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Authors: Marta Pascual-Sáez, David Cantarero-Prieto, Paloma Lanza-León

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The dynamics of health poverty in Spain during the economic crisis (2008-2016)

Marta Pascual-Sáez[a], David Cantarero-Prieto[a] and Paloma Lanza-León[a]

Email: marta.pascual@unican.es; david.cantarero@unican.es; paloma.lanza@unican.es

[a]Department of Economics,

University of Cantabria

Avenue. Los Castros, s/n, Santander CP 39005, Spain.

Corresponding Author:

Marta Pascual-Sáez

Department of Economics,

University of Cantabria

Avenue. Los Castros, s/n, Santander CP 39005, Spain.

Email: marta.pascual@unican.es

HIGHLIGHTS

- Trends in general health status are analysed in Spain.
- The poverty indices show changes in the Spanish population health.
- There is more poor population at the beginning of the economic crisis.
- The average of the general health status improves from 2011 to 2016.
- Being a woman, older and a low education level imply poor health.

Abstract

In recent years, and because of the economic crisis, Spain's government has been worried about changes in health poverty. In this paper, we examine individual health status measured subjectively (SAH) and we decompose some socio-economic determinants to analyse how this situation affects health. We focus on SAH to estimate the poverty trends over time using the Foster-Greer-Thorbecke (FGT) index. For this purpose, we have used data provided by the European Union Statistics on Income and Living Conditions (EU-SILC). Our results show a negative growth if a poor SAH status is chosen as a health poverty threshold, and a positive growth of health poverty, if a fair SAH status is chosen. Furthermore, we decompose some socio-economic factors (such as gender, age and education level) to study how these characteristics affect health poverty. Our findings, based on different subgroup decompositions, reveal a rise of health poverty in Spain.

Keywords Self-Assessment Health · Health poverty · Foster-Greer-Thorbecke index · European Union Statistics on Income and Living Conditions

1. Introduction

Health outcomes are often affected by socio-economic conditions and vice-versa. More specifically, health status and poverty are negatively associated with living in poor health. However, an important empirical gap in literature concerns the relationship between health and socio-economic status through Self-Assessed Health (SAH), which is a subjective health measure and changes over time. Nevertheless, these health issues have been less considered although they can be defined from different points of view. On the one hand, in the case of SAH, individuals assess their own health as poor if they believe that another person of the same gender, age, education level or income, is much healthier than them. On the other hand, individuals are poor in health when their health are below the chosen health poverty threshold [1-2].

According to the use of subjective health measures, such as SAH, some authors are in favour of its use instead of objective measures. Several studies argue that SAH is a relevant predictor of future mortality and morbidity within countries. In addition, it has a great capacity to cover a large part of individuals' health conditions, being commonly used epidemiological surveys [3-7]. Therefore, it should not disregard health data obtained through the individuals' SAH as it provides valuable information about their well-being. If it is used with caution, SAH data are appropriate in health economics research.

Nevertheless, other authors are sceptical about its use and they prefer a more objective health measure, concluding that the perceived and the current health status do not have to agree with [8-9]. This is because SAH is strongly correlated with a set of clinical health conditions and it can cause measurement errors [10]. In other words, respondents with the same real health status may have different response styles or reference points when they evaluate their overall health. Hence, the different measures of social inequalities in health economics literature must be considered [11-13].

This paper analyses the recent dynamics in SAH in Spain using poverty indices. Thus, the first purpose is to analyse trends in individual health status in Spain. The period analysed is between 2008 and 2016, which are the first and the last years in which data are available. For this purpose, we have used data provided by the European Union Statistics on Income and Living Conditions (EU-SILC). The second goal is to decompose some socio-economic determinants (gender, age and education level) to analyse how these characteristics affect health poverty during the economic crisis (2008-2016).

The paper is organised as follows. Firstly, we introduce a review of the last studies interested in health poverty. Secondly, we describe some methods proposed in literature to measure health inequalities. Next, we provide a brief description of the data source used. Then, we explain the main empirical results of health poverty, highlighting those obtained with the Foster-Greer-Thorbecke (FGT) index, as well as with the subgroup decomposition. The paper ends with conclusions in the last section.

2. Self-assessment health & poverty: a survey

Social determinants are in part responsible for health inequalities. Some significant ones that influence health are education, socio-economic status, place of residence, race, marital status or ethnic origin [10, 14-15]. Below, we describe in detail some empirical evidence regarding literature.

There are some papers which prove that health trends to be worse in those societies with greater income differences [16-18]. The studies of Meer et al. [19], Buddelmeyer and Cai [20], Ásgeirsdóttir and Ragnarsddóttir [21], Brzezinski [2], Mackenbach et al. [22], Simões et al. [23] and Ivaldi et al. [24] analyse the relationship between poverty and health. The main difference between these papers are the methodology used. Meer et al. [19] use ordinary least squares regressions as well as a two-stage probit model; Buddelmeyer and Cai [20] combine a dynamic model and the Pearson's chi-squared test; Ásgeirsdóttir and Ragnarsddóttir [21] calculate the Concentration Index and the Absolute Concentration Index; Brzezinski [2] uses the FGT index; Mackenbach et al. [22] and Simões et al. [23] propose an ordered probit model; and Ivaldi et al. [24] present factor analysis and Pena distance, a non-parametric method and another parametric, respectively.

