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Financial Protection from Health Care Spending in Argentina: Evolution and Distribution (1985-2018)

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ABSTRACT

INTRODUCTION: Financial protection from healthcare spending has become an important objective to be addressed by health systems all over the world. A common strategy used to assess financial protection from health care is to estimate the proportion of the population for which out-of-pocket expenditures made at the moment of receiving health services (OOP) might affect the consumption of other goods and services. To this end, two groups of indicators have been developed: catastrophic health expenditure (CHE) and impoverishing health expenditure (IHE). This work aims to investigate how CHE and IHE evolved in Argentina and how equitable was distributed between 1985 and 2018.

METHODOLOGY: we estimated CHE and IHE measures, concentration indexes and concentration curves for all studied periods. In addition, we performed dominance analysis of concentration curves in order to assess changes in the distribution of CHE.

RESULTS: In 2017/18, 9.57 % of Argentina's population incurred in CHE using a 10 % of total expenditure (EXP) threshold, 5.81 % using a 15 % of EXP, 4.52 % using a 25 % of EXP net of food spending (ATP), and 1.87 % using a 40 % of ATP. All CHE headcount measures dropped considerably between 1996/97 and 2017/18. IHE measures resulted in nearly zero values. The distribution of CHE was found to be progressive in all periods applying different thresholds. Dominance analysis and CI show that 2004/05 was the most progressive period. However, dominance between curves was only found using low specificity criteria.

DISCUSSION: We found evidence of higher financial protection in the most recent studied period and progressivity of CHE in all periods. A further question to be assessed is whether the lower CHE and progressivity in its distribution is a consequence of an effective public policy or difficulties to access health care.

Keywords: Financial protection; Health spending; Catastrophic expenditure.

JEL Classification: I10

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Protección Financiera frente a Gastos en Salud en Argentina: Evolución y Distribución (1985-2018)

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RESUMEN

INTRODUCCIÓN: La protección financiera frente a gastos en salud se ha convertido en un importante objetivo de los sistemas de salud en todo el mundo. Una estrategia utilizada para evaluar la protección financiera es la estimación de la proporción de la población para la cual los gastos de bolsillo en salud al momento de recibir atención afectan el consumo de otros bienes y servicios. Con este fin, se han desarrollado dos grupos de indicadores: gasto catastrófico en salud (GCS) y gasto empobrecedor en salud (GES). Este trabajo tiene por objetivo evaluar en el periodo 1985-2018 como ha evolucionado el GCS y GES, y como ha sido su distribución entre la población según su ingreso.

METODOLOGÍA: Se han estimado indicadores de GCS y GES, índices de concentración y curvas de concentración. Además, se realizaron análisis de dominancia entre curvas de concentración para evaluar cambios en la distribución del CHE.

RESULTADOS: En 2017/18, el 9.57 % de la población argentina incurrió en GCS utilizando un límite del 10 % del gasto total, el 5.81 % utilizando un límite del 15 % del gasto total, el 4.52 % utilizando un 25 % del gasto neto del gasto en alimentos (capacidad de pago) y el 1.87 % utilizando un límite del 40 % de la capacidad de pago. Todos los indicadores de GCS muestran una caída considerable entre 1996/97 y 2017/18. Los indicadores de GES resultaron en valores cercanos a cero. La distribución del GCS resultó progresiva en todos los periodos e indicadores. Los análisis de dominancia e índices de concentración muestran que 2004/05 es el periodo más progresivo. Sin embargo, la dominancia solo fue hallada utilizando métodos de baja especificidad.

DISCUSIÓN: Encontramos evidencia de mayor protección financiera en los periodos más recientes y una distribución progresiva del GCS en todos los periodos. En investigaciones futuras es necesario evaluar si estos resultados responden a políticas públicas exitosas o a problemas en el acceso al sistema de salud.

Palabras Claves: Protección financiera; Gasto en salud; Gasto catastrófico.

Clasificación JEL: I10

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1 Introduction

Financial protection from healthcare spending has become an important objective to be addressed by health systems all over the world (World Health Assembly 58, 2005b; General Assembly of the United Nations 70, 2015, p. 16). This objective is mainly based on preventing high out-of-pocket spending[1] (OOP) in households which is able to diminish the consumption of other essential goods and services. To reduce the impact of OOP, several approaches have been designed. For instance, the WHO has urged its members to implement strategies such as pre-payment schemes (World Health Assembly 58, 2005a, p. 124) which have a negative impact on OOP (Xu et al., 2007). Moreover, the reduction of high OOP is currently established as one of the Sustainable Development Goals. As a result, the relevance of financial protection from OOP has encouraged the discussion of several methods to evaluate this issue (Flores et al., 2008; Wagstaff and Doorslaer, 2003; Wagstaff, 2019; Xu and Organización Mundial de la Salud, 2005).

A common strategy used to assess financial protection from health care is to estimate the proportion of the population for which OOP might affect the consumption of other goods and services. To this end, two groups of indicators have been developed: catastrophic health expenditure (CHE) and impoverishing health expenditure (IHE). The former estimates the percentage of the population for which OOP is higher than a certain percentage of its income or expenditure and the latter estimates the percentage of households that have fallen below the poverty line because of health spending. Also, gap measures are usually estimated. These indicators have been widely used in previous literature in order to assess the financial protection given by health systems.

The Argentinian health system is currently divided into three sub-sectors. First, the social security sector provides coverage for registered employees and people who receive pension benefits from the federal government and all people above 75 years old who request. Second, the private insurance system provides coverage for people who pays voluntarily an insurance policy. Third, the public system is composed of different complexity and sizes of health care facilities, in which any Argentinian citizen is able to be assisted and no out-of-pocket spending is required. Therefore, virtually all Argentinian people are covered by one or more of these subsystems.

