Determinants of Child Health Inequalities in Developing Countries. A New Perspective

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Abstract

The main objective of this essay is to analyze what the determining factors in the differences in child health are. To achieve this, we estimate a cross-sectional model for 88 developing countries and we have used two measures of the child health inequalities: the infant mortality rate by wealth quintiles and the infant mortality rate by maternal educational level. The achieved results allow us to conclude that a lower inequality in the distribution of the income, greater public health expenditure and the introduction of capitalism in these countries make the inequality in health decrease.

Keywords

JEL classification

I12, I18, I31

1. INTRODUCTION

The interest in analyzing the inequality in health has grown in the last three decades, although there is not much literature which analyzes the determining factors of the inequality through a comparative study among countries. Also, there are many published works that show a greater interest in analyzing the measurement of inequality in health rather than in studying its causes.

This research is intended to answer one main objective. It analyzes the determining factors of child health inequality in developing countries. To achieve this, we have employed two different indicators of the inequality in health which implies a novel aspect, since it is used the infant mortality rate by wealth quintiles and the infant mortality rate by educational maternal level. In order to analyze its causes a cross-sectional model for 88 developing countries has been estimated. To the traditional explanatory variables such as income, inequality of income, poverty, public health expenditure or the education of women, we have incorporated other types of factors like the institutional variables that can respond to issues such as, whether capitalism reduces or increases the inequality in health.

The estimates carried out allow us to conclude that the greater the inequality of the income the greater the inequality in health is. On the other hand, a higher public health expenditure and the promotion of capitalism, measured through the Index of Economic Freedom, reduce this.

The work is structured in the following way. The second heading consists of a bibliographic revision on the main works carried out in this field. In the third heading we will explain the model and variables used and the empirical results obtained. Finally, we will present the main conclusions on the basis of the assessment made.

2. THEORETICAL FRAMEWORK

Since the Decade of the 80s in the 20th century, the interest of researchers to study the inequality in health has increased. However, many of these studies have focused primarily on analyzing national health surveys without developing comparative analysis among countries. In addition, these works have mostly studied the cases of Great Britain and the United States. These works include those of Arber and Lahelma (1993), who carried out an analysis of gender of the inequality in health. For their part, Wagstaff and Van Doorstaler (1994), argued that the index of concentration is sometimes not applicable to this type of study. Subsequently, Etner (1996) related the income of households to health. On the other hand, Wagstaff et al (2001) carried out an analysis of the effect of the behavior of individuals related to health has on the inequality thereof. In addition, Houweling et al. (2003) evaluated the influence that the indicator of the economic status on the inequality in health has as they did later Hernández and Jiménez (2009), who showed the importance of the economic position as a relevant factor which explains the differences in health in Spain. On the other hand, Chatterji et al. (2013) used as explanatory variable in health inequality a relative index

of inequality income which, when decomposed, shows that the main determinants of inequality in health are the income and the maternal education. To this same conclusion came Nolan and Laite (2014), also using family income and maternal education as principal explanatory variables of the inequality in children's health in Ireland.

Another strong trend in this field of study has been the interest that some authors have shown to find the suitable measurement of inequality in health, since, as noted in López-Casasnovas and Rivera (2002), the measurement of health status shows major problems due to the lack of a complete and comparable health index among countries and regions. In this way, Borrell et al. (2000) made a classification of different measurements of inequality depending on the addition or not of the socio-economic level in the analysis, the availability of individual or aggregated data, measurement of effect or total impact, and relative or absolute measurements. Sahn and Younger (2009) used the BMI as a measurement of inequality in intra-household health. On the other hand, it is highlighted Tang et al. (2009) using the variable "realization of potential life years" (age at death / potential length of life) as a measurement of inequality in health. The goal is to separate the avoidable risks of mortality from the unavoidable ones. Ho y Slavov (2012) offered an alternative perspective on inequality in health. Instead of studying this inequality among socio-economic groups, they performed an analysis of inequality in existing health care within each one. To do so, they used as a measurement of inequality the life length, which decreased during the last century despite increasing the inequalities of income.

