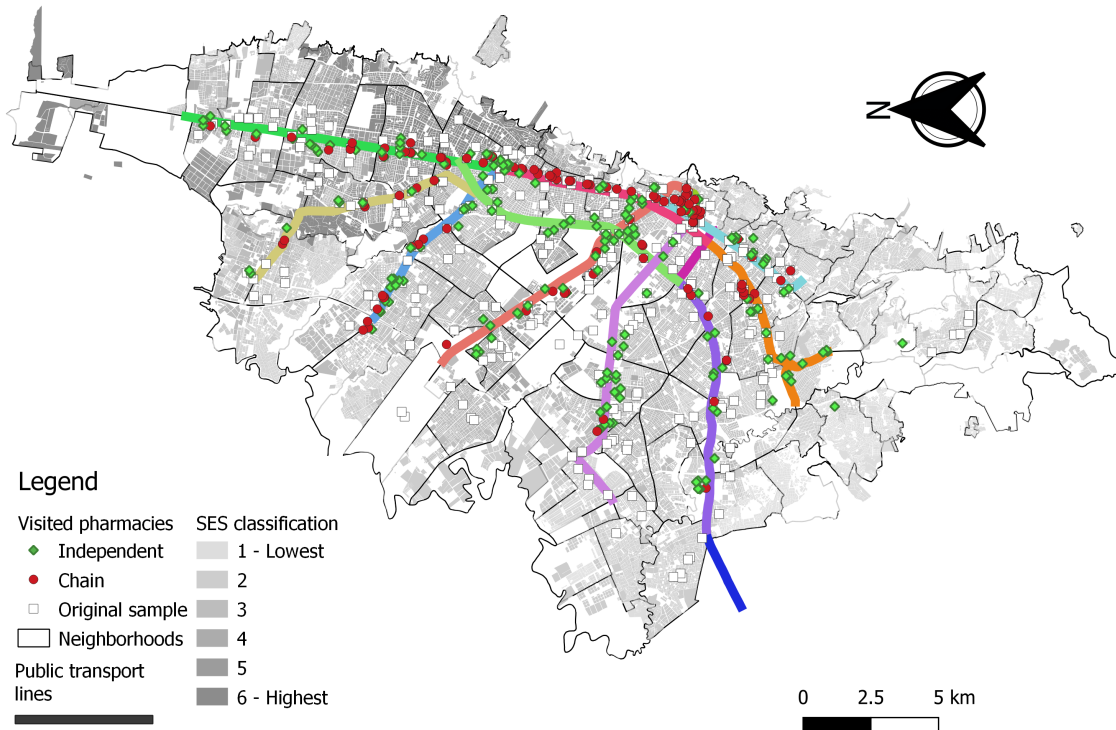
them were independent and the remaining 38% belonged to a chain. This prevalence of small, independent pharmacies, is also evident in the large proportion of pharmacies in which, by the time of the visit, there was only one seller (52%). In terms of the inventory management, the simulated clients observed that in 79% of the visited pharmacies the inventory was handled by computer and another 16% with electronic cash registers. Moreover, 53% offered services or even sold other goods apart from pharmaceutical products or basic health services. This includes beauty products, photocopies, toys, groceries, among others. Most pharmacies offer packed ice-creams, sodas or bottled water, as this has been a traditional distribution channel of these firms.

Regarding the interactions between the seller and the simulated client, we have that 51% of the sellers were female. The perceived age of the sellers fell in our "30-50 years old" range in 55% of the cases, and sellers looked older than 50 years in 19% of the cases. Finally, since most of the pharmacies were small and our protocols required that simulated clients waited outside (or come back in 5-10 minutes) if the pharmacy had multiple clients, we find that in 54% of the interactions

Table 1: Characteristics of visited pharmacies

Characteristics	(%)	Obs
Transmilenio zone		
North	29.3	
South	38.0	297
West	33.7	
SES level		
Low	61.4	298
High	38.6	
Pharmacy type		
Independent	62.1	298
Chain	37.9	
Number of sellers		
One	52.2	
Two	34.7	297
Three or more	13.1	
Inventory management system		
Computer	79.3	
Electronic cash register	16.3	294
Other	4.4	
Client's gender		
Male	48.99	298
Female	51.01	
Seller's gender		
Male	48.6	298
Female	51.4	
Seller's age range (years)		
18-29	25.8	
30-50	55.4	298
>50	18.8	
Other customers in pharmacy		
No	54.0	
One or two	32.2	296
Three or more	13.8	
Other services		
Groceries store	52.7	298
Only health services	47.3	

Table 2: Compliance rate across pharmacies for four different outcomes (N=298).