Although several studies assessed CHE and IHE in Argentina, the research on the evolution over a long period remains limited. To our knowledge, no prior studies have examined all available data in order to address in which direction have these measures evolved and which parts of the population have benefited from these changes. In this study, we use all waves of the National Household Expenditure Survey (ENGHo, for its acronym in Spanish) which has been performed four times using a nationally representative sample.

This work aims to investigate how CHE and IHE evolved in Argentina and how equitable was distributed between 1985 and 2018. The paper is organized as follows. In the next section, we present a review of the literature related to CHE and IHE. The third section describes the data source and applied methodology. The fourth section presents the results of this paper. Finally, section five provides a discussion of the main results.

2 Background

CHE measures are based on normative criteria which state that OOP caused by health shocks should not affect households' customary standard of living (Berki, 1986). To this end, a consumption capacity measure and a threshold above which households' expenditure is classified as catastrophic are defined. Household consumption capacity is usually measured using total household income (INC) or expenditure (EXP). Some authors have proposed that OOP should be compared to households' ability to pay (ATP) which is defined as the total budget, measured in terms of INC or EXP, minus subsistence spending such as food expenses or the poverty line (Wyszewianski, 1986; Xu et al., 2003).

[1] OOP is defined as payments made at the moment of receiving health care.

Once defined the measure of consumption capacity it is necessary to state the threshold above which OOP is catastrophic. In order to address this issue, previous research has applied a percentage of INC or EXP. This percentage is usually defined arbitrarily, and a wide choice of thresholds can be found in the literature. Seminal contributions used a threshold based on income tax laws that state the amount of health spending that was tax-deductible as a percentage of gross income (Berki, 1986). More recent studies applied several thresholds based on INC or EXP and ATP. For example, Wagstaff and Neelsen (2020) applied a 10 % and 25 % of income threshold, using the latter for sensitivity analysis. In particular, these two thresholds are used to measure the achievement of Sustainable Development Goals (Economic and Social Council of the United Nations, 2020). Other studies estimated CHE using a broader number of thresholds (p. 207 O'Donnell et al., 2008; Wagstaff and Doorslaer, 2003). In general, CHE literature applies higher thresholds if OOP is compared to ATP than if it is compared to INC or EXP.

The ATP approach has been applied in some of the most relevant literature which assesses CHE (Knaul et al., 2011; Wagstaff and Doorslaer, 2003; Xu et al., 2003; Xu et al., 2007; Xu et al., 2010). However, Wagstaff (2019) has discussed the usefulness of this approach. He stated that, even though it might help to adjust households' disposable income, it classifies equally a poor household with any health spending, a household pushed below poverty due to health spending, and a high-income one that is able to afford high health care costs and remain above subsistence spending. Because of this, the ATP approach fails to assess the impact of health spending on basic needs. According to Wagstaff (2019), the impact of health spending on basic expenditure should be estimated using IHE measures which are specifically designed to assess changes in poverty headcounts and poverty gaps. Despite these disadvantages, IHE measures have been used in relevant previous literature (Knaul et al., 2012; Wagstaff et al., 2018).

Another important dimension of the impact of OOP is how it is distributed across different income groups. To this end, O'Donnell et al. (2008) proposed to estimate concentration curves (CC) which are defined as the plot of a cumulative percentage of a health variable against the cumulative percentage of the population, ranked progressively by living standards. This has been used in several studies to assess inequity in CHE and how it changes over time by the comparison of different periods CCs (Islam et al., 2017; Mohanty and Dwivedi, 2021; Njagi, Arsenijevic and Groot, 2020; Quintal, 2019).

In order to estimate the measures mentioned above, numerous studies have used cross-section data, given its availability. Prior research has emphasized that panel data is the best source of information in order to assess the impact of a health shock on households' standards of living. According to Flores et al. (2008), CHE measures based on cross-section expenditure data might overestimate the impact of health payments. Similarly, Wagstaff (2019) has shown that if a household is a borrower after suffering a health shock income-based and expenditure-based approaches will overestimate CHE. In contrast, if the household is a saver the income-based approach is a better measure.

Financial protection from health care spending has been studied in several previous research for Argentina. Firstly, with concern to CHE, Knaul et al. (2011) found that 8.4 % of households suffered CHE in 2004/05 using a 30 % of ATP threshold. Secondly, using a 40 % of ATP threshold, Perticara (2008) and the World Health Organization (2006) found that 5,6 % of households suffered CHE in 1996/97 and, applying the same methodology, Abeldaño (2017) found that 3 % suffered from CHE using a 40 % of ATP household in 2012/13.

3 Data and methodology

3.1 Data

The data used in this study was obtained from the ENGHo performed by the National Institute of Statics and Census (INDEC, for its acronym in Spanish). This survey's objective is to characterize the expenditure of Argentinian urban households (INDEC, 2020a). The ENGHo was performed on five

occasions and each survey took two years to be completed. In the rest of the paper, each version is named by the year in which the survey started and the year it was finished. For example, the ENGHo performed between 2017 and 2018 is denoted as ENGHO 2017/18. The other four editions are the ENGHo 1985/86, 1996/97, 2004/05, and 2012/13. ENGHo 1985/86 was dismissed because it is composed of a sample of households in Buenos Aires City's metropolitan area and, therefore, measures from this survey are not comparable with ENGHo 1996/97, 2004/05, 2012/13, and 2017/18 which are nationally representative. The variables used in order to estimate CHE and IHE measures were OOP, food spending, and EXP, which for the *i - th* household are denoted by oop_i, $food_i$, and exp_i respectively. All observations correspond to goods and services consumed over one month. As mentioned previously, OOP is defined as payments made at the moment of receiving healthcare, which excludes insurance premiums and other pooling or pre-payment schemes (Xu and Organización Mundial de la Salud, 2005; OECD, Eurostat and World Health Organization, 2017, p. 178). All datasets were downloaded from INDEC's official website (INDEC, 2020b).

