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HOW MUCH COULD CHILEAN HOUSEHOLDS SAVE BY USING GENERICS DRUGS INSTEAD OF THEIR BRANDED EQUIVALENTS? (AND WHAT WOULD THEY GAIN?)

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SUMMARY

» In Chile, 32 percent of total health spending is paid directly by households (that is, out-of-pocket health spending). This is one of the highest levels among OECD (Organisation for Economic Co-operation and Development) countries. Of this spending, 40 percent is attributed to drug purchases. Furthermore, 40 percent of the outpatient drugs used by the Chilean population are bought privately from retail pharmacies. This article estimates the potential savings that households could achieve by opting for unbranded generic drugs instead of their branded equivalents. It also quantifies how these savings differ by socioeconomic groups and calculates the opportunity cost in terms of other items households could pay for with these savings (transport, food and recreation.

» The results of this study indicate that substitution toward an unbranded generic is feasible for a segment of drugs representing 29 percent of the market's value. The study estimates the potential annual savings at US$315 million; this would translate to a 48 percent reduction in this segment's spending. Additionally, 51 percent of the market does not have any (branded or unbranded) available generic substitutes, despite the lack of patent protection and the availability of registered generic alternatives in Chile or other countries.

» The potential savings from substituting branded drugs with generics could reduce total household health expenditures by 4 percent and drug expenditures by 10 percent. The savings are more pronounced for lower education level households, ranging from 12 to 17 percent of their drug spending. **These savings would enable lower education level households to cover the equivalent of 50 days of transportation per year (more than two months of working-day transportation), underscoring their significance in terms of other household expenses.**

JEL codes: H10, H11, H21, H30, H51, H61, I1

Keywords: Health expenditure, Public health expenditure, Medications, Prices, Priority setting, Pharmaceutical policies, Pharmaceutical products, Procurement, Procurement policies, Efficiency, Expenditure, Prioritization, Resources, Health, Generic medications, Healthy living, Cost-effectiveness.

INTRODUCTION

In Chile, out-of-pocket health expenditure (OHE) –that is, the health spending not covered by the public or private insurance system– accounts for 32 percent of total health spending.

» **This makes Chile one of the OECD countries with the highest OHE** [1]. Additionally, drug spending is the main OHE item, accounting for nearly 40 percent of the total [2].

» One approach to reducing drug spending and OHE is to foster substitution of branded drugs with lower-priced, unbranded generics. This study aims to quantify the potential household savings from substituting branded drugs (including both innovators and branded generics) with unbranded generic drugs within the purchases made at private pharmacies. Furthermore, we aim to contrast these savings with other household expenses to highlight the significance of this issue for health policy decision-makers in Chile.

1. OUTPATIENT DRUG MARKET AND FINANCIAL COVERAGE IN CHILE

This study focuses on outpatient drugs purchased at pharmacies.

According to the latest National Health Survey (*Encuesta Nacional de Salud*, ENS 2016-2017), approximately 40 percent of spending on outpatient drugs by the Chilean population is made through the private retail, with low financial coverage[2]. The remainder is dispensed by the public network (primary care clinics and hospitals) with varying coverage levels. Generally, members of the public insurance fund (*Fondo Nacional de Salud, Fonasa*, which covers approximately 80 percent of the population) receive full financial coverage in the primary care network for drugs listed in the national formulary. Coverage for specialized care depends on socioeconomic status[3].

According to IQVIA data, sales in the outpatient drug market through the private retail channel totaled US$2.7 billion[4,5] in 2017. From this total, we removed natural products, food items, medical devices and problematic data. The resulting dataset used for this study had a total value of US$2.294 billion, divided into US$1.893 billion for prescription products and US$401 million for over-the-counter (OTC) products.

Table 1 presents sales across the three available segments in Chile (innovators, branded generics and unbranded generics) for both prescription and OTC markets[6]. For the estimation of potential savings, our focus is on markets where both branded products (innovators or branded generics) and unbranded generic alternatives are available.

Sales in this market segment amounted to US$663 million, divided into US$600 million for prescription products and US$63 million for OTC products[7].

TABLE 1 **Pharmaceutical retail sales in Chile, 2017 (US$ million)**

	Total	Initial sample			With substitutes		
		All	Prescription	OTC	All	Prescription	OTC
Innovator	1,138	826	667	159	176	153	23
Branded generic	1,325	1,264	1,048	216	318	286	32
Unbranded generic	210	204	179	25	170	161	9
Total	2,673	2,294	1,893	401	663	600	63

Source: authors' elaboration based on IQVIA 2017.

2. DATA

For this study, we used aggregate price and quantity data from IQVIA, supplemented with individual data from the *Encuesta Nacional de Salud* (ENS).

IQVIA provides monthly price and sales information for each product. We used data from 2017, as this aligns with the latest *Encuesta Nacional de Salud*. IQVIA gathers information from chain pharmacies and distributors across 83 local markets, covering 92 percent of the country's total retail sales. To compute national averages, we calculated weighted averages based on these local markets.

For branded products, IQVIA includes detailed data at the product level, including product names and manufacturing laboratories. For generics, the information is provided aggregated across laboratories. We used product names to infer the total content of each product's main active ingredient and to calculate unit prices.

The ***Encuesta Nacional de Salud*** **(ENS)** is used by the Chilean Health Ministry to assess the prevalence of diseases and treatment patterns among the population. For this study, we used the third edition of the ENS, conducted in 2016-2017[8]. This nationwide survey targets Chilean residents aged 15 and above residing in private occupied dwellings across urban and rural areas, with a sample size of 6,233 individuals[9].

3. METHODOLOGY TO ESTIMATE POTENTIAL SAVINGS

3.1 GENERAL CONSIDERATIONS

Let us consider an individual *i* who consumes a quantity q_{ijm} of a drug *j* in market *m*. The sub-index j denotes the type of drug, which can be either generic (*j* = *G*) or branded (*j* = *B*, encompassing both branded generics and innovators). The market *m* is defined such that two drugs belong to the same market if they are substitutable based on the active ingredient, presentation, administration route, and pharmaceutical liberation[10].

The respective unit prices are p_{Bm} and p_{Bm}, and we denote the difference as $\Delta_m \equiv p_{Bm} - p_{Gm}$. Additionally, we assume that the individual pays a fraction α_{ij} of the drug's price out-of-pocket.

The potential savings of an individual *i* from substituting a branded drug *j* in market m with its generic alternative is calculated as follows:

$$A_{im} = \alpha_{ij} \cdot \Delta_m \cdot q_{iBm}$$

In this equation, the potential savings, A_{im} equals the consumed quantity of the branded drug multiplied by the difference in the out-of-pocket expenditure between both drugs.

There are three important observations regarding the definition of A_{im}:

1. This definition applies only when there are generic alternatives to branded products in the market. If no generic alternatives exist, the potential savings are null by definition.
2. The definition quantifies savings assuming that there are *no changes in total quantity consumed* as a result of the substitution. That is, it quantifies how much would the expense decrease if individuals substituted all their consumption of the branded drug with *the same* quantity of generic drugs[11].
3. The definition quantifies savings based on *current* price differences. However, policies promoting substitution toward generics are expected to change the relative prices between branded and generic drugs, potentially narrowing price gaps and even increasing prices for certain generic drugs.