	Requested prescription (%)	Additional questions (%)	Visible banner or diploma (%)	Vendor wore coat (%)
Average compliance rate	1.01	5.03	32.21	84.56
By pharmacy type				
Independent	1.08	3.78	23.8	76.7
Chain	0.87	7.07	46.01	97.3
$p-$value Chi-squared test	0.869	0.207	< 0.01	< 0.01
By SES Level				
Low	1.09	6.01	34.9	82.5
High	0.87	3.47	27.8	87.8
$p-$value Chi-squared test	0.851	0.33	0.199	0.217
By other offered services				
Sells groceries	0	5.73	35.03	85.35
Only health services	2.18	4.25	29.07	83.68
$p-$value Chi-squared test	0.066	0.56	0.272	0.692

there were no other customers at the time of the audit, and in 32% of the cases there were between one and two additional customers.

4.2 Compliance rates

Table 2 reports the compliance rate for four different outcomes of interest. We find that in 1% of the visited pharmacies the vendor requested the prescription. In 5% of the cases the vendor asked additional questions about the younger sister, for whom the pills were prescribed. The majoritarian question was if the prescription corresponded to acne problems (8/15), followed by the sister's age (6/15), and whether this was the first time that the sister would take contraceptive pills (1/15).[4] We also find that 32% of the pharmacies held a visible operating banner or a diploma certifying the expertise for handling pharmaceutical products, and that 85% of vendors were wearing a white coat at the time of the interaction.

We also report in Table 2 whether we observe differences in these outcomes by pharmacy type (i.e., independent or belonging to a chain), by the socio-economic status of the block in which the pharmacy is located (High SES *versus* Low SES), and by the extent of offered services (only health services *versus* selling groceries). We do not find any difference across pharmacy type for the outcome variables with the lowest compliance rate, the request of a prescription and further questions about the younger sister for whom the pills are being bought. By contrast, we find that pharmacies belonging to a chain were more likely to hold a visible operating banner or diploma (46%) than the independent pharmacies (24%), and it was also more likely that in these pharmacies the

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[4]In an additional case, not included in this analysis because this is not a measure of quality, the vendor asked if the pills were really for the client's sister.

vendor wore a white coat at the time of the interaction (97% compared to 77% in the independent pharmacies).

We do not find differences for any of the four outcomes when comparing high versus low SES levels. Regarding the type of services offered by community pharmacies, the few cases in which the prescription was requested occurred in pharmacies that only offered health services. The $p-$value of the associated test is 0.066. We do not find ant other statistically significant difference for the remaining measures of quality reported in this table.

5   Discussion and conclusions

Our main result is that community pharmacies, whether independent or those belonging to large chains, do not comply with the basic regulation of requesting a prescription. This might be problematic in our studied product, as the medication is intended to be used for young women. A complementary finding is that pharmacies' quality signals are limited to more aesthetic patterns, such as showing a diploma certifying the handling of pharmaceutical products, or interacting with customers while wearing a white coat.

Interestingly, we do not observe differences across SES. A conjecture, *ex-ante* valid, is that highly educated consumers (who live in high SES areas) would exert more pressure for their local pharmacies to meet the highest standards in quality control. The lack of a correlation between SES and signals of quality suggests that this pressure is absent, at least for contraceptive pills.

A limitation in our study is that the SCM was applied with a single pharmaceutical product. Community pharmacy vendors may assign a low risk to the use of contraceptive pills without prescription or, alternatively, they are satisfied with the fact that in our script we explicitly say that the pills were prescribed by a doctor. It could be the case that for other pharmaceutical products the vendors exhibit higher compliance in the prescription request. However, Vacca et al. (2011) result show us that for antibiotics, where the chances of complications are larger, a similar pattern holds.

Pharmacies appear to acknowledge the importance of quality signals. Unfortunately, aesthetic rather than procedural signals are prevalent. Sanitary authorities should move beyond checking the physical characteristics of the pharmacy, or the existence of procedure manuals. Inspection strategies assessing the quality of the interaction with costumers, without sacrificing the blinded nature of the audit, pose an interesting regulatory challenge. Moreover, educational campaigns directed to chemists of community pharmacists should emphasize on the importance of complying with the non-OTC procedures.

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