Table 1 shows descriptive statistics of monthly households' total expenditure and health care spending. OOP and OOP plus health insurance spending are expressed in United States dollars adjusted by purchasing power parity (PPP) (OECD, 2021). OOP was lower during 2004/05 (58.74 USD) and 2012/13 (58.55 USD) than in 2017/18 (67.02 USD). However, OOP as a percentage of total expenditure was lower in 2017/18 than in 2004/05 and slightly higher than in 2012/13. This means that, even though OOP has increased in 2017/18 in comparison to 2012/13, it represents the same proportion of total expenditure. In 1996/97, 2004/05 and 2017/18 at least 50 % of the population had zero OOP as shown by the zero medians.

Table 1 Descriptive statistics. PPP values (OECD, 2021).

	Mean	(SD)	Median	(Interquartile Range)
1996/97				
Total expenditure	1119.94	(1018.04)	832.55	(937.5)
OOP + health insurance	84.56	(205.42)	8.23	(84.3)
OOP	66.11	(187.57)	0	(57.05)
OOP as % of total expenditure	5.18	(13.13)	0	(5.27)
2004/05				
Total expenditure	1070.76	(1044.77)	771.92	(898.58)
OOP + health insurance	73.98	(184.72)	6.25	(63.41)
OOP	58.74	(161.86)	3.23	(45.3)
OOP as % of total expenditure	4.7	(10.16)	0.36	(4.37)
2012/13				
Total expenditure	1472.95	(1255.43)	1128.26	(1155.83)
OOP + health insurance	69.83	(243.8)	4.01	(56.55)
OOP	58.55	(232.97)	0	(44.74)
OOP as % of total expenditure	3.41	(7.79)	0	(3.25)
2017/18				
Total expenditure	1642.79	(1418.31)	1245.72	(1304.07)
OOP + health insurance	96.26	(241.12)	9.13	(85.57)
OOP	67.02	(196.91)	0	(57.41)
OOP as % of total expenditure	3.71	(8.04)	0	(3.78)

We estimated the overall poverty line (OPL) and food poverty line (FPL) for each household using the methodology applied by INDEC to measure poverty in Argentina (INDEC, 2016). We obtained monthly costs of basic goods and services and basic food costs for each Argentinian region (AMBA,

Noreste, Noroeste, Pampeana, Cuyo y Patagónica) in the months when ENGHo 2004/05 and 2017/18 were performed (INDEC, 2005; 2006; 2017; 2018a; 2018b; 2019). The data sets included the quarter to which households' information belongs. Therefore, we estimated a simple average of monthly costs which compose each quarter of the year and assigned each household its corresponding value. In the case of periods that compose ENGHo 1996/97 costs of basic goods and services were not published every month (INDEC, 2020c). However, over these years a nearly zero inflation index was observed. Hence, we used September 1996 costs as representative of all 1996 and 1997 months. Similarly, in these years regional costs were not published, consequently, we used the first published regional costs of basic goods and services to estimate regional parity purchase power indexes (INDEC, 2002). We dismissed the 2012 and 2013 costs published by INDEC due to methodological problems in surveys (INDEC, 2016). Because of this, no IHE indicators were estimated for these years.

In OPL estimated by INDEC, a health care item is included. IHE evaluation requires comparing EXP and INC with a poverty line net of health spending (O'Donnell et al., 2008, p. 216). To this end, we estimated an OPL net of health spending using OPL composition as published by INDEC (2016). This procedure is described in the next section.

3.2 Methodology

In this section, we present the indicators used in this investigation to measure the impact of health spending on living standards and the distribution of this impact across different income populations. All described measures were weighted using sampling weights and household sizes which were provided in all data sets. For confidence intervals, we followed Deaton (2018, p. 48) to estimate weighted standard deviation and Price (1972) for weighted covariance matrix.

3.2.1 Catastrophic health expenditure (CHE)

The following indicators are designed to measure if health expenditure is excessive in comparison to a household EXP or ATP. CHE based on EXP was estimated using thresholds z_{cat} = 10% and z_{cat} = 15%. Let E_i = 1 if $oop_i/exp_i > z_{cat}$ and zero otherwise, CHE headcount is equal to

$$H_{cat} = \frac{1}{n}\sum_{i=1}^{n} E_i \quad (1)$$

H_{cat} measures the proportion of the population who lives in households that exceed the threshold z but does not provide information about the height above which the threshold is exceeded. To this end, the catastrophic payment gap was estimated using a CHE overshoot measure (O_i), which is equal to $oop_i/exp_i - z_{cat}$ if $oop_i/exp_i > z_{cat}$ and zero otherwise. Then, catastrophic payment gap is estimated as

$$G_{cat} = \frac{1}{n}\sum_{i=1}^{n} O_i \quad (2)$$

H_{cat} and G_{cat} were also estimated using household's ATP (atp_i) which for the *i - th* household is equal to $exp_i - food_i$. The variable $food_i$ is equal to the food-poverty line for the *i - th* household. In order to estimate CHE measures based on ATP, we replaced exp_i by atp_i and thresholds z_{cat} = 25% and z_{cat} = 40% were used.

3.2.2 Impoverishing expenditure

In order to estimate IHE measures, we followed a procedure suggested by Wagstaff and Doorslaer (2003), who propose to use pre-payment and post-payment variables. First, we estimate pre-

payment measures by comparing EXP with a minimum consumption level denoted as z_{pov}^{pre} which might be equal to the overall poverty line or food poverty line. Second, we denote pre-payment income level as $exp_i^{pre} = exp_i$. We define $P_i^{pre} = 1$ if $exp_i^{pre} < z_{pov}^{pre}$ and zero otherwise. Therefore, pre-payment poverty headcounts are equal to

$$H_{pov}^{pre} = \frac{1}{n}\sum_{i=1}^{n} P_i^{pre} \quad (3)$$

Also, we estimated pre-payment poverty gap measures which for the *i-th* household is denoted as g_i^{pre} and equal to $z_{pov}^{pre} - exp_i$ if $z_{pov}^{pre} > exp_i^{pre}$ and zero otherwise. Therefore, the average pre-payment poverty gap is equal to