According to the area considered, Ásgeirsdóttir and Ragnarsddóttir [21], Mackenbach et al. [22] and Ivaldi et al. [24] focus their studies on Europe. More specifically, Brzezinski [2] analyse Great Britain while Simões et al. [23] do it for Portugal. By contrast, Meer et al. [19] examine the United States; and Buddelmeyer and Cai [20] analyse the case of Australia.

Moreover, Meer et al. [19] corroborate the effect of wealth on individual's health status, using the 1984, 1989, 1994, and 1999 waves of data from the Panel Study of Income Dynamics (PSID). Their results suggest that wealth presents a positive and statistically significant impact on SAH, but it is not as important as it is supposed to be.

Besides, Buddelmeyer and Cai [20] analyse the trends of poverty and health, using data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. Their results indicate that households headed by a person with poor health are more likely to be in poverty than the ones headed by a healthy person. A man, whose family is poor in a specific year, is more likely to be ill the following one than a man, whose family is well positioned economically. They also determine that there is persistence over time in both poverty and health.

For example, Ásgeirsdóttir and Ragnarsddóttir [21] measure to what extent it has been produced health and decreased variation in health by socio-economic status, using data from the EU-SILC. Their results suggest that in most high-income countries, male individuals value their health better than females. Moreover, health status gets worse with age whereas countries with a higher education level report better health. Being unemployed, retired, disabled or a part-time worker is positively related to poor health. In addition, being at risk of poverty is associated with poor health in most countries.

On the one hand, Brzezinski [2] analyses the trends in SAH poverty from 1991 to 2008. This study uses data from the British Household Panel Survey (BHPS) establishing his results on differences in income, education, household structure and conditions. As a result, if a fair SAH status such as the poverty threshold is chosen, the health poverty rate will increase. Furthermore, if a higher health poverty threshold is chosen, poverty will rise too, and it will be statistically significant. Focused on decompositions, the most important effects are health poverty as well as the proportion of persons cohabiting.

On the other hand, Mackenbach et al. [22] analyse the changes in mortality by socio-economic status. They show a growing inequality in health, both within and between each analysed country. Their results display an increase in the relative inequality in premature mortality in most European countries since 1990. However, a tendency of decreased population with lower education level is shown and they emphasize the contrast between the South and East Europe. The former group of countries present small inequalities while the second ones present greater ones.

In addition, Simões et al. [23] assess the determinants of health inequalities, using the National Health Survey. They evaluate poverty, wealth and health inequality. Their results suggest that there are huge health inequalities, highlighting education and income as important determinants. They emphasize the aging of the Portuguese population because age is negatively correlated with health, which generates more inequality.

Finally, Ivaldi et al. [24] study the relationship between health and income distribution. Their results find that health trends to be better in those countries with a high Gross Domestic Product (GDP) per capita and it gets worse when some determinants influence such as lifestyle or diet. Furthermore, they conclude that there is an indirect relationship between health and income distribution.

3. Measures of self-rates health poverty

In the literature which analyses health inequalities, several measures are used [25-26]. We analyse a variable such as SAH, which has an ordinal scale and represents one of the most commonly-used health indicators. Many general population surveys include it using the following question: How is your health in general? Thus, respondents are asked to rate their own health. When they answer the survey question about SAH, they assess their true health and project it into a scale. The answers usually vary according to different categories, varying from 1 (very good) to 5 (very poor).

3.1 Poverty measures

Regarding the discrete variables, we have considered the FGT index, which is developed by Foster et al. [25] and Bennett and Hatzimasoura [26], among others. We use this index to analyse the dynamics of health poverty. It considers a sample of N individuals, whose SAH is represented by a vector of S categories, all ordered, such as $Y = (y_1, y_2, \dots, y_S)$, with $y_i > y_j$ if and only if health status i is preferred to health status j. In practice, y_1 is the worst health status proposed in the self-assessment survey, while y_S is the best possible health status. If the assumption of selecting a category k as a poverty threshold is supposed, Bennett and Hatzimasoura [26] propose the following measure:

$$\pi_\alpha(Y;k) = \sum_{j=1}^{k} p_j \left(\frac{k-j+1}{k}\right)^\alpha \ when\ 1 \leq j \leq k;\ \alpha \geq 0 \qquad (1)$$

This equation is a weighted sum of the probabilities of having SAH below the chosen health poverty threshold, where $p_j = Pr[Y = y_j]$ is the proportion of people y in self-assessment j. Moreover, when the parameter α takes the value 0 ($\alpha = 0$), the standard poverty head-count ratio is obtained, showing the proportion of poor households below the poverty line. Thus, the simplest version can be described as $\frac{q}{n}$ (where q is the number of poor households and n is the total households). In addition, if $\alpha = 1$, it is weighted equal to the lowest health status. If α is greater than 0, this index is more sensitive to the depth of health poverty, whereas if α is greater than 1, the FGT index is a more sensitive indicator to depth. As α grows, the lower valuation categories have more weight. Therefore, the poverty index is sensitive to changes in the probability of population with poor health status.