Among the pioneering works we can find those of Le Grand (1985,1987), who related the inequality in health and human capital; Parkin et al. (1987), who analyzed the relationship between the public budgets in health and the GDP of the countries, Pamuk (1988), who relates the inequality in health to the economic inequality between

the different social classes and Leclere (1989), who performed a compared survey between European countries. All of them used the mortality and the life expectancy indexes as health indicators, which allow the comparative analysis among countries, but as Lopez_Casasnovas and Rivera (2002) pointed out that these indicators are not sensitive to improvements in quality of life, something which is essential in the most developed countries that they have already reached high levels of health. Yet, as Arokiasamy Pradham (2010) shows, the assessment of the inequalities in health with comparative analysis of their determinants is crucial for drawing up the agendas dedicated to the health policies. In this sense, King et al (2013) analyzed which countries have as a priority to reduce the inequality in health and how such prioritization is due to socio-economic factors. These authors come to the conclusion that those countries with the largest PIB are the ones which prioritized more the fight against inequality in health, supporting the thesis of Gakidou et al (2003).

In addition to the relationship between income and distribution, education and inequality in health, and the size of the health services and their impact on the observed differences in health indicators, studies of gender have also been carried out like the aforementioned Arber and Laherma (1993) or the Borrell and Artazcoz (2008). On the other hand, Gatrell et al (2004) preformed a spatial analysis of inequality in health, showing how the geographical inequalities affect health outcomes.

Other determining factors that have been used in economic literature have been variables related to the labor market, in other words, both the workplace and the lack of or no employment (Dalghren and Whitehead, 1991), since the labor risks and psychological stress affects a healthy lifestyle and, as noted in Mackenbach and Bakker (2002), the esteem and social approval depends on largely on the kind of job that people have. Also, the environment has been also referred to as determinant. In this way, the

access to basic sanitation, clean water and waste disposal have been taken into account in such studies (Dalghren and Whitehead, 1991; WHO, 2009).

Many authors have studied the causes of health and health inequalities of children. In this sense, Flegg (1982) states that the inequality of income, level of education of women and the number of physicians and nurses per capita are the main determinants of child mortality. In the same line it is the contribution of Marmot (2005) for whom the infant mortality varies among countries and within each country as a result of the effect of the social gradient. In this context, Rajmil et al (2010) proposed a series of public intervention measures to reduce the effects of poverty and social exclusion on children's health.

What is intended here is to further deepen the analysis of the determinants of inequality in health through a comparative study of 176 countries by 2013. The goal is double, on the one hand, it is to analyze how important the indicator of inequality in health chosen and on the other hand to analyze the effect that different determinants of inequality in health have, introducing institutional variables as explanatory variables in this type of analysis.

3. METHOD

This study will adapt to the classic model of Dalghren and Whitehead (1991) to conduct a compared analysis among 88 developing countries. These two economists' model has been widely used and shows the determinants of health in concentric layers, from the structural determinants (outer layer) to the individual lifestyles (inner layer), being placed in the center the characteristics of the people which cannot be modified such as sex, age, or constitutional factors.

(Figure 1)

According to these authors, individuals are equipped with risk factors such as age, sex and other genetic factors which affect their potential to their final health. Also, it is influenced by personal behavior and lifestyles. People with an unfavorable economic situation tend to exhibit behaviors that deviate from the healthy lifestyle, such as smoking, alcohol abuse, drugs and poor nutrition. On the other hand, labor and environmental conditions, and access to basic services constitute another set of determinants of health status. Differences in the habitability house conditions, occupational risks, possession or not of an employment, and the possibility of having a free quality education and basic sanitation services and accessible infrastructures to drinking water, sewerage, roads paved, are key factors for differences in health that show the different social groups. Finally, the economic, cultural and environmental conditions prevalent in society as a whole, as well as the economic situations in the country will also affect the outcome on the health of the population.