We can also define the potential savings within a specific market:

$$A_m = \sum_i A_{im}$$

Assuming an average coverage in the market α_m, we can re-write A_m as:

$$A_m = \alpha_m \cdot \Delta_m \cdot Q_{Bm}.$$

Here, $Q_{Bm} \equiv \sum_i q_{iBm}$ represents the total quantity of the branded drug consumed in market *m*.

This equation forms the cornerstone for estimating potential savings within a market. To that aim, we use IQVIA data to obtain the price differences and the quantities consumed of branded drugs.

Alternative Expression

An alternative expression of the previous equation allows us to represent potential savings as a function of variables that can be more naturally comparable across markets. It is helpful to introduce the concept of "propensity to consume branded drugs" in market *m*, defined as the market share of branded drugs within market *m*:

$$\beta_m \equiv \frac{Q_{Bm}}{Q_{Bm} + Q_{Gm}}.$$

Additionally, we define the "total value of market *m*", R_m, as the average price of generics multiplied by the total amount of sales in the market:

$$R_m \equiv p_{Gm} \cdot Q_m$$

Thus, we can rewrite the equation for potential savings within the market as:

$$A_m = \alpha_m \cdot \left(\frac{p_{Bm}}{p_{Gm}} - 1\right) \cdot \beta_m \cdot R_m$$

This way of expressing potential savings illustrates that they will be higher in markets where the relative price is higher, the market share of branded drugs is higher and the total market value is higher.

3.2 POTENTIAL SAVINGS DISAGGREGATED BY SOCIO-ECONOMIC GROUP

In this section, we describe the process of disaggregating potential savings by socio-economic group. To accomplish this, we complement IQVIA data with ENS data.

The potential savings for a given market is the aggregate of the potential savings for all individuals who consume a product within that market. Our objective is to divide these potential savings by socio-economic groups, denoted as *S*. To account for the existence of different groups of individuals, we reformulate the potential market savings as:

$$A_m = \alpha_m \cdot \Delta_m \cdot \sum_S \beta_m^S \cdot Q_m^S.$$

Here, β_m^S is defined analogously to β_m and represents the propensity to consume branded drugs in market *m* for individuals belonging to socio-economic group *S*, while Q_m^S corresponds to the total quantity consumed by each group.

The equation illustrates that the portion of potential savings in market m from group S depends on each group's total consumption (Q_m^S) and propensity to consume branded drugs(β_m^S). Socio-economic groups with a larger market share and a higher propensity to consume branded drugs will contribute a greater share to the market's potential savings.

To disaggregate potential savings by socio-economic group, we must then: (a) assign the total quantities observed in IQVIA to each socio-economic group (Q_m^S), and (b) estimate the market share of branded products within each group (β_m^S). This process involves complementing IQVIA data with ENS data.

We utilize ENS data, first, to estimate the share of individuals in market m belonging to group *S*, which we denote as f_m^S (for example, this would reflect the percentage of individuals purchasing atorvastatin in private pharmacies who have 12 or more years of formal education). We then assume that:

$$Q_m^S = f_m^S \cdot Q_m$$

This equation is valid under the assumption of equal *per capita* consumption across socio-economic groups. Hence, the proportion of consumption by each group *S* corresponds to the proportion of people within that group[12].

Additionally, we use ENS data with IQVIA data to estimate the propensity to use branded drugs within each group, β_m^S. To achieve this, we estimate in the ENS the share of individuals in group *S* who consume a branded drug among all individuals consuming a drug in market *m* at private pharmacies. This fraction is represented as $\widetilde{\beta_m^S}$. We calculate β_m^S using the fact that propensities,β_m^S, must be consistent with the aggregate fraction β_m, calculated in IQVIA. Therefore, the propensity of group β_m^S is computed as:

$$\beta_m^S = \beta_m \cdot \frac{\widetilde{\beta_m^S}}{\sum_s \widetilde{\beta_m^S} f_m^S}$$

Intuitively, this equation indicates that we deduce the propensity to consume branded drugs for each group *S* by multiplying the average market propensity by a factor. This factor exceeds one for groups with a propensity above the average in ENS and is below one for those with a propensity below the average.

Discussion. In practice, given the limitations of the ENS sample size, parameters β_m^S and f_m^S are estimated for similar market groups, as will be further discussed in Section 4.

Sample selection. As previously described, we exclude food, vitamins and other natural products. Also, the estimations in ENS are conducted on the subset of individuals who report purchasing drugs from private pharmacies.

Coverage. Potential savings occur only when outpatient drugs purchased through the retail channel are not covered by any insurance system. From ENS data, we infer that a very small fraction of consumers receives financial coverage from an Isapre or Fonasa for drugs bought at pharmacies (see Table 2). Therefore, we assume that pharmacy sales have minimal coverage (i.e., we assume that $\alpha = 1$)[13].

TABLE 2 Where did you obtain this drug?

Alternative	Percentage
Primary care clinic (PCC), hospital or public system network	57.3
Pharmacy w/Isapre or PCC card	1.3
Bought it privately at a pharmacy	37.0
Bought it somewhere else (fair, street)	0.0
It was a gift from someone I know	1.0
It was given to me through AUGE/GES	1.4
Other, specify	1.2

Source: authors' elaboration based on ENS 2016-2017.

4. RESULTS: POTENTIAL SAVINGS AND BREAKDOWN BY SOCIO-ECONOMIC GROUP

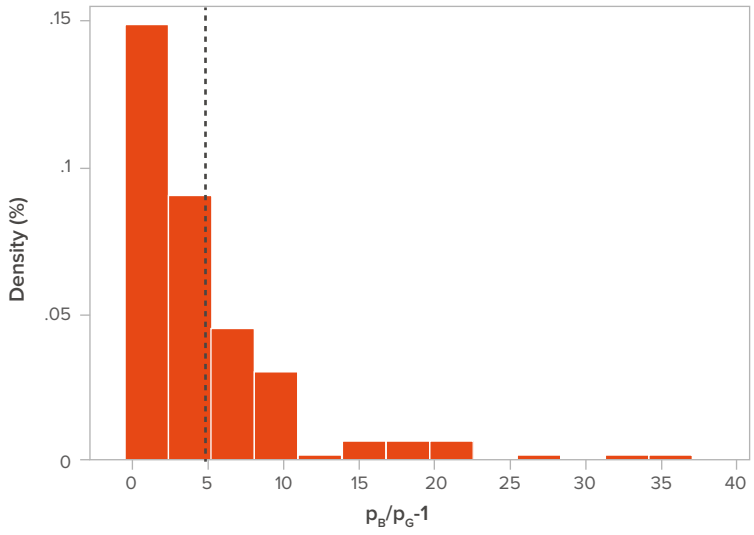
4.1 POTENTIAL SAVINGS FROM THE SUBSTITUTION WITH GENERIC DRUGS

As previously mentioned, potential savings are achievable in markets where generic alternatives and branded products (either innovators or branded generics) are available. **There are 189 markets and 155 active ingredients in this segment.**

The price differences between generic and branded products are substantial, with branded products being, on average, 6 times more expensive. Figure 1 illustrates the distribution of relative prices, $p_{Bm}/p_{Gm} - 1$. There is a significant dispersion in relative prices, with a standard deviation of 5.8; in certain markets, branded drug prices are 35 times higher than their generic equivalents.