Furthermore, the FGT index is additive. This means that the poverty measure for the whole population is the weighted sum of the poverty measures for the different population subgroups. Thus, changes in poverty over time from t_1 to t_2 can be denoted as follows:

$$\Delta\pi_\alpha = \pi_\alpha(Y_{t_2}; k) - \pi_\alpha(Y_{t_1}; k) = \sum_{i=1}^{h}\left[v^i(t_2)\pi_\alpha^i(Y_{t_2}; k) - v^i(t_1)\pi_\alpha^i(Y_{t_1}; k)\right] \quad (2)$$

where v^{i} is the population share of subgroup $i \in (1, \dots, h)$ and π_α^{i} is the poverty level of subgroup $i \in (1, \dots, h)$. If we consider poverty changes over time and the Shapley value, the subgroup decomposition can be written as follows:

$$\Delta\pi_\alpha = \sum_{i=1}^{h}(W^i + P^i) = \sum_{i=1}^{h}\left[\frac{v^i(t_1)+v^i(t_2)}{2}\Delta\pi_\alpha^i + \frac{\pi_\alpha^i(Y_{t_1};k)+\pi_\alpha^i(Y_{t_2};k)}{2}\Delta v^i\right] \quad (3)$$

In order to support the results obtained with the FGT index, we calculate two other indices. Firstly, the Poverty Gap (PG) index, which represents the proportion of individuals below the poverty line and express it as a percentage. However, it has the disadvantage that it only evaluates poor individuals. The PG (G_i) is defined as the poverty line (z) minus real income (y_i) and it is given by:

$$G_i = (z - y_i) * I(y_i < z) \qquad (4)$$

The index (P_1) is obtained as:

$$P_1 = \frac{1}{N}\sum_{i=1}^{N}\frac{G_i}{z} \qquad (5)$$

This measure is the mean poverty gap in the population, where N represents the individuals in the sample.

Similar to P_1, we have the squared PG index, which considers inequalities among the poor population. The corresponding measure is given by:

$$P_2 = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{G_i}{z}\right)^2 \qquad (6)$$

However, this measure is not very commonly-used because it does not have an intuitive appeal and it is not easy to interpret.

Secondly, the we calculate the Generalized Entropy (GE) to measure inequality. Among these measures, there are those proposed by Theil [27]. The general formula can be written as:

$$GE(\alpha) = \frac{1}{\alpha(\alpha-1)}\left[\frac{1}{N}\sum_{i=1}^{N}\left(\frac{y_i}{\bar{y}}\right)^{\alpha} - 1\right] \qquad (7)$$

where α represents the weight given to distances between incomes at different parts of the income distribution, N is the number of individuals in the sample, y_i is the income or expenditure corresponding to individual i and $\bar{y}$ is the mean income or expenditure per capita. The values of this measure vary between 0 (it represents an equal distribution) and infinite (it represents high values of inequality).

If $\alpha = 0$, we obtain the mean logarithmic deviation measure that may be written as:

$$GE(0) = \frac{1}{N} \tag{8}$$

And if $\alpha = 1$, we have the Theil index, which is defined as follows:

$$GE(1) = \frac{1}{N}\sum_{i=1}^{N}\frac{y_i}{\bar{y}}\ln\left(\frac{y_i}{\bar{y}}\right) \tag{9}$$

4. Data

In this paper, we use micro-data from waves 1-9 of the EU-SILC for the case of Spain. We are mainly interested in analysing the dynamics of health poverty in the period of economic crisis, from 2008 to 2016. EU-SILC accumulates data from all private households and individuals residing in countries at the moment in which data are collected. All members are surveyed, but only those older than 15 years old are interviewed. It collects micro-data about income, social exclusion, household conditions, poverty, education, work and health, covering the objective and subjective requirements of these issues.

Every year, the average of the general health status is greater than 2 and this means a “good” average of the health status. The lowest value is recorded (2.1752) in 2011. There is an increase in the general health status from this year to 2016. In addition, most of the surveyed people declare that they have no health problems or chronic diseases. This question reaches the highest value (1.7454) in 2011 and the lowest one (1.6492) in 2015. According to being limited, most of the respondents declare not to be limited, all values being greater than 2.5. They range from 2.6816, in 2009, to 2.7142, in 2011.

If the question is about having visited the doctor during the last 12 months, all values are greater than 1.9 although most people did not attend. The lowest value (1.9190) is reached in 2009 while the highest one (1.9852) is registered in 2016. In the case of not consulting a doctor, the lowest value is 3.7671, in 2016, which is focused between not having time and living too far away. Meanwhile, the highest value (5.4553) is reached in 2009. Thus, individuals are afraid of doctors/hospitals and they wanted to wait and see if the problem improved by itself. If the question is having attended to a dentist during the last 12 months, all values are greater than 1.8 and again most people did not attend. The lowest value (1.8808) is reached in 2015 while the highest one (1.9323) is in 2011. In the case of not consulting a dentist, the average of the answers in 2015 is 1.9047 and most people are on a waiting list or do not have a referral note. Meanwhile, the average of the answers is 3.6927 in 2009. Therefore, more than half the respondents did not have time because of their job, child care or other people.

5. Empirical results

Table 1 shows the results for FGT index. It presents the mean, standard error and 95% confidence intervals for three different values of α as well as for three different poverty thresholds (k). Firstly, the alpha (α) values have been selected with the guideline of being π_0 $(\alpha = 0)$, π_1 $(\alpha = 1)$ and π_2 $(\alpha = 2)$. Secondly, the following health poverty thresholds are chosen: a very poor SAH status $(k = 1)$, a poor SAH status $(k = 2)$ and a fair SAH status $(k = 3)$. Nevertheless, some authors such as Brzezinski [2] argue that a health poverty threshold such as $k = 1$ is unsuitable to analyse because people, who declared a higher SAH condition, consider it poor.