To perform this analysis two new indicators have been calculated, the infant mortality rate by wealth quintiles and the infant mortality rate by maternal educational level. These indexes aim to provide an overview on inequalities in health within countries and among countries.

The infant mortality rate by wealth quintiles is the result of the following expression:

$$\text{Mortality} \left(\frac{20}{80}\right) = \frac{\text{Under 5 mortality rate Q1}}{\text{Under 5 mortality rate Q5}} \tag{1}$$

Where, Q1 represents the 20% poorest population and Q5 the 20% richest population. The ratio 80/20 is used to study the inequality in income distribution. In this

paper, we have decided to use the ratio 20/80 in order to obtain a positive measurement in relation to the health inequality, that is, the higher the ratio the greater the child health inequality is.

Likewise, the infant mortality rate by maternal educational level is derived from the following equation:

$$\text{Mortality (edu)} = \frac{\text{Under 5 mortality rate (None maternal education)}}{\text{Under 5 mortality rate (Secondary or higher maternal education)}} \quad (2)$$

The data of both dependent variables has been obtained from the World Health Survey.

As it has commented above the model of Dalghren and Whitehead (1991) has been adapted to analyze the determining factors of child health inequality using a cross-sectional model for 88 countries. The following independent variables have been used in this linear model:

- **Gini Index** is an indicator of inequality in the distribution of income.
- **GDP per capita** measured in PPP terms in constant $.
- **Poverty** measured by the mean shortfall from the poverty line (counting the nonpoor as having zero shortfall) expressed as a percentage of the poverty line.
- **CO2 emissions** (metric tons per capital) used as a proxy variable of the environmental conditions of the country in question.
- **Rural population** represents the percentage of population living in rural areas on population.

- **Parliamentary** measures the percentage of women who are parliamentary in a single or lower chamber and it is a proxy variable of the role of women in the society of the country in question.

- **Public health expenditure**, measured as a percentage of the GDP.

- **Physicians**, measured by the number of physicians per 10,000 inhabitants.

- **Education** is a proxy variable for the educational level of women in the country in question through the number of years spent at school by women.

- **Unemployment** is the unemployment rate.

- **Rural water** reflects the percentage of population using an improved drinking water source.

- **Crime** is the number of homicides for each 100,000 habitants. The source used is the United Nation Office on Drugs and Crime.

- **Globalization** is measured by the KOF Index of Globalization. It measures the global connectivity, integration and interdependence of countries in cultural, ecological, economic, political, social and technological spheres. This index is prepared by KOF Swiss Economic Institute.

- **Democracy** is measured by the Political Right Index. This index, elaborated by the NGO *Freedom House,* includes evaluations of free and impartial elections, plurality of political parties, significant opposition, military regimes and self-determination for minority groups.

- **Capitalism** is measured by the Index of Economic Freedom. It includes evaluations of trade policies, Government tariffs, Government intervention in the economy, monetary policy, flow of capital and foreign investment, foreign activity, financial activity, price and wage control, property rights and black

market activity and regulation. The Heritage Foundation of Wall Street Journal elaborates this index.

- **Life expectancy** is used as a proxy variable of the health status of the population by the simple fact of being born and living in the country in question.

The source for all the variables used, with the exception of "crime" and institutional variables, is the World Development Indicators published by the World Bank.

The model has been estimated by Ordinary Least Squares (OLS) and by Two Stage Least Squares (2SLS) and the empirical results are collected in the following table.

(Table 1)

Many authors have pointed out that more than absolute income it is the difference of income which determines to a greater extent the inequality in health (Duleep, 1995; Wilkinson, 1996; Deaton, 1999). In this study this fact is corroborated since the Gini index is significant in all the estimates. The positive sign shows that the inequality in the distribution of income has a direct and significant effect on the child health inequality, that is to say, countries where the income inequality is greater, inequality in health is also more marked. However, the effect of absolute income measured by per capita GDP is not significant in all estimates. So, in the case of developing countries, the absolute income doesn't explain the inequalities in child health. Indeed, the child health inequalities in developing countries depend on how the income is distributed among the population.