$$G_{pov}^{pre} = \frac{1}{n}\sum_{i=1}^{n} g_i^{pre} \quad (4)$$

the normalized pre-payment poverty gap is equal to

$$NG_{pov}^{pre} = \frac{G_{pov}^{pre}}{z_{pov}^{pre}} \quad (5)$$

Finally, we estimated the post-payment version of these measures which are denoted with the superscript *post*. We defined post-payment expenditure as $exp_i^{post} = exp_i^{pre} - oop_i$ and $P_i^{post} = 1$ if $exp_i^{post} < z_{pov}^{post}$ and zero otherwise. The z_{pov}^{post} threshold differs from z_{pov}^{pre} when the OPL includes a health spending amount which is the case in this investigation. Because of this, we estimated $z_{pov}^{post} = z_{pov}^{pre} \times (1 - \alpha)$, denoting α as the proportion of OOP included in z_{pov}^{pre}. This proportion was estimated as the mean OOP in households between the 23rd and 42nd percentile of per capita income for 1996/97 and between the 29th and 48th percentile for 2004/05 and 2017/18. These percentiles were chosen following INDEC's methodological procedures for OPL estimation (INDEC, 2016, p. 13). Even though INDEC uses the net of rent per capita income in order to estimate percentiles, we used per capita income due to limitations in ENGHo 1996/97 dataset.

According to INDEC (2016), α was equal to 0.071 in 1996 and 1997 and 0.06 in the following periods. By replacing pre-payment variables with their post-payment versions in equations (3), (4) and (5), the impact of OOP on poverty is estimated as the difference between the pre-payment and post-payment versions of each measure.

3.2.3 Concentration curves and concentration index

In order to estimate concentration curves (CC) and concentration index (CI), we follow the methodology proposed by O'Donnell et al. (2008, p. 83). The variable used to rank households by living standard was expenditure per equivalent adult. An equivalent adult is a coefficient designed to adjust basic food costs for different ages and gender individuals. For example, the cost of food for a five-year-old child is estimated as 60 % of the cost of a man who is between thirty and sixty years old. Even though the equivalent adult coefficient is originally designed to adjust nutritional requirements, it helps us to attenuate the bias generated by the assumption that all integers of a household require the same consumption level in order to enjoy a similar living standard. The CCs are estimated at individual level which means that are composed of the cumulative percentage of CHE against the cumulative percentage of the population.

In this investigation, we apply two methods in order to assess the distribution of CHE. First, we compare the CC with the 45° line which represents a perfectly equal distribution. If the CC is above the 45° line CHE takes higher values among poorer people. Conversely, if the CC is below the line of equality CHE is more concentrated among the richest population. We also compare different CCs in order to evaluate how this distribution changed over periods. The comparison of two CCs tells us in which period the variable of interest relied more on the richest or the poorest. All these comparisons

were assessed by applying dominance test using Distributive Analysis Stata Package (Araar and Duclos, 2007). In order to define dominance, we applied two criteria. On the one hand, a relaxed criterion which states that a CC dominates another if its values are significantly lower at any quantile and are not significantly higher at any other. On the other hand, a restricted criteria in which a CC dominates another if the difference is significantly negative from 0.05 to 0.95 quantiles. Second, we estimated the concentration index (CI) which is defined as twice the area between the CC and the 45-degree line (Kakwani, 1980, p. 173). In order to obtain a negative value when higher CHE is in poorer population and positive values otherwise the CI is defined as

$$CI = 1 - 2\int_0^1 L_h(p)dp \quad (6)$$

denoting as $L_h(p)$ the cumulative proportion of the variable of interest against the cumulative percentage p of people ranked progressively by living standards.

4 Results

4.1 CHE

Figure 1 exhibits CHE headcount measures (H_{cat}). In 2017/18, 9.57 % of Argentina's population incurred in CHE using a 10 % of EXP threshold, 5.81 % using a 15 % of EXP, 4.52 % using a 25 % of ATP, and 1.87 % using a 40 % of ATP. All CHE headcount measures dropped considerably between 1996/97 and 2017/18. However, the measures based on ATP increased slightly in the last period.

Figure 1 H_{cat} measures.

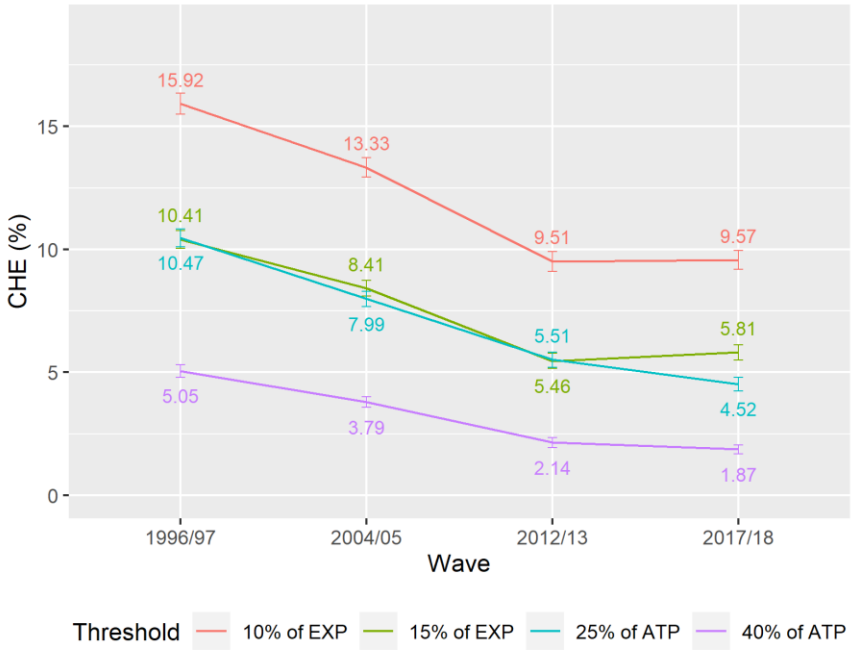


Figure 2 displays G_{cat} measures. In 2017/18 the estimated indicators using different thresholds are between 1.1 and 0.28 %. All measures decreased significantly between 1996/97 and 2017/18. Measures based on ATP show a slight increase in the last period.