Now we discuss the results obtained for a poor SAH status ($k = 2$) in 2008. The values obtained represent the weight of those individuals whose SAH is below the threshold chosen. Hence, if we determine a poor SAH as measured by poverty headcount rate (π_0), we will get a value such as 0.1142. This value reaches 0.0802 if health poverty is measured by π_1. Whereas, in the case of π_2, a value such as 0.0749 is accomplished. Meanwhile, if we choose a fair SAH status ($k = 3$) like the health poverty threshold, it has a value of 0.4114 for π_0, it falls to 0.2745 for π_1, but it increases at 0.3209 for π_2.

For 2016, when there is a health poverty threshold such as $k = 2$ with a SAH poverty as measured by π0, a value such as 0.1082 is obtained and it decreases (measured by π_1) reaching 0.0786. The same happens in the case of π_2, where a value of 0.0760 is achieved. In the meantime, if we choose $k = 3$ as the health poverty threshold at a SAH poverty as measured by π_0, it has a value of 0.4064, which is reduced to 0.2682. Besides, for π_2, it takes the value 0.3153.

Comparing the first and the last year of our period, we observe that health poverty as measured by π_0 decreased by 5.25% and by 1.21% for a poor SAH ($k = 2$) status and for a fair SAH status ($k = 2$), respectively. This decrease is lower when $k = 2$ and the health poverty as measured by π_1 (1.99%). Nevertheless, if SAH poverty is measured by π_2, there is an increase of 1.46%. In the event of $k = 3$, the decreases are higher. The reduction is 2.29% and 1.74% if SAH poverty as measured by π_1 and by π_2, respectively.

It also provides the results of significance tests using the conventional 5% significance level. Firstly, the findings of the health poverty threshold such as a poor SAH ($k = 2$) are discussed. If a SAH poverty headcount (π_0) is used, the result is not significant.

Moreover, this means, if health poverty is measured by π_0 as well as by π_1 or by π_2, that our results are significant. Secondly, we assume a fair SAH ($k = 3$), where the opposite happens and changes in all SAH poverty decreases are statistically significant.

As it has been mentioned before, two other indices have been calculated in order to support our results obtained with the FGT index. We calculate the PG index expressed as a percentage (Figure 1) which considers the poor population (those who are situated below the poverty line). This index calculates the depth of poverty, considering how far the poor population is from the poverty line, on average. Nevertheless, the PG index does not capture differences of inequality among the poor population.

We assume two health poverty thresholds. On the one side, there is a poor SAH status ($k = 2$) formed by those individuals who report poor and very poor health. Alternatively, there is a fair SAH status ($k = 3$). This poverty line incorporates individuals just mentioned and additionally those who report a fair health status.

The results obtained for 2008 are 0.90% for $k = 2$ and 3.48% for $k = 3$. Meanwhile, our findings for 2016 are lower in both cases for a poor and a fair SAH status, 0.81% and 3.07%, respectively. These values indicate the ratio between poverty and the poverty line. If a general evaluation is made of the progress of health poverty in Spain between 2008 and 2016, it can be argued that at the beginning of the economic crisis, there was a higher proportion of poor population than there is now. This value increases by almost 0.10% for $k = 2$ and more than 0.40% for $k = 3$.

Moreover, we calculate some GE measures, based on the most common values of α used, which are 0, 1 and 2 (see Table 2). As a result, if $\alpha = 0$, we obtain the mean logarithmic deviation measure, also known as Theil's L, $GE(0)$. Instead, whether it is α =1, the Theil's T index, $GE(1)$ is obtained.

In 2008, the weighted average of SAH in the sample is 2.2585. To find $GE(1)$, for a "very poor" and a "poor" health status ($SAH = 1$ and $SAH = 2$), the ratio between SAH and population shares for the individuals with worst health is lower than one (0.4428 and 0.8855). Meanwhile, its logarithm is negative (-0.8147 and -0.1216). However, the same ratio for the people with better levels of health (fair: $SAH = 3$; good: $SAH = 4$; very good: $SAH = 5$) has values higher than one. Consequently, the logarithm of each of them is positive. Thus, the contribution of each health status to the index is specified. Consequently, the Theil's T index (0.0677) is obtained through the aggregattion of these values. For $GE(0)$, the mean logarithmic deviation measure as 0.0703 is reached Therefore, it can be assumed that the α value is higher for $GE(0)$ than for $GE(1)$. But if it is increased to 2, the GE measure is bigger than the unit (1.1402).

The same happens in 2016 and the weighted average of SAH in the sample is 2.2354. Also, $GE(1)$ is calculated and its value is 0.0676. The value that corresponds to $GE(0)$ is 0.0706 and for $GE(2)$ the highest value for this year, 1.1391, is reached. In general, the lower the SAH is, the smaller the value gets.

We also compare inequality between health status for 2008 and 2016. The last year comes across as more unequal than 2008 by having a lower Theil index, although both years have very similar values, only varying by 0.0001 and for 2008 and 2016 (0.0677 and 0.0676, respectively).