Poverty has no effect on the inequality in health. It is due to the sample used because we are studying the child health inequality observed in the developing

countries. These countries are very poor, and so, the poverty is a common characteristic of these countries. Likewise, the social, cultural, demographic, and environmental conditions show, in the majority of cases, a similar result. Only the public expenditure on health and the density of physicians have a significant effect on the inequality. In terms of public expenditure on health, the effect is the expected one. Thus, the significant and negative sign indicates that the bigger the public intervention in health is, the lower the inequality, in other words, the public sector reduces the inequality in health. This result coincides with that obtained by Wagstaff and Van Doorsaler (1993). A similar result is obtained with the independent variable that measures the number of physicians that there is in the country in question. The effect of this variable on the inequality is negative, so the larger number of physicians the lower the inequality is. Therefore, the improvement of the needed infrastructures and human capital in health through a greater public health expenditure is a key element to reduce the child health inequalities in developing countries.

The environmental variable used cannot support any significant results, so CO_2 emissions, in other words, pollution does not cause greater inequality in health. We arrived to the same conclusion in the case of the unemployment variable. The lack of employment does not affect inequality in health. Essential infrastructures do not play a fundamental role in health inequality either. Even so, the non-significant sign for the variable that measures the percentage of rural population having access to drinking water doesn't allow affirming an impoverishment of the living conditions of the rural population reduce inequality in health.

Regarding the effect that the institutional variables included in the model, it can be concluded that capitalism, measured by the economic freedom index, and globalization affects inequality in different directions. The positive and significant sign

in the majority of cases for the variable globalization indicates that the greater the economic interdependence in the global market is the bigger the inequality in health is. However, the negative and significant sign for the variable capitalism shows that the openness of developing countries, which allows a greater flow of capital and foreign investment, can improve the child health inequality. Finally, democracy has no significant effect for these countries.

The crime rate has a negative effect on the inequality in health. Therefore, this result doesn't allow stating that in those countries where the homicide rate is greater, inequality is also more marked. Finally, life expectancy has a direct relationship with the inequality in health. This shows that there is a direct relationship of causality between the absolute health index and the relative one, in other words, an improvement of the overall health of the population does not imply that it is evenly distributed among the population.

4. CONCLUSIONS

The main objective pursued by this study is to analyze what the determinants of child health inequality in developing countries are. One of the issues that has given rise to more discussion among the researchers of the determinants of health and inequality in health is whether absolute income or relative income is more important. In accordance with the results of the estimates it is verified that there is a direct relationship between the inequality in the distribution of income and inequality in health. For this reason, redistributive policies should be an essential element in any health equity plan. To achieve this, public intervention through health expenditure is necessary. However, the free market, the private management, individualism, ultimately, capitalism in these

countries can reduce child health inequalities and it is necessary to combine the advantages offered by the market with the virtues associated with intervention of the public sector, especially in such sensitive sectors as healthcare. Healthcare is a merit good, with strong positive externalities that should be taken into account when setting up a country's healthcare system. Reducing inequalities in health requires that the entire population has access to healthcare and the number of physicians has to be enough to guarantee a suitable health service.

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TABLE 1: RESULTS OF THE ESTIMATIONS