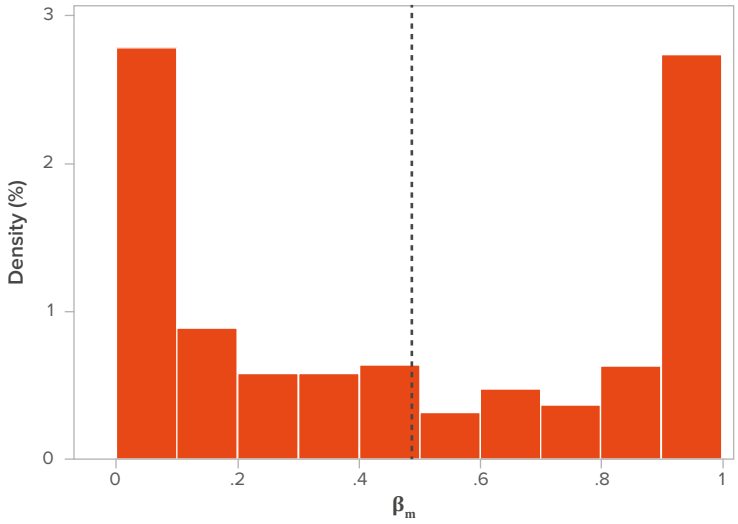
Despite these price differences, the market share of branded drugs is relatively high. On average, branded drugs hold a 48 percent market share. Figure 2 displays the distribution of the market share of branded drugs in each market (β_m). The distribution is wide, with a standard deviation of 0.4.

FIGURE 1 **Distribution of relative prices of branded and generic drugs**



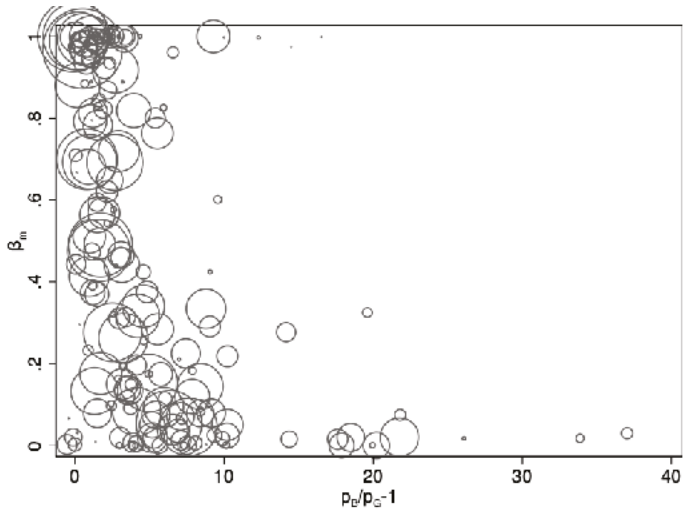
Source: authors' elaboration based on IQVIA.

FIGURE 2 **Distribution of market share of branded drugs**



Source: authors' elaboration based on IQVIA.

FIGURE 3 **Relationship between relative prices, market share of branded drugs and market size**



Source: authors' elaboration based on IQVIA.

As previously mentioned, the potential savings increase with higher price differences, greater market share of branded drugs and larger total market values.

Figure 3 illustrates the relationship among these three variables across different markets through a scatterplot. Each point represents a different market. The horizontal axis displays the relative price of the alternatives $p_{Bm}/p_{Gm} - 1$, the vertical axis represents the market share of branded drugs (β_m). and the size of each circle corresponds to the proportional total market value (R_{Gm}).

Some interesting patterns are worth mentioning. First, the market shares of branded drugs tend to be lower when their relative prices are higher. That is, and as expected, the use of generic drugs also increases as the prices of branded drugs increase relative to their generic alternatives. Second, in general terms, larger markets tend to have lower relative prices compared to smaller markets. These correlations suggest that, to a certain extent, the different factors contributing to potential savings in specific markets are balanced across markets.

Applying the equation described in the methodology, we find that the aggregate total potential savings for all markets amount to US$316 million, representing 48 percent of the total drug spending in these markets. Savings in the average market are 41 percent of total expenditure[14].

4.2 BREAKDOWN OF THE POTENTIAL SAVINGS BY SOCIO-ECONOMIC GROUP

To break down the savings by socio-economic group, we calculated the market share of branded drugs by socio-economic group, as well as the percentage of total market sales associated with each socio-economic group.

Due to the sample size limitations of ENS, these propensities were estimated based on the first letter of the EphMRA code[15].

Table 3 displays the breakdown of potential savings by socio-economic group. Based on educational level, approximately 43 percent (US$135.2 million) of potential savings would go to individuals with 12 or more years of schooling. These households represent, on the average market, 37 percent of consumers. The market share of branded drugs among these households is estimated at 57 percent, which is higher than the average (49 percent). The group with 9 to 12 years of schooling would receive 40 percent (US$124.8 million) of the total savings. This group represents, on average, 44 percent of consumers and has a slightly lower propensity to consume branded drugs than the average (0.44). Finally, the group with the lowest educational attainment (less than 9 years) would receive 17 percent of the potential savings. This group represents 19 percent of consumers and also has a slightly lower propensity to consume branded drugs than the average (0.44).

The breakdown by insurance type (Isapre or Fonasa) shows that 62 percent (US$195 million) of the potential savings would go to Fonasa members. Although the propensity to consume branded drugs is higher among Isapre members than among Fonasa members (on average, 55 versus 45 percent), Fonasa members represent 66 percent of consumers in the average market.

TABLE 3 Potential savings by socio-economic group

	f_m	β_m	Total spending million dollars	Potential savings million dollars
< 9 years of education	0.19	0.44	120	56
9 to 12 years of education	0.44	0.44	282	125
> 12 years of education	0.37	0.57	261	135
Fonasa	0.66	0.45	426	195
Isapre and others	0.34	0.55	237	121
Total			**663**	**316**

Source: authors' elaboration based on IQVIA and ENS.

5. EXPLORING THE ABSENCE OF GENERIC ALTERNATIVES

Table 1 reveals that approximately 72 percent of sales in the Chilean pharmaceutical retail channel occur in markets where substitution between unbranded drugs and branded drugs (branded generics or innovators) is not possible. This limitation significantly restricts the potential savings from substitution. To provide context and further understanding, Figure 4 breaks down the total market under analysis (valued at US$2.294 billion) into four groups:

- Markets where substitution is not possible because only innovators are available.
- Markets where substitution is not possible because there are only unbranded generics.
- Markets where substitution is not possible because there are no unbranded generics (although at least one branded generic is available).
- Markets where substitution is possible.