Once the poverty indices are calculated, we analyse the contribution of diverse population subgroups to changes in overall poverty between 2008 and 2016. We decompose health poverty into their determinants using information for three subgroups defined by: i) gender, which is divided between men and women; ii) age, which is divided into age groups at 10 year intervals (except the first and the last one) and iii) education level, which is divided into 5 levels (primary school, 1st stage of secondary school, 2nd stage of secondary school, non-higher post-secondary education and higher education). These three variables have been chosen, partly because authors such as Jürges [13] argue that SAH is likely to be comparable only within clearly defined socio-economic groups. It suggests using subjective health measures within a subsample. Therefore, it would have to be divided, raising problems when answering interesting research questions. There is no clear finding on which characteristics should be used to divide it, but gender and age are the most likely ones.

Table 3 shows the results of these decompositions of changes in SAH poverty between 2008 and 2016. We assume that health poverty is measured by π_2, with a fair SAH status $(k = 3)$. Therefore, the time period as well as the hypotheses of π and k, have been determined. So, it can be defined that the total change in health poverty, in relative terms, is 0.0001 or 0.303% and this total change is expressed as δ. In addition, when we analyse total population, the trend remains stable in all decompositions (gender, age and education level).

Surveyed men who rate a poor SAH, have increased approximately 2% between 2008 and 2016, thereby offsetting the female population decreases by the same percentage. The pattern of the existence of negative correlations between SAH and gender, to the detriment of women, also can be observed in studies such as McCallum et al. [28] or Cantarero et al. [29].

In the age subgroup, there is little change in population rates from 2008 to 2016. The biggest increase can be seen in the subgroup of individuals older than 80 years, which rise from 14.04% in 2008 to 18.22% in 2016. The opposite happens with the population who are between 71 and 80 years old, which is reduced by more than 3%. Other authors, such as Contoyannis et al. [30], conclude that young people evaluate their health more favourably than older people. Similarly, Bago d'Uva et al. [31] show that there are huge health inequalities and that older people has lower health expectations than the younger ones.

Lastly, the decomposition based on education level show that people who only finished primary school, decreased 20% between 2008 and 2016. Hence, it increases in the secondary school (2nd stage) and higher education people contribute to more than 5% each. In other words, the weight of the Primary education level is reduced and, therefore, the weight of the Secondary education level (1st and 2nd stages) as well as the weight of the Higher education is increased. Some authors like VanDoorslaer et al. [32] find that the most important factors are changes in the distribution of learning achievements and health inequalities among different education groups.

6. Conclusions

In this paper, we have analysed the recent dynamics of health poverty in subjective terms (SAH). To this end, we have used micro-data from the EU-SILC for the case of Spain over 2008-2016. The study is mainly focused on FGT poverty index and we provide the main results of statistical inference. Other indices have been calculated to confirm and to consolidate our findings. Besides, the subgroup decomposition has been made to analyse health poverty changes during economic crisis.

Our results of the FGT index for 2008 suggest the following issues. If a poor SAH status as a health poverty threshold is chosen, the values from the FGT index reach their lowest value in the case of SAH poverty, as measured by $\pi 2$. Meanwhile, if it is chosen a fair SAH, the lowest value is reached for $\pi 1$. The same happens in both situations (a poor and a fair SAH status) for 2016. FGT index between 2008 and 2016 shows a negative growth of health poverty in Spain, when it is chosen a poor SAH status as a health poverty threshold. This happens for SAH poverty as measured by poverty headcount rate ($\pi 0$) and $\pi 1$. As with the negative growth of health poverty, in the case of a SAH poverty it is measured by $\pi 2$. Moreover, in all of these three cases the results are not significant. However, when a fair SAH status is chosen, the FGT index shows that this growth is positive for a SAH poverty as measured by poverty headcount rate ($\pi 0$), $\pi 1$ or $\pi 2$, in a statistically significant way.

Furthermore, based on our findings obtained for the subgroup decomposition, the following insights can be stated. In terms of gender, an increase (2%) of the surveyed men is shown. Therefore, female population decreases in the same proportion. The population aged 80 and older is the one that has experienced the greatest increase (more than 4%) from 2008 to 2016. The opposite happens with the population between 71 and

80 years old, which is reduced by 3%, approximately. Besides, our findings for the decomposition analysis show that most of the respondents are individuals with low education, specifically, those who only finished primary school.

Finally, our results may have significant implications for health policies. More generally, although health is a multidimensional and complex issue, , the dataset used in the analysis (EU-SILC) are large and include a great amount of information about individuals' health in Spain. Therefore, it provides a good base for cross-country comparison. Regarding implications, it is useful to reduce health inequalities, assuming that exclusion and poverty will also reduce them. Moreover, there must be changes in terms of equality in access and use of health care services, establishing on healthcare needs for different socio-economic groups. In addition, it would be appropriate to evaluate Spanish health trends to ensure the continuous attention of the whole population even in times of economic and financial crisis. A great effort should be also made to guarantee the availability, use and quality of healthcare services, more specifically, by most disadvantaged population.