Figure 2 G_{cat} measures.

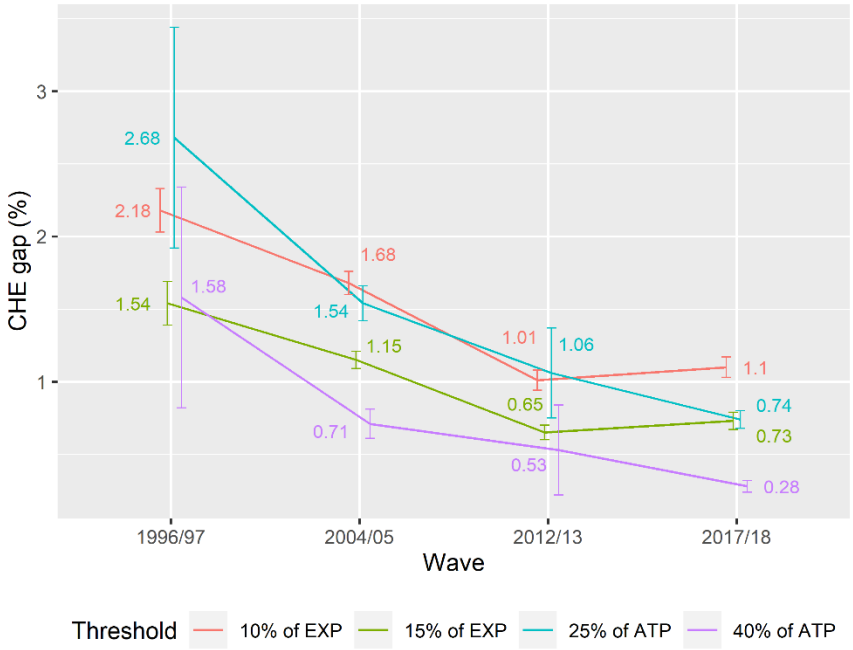
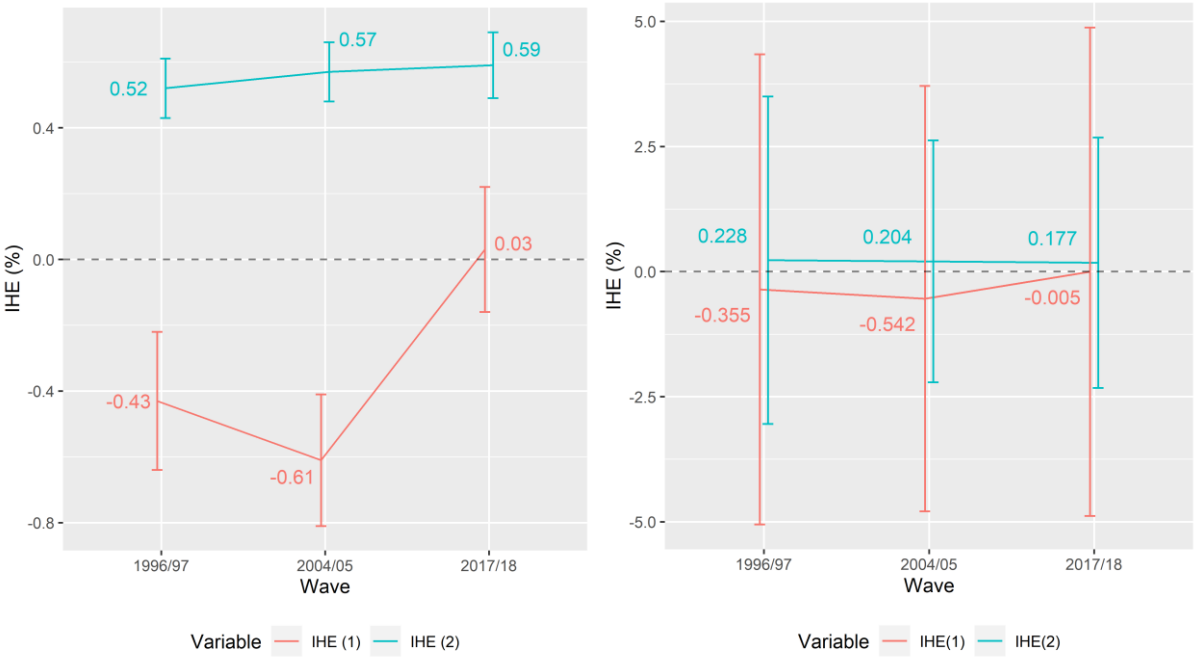


Figure 3 presents results of IHE. Firstly, based on OPL, H_{pov}^{post} resulted lower than H_{pov}^{pre} in 1996/97 and 2004/05. This means that the amount of population classified as poor before OOP and non-poor after OOP is higher than the amount of population pushed below OPL due to OOP. In 2017/18 IHE was equal to 0.03 %. Based on FPL, IHE is equal to 0.52 %, 0.57 % and 0.59 % for 1996/97, 2004/05 and 2017/18 respectively. Similarly, IHE using poverty gap measures resulted in nearly zero values.

Figure 3 IHE measures. Left: difference in poverty headcount. Right: difference in the normalized poverty gap. (1) based on OPL. (2) based on FPL.