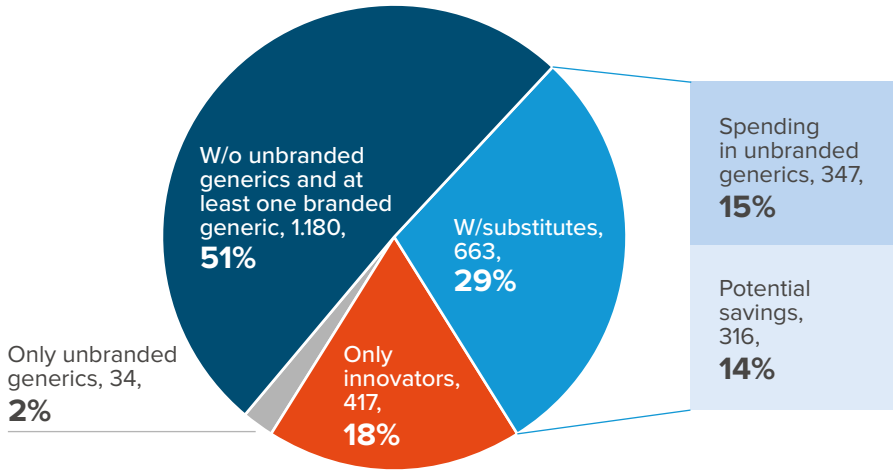
Markets where substitution with unbranded generics is not possible are mostly markets with at least one branded generic. These markets represent 51 percent of the total market (US$1.180 billion). By definition, these are markets where the innovator drug is off-patent and where, consequently, unbranded generics could be available.

Another point to consider is within the markets where substitution is not possible due to the exclusive availability of innovator drugs, representing 18 percent of the total. We cannot directly distinguish between on-patent and off-patent markets within this group (patent data are unavailable for this study); but we found that a significant portion of these markets have two or more laboratories with valid licenses from the health authority, representing 58 percent of this group[16].

Therefore, a simple calculation allows us to infer that there could be unbranded generic competition, and potential savings by substitution, in markets worth US$1.421 billion, which represents 62 percent of the total market value. These markets are not included in the estimation of the potential savings because they lack unbranded generic alternatives. We cannot quantify the potential savings in these markets from the data. However, given that the average potential savings in markets with alternatives available exceeds 40 percent, we can presume that a significant portion of this US$1.421 billion could potentially be considered as savings.

Lastly, markets where only generics are available constitute a very small portion (2 percent, US$34 million) of the total market.

FIGURE 4 **Value distribution according to structure of the market**



Source: authors' elaboration based on IQVIA.

6. CHILEAN HOUSEHOLDS' OPPORTUNITY COST OF CONSUMING BRANDED DRUGS

40 percent of the outpatient drugs used by the Chilean population are purchased privately at retail pharmacies. With low financial coverage, most of this spending is out-of-pocket.

What is the opportunity for Chilean households to use branded drugs instead of generic alternatives? What are they not consuming and how much could they reduce their out-of-pocket spending?

The opportunity cost for Chilean households purchasing branded drugs can be expressed in terms of savings in healthcare or drug costs, as well as in terms of other goods they could consume. In this section, we aim to express the potential savings as reductions in total healthcare and drug spending, and in terms of other expenditures such as transportation, food and recreation.

Additionally, we seek to estimate the breakdown of these metrics by socio-economic group, using proxies if necessary. Furthermore, we present metrics that illustrate the magnitude of potential savings at the national level, although this does not directly relate to household decision-making. This information is presented only to effectively demonstrate the opportunity cost of potentially inefficient resource allocation in drug consumption.

Building on the results from the previous section, which indicate that the use of unbranded generics could result in potential savings of US$315 million in the drug market with US$283.2 million from prescribed drugs, this section focuses on potential savings in the prescription retail market. The differences for over-the-counter (OTC) drugs are not considered significant.

6.1 DATA AND STATISTICAL CONSIDERATIONS

From the household perspective, the most important source of information is the *Encuesta de Presupuestos Familiares* (EPF, Family Budgets Survey). Its seventh version was conducted between 2016 and 2017, the same years as the ENS and the IQVIA database we used to estimate potential savings from generic drug use. The EPF is conducted by Chile's statistical institute, Instituto Nacional de Estadísticas (INE). Their databases include observations from 48,308 individuals on 1,064,239 expense items categorized according to the *Clasificación de Consumo Individual por Finalidades* (CCIF, Individual Consumption by Purpose). The goal of this survey is to collect information on household incomes and expenditures within a given time period [4]. The EPF is conducted only in households in regional capitals and in the Santiago province of the Metropolitan region, making it representative of close to 61 percent of the country's population.

To achieve nationwide estimations, we complemented EPF data with information from the 2017 *Encuesta de Caracterización Socioeconómica* (CASEN). CASEN is nationally representative, and we used it to correct possible biases in EPF results and expand its findings to the national context. CASEN has been conducted every two to three years by the Ministerio de Desarrollo Social y Familia (MIDESOF, Social Development and Family Ministry) since the 1980s. CASEN 2017 included 216,439 individuals in 324 of the country's 356 counties (*comunas*) [5]. (The procedure to expand EPF data to the national level using CASEN data is explained in Annex 1).

All of our analyses were conducted considering the sample design and the sampling weights of CASEN and EPF participants[17]. Results are reported along with their respective 95 percent confidence intervals or credibility intervals using the 2.5 percentiles and 97.5 percent of the resulting distributions.

6.2 RESULTS

Table 5 displays the percentage of spending on health and drugs from households that spend on drugs (the annex shows the information in Chilean pesos). According to EPF data, the total monthly household spending averages 1,397,364 Chilean pesos (US$2,167)[18]. Within this total expenditure, health spending accounts for 9.5 percent and drug spending for 3.5 percent (that is, 36 percent of health spending is allocated to drugs). On average, monthly household drug spending is 48,291 Chilean pesos (US$74.9). These findings are in line with Benítez, Hernando and Velasco (2019) [6].

Table 5 further breaks down these results by socio-economic group. Drug spending as a share of total spending is similar across different types of insurance, but notable differences exist among educational groups. For example, households with less than 9 years of education (primary or less) allocate 4.8 percent of total expenditures to drug spending, whereas households with individuals who have more than 12 years of education (complete secondary level) allocate 3.4 percent of total expenditure to drug spending[19].

TABLE 5 **Average household per capita health and drug spending, as a percentage, in houses with drug spending, 2017**

	% of per capita household spending in health		% of per capita household spending in drugs	
	coefficient	IC95 %	coefficient	IC95 %
Total	9.5 %	[8.4 - 10.7]	3.5 %	[3.3 - 3.7]
Breakdown by insurance type				
Fonasa	9.3 %	[8.8 - 9.7]	3.7 %	[3.5 - 3.9]
Isapre and others	11.8 %	[8.7 - 14.9]	3.6 %	[3.3 - 3.9]
< 18 years old	7.8 %	[7.2 - 8.5]	2.7 %	[2.6 - 2.9]
Breakdown by education level				
< 9 years of education	10.1 %	[9.1 - 11.1]	4.8 %	[4.4 - 5.2]
9 - 12 years of education	9.7 %	[9.0 - 10.5]	4.0 %	[3.7 - 4.3]
> 12 years of education	10.1 %	[8.6 - 11.5]	3.4 %	[3.3 - 3.6]
< 20 years old	7.9 %	[7.2 - 8.6]	2.7 %	[2.5 - 2.8]

Source: authors' elaboration with data from EPF 7th edition.