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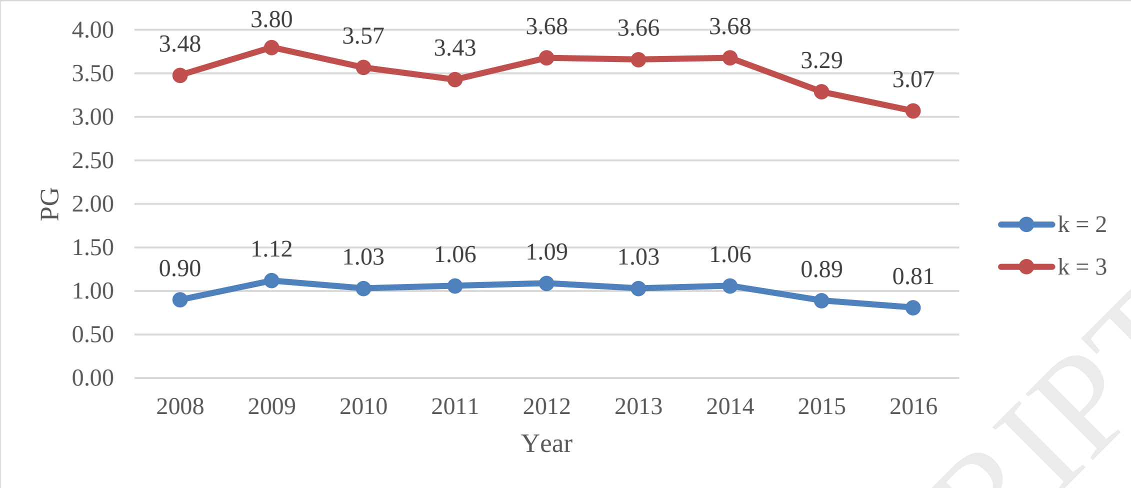
Figure 1. Poverty Gap (PG) index for Self-Assessment Health (SAH) status (2008-2016).



Source: Authors' elaboration.

Table 1. Foster-Greer-Thorbecke (FGT) index for Self-Assessment Health (SAH) status (2008-2016).

		k = 2			*k = 3*		
		π_0	π_1	π_2	π_0	π_1	π_2
	Mean	0.1142	0.0802	0.0749	0.4114	0.2745	0.3209
2008	Std. Err.	0.0022	0.0019	0.0022	0.0040	0.0041	0.0068
	[95% Conf. Interval]	[0.1098; 0.1185]	[0.0766;0.0839]	[0.0706:0.0792]	[0.3900;0.4058]	[0.2664;0.2825]	[0.3076; 0.3342]
	Mean	0.1410	0.1065	0.1072	0.4575	0.3295	0.4178
2009	Std. Err.	0.0025	0.0022	0.0027	0.0044	0.0047	0.0080
	[95% Conf. Interval]	[0.1361;0.1459]	[0.1022;0.1108]	[0.1020;0.1124]	[0.4488;0.4661]	[0.3202;0.3387]	[0.4019;0.4336]
	Mean	0.1376	0.1046	0.1060	0.4489	0.3230	0.4104
2010	Std. Err.	0.0025	0.0220	0.0026	0.0044	0.0047	0.0080
	[95% Conf. Interval]	[0.1327;0.1424]	[0.1003;0.1089]	[0.1008;0.1112]	[0.4404;0.4575]	[0.3139;0.3322]	[0.3947;0.4261]
	Mean	0.1212	0.0910	0.0911	0.3971	0.2840	0.3576
2011	Std. Err.	0.0024	0.0021	0.0025	0.0043	0.0045	0.0077
	[95% Conf. Interval]	[0.1165;0.1279]	[0.0869;0.0951]	[0.0862;0.0960]	[0.3887;0.4056]	[0.2751;0.2980]	[0.3425;0.3726]
	Mean	0.1246	0.0913	0.0891	0.4064	0.2891	0.3591
2012	Std. Err.	0.0024	0.0021	0.0025	0.0044	0.0046	0.0077
	[95% Conf. Interval]	[0.1198;0.1294]	[0.0872;0.0954]	[0.0842;0.0941]	[0.397;0.4150]	[0.2801;0.2980]	[0.3441;0.3742]
	Mean	0.1434	0.1093	0.1109	0.4524	0.3318	0.4269
2013	Std. Err.	0.0027	0.0024	0.0029	0.0048	0.0051	0.0088
	[95% Conf. Interval]	[0.1381;0.1488]	[0.1045;0.1140]	[0.1052;0.1166]	[0.4431;0.4617]	[0.3217;0.3418]	[0.4097;0.4442]
	Mean	0.1233	0.0893	0.0862	0.4182	0.2904	0.3534
2014	Std. Err.	0.0025	0.0021	0.0025	0.0045	0.0046	0.0078
	[95% Conf. Interval]	[0.1184;0.1286]	[0.0851;0.0935]	[0.0812;0.0911]	[0.4093;0.4271]	[0.2813;0.2994]	[0.3381;0.3687]
	Mean	0.1211	0.0895	0.0883	0.4210	0.2904	0.3549
2015	Std. Err.	0.0025	0.0021	0.0026	0.0045	0.0046	0.0078
	[95% Conf. Interval]	[0.1163;0.1259]	[0.0853;0.0937]	[0.0833;0.0933]	[0.4122;0.4297]	[0.2814;0.2995]	[0.3396;0.3702]
	Mean	0.1082	0.0786	0.0760	0.4064	0.2682	0.3153
2016	Std. Err.	0.0022	0.0019	0.0022	0.0041	0.0041	0.0068
	[95% Conf. Interval]	[0.1040; 0.1125]	[0.0749;0.0822]	[0.0717;0.0803]	[0.3985;0.4144]	[0.2602;0.2761]	[0.3019;0.3286]
	Mean	-0.2308	-0.3461	-0.5192	0.1424	0.3323	0.7753
2008 vs 2016	Std. Err.	0.2809	0.4213	0.6320	0.0720	0.1681	0.3922
	[95% Conf. Interval]	[-0.8428;0.3812]	[-1.264;0.5718]	[-1.8962;0.8578]	[0.0007;0.2841]	[0.0016;0.6630]	[0.0036;1.5470]

Source: Authors' elaboration.