4.2 CC and CI

Figure 4 presents CC for all measures of CHE and periods assessed in this research. All CCs are below the 45° line which means that in all periods CHE relied more on the richest people. Dominance analysis in Table 2 shows that, based on the restricted criteria, no CC dominates another. In the case of the relaxed criteria, in 1996/97 CHE was higher among the poorer than in 2004/05 and 2012/13. In the former, the effect is verified in two of the four applied measures and, in the latter, in three measures. In period 2012/13 CHE was higher among the poorer than in 2004/05. Finally, the 2017/18 period is in which CHE resulted higher among the poorer compared to all previous periods, except for 2012/13. In this case, no dominance was found.

The dominance effects described previously are consistent with CI presented in Table 2. Period 2017/18 is the one with the lower value, except for the CI based on 40 % of ATP threshold in which it is higher than 1996/97 and lower than the rest of the periods.

Figure 4 Concentration curves. Y-axis accumulated proportion of CHE. X-axis accumulated proportion of the population.

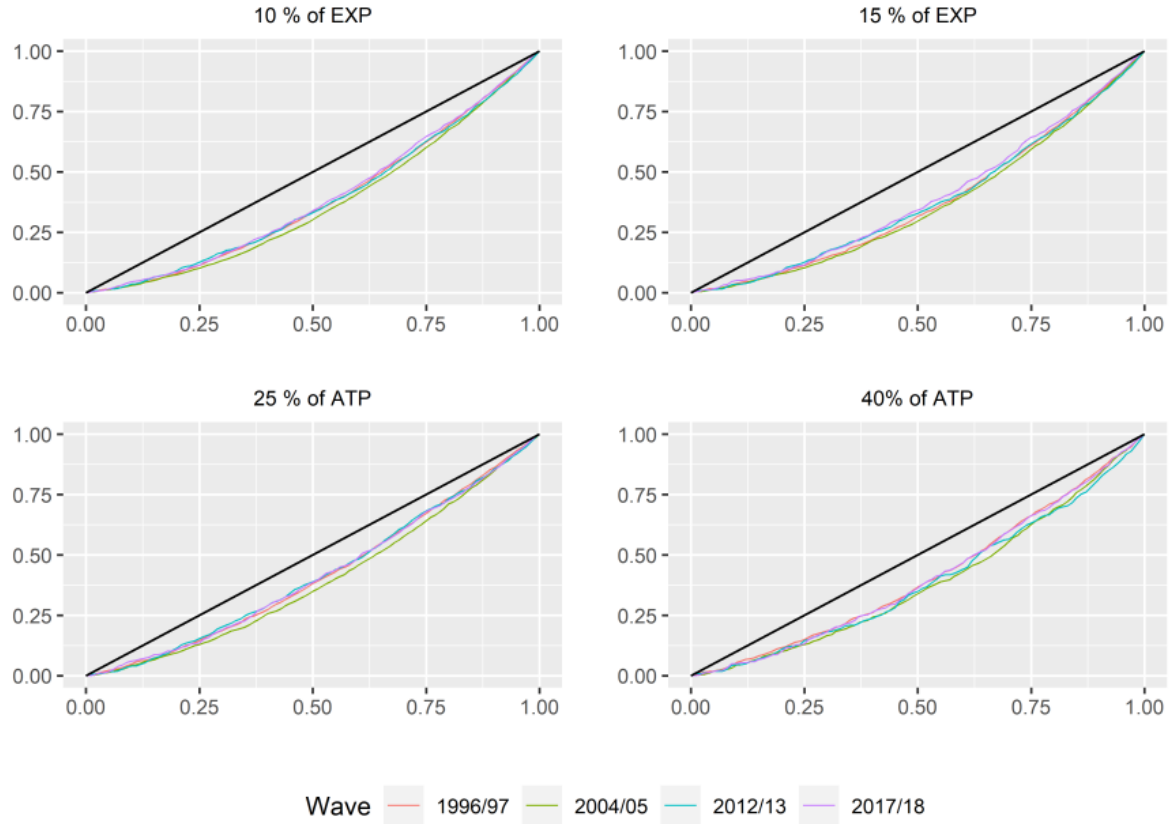


Table 2 Dominance between CCs. (+) progressive expenditure dominance of most recent period; (-) regressive expenditure dominance of most recent period; (=) no dominance. The symbols in each cell denote domination of the CC of the Wave mentioned in the column over the CC of the Wave mentioned in the row for each CHE measure. Symbols correspond to CHE measures and are ordered as follows: (1) 10 % of EXP; (2) 15 % of EXP; (3) 25 % of ATP; (4) 40 % of ATP.

	Restricted criteria			Relaxed criteria		
	2004/05	2012/13	2017/18	2004/05	2012/13	2017/18
1996/97	====	====	====	+ == +	= + + +	-- ==
2004/05		====	====		= -- =	--- =
2012/13			====			====

Table 3 Concentration index of health expenditure per household ranked by expenditure per equivalent adult.

Wave	10% of EXP	15% of EXP	25% of ATP	40% of ATP
1996/97	0.21	0.24	0.17	0.17
2004/05	0.25	0.27	0.21	0.24
2012/13	0.21	0.22	0.16	0.24
2017/18	0.18	0.18	0.15	0.21

5 Discussion

In general, our results of CHE measures are nearly the same as previous studies for periods 1996/97, 2004/05 and 2012/13. With concern to IHE, Maceira (2018) found that in 1997, 2005 and 2012 it was 4.2 %, 2.8 % and 0.6 % respectively using 2.5 USD per day as poverty line and 2.8 %, 2 % and 0.4 % respectively using a 1.9 USD per day poverty line. These results are significantly higher than our results which is caused by a different methodological approach. The author used the international poverty line and we applied the regional cost of basic goods and services estimated by INDEC, which are based on Argentinian consumption data. This approach might be more suitable given certain bias which might occur when international poverty measures and purchase parity power is applied (Deaton, 2010).