	Mortality (20/80)		Mortality (education)[b]	
	MCO	2SLS[a]	MCO	2SLS[a]
Gini index	2.83	6.94	4.33	4.89
	(2.45)**	(3.07)***	(1.92)*	(1.84)*
GDPpc	0.0005	-0.00005	0.00002	
	(0.98)	(-0.09)	(0.23)	
Poverty	-0.003		-0.02	
	(-0.29)		(-1.19)	
CO2	0.05	0.05	0.16	0.04
	(0.62)	(0.57)	(1.08)	(0.41)
Rural population	0.004	-0.0004	0.01	
	(0.64)	(-0.05)	(1.14)	
Parliamentary	-0.002	0.002	-0.004	0.002
	(-0.26)	(0.20)	(-0.34)	(0.12)
Public health expenditure	-0.13	-0.23	-0.02	-0.09
	(-1.95)*	(-2.63)**	(-0.21)	(-0.84)
Physicians	-0.25	-0.11	-0.20	-0.19
	(-2.07)**	(-0.74)	(-0.53)	(-0.62)
Education	-0.00008			
	(-0.00)			
Unemployment	-0.02		-0.06	
	(-0.97)		(-1.48)	
Rural water	0.003	0.004	-0.01	-0.001
	(0.56)	(0.62)	(-0.95)	(-0.11)
Crime	-0.01	-0.02	-0.02	-0.02
	(-2.23)**	(-2.82)***	(-2.21)**	(-2.21)**
Globalization	0.03	0.03	0.02	0.007
	(2.63)**	(1.99)*	(1.04)	(0.34)

Democracy	-0.03	0.003	-0.03	0.01
	(-0.56)	(0.04)	(-0.42)	(0.17)
Capitalism	-0.03	-0.06	-0.04	-0.05
	(-1.94)*	(-2.70)**	(-1.42)	(-2.02)**
Life expectancy	0.02	0.03	0.04	0.04
	(1.51)	(1.86)*	(2.02)*	(2.74)***
Observaciones	42	42	42	42
R^2	0.98		0.93	

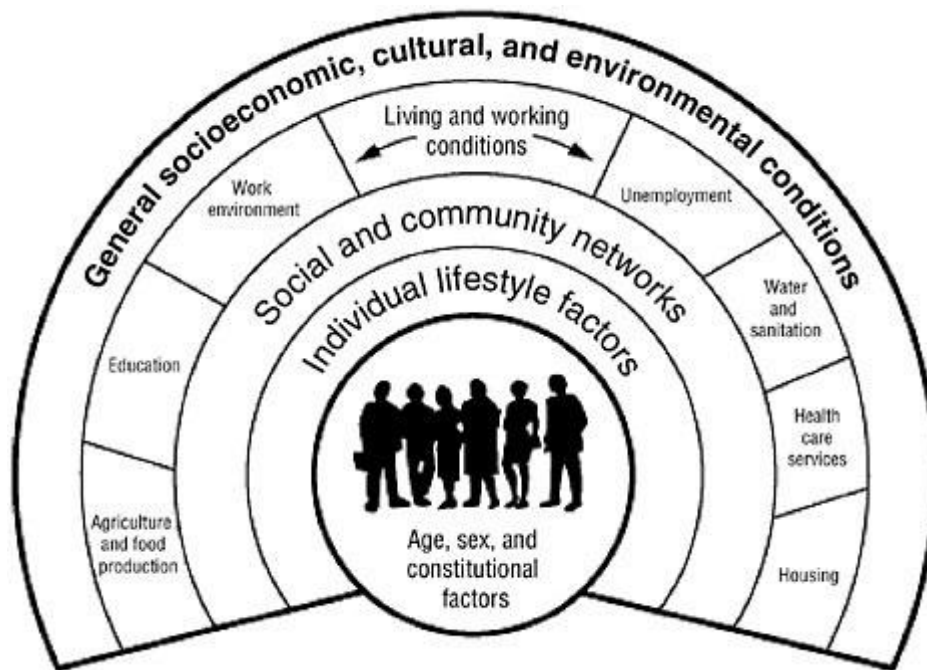*Significant at 10%   **Significant at 5%   ***Significant at 1%

Notes:

[a] Gini index is used as instrumented variable.

[b] Education is dropped because is used to calculate the dependent variable.

FIGURE 1: THE DALGHREN-WHITEHEAD MODEL OF DETERMINANTS IN HEALTH

Source: Dalghren and Whitehead (1991)