Table 2. Generalized Entropy (GE) inequality indices for Self-Assessment Health (SAH) status (2008-2016).

	SAH (= y_i)		1	2	3	4	5
2008	Mean SAH (ÿ)	2.2585					
	ln (ÿ / y_i)		0.8147	0.1216	-0.2839	-0.5716	-0.7947
	GE(0): Theil's L	0.0703					
	y_i / ÿ		0.4428	0.8855	1.3283	1.7711	2.2138
	ln (y_i / ÿ)		-0.8147	-0.1216	0.2839	0.5716	0.7947
	Product		-0.3607	-0.1077	0.3771	1.0123	1.7594
	GE(1): Theil's T	0.0677					
	(y_i / ÿ)^2		0.1960	0.7842	1.7644	3.1366	4.9010
	GE(2)	1.1402					
2009	Mean SAH (ÿ)	2.2734					
	ln (ÿ / y_i)		-0.8213	-0.1281	0.2773	0.5650	0.7882
	GE(0): Theil's L	0.9864					
	y_i / ÿ		0.4399	0.8797	1.3196	1.7595	2.1994
	ln (y_i / ÿ)		-0.8213	-0.1281	0.2773	0.5650	0.7882
	Product		-0.3613	-0.1127	0.3660	0.9941	1.7335
	GE(1): Theil's T	0.0713					
	(y_i / ÿ)^2		0.1935	0.7739	1.7414	3.0958	4.8372
	GE(2)	1.1340					
2010	Mean SAH (ÿ)	2.2476					
	ln (ÿ / y_i)		-0.8099	-0.1167	0.2887	0.5764	0.7996
	GE(0): Theil's L	0.9848					
	y_i / ÿ		0.4449	0.8898	1.3348	1.7797	2.2246
	ln (y_i / ÿ)		-0.8099	-0.1167	0.2887	0.5764	0.7996
	Product		-0.3603	-0.1039	0.3854	1.0259	1.7787
	GE(1): Theil's T	0.0726					
	(y_i / ÿ)^2		0.1980	0.7918	1.7816	3.1672	4.9488
	GE(2)	1.1348					
2011	Mean SAH (ÿ)	2.1752					

	ln (ÿ / y_i)		-0.8213	-0.1281	0.2773	0.5650	0.7882
	GE(0): Theil's L	0.9908					
	y_i / ÿ		0.4399	0.8797	1.3196	1.7595	2.1994
	ln (y_i / ÿ)		-0.8213	-0.1281	0.2773	0.5650	0.7882
	Product		-0.3613	-0.1127	0.3660	0.9941	1.7335
	GE(1): Theil's T	0.0795					
	(y_i / ÿ)^2		0.1935	0.7739	1.7414	3.0958	4.8372
	GE(2)	1.0585					
2012	Mean SAH (ÿ)	2.1812					
	ln (ÿ / y_i)		-0.7799	-0.0867	0.3187	0.6064	0.8296
	GE(0): Theil's L	0.9929					
	y_i / ÿ		0.4585	0.9169	1.3754	1.8339	2.2923
	ln (y_i / ÿ)		-0.7799	-0.0867	0.3187	0.6064	0.8296
	Product		-0.3575	-0.0795	0.4384	1.1121	1.9016
	GE(1): Theil's T	0.0831					
	(y_i / ÿ)^2		0.2102	0.8408	1.8917	3.3630	5.2547
	GE(2)	1.1655					

Table 3. GE inequality indices for SAH status (2008-2016) (continue).

	SAH (= y_i)		1	2	3	4	5
2013	Mean SAH (ÿ)	2.2231					
	ln (ÿ / y_i)		-0.7989	-0.1058	0.2997	0.5874	0.8105
	GE(0): Theil's L	0.9831					
	y_i / ÿ		0.4498	0.8996	1.3495	1.7993	2.2491
	ln (y_i / ÿ)		-0.7989	-0.1058	0.2997	0.5874	0.8105
	Product		-0.3594	-0.0951	0.4044	1.0569	1.8230
	GE(1): Theil's T	0.0781					
	(y_i / ÿ)^2		0.2023	0.8094	1.8211	3.2374	5.0585
	GE(2)	1.1442					
2014	Mean SAH (ÿ)	2.2399					