The distribution of CHE was found to be progressive in all periods applying different thresholds. As Wagstaff (2002) stated, it is a policymaker problem to assess the question of how progressive OOP should be, but it is reasonable that the burden of CHE is not regressive. Dominance analysis and CI show that 2004/05 was the most progressive period. However, dominance between curves was only found using low specificity criteria (Dardanoni and Forcina, 1999). Besides comparisons between periods, the progressivity of CHE observed in concentration curves and concentration indexes is a robust result. This is an important issue to be studied in future research. As has been described in the introduction, the Argentinian health system is composed partly of tax-financed facilities which mainly provide health services to people without any other coverage who also belong to low-income groups (Maceira, 2018). Prepayment mechanisms such as taxes or insurances are proven to be negatively correlated with the incidence of CHE. However, previous research has shown that in Argentina health services are unequally distributed (Palacios, Espinola and Rojas-Roque, 2020). A further question to be assessed is whether the progressivity in the distribution of CHE is a consequence of an effective public policy or difficulties to access health care.

Finally, it is important to highlight that the Argentinian economy is composed of a large informal sector (Bertranou, 2007). Informality is related to vulnerability to supply chain disruptions that cause suspension of formal coverage and might force families to finance health services with OOP. As has been previously reported in the literature, supply chain disruption might represent an additional barrier to households' income or access to pre-payment schemes, which increases the burden of CHE (Renzaho, 2020; Dastan et al., 2021). Similarly, an inefficient and ineffective resource allocation in the public system might lead to a scarcity of essential health services, forcing people to use private services which increases financial risk (Piroozi et al., 2017; Selvaraj, Farooqui and Karan, 2018).

This research has several novelty results which are important to highlight. First, to our knowledge no previous research has evaluated financial protection in Argentina over a long period. Second, no previous research has applied a pre-payment and a post-payment poverty line in order to estimate IHE measures. Third, this is the first research that compares the distribution of CHE in different periods using dominance analysis. Finally, these are the first estimation using 2017/18 data, which is the last available one.

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7 Appendix

A CHE and IHE

Table 4 $\boldsymbol{H_{cat}}$ (%)

Wave	10% of EXP	15% of EXP	25% of ATP	40% of ATP
1996/97	15.92	10.41	10.47	5.05
2004/05	13.33	8.41	7.99	3.79
2012/13	9.51	5.46	5.51	2.14
2017/18	9.57	5.81	4.52	1.87

Table 5 G_{cat} (%)

Wave	10% of EXP	15% of EXP	25% of ATP	40% of ATP
1996/97	2.18	1.54	2.68	1.58
2004/05	1.68	1.15	1.54	0.71
2012/13	1.01	0.65	1.06	0.53
2017/18	1.10	0.73	0.74	0.28

Table 6 $H_{pov}^{post} - H_{pov}^{pre}$ (%)

Wave	IHE (1)	IHE (2)
1996/97	-0.43	0.52
2004/05	-0.61	0.57
2017/18	0.03	0.59

Table 7 $G_{pov}^{post} - G_{pov}^{pre}$ (%)

Wave	IHE (1)	IHE (2)
1996/97	-0.66	0.43
2004/05	-0.93	0.33
2017/18	-0.13	0.30

B Differences between CCS

Figure 5 Difference in CC of CHE based on EXP and $\boldsymbol{z = 0.1}$ (Gray shaded: 95% confidence interval). Population ranked by expenditure per equivalent adult.

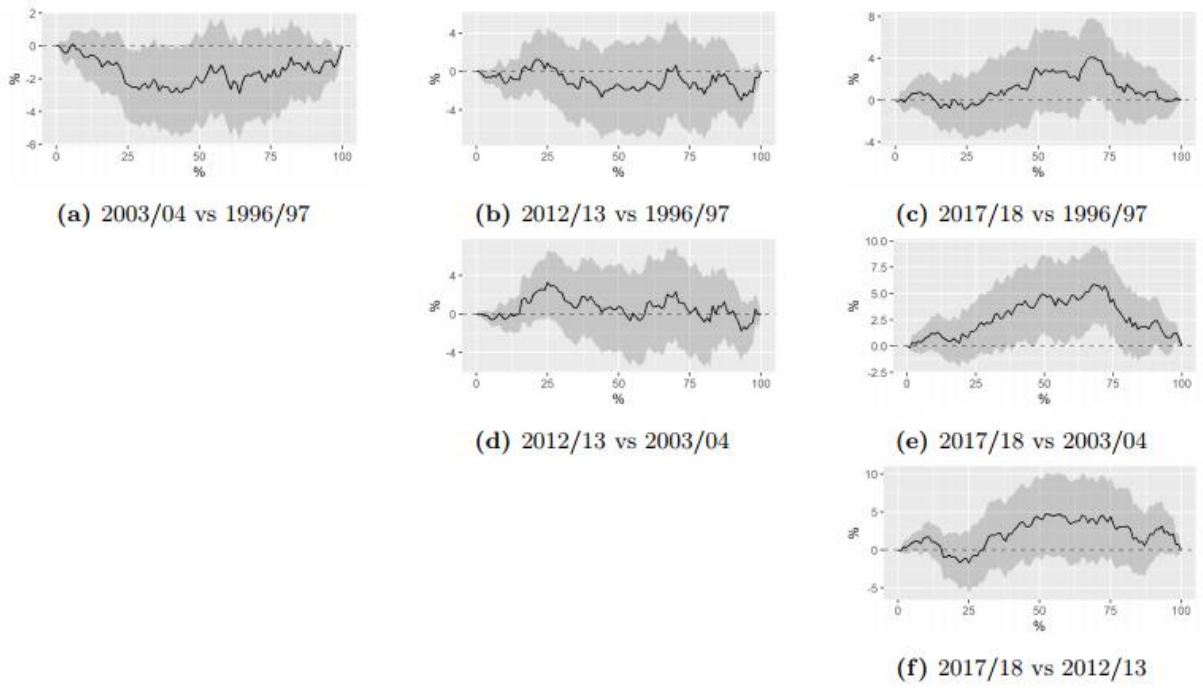

Figure 6 Difference in CC of CHE based on EXP and $z = 0.15$ (Gray shaded: 95% confidence interval). Population ranked by expenditure per equivalent adult.