Table 6 provides national estimates of total monthly household expenditures, amounting to US$78.770 billion, with US$7.493 billion allocated to health and US$2.722 billion to drugs[20]. Therefore, the annual potential savings from the use of prescription generic drugs (US$283.2 million) represents 0.4 percent of total household expenditures, 3.8 percent of health spending and 10.4 percent of drug spending. Table 6 also presents the breakdowns by insurance type and by education level.

Table 7 presents the opportunity cost analysis in terms of other items. Specifically, the potential savings for households that purchase drugs represent 2.4% of spending on transportation, 2.1 percent of spending on food and 5.1 percent of spending on recreation. In absolute terms, the monthly potential savings from generic drug use amount to 4,998 Chilean pesos (US$7.74) per household.

TABLE 6 **Total annual national spending in health, drugs and other selected items, in million dollars, 2017 (1 of 2)**

	Total spending		Health		Drugs	
	Million dollars	IC95 %	Million dollars	IC95 %	Million dollars	IC95 %
Total	78,770	[76,331 - 81,230]	7,493	[6,876 - 8,110]	2,722	[2,619 - 2,826]
Breakdown by insurance type						
Fonasa	51,105	[49,220 - 52,999]	4,736	[4,477 - 4,989]	1,899	[1,809 - 1,992]
Isapre and others	14,696	[13,460 - 15,968]	1,731	[1,268 - 2,200]	523	[476 - 570]
< 18 years old	18,554	[17,367 - 19,811]	1,453	[1,322 - 1,589]	510	[472 - 549]
Breakdown by education level						
< 9 years of education	8,278	[7,625 - 8,925]	833	[744 - 921]	395	[358 - 434]
9 - 12 years of education	15,766	[14,912 - 16,617]	1,535	[1,412 - 1,661]	629	[581 - 679]
> 12 years of education	35,498	[33,552 - 37,483]	3,569	[3,049 - 4,082]	1,219	[1,144 - 1,296]
< 20 years old	18,289	[17,132 - 19,513]	1,447	[1,307 - 1,591]	490	[453 - 527]

TABLE 6 **Total annual national spending in health, drugs and other selected items, in million dollars, 2017 (2 of 2)**

	Transport		Food		Recreation	
	Million dollars	IC95 %	Million dollars	IC95 %	Million dollars	IC95 %
Total	11,989	[11,496 - 12,496]	13,798	[13,402 - 14,201]	5,512	[5,262 - 5,764]
Breakdown by insurance type						
Fonasa	7,707	[7,314 - 8,119]	9,684	[9,342 - 10,025]	3,461	[3,259 - 3,665]
Isapre and others	2,241	[1,996 - 2,489]	2,007	[1,855 - 2,164]	1,163	[1,026 - 1,301]
< 18 years old	2,881	[2,654 - 3,108]	3,335	[3,132 - 3,546]	1,227	[1,133 - 1,322]
Breakdown by education level						
< 9 years of education	998	[884 - 1,111]	2,312	[2,133 - 2,494]	484	[392 - 576]
9 - 12 years of education	2,178	[2,036 - 2,325]	3,718	[3,513 - 3,921]	951	[855 - 1,049]
> 12 years of education	5,733	[5,342 - 6,136]	5,036	[4,780 - 5,296]	2,663	[2,473 - 2,857]
< 20 years old	2,774	[2,564 - 2,990]	3,168	[2,978 - 3,362]	1,266	[1,159 - 1,372]

Source: authors' elaboration with data from EPF 7th edition and corrected by CASEN data.

These results show that substituting with unbranded generic drugs could reduce drug spending for households that purchase drugs by around 10 percent. For households with members of Isapre or other insurance types, the savings could amount to 20 percent. Savings would be higher in households with lower education attainment (<12 years). Households with less than 9 years of education could save 12 percent on drug expenses, while households with 9 to 12 years of education could save 18 percent.

In terms of other expenditures, these savings could allow households to cover approximately four days of transportation per month (assuming two sections per day at 600 Chilean pesos per section). This equates to nearly 50 days a year, or more than two months' worth of working-day transportation. For households with less than 12 years of education, the savings could increase spending on recreation by just over 10 percent.

TABLE 7

Potential savings as a percentage of total spending, health spending and drug spending; and potential percentage spending increase in other items by substituting with generic drugs in households that buy drugs

	Potential savings (million dollars)	Total spending		Health spending		Drug spending	
		% of potential savings	IC 95%	% of potential savings	IC 95%	% of potential savings	IC 95%
Total	283.2	0.4 %	[0.3 - 0.4]	3.8 %	[3.5 - 4.1]	10.4 %	[10.0 - 10.8]
Breakdown by insurance type							
Fonasa	174.8	0.3 %	[0.3 - 0.4]	3.7 %	[3.5 - 3.9]	9.2 %	[8.8 - 9.7]
Isapre and others	108.4	0.7 %	[0.7 - 0.8]	6.3 %	[4.9 - 8.5]	20.7 %	[19.0 - 22.8]
Breakdown by education level							
< 9 years of education	49.2	0.6 %	[0.6 - 0.6]	5.9 %	[5.3 - 6.6]	12.4 %	[11.3 - 13.7]
9 - 12 years of education	111.6	0.7 %	[0.7 - 0.7]	7.3 %	[6.7 - 7.9]	17.7 %	[16.4 - 19.2]
> 12 years of education	122.4	0.3 %	[0.3 - 0.4]	3.4 %	[3.0 – 4.0]	10.0 %	[9.4 - 10.7]

	Transport spending		Food spending		Recreation spending	
	% of potential savings	IC 95%	% of potential savings	IC 95%	% of potential savings	IC 95%
Total	2.4 %	[2.3 - 2.5]	2.1 %	[2.0 - 2.1]	5.1 %	[4.9 - 5.4]
Breakdown by insurance type						
Fonasa	2.3 %	[2.2 - 2.4]	1.8 %	[1.7 - 1.9]	5.1 %	[4.8 - 5.4]
Isapre and others	4.8 %	[4.4 - 5.4]	5.4 %	[5.0 - 5.8]	9.3 %	[8.3 - 10.6]
Breakdown by education level						
< 9 years of education	4.9 %	[4.4 - 5.6]	2.1 %	[2.0 - 2.3]	10.2 %	[8.5 - 12.6]
9 - 12 years of education	5.1 %	[4.8 - 5.5]	3.0 %	[2.8 - 3.2]	11.7 %	[10.6 – 13.0]
> 12 years of education	2.1 %	[2.0 - 2.3]	2.4 %	[2.3 - 2.6]	4.6 %	[4.3 - 4.9]

Source: authors' elaboration.

Results do not vary significantly when considering the additional savings in the OTC retail market (US$29 million). While these savings may appear small relative to drug spending, health spending or total household spending, it is important to note that they only pertain to drug markets with unbranded generic substitutes, which account for 28 percent of retail sales. On the other hand, 48 percent of retail sales are attributed to the branded generic markets where no unbranded generic competition exists. In other words, while a readjustment in 28 percent of the retail market could reduce drug spending by 10 percent, there is still potential for additional savings in 62 percent of the market (US$1.421 billion) by fostering competition with the entry of unbranded generics.

6.3 ADDITIONAL METRICS

Annex 2 presents additional opportunity cost metrics at the national level, distinct from the household-level opportunity cost discussed in the previous section. These are the key findings of the national-level analysis.