	ln (ÿ / y_i)		-0.8064	-0.1133	0.2922	0.5799	0.8030
	GE(0): Theil's L	0.9936					
	y_i / ÿ		0.4464	0.8929	1.3393	1.7858	2.2322
	ln (y_i / ÿ)		-0.8064	-0.1133	0.2922	0.5799	0.8030
	Product		-0.3600	-0.1012	0.3913	1.0355	1.7925
	GE(1): Theil's T	0.0736					
	(y_i / ÿ)^2		0.1993	0.7973	1.7938	3.1891	4.9829
	GE(2)	1.1462					
2015	Mean SAH (ÿ)	2.2410					
	ln (ÿ / y_i)		-0.8069	-0.1138	0.2917	0.5794	0.8025
	GE(0): Theil's L	0.9888					
	y_i / ÿ		0.4462	0.8925	1.3387	1.7849	2.2311
	ln (y_i / ÿ)		-0.8069	-0.1138	0.2917	0.5794	0.8025
	Product		-0.3601	-0.1015	0.3905	1.0341	1.7905
	GE(1): Theil's T	0.0686					
	(y_i / ÿ)^2		0.1991	0.7965	1.7921	3.1859	4.9780
	GE(2)	1.1306					
2016	Mean SAH (ÿ)	2.2354					
	ln (ÿ / y_i)		0.8044	0.1113	-0.2942	-0.5819	-0.8050
	GE(0): Theil's L	0.0706					
	y_i / ÿ		0.4473	0.8947	1.3420	1.7894	2.2367
	ln (y_i / ÿ)		-0.8044	-0.1113	0.2942	0.5819	0.8050
	Product		-0.3599	-0.0996	0.3948	1.0412	1.8006
	GE(1): Theil's T	0.0676					
	(y_i / ÿ)^2		0.2001	0.8005	1.8010	3.2019	5.0029
	GE(2)	1.1391					

Source: Authors' elaboration.

Table 3. Subgroup decompositions for Self-Assessment Health (SAH) status (2008-2016).

Subgroup		2008		2009		2010		2011		2012		2013		2014		2015		2016	
		v	π_2	*v*	π_2	*v*	π_2	*v*	π_2	*v*	π_2	*v*	π_2	*v*	π_2	*v*	π_2	*v*	π_2
Gender																			
	Man	41.32	0.18	41.58	0.18	42.63	0.19	42.36	0.19	42.73	0.19	41.62	0.19	42.05	0.19	43.04	0.19	42.93	0.19
	Woman	58.68	0.07	58.42	0.06	57.37	0.06	57.64	0.06	57.27	0.06	58.38	0.06	57.95	0.06	56.96	0.06	57.07	0.06
Total population		100	0.02	100	0.02	100	0.02	100	0.02	100	0.02	100	0.02	100	0.02	100	0.02	100	0.02
Age																			
	16-20	0.59	0.16	0.79	0.22	0.62	0.17	0.48	0.13	0.63	0.17	0.64	0.17	0.70	0.19	0.79	0.21	0.65	0.17
	21-30	3.37	2.13	3.58	2.31	2.78	1.85	2.23	1.44	2.01	1.22	2.68	1.57	2.71	1.63	2.37	1.42	2.36	1.58
	31-40	7.33	9.06	7.88	9.75	7.21	8.82	5.96	7.31	5.29	6.54	6.28	7.77	6.15	7.67	5.79	7.17	5.49	6.81
	41-50	13.12	26.97	13.35	27.39	12.75	26.13	11.56	23.71	11.10	22.94	13.12	27.13	13.02	26.93	11.86	24.54	11.99	24.62
	51-60	18.37	56.89	17.55	54.20	17.75	54.76	16.99	52.66	17.58	54.51	19.35	59.66	19.29	59.88	19.14	59.37	19.84	61.57
	61-70	20.75	90.25	21.89	94.95	24.49	95.16	22.53	98.26	22.44	98.13	21.60	94.26	21.10	92.03	21.87	95.31	20.86	90.72
	71-80	23.33	136.11	22.19	129.66	21.79	128.11	23.26	136.69	22.95	135.48	20.16	118.60	20.19	118.42	20.44	119.68	20.59	119.85
	80+	13.13	96.12	12.72	93.28	14.55	106.65	16.99	124.47	17.96	131.85	16.18	118.56	16.83	123.65	17.76	130.55	18.22	134.04
Total population		100	0.02	100	0.02	100	0.02	100	0.02	100	0.02	100	0.02	100	0.02	100	0.02	100	0.02
Education level																			
	Primary	55.46	0.25	53.70	0.24	53.82	0.24	56.53	0.25	55.20	0.25	49.49	0.22	37.56	0.17	36.58	0.16	36.06	0.16
	Secondary (1st stage)	21.40	0.02	22.75	0.03	22.66	0.03	20.07	0.02	22.03	0.02	24.28	0.03	31.43	0.03	30.63	0.03	30.12	0.14
	Secondary (2nd stage)	11.84	0.02	12.01	0.02	12.15	0.03	11.71	0.02	11.84	0.02	13.00	0.03	14.55	0.03	16.24	0.03	17.29	0.03
	No higher post-secondary	0.33	0.00	0.43	0.00	0.20	0.00	0.45	0.00	0.24	0.00	0.25	0.00	0.12	0.00	0.20	0.00	0.18	0.00
	Higher education	10.97	0.05	11.11	0.05	11.18	0.05	11.24	0.05	10.96	0.05	12.99	0.06	16.34	0.07	16.35	0.07	16.35	0.07
Total population		100	0.02	100	0.02	100	0.02	100	0.02	100	0.02	100	0.02	100	0.02	100	0.02	100	0.0209

Source: Authors' elaboration.