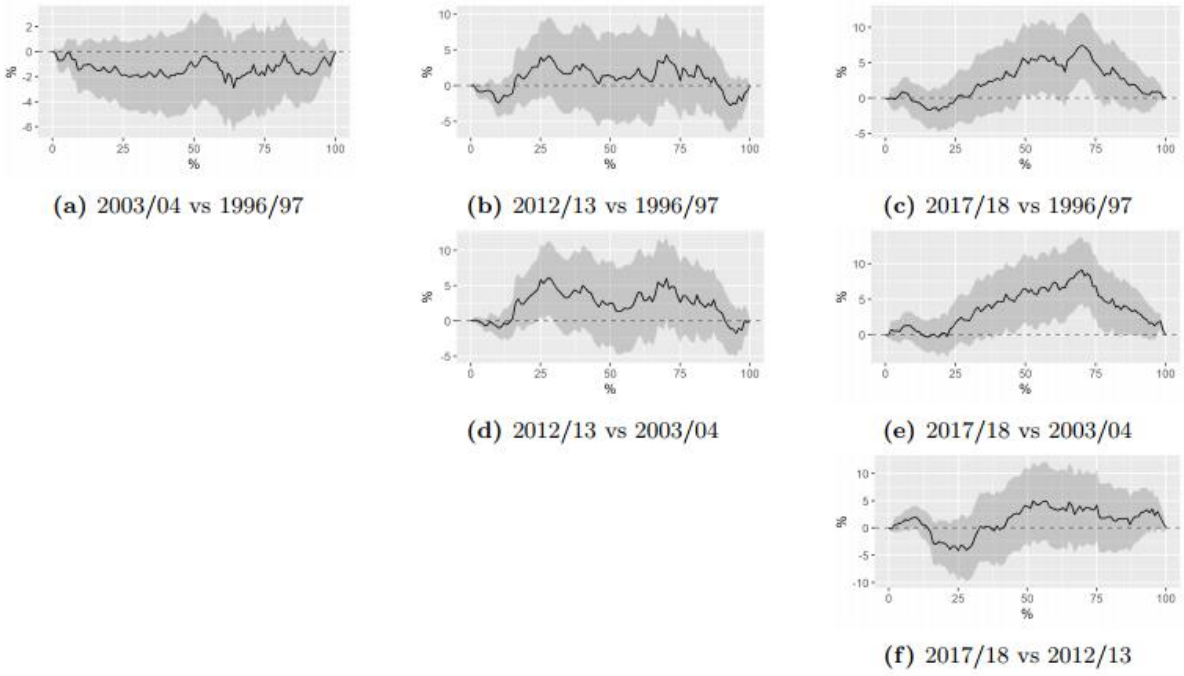

Figure 7 Difference in CC of CHE based on ATP and $z = 0.25$ (Gray shaded: 95% confidence interval). Population ranked by expenditure per equivalent adult.

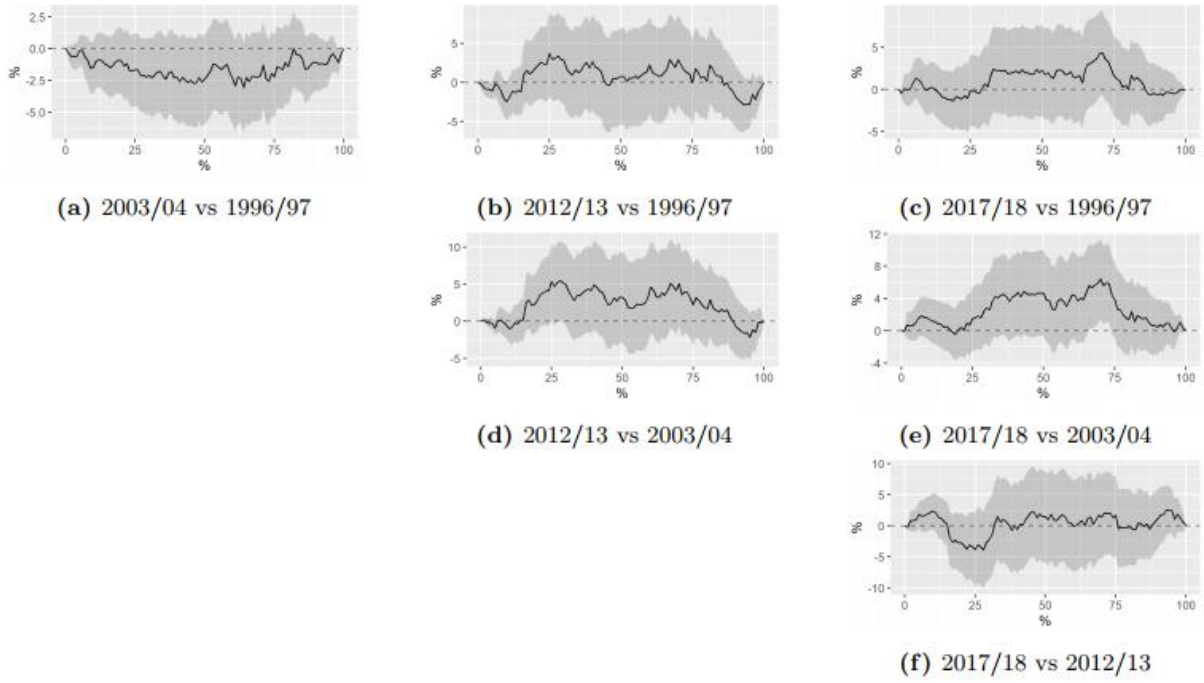

Figure 8 Difference in CC of CHE based on ATP and $z = 0.40$ (Gray shaded: 95% confidence interval). Population ranked by expenditure per equivalent adult.