1. **In 2017, health spending in Chile amounted to US$25.123 billion**, with private spending amounting to US$12.461 billion. The potential savings from using generic drugs equals 1.13 percent of total health spending and 2.27 percent of private health spending[21].

2. **The potential savings from using generic drugs equals the incremental cost of cost-effective** strategies that could prevent nearly 0.5 percent of the country's disease burden.

3. **The potential savings from using generic drugs surpass the expected costs in 2017** associated with common cancers covered by the Ley de Garantías Explícitas en Salud, GES, Explicit Health Guarantees Act or GES Act. This holds true for both total expected costs and costs by insurance type (Fonasa or Isapre). Similarly, the potential savings from using generic drugs exceed the expected costs of baskets covering mental health, maternal-neonatal, respiratory and surgical issues. For cardiovascular issues covered by the GES Act, potential savings from generic drugs surpass 100 percent of the costs for Isapre and equal 92 percent of the expected costs for Fonasa.

4. **The potential savings from using generic drugs exceed the income gap required to lift 223,239 households** (representing 665,571 people) out of extreme poverty. It is important to clarify that this comparison does not imply that household savings could directly lift families out of extreme poverty; rather, it illustrates the magnitude of potential savings.

5. **Potential savings amount to nearly 40 percent of the income gap for households** below the poverty line, including those in extreme poverty.

7. CONCLUSIONS AND POLICY RECOMMENDATIONS

As highlighted in several publications (e.g., WHO, 2000), promoting the use of generics holds significant potential to reduce out-of-pocket spending and enhance health access for Chileans.

This study strengthens this assertion by estimating that potential savings from substituting branded products with generic equivalents amounts to 48 percent of spending in markets where substitution is possible. Additionally, it represents approximately 10 percent of household drug spending and 4 percent of their total health spending.

From a policy perspective, the potential savings from generic drug use are substantial, irrespective of the metric used to gauge value. Indeed, they constitute 1.13 percent of total health spending and match the incremental cost of cost-effective strategies that could prevent nearly 0.5 percent of Chile's disease burden. Furthermore, these savings surpass the expected costs associated with various health issues covered by the GES Act, including common cancers, selected cardiovascular conditions, mental health, respiratory ailments and surgical procedures, etc. On a broader scale, the savings exceed the total income gap required to lift households out of extreme poverty, and a significant portion of those in non-extreme poverty.

The size of these potential savings stems from the considerable price differential and substantial market share of branded drugs. To design effective policies aimed at reducing out-of-pocket health spending, it is essential to understand why consumers prefer branded drugs over their generic counterparts. Economic literature underscores that consumers lack information about the relevance of each product for their specific conditions. Patients rely on the recommendations of physicians and pharmacists, with prescriptions acting as a pivotal factor. However, the incentive for professionals may not be completely aligned with their patients'[22]. The physician's influence is particularly relevant in contexts where substitution with alternatives that are not explicitly included in the prescription is prohibited.

Chilean law mandates that prescriptions must individualize the pharmaceutical product by its brand name. Nevertheless, with the recent introduction of bioequivalence requirements, the law stipulates the inclusion of the international nonproprietary denomination if a certified bioequivalent is available. In such cases, and only if the patient requires it, pharmacists can dispense generic bioequivalents as substitutes[23]. However, several industry stakeholders acknowledge that this requirement has not been systematically enforced[24]. Therefore, we advocate for initiatives that facilitate the substitution toward generic drugs at the point of sale by regulating the content of prescriptions.

Lack of information also leads consumers to hold a mistaken perception of branded products –products individualized by commercial brand names– compared to generic drugs marketed through international nonproprietary denominations (unbranded generics). Consequently, consumers are inclined to pay more for branded products, beyond any additional clinical benefits they might offer. This can result in consumers buying different products than they would choose under conditions of perfect information [12]. In essence, this information gap drives increased demand for certain products, typically branded ones, leading to a loss of consumer welfare. In this context, information campaigns promoting the use of bioequivalents could be helpful[25].

It is crucial to emphasize that 70 percent of sales occur in markets where no substitution is possible, mainly due to the unavailability of unbranded generics. However, we estimate that in most of these markets (90% in terms of value), there could be generic competition because these drugs are off-patent. Further analysis of these markets could be a promising avenue for designing policies that increase the market penetration of unbranded generics.

ANNEX 1. METHODOLOGY

The EPF reports both expenditures and incomes of participating households, while CASEN only reports income. Using the counties included in the EPF (regional capitals and Santiago province), we found there was an equivalence in income distribution with CASEN: the EPF showed an expanded median income of 1,193,456 Chilean pesos, while CASEN showed 1,161,267. However, the expanded median income estimated in CASEN for the whole country was 946,597 Chilean pesos; this implies that the counties excluded in the EPF include households with lower incomes and, probably, lower spending. We built a correction factor (CF) given by the ratio between the aggregate income in CASEN in all counties and the aggregate income in CASEN in the counties participateing in the EPF.

Then, the aggregate household income according to the EPF, and corrected by this CF, was transformed into expenditures using the ratio between aggregate expenditures and aggregate income in the EPF, assuming an identical ratio in counties not included in the EPF. In general terms, expenditures and incomes were quite similar, so this ratio was close to 1.

However, we had to calculate the opportunity cost only for those households which had spent on drugs; this is, according to the EPF, close to 53.2 percent of households. Moreover, these households do not necessarily share the same expenditure profile with households which do not have any drug spending. Consequently, we calculated the expenditures of households which had drug spending as a share of the total expenditure of all households, share which we applied to the aggregate of the corrected expenditures.

These steps can be simplified with the following expression:

$$\text{Total expenditure of households with drug spending} = FC * \sum \text{spending of EPF households with drug spending}$$

where CF is the correction factor we mentioned previously.

We explored other procedures which could link drug spending with the total household income level to extrapolate the EPF results to CASEN data (e.g. lineal models, zero inflated). However, these procedures did not render satisfactory results.

We repeated the aforementioned procedure for each socio-economic group with the precaution of using *per capita* household data, both with CASEN and with the EPF. This means that the interpretation of the opportunity cost results by socio-economic is subtly different from the interpretation for the overall results.

Regrettably, the EPF does not assign an insurance system to people under 18 years old. Also, people under 20 years old are not categorized by education level, since there is no certainty that their education journeys have been completed.

ANNEX 2

TABLE A2 **Average monthly spending of households and per capita in health, drugs and other selected items in households with drug spending, 2017, in Chilean pesos**

	General			
	Per household analysis IC 95%		Per capita analysis IC 95%	
Average monthly household spending	1,397,364	[1,351,741 – 1,442,987]	411,429	[403,567 – 419,291]
Average health spending	132,947	[117,505 – 148,388]	39,144	[36,053 – 42,234]
Average drug spending	48,291	[46,033 – 50,549]	14,219	[13,793 – 14,644]
Health spending as a % of total household spending	9.5 %	[8.4 - 10.7]	9.5 %	[8.7 - 10.3]
Drug spending as a % of total household spending	3.5 %	[3.3 - 3.7]	3.5 %	[3.3 - 3.6]
Average spending on food and non-alcoholic beverages	244,774	[238,453 - 251,095]	72,069	[71,209 – 72,929]
Average spending on transport	212,784	[199,793 - 225,775]	62,650	[60,553 – 64,748]
Average spending on recreation and culture	97,774	[91,269 - 104,279]	28,788	[27,711 – 29,865]
Number of expanded households under analysis	1,795,800		-	
Number of expanded people under analysis	6,099,198		-	

Source: authors' elaboration with data from EPF 7th edition.

ANNEX 3. OTHER OPPORTUNITY COST MEASURES AT GOVERNMENTAL LEVEL

a. Equivalence to Potentially Avoidable Disease Burden

WHO recommendations state that interventions with an incremental cost below one *per capita* gross domestic product (GDP) per healthy life per disability adjusted life year (DALY) avoided should be considered cost-effective [14, 15] [16]. In 2017, Chilean GDP amounted to US$277.035 billion, and *per capita* GDP to US$15,040. Using this value as the threshold of the disposition to pay, the potential savings of using generic drugs equals 18,829 DALY, which corresponds to 0.43 percent [0.38 – 0.49] of the total disease burden estimated for Chile in 2017 according to the Institute for Health Metric and Evaluation [17]. This number is larger than all the burden produced by diseases such as renal cancer, central nervous system tumors, eating disorders, Parkinson disease, tuberculosis and upper respiratory tract infections, to name a few.

b. Equivalence to Costs of Specific Health Interventions

We found the health problems financed by the Ley del Régimen de Garantías Explicitas de Salud [18] whose expected cost was equal or below potential savings from generic drug use. We used the results of the 2018 Estudio de Verificación del Costo (EVC, Cost Verification Study) [19] to explore the expected cost of benefits associated with 80 health issues. The issues were grouped into six categories: most common cancers, selected cardiovascular issues, mental health issues, maternal-neonatal issues, respiratory issues and surgical issues. We calculated the total cost considering the expected demand for each specific benefit within each health issue's basket and its price, expressed in *unidades de fomento* (UF)*, equivalent to 27,159.8 Chilean pesos, according to the same report. We conducted the analysis using the public insurer's (Fonasa) and private insurers' (Isapre) demands and prices. We added up the expected costs for each basket, and then we added the costs of the different baskets of the health issues we grouped together. These costs were expressed in dollars, using the median exchange rate reported by the Banco Central de Chile for 2017: 649.33 Chilean pesos [20].

Additionally, within each basket, we selected the price of one specific benefit (e.g., hypertension treatment, screening for cervical cancer) to calculate the number of benefits equivalent to the savings from generic drug use.

The potential savings from generic drug use is higher than the total expected cost associated with the most common cancers for 2017, according to the baskets covered by the Ley de Garantías Explícitas en Salud. This is valid for the total expected cost and for the total expected cost by type of insurance (Fonasa or Isapre). Similarly, the potential savings from generic drug use is higher than the total expected costs of baskets which group together mental health issues, maternal-neonatal issues, respiratory issues and surgical issues. For the main cardiovascular health issues covered by the GES Act, the potential savings from generic drug use is higher than the complete Isapre cost and equivalent to 92 percent of the cost expected for Fonasa.

Table A3.1 details the issues included in each group of baskets and the total expected costs. In tables included as supplementary material there is a detailed analysis by health issue and specific basket components.

* The Unidad de Fomento (UF, Development Unit) is a unit of account or non-circulating currency which is constantly readjusted to inflation. It is widely used in banking, credit and government account systems.

TABLE A3.1 **Groups of baskets whose expected costs are lower or similar to the potential savings from generic drug use**

Oncologic	Cardiovascular	Mental health	Maternal-neonatal	Respiratory	Surgical
Cervical cancer	Hypertension	Depression	Comprehensive oral health of the pregnant woman	Outpatient lower respiratory tract infection (LRTI) in < 5 years	Cataract surgical treatment
Breast cancer	Secondary prevention, terminal chronic kidney disease	Bipolar disorder	Prevention of premature parturition	Outpatient community-acquired pneumonia in 65+ years	Preventive cholecystectomy 35-49 years
Gastric cancer	Myocardial infarction	Schizophrenia	Parturition analgesics	Moderate and severe bronchial asthma in <15 years	Scoliosis in 25+ years
Prostate cancer	Ischemic cerebrovascular accident	Alcohol and drug use	Infant respiratory distress syndrome	Bronchial asthma in 15+ years	Spinal dysraphism
Colorectal cancer	-	-	Bronchopulmo-nary dysplasia of premature infants	Outpatient chronic obstructive pulmonary disease	Labio-palatine fissures
Pain relief and palliative care	-	-	Retinopathy of prematurity	Cystic fibrosis	Hip dysplasia
-	-	-	Bilateral sensorineuronal deafness in premature infants	-	-
Fonasa: 141 MMUS$ ISAPRE: 30,4 MMUS$ Total: 172,3 MMUS$	Fonasa: 190,2 MMUS$ ISAPRE: 22,0 MMUS$ Total: 212,2 MMUS$	Fonasa: 169,0 MMUS$ ISAPRE: 102,5 MMUS$ Total: 271,5 MMUS$	Fonasa: 50,4 MMUS$ ISAPRE: 6,7 MMUS$ Total: 57,0 MMUS$	Fonasa: 123,6 MMUS$ ISAPRE: 49,1 MMUS$ Total: 172,8 MMUS$	Fonasa: 75,5 MMUS$ ISAPRE: 5,6 MMUS$ Total: 81,4 MMUS$

Source: authors' elaboration with data from EVC 2018 / (MMUS$: million US dollars).

c. Equivalence to the Costs of Overcoming Poverty

Once again, we used data from CASEN 2017 as described above. We considered the poverty line at $155,654 Chilean pesos for a one person household [12]. The poverty line was set for the specific size of each household using the per person income resulting from: 155,654 / (number_of_peoples^0.7), where 0.7 is the coefficient used to correct incomes for economies of scale. The extreme poverty line was set at 2/3 of the poverty line [21].

We calculated the gap to overcome extreme poverty adding up the difference between the extreme poverty line calculated for each household and reported income. We calculated the gap to overcome non-extreme poverty in this way: (2) discounting the gap to overcome extreme poverty covered by the potential savings from generic drug use; (2) assigning the value of the extreme poverty line to households below it; and (3) ordering households starting with those with a larger gap.

Table A3.2 presents the aggregate of the difference between the incomes of houses below the extreme poverty line and the threshold. This adds up to US$153.1 million, which mostly comes from the population of Fonasa and those with less than 12 years of education. The potential savings from generic drug use is larger than the total income gap. The breakdown by insurance type or education level must be taken with caution since the gap to overcome extreme poverty is calculated using the *per capita* household income of people in each category. That is, the sum of the *per capita* incomes of households with people with less than 9 years of education is US$57.4 million. On the other hand, the potential savings from generic drug use generated by people with less than 9 years of education is US$49.2 million. The ratio between these two numbers is 85.7 percent. However, households could have people with different education levels, so that overcoming the gap in people from different education categories could create a cross benefit.

TABLE A3.2 **Gap to overcome extreme poverty in million dollars, and percentage of the gap equivalent to the potential savings from generic drug use; incomes on an annual basis**

	MMUS$	IC95 %	% of gap overcome	IC95 %	Potential savings from the use of generics (million dollars)
Gap	153.1	[141.7 - 164.4]	>100 %	[100 - 100]	283.2
Fonasa gap	128.8	[118.1 - 139.5]	>100 %	[100 - 100]	174.8
Isapre and others gap	24.2	[18.8 - 29.6]	>100 %	[100 - 100]	108.4
Gap in < 9 years of education	57.4	[50.9 - 63.9]	85,7 %	[96.6 – 77,0]	49.2
Gap in 9 - 12 years of education	68.1	[58.6 - 77.7]	>100 %	[100 - 100]	111.6
Gap in > 12 years of education	25.3	[20.0 - 30.6]	>100 %	[100 - 100]	122.4

Source: authors' elaboration with data from CASEN 2017.

In other words, the potential savings from generic drug use is higher than the income gap of 223,239 households (665,571 people) to overcome extreme poverty.

Table A3.3 shows the income gap for households below the poverty line, including those below the extreme poverty line (421,512 households, 1,464,342 people). The gap amounts to US$704.9 million and the potential savings from generic drug use equals to close to 40 percent of this number. After subtracting the US$153.1 million mentioned above to overcome extreme poverty (extreme poverty gap), the remaining potential resources equal the gap of 42,930 households (236,281 people) who are below the poverty line.

TABLE A3.3 **Gap, in million dollars, to overcome poverty and extreme poverty, and percentage of the gap equivalent to the potential savings from generic drug use; incomes on an annual basis**

	Million dollars	IC	% of gap overcome	IC	Potential savings from the use of generics (million dollars)
Gap	704.9	[678 - 731.8]	40.2	[38.7 - 41.8]	283.2
Fonasa gap	631.2	[605.5 - 656.9]	27.7	[26.6 - 28.9]	174.8
Isapre and others gap	73.6	[62.5 - 84.7]	>100 %	[100 - 100]	108.4
Gap in < 9 years of education	303.4	[285.9 - 320.9]	16.2	[17.2 - 15.3]	49.2
Gap in 9 - 12 years of education	311.0	[289.1 - 332.9]	35.9	[38.6 - 33.5]	111.6
Gap in > 12 years of education	85.5	[74.0 – 97.0]	>100 %	[100 - 100]	122.4

Source: authors' elaboration with data from CASEN 2017.

NOTES

[1] Juan Pablo Atal designed the methodology to estimate potential savings and its household distribution and prepared the texts for the pertinent sections. Pedro Zitko designed the methodology and the metrics to estimate households' opportunity costs and prepared the text of section 6. Catalina Gutiérrez and Úrsula Giedion designed and directed the study and contributed with technical suggestions and with the texts. The authors thank Janeth López for her support in section 5.

[2] Some pharmacies dispense drugs covered by the AUGE/GES plan; this plan covers between 80 and 100 percent of the cost of drugs included in a basket of treatments for a group of 85 pathologies. Osorio (2020) estimates that, in total, 80 percent of the retail spending is financed out-of-pocket. In this study, following the answers presented in Table 2, we present our results assuming there is no financial coverage in the retail channel.

[3] Fonasa segments beneficiaries in four groups according to their income and economic vulnerability levels; from Group A (people of lower incomes and higher vulnerability) to group D (people of higher incomes and lower vulnerability). Coverage is 100 percent for members in groups A and B, 90 percent for group C and 80 percent for group D [3].

[4] IQVIA is a private firm that provides advanced analyses, technological solutions and clinical research services to the life sciences industry. IQVIA has a database of Chilean pharmaceutical retail which we describe later. For more information on the firm, see https://www.iqvia.com/es-ar/about-us.

[5] We used 2017 data because it is the year in which the last version of the *Encuesta Nacional de Salud* was conducted.

[6] Innovators are the first drug to contain the specific molecule approved for medicinal use. Generic drugs with the same molecule as the innovator can be marketed once the innovator drug loses its patent exclusivity. Unbranded generics are marketed with the name of the molecule, while branded generics are marketed with a brand name.

[7] The existence of products is defined based on the presence of sales in IQVIA. Specifically, a product is an alternative if at least one unit of it was sold in 2017. We also consider as 2017 alternatives products with no sales in 2017 but which did have sales both in 2016 and 2018.

[8] The survey has been conducted in 2003, 2009-2010 and 2016-2017.

[9] For methodological details, see https://epi.minsal.cl/resultados-encuestas/.

[10] This assumes that people can substitute drugs with different doses. The goal of this exercise is to quantify the potential savings in case this type of substitution is possible.

[11] That is, our analysis does not include the fact that lower generic drug prices could induce a higher consumption, which would tend to reduce the savings from the substitution. We believe that comparing scenarios with fix consumption quantities puts us closer to the idea of potential savings.

[12] This would result, for example, of estimating an average annual unit dose in the market and assume that all individuals in the market who consume the active ingredient do so in the same average unit dose, independently of their socio-economic group.

[13] It is important to note that this assumption omits potential discounts not declared in the ENS.

[14] The data show that savings as a share of the market's value increases (albeit slightly) with the market's value.

[15] The EphMRA code is an international system used by IQVIA where drugs are classified hierarchically in three or four levels according to their indication and use.

[16] We conducted an exhaustive review of the licenses in the Instituto de Salud Pública de Chile valid through 2017 for 70 percent (in value) of the markets where UQVIA only records sales of innovators. We found that markets where there are health registrations of non-innovator drugs represent 58 percent of this segment. It is also noteworthy that in a smaller fraction of the markets without health registrations of generics in Chile there are registrations of generics in the United States.

[17] For some of the results in which there are no simple analytical solutions we used Monte Carlo simulations under distributional assumptions (normal and beta).

[18] For further detail, see annex.

[19] The EPF excludes people under 20 years old from the years of education categorization. Hence, when we refer here to people with a given number of years of education, we are referring to people aged 20 or above.

[20] We note here that this magnitude is consistent with the aggregate numbers from IQVIA on Table 1.

[21] We used data from the World Health Organization's (WHO) Global Health Expenditure Database (GHED) [7].

[22] This lack of alignment can occur due to direct economic incentives from laboratories, when retail is vertically integrated with manufacturers or for other reasons which might cause retail's margins to be heterogeneous across products [8,9,10,11].

[23] Act 20.724, article 101: "The prescription is the private instrument through which the professional authorized to prescribe signals to a previously evaluated and identified person, and as an integral part of the medical act and thus of the clinical relationship, the use and conditions of application of a pharmaceutical product individualized by its brand denomination, and adding, for information purposes, the international nonproprietary denomination that would authorize its interchange, in case certified bioequivalent drugs are available".

[24] Pharmacies in Chile are required to have a minimum petition of drugs; this ensures the presence of bioequivalent drugs which are part of that list. The Instituto de Salud Pública (ISP, Public Health Institute) is responsible for its enforcement. Recent audits have shown positive results in terms of the compliance with this regulation (see https://web.archive.org/web/20230315051038/https://www.minsal.cl/34-fiscalizaciones-y-2-sumarios-en-semana-de-fiscalizacion-especial-para-constatar-disponibilidad-de-bioequivalentes/).

[25] Atal, Cuesta and Sæthre (2022) suggests the policy's low impact is partly explained by the population's low level of understanding of the concept of bioequivalence [13].

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