

Title: What is happening to health in the economic downturn? A view of the Lisbon Metropolitan Area, Portugal.

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Abstract

Background: The economic downturn has introduced new social risks in the most affected countries with foreseeable negative consequences for health.

Aim: To analyze changes in health and its socioeconomic inequalities between 2001 and 2011 in the Lisbon Metropolitan Area (LMA), Portugal.

Subjects and methods: This study, conducted in the LMA neighborhoods (n=207), examines the association between deprivation and premature mortality using standardised premature mortality ratios and a composite index of socioeconomic deprivation. The association was observed by analyzing the whole range of values, quintiles and deciles of the LMA population. Pearson coefficients and ANOVA were used to assess associations and variability between quintiles/deciles.

Results: Our findings show that people living in extreme deprivation conditions increased (5,45%) and that increasing deprivation is associated with health degradation in specific groups. Between 2001 and 2011, premature mortality became more unequally distributed, increasing in the richest (1%) and median (12%) areas, even though socioeconomic inequalities in mortality decreased.

Conclusions: Health degradation is selective affecting mainly the middle class living in LMA; these “newly deprived” people experience an increased risk, while the “traditionally deprived” known a decrease in premature mortality. Therefore, social inequalities in health tend to decrease but without health gains.

Introduction

The western world experienced rapid development during the last century, which was promoted by continued economic growth and led to dramatic improvements in the quality of life and health. For example, in the 1900s, Portugal had an infant mortality rate of 150 deaths per 1000 births; this rate was 75/1000 in 1960 and had fallen to 5/1000 births by 2001. Life expectancy rose from 35.8 years for men and 40 years for women in 1920 to 73.3 for men and 80.1 for women in 2001, adding 37.5 and 40.1 years of expected life for men and women, respectively (Pordata 2015). However, even under such propitious conditions, health disparities and inequities have persisted into the present, as reported everywhere (Mackenbach 2006; Clarck 2011; Saint-Jacques et al. 2014).

This persistent dyssynchrony has led to the development of several studies that have consistently noted the role of social factors in the emergence and maintenance of such inequities (Navarro 2009; Marmot 2010; Clarck 2011; Yngwe et al. 2012; Saint-Jacques et al. 2014). Deprivation, broadly understood as a disadvantage in living, work and leisure conditions (Townsend 1987), has been one of the most extensively studied social determinants of health. Within European countries, many systematic inequalities in health are related to socioeconomic status and occur between social classes and areas, with most deprived population groups and neighborhoods having worse health and higher mortality (Sridharan et al. 2001; Nolasco et al. 2009; Yngwe et al. 2012, Saint-Jacques et al. 2014). These inequalities in health have been observed across the social hierarchy, not only at the extremes

(Charlton 1994; Marmot 2010), highlighting the need to focus research and actions on the entire gradient, not just on the bottom groups.

The socioeconomic prosperity cycle that led to an improvement in health indicators ended in a new order that posed several social risks to the societies most affected by the economic crisis. Between 2001 and 2011, the unemployment rate in Portugal rose from 4% to 12.7%, as did the percentage of people unable to meet unexpected financial expenses, which rose from 19.5% to 29.1%. Conversely, the work remuneration as a percentage of GDP fell from 48.2% to 46.3% (Pordata 2015). The economic crisis unquestionably impacted living conditions in Portugal.

According to the World Health Organization (WHO), in periods of economic decay, the people who are most affected are those who belong to low socioeconomic groups (WHO 2009)¹². Therefore, during recessions, the health status of such groups tends to decline and the health inequities between the rich and the poor increase. Edwards (2008) showed that poorly educated individuals were at greater risk of declining health during economic downturns; thus, health inequities may widen. Some studies, however, have shown that economic recessions are associated with health improvements at individual levels (Ruhm 2000) - or, at least, aggregated levels (Tapia Granados 2005) - through the adoption of healthy lifestyles, including better diet and increased active leisure time.

Our aim is to analyze socioeconomic inequalities in premature mortality and their evolution during the 2001-2011 period and to explore the evidence for the strengthening or weakening of these inequalities. We hypothesized that this study would offer evidence regarding (1)

improvement or degradation in health or (2) changes in the gradient, that is, in the association between health and deprivation.

Methods

This study focused on the Lisbon Metropolitan Area (LMA), Portugal, located in the south-central part of the country. The 2 921.9 km² area is the most intensively urbanized in Portugal. It is composed of eighteen municipalities and 207 parishes and includes some of the largest Portuguese cities. In 2011, approximately 25% of the Portuguese population (2 821 876 inhabitants) was concentrated in this area, an increase of 6% from 2001 (similar to the one occurred between 1991 and 2001). The LMA, historically the most affluent Portuguese region, has experienced major declines since the economic crisis: between 2001 and 2011, the rise in unemployment was more pronounced there, increasing from 7.6% to 12.9% and reaching 18% in some municipalities. In addition, the purchasing power per capita, which increased in all other Portuguese regions between 2000 and 2011, fell from 155 to 130.97 in the LMA, decreasing more than 15% (Pordata 2015). The purchasing power per capita is a composite index that measures the daily purchasing power, showing on average and per person, where is the highest and lowest material well-being. The index is the result of a Principal Component Analysis performed on 17 variables related with income, purchase expenditure, ATM withdrawals, car sales, among others; the drop observed in the LMA shows the deeper impact of the crisis in this area, probably as a consequence of the region's employment and socioeconomic structures. In fact, according to the International Labor Organization (ILO), Portugal saw a decline in wages (and in general incomes) but the purchasing power decreased much more for families with higher income than for families with lower income (ILO 2015).

Thus, it is likely that the crisis has had a spatially differentiated impact, mainly affecting the richest areas.

We gathered data from small urban areas within the LMA (parishes, $n= 207$), including mortality data from 2001-2003 and 2010-2012 and socioeconomic census data (2001 and 2011). The year 2001 was chosen as a baseline because it corresponds to the last census conducted before the crisis. The Portuguese Institute for National Statistics (INE) publishes annual mortality data; the Census provides population data. To assess area-based deprivation, we developed a multiple deprivation index for the LMA for 2001 and 2011 using the methodology proposed by Carstairs and Morris (1991). The Multiple Deprivation Score (MDS), calculated at the parish level, is based on three standardised census variables: overcrowding (percentage of people living in houses where the number of rooms is not sufficient for the household's dimension and demographic composition), low social class (percentage of unskilled employment) and proportion of unemployed males. This index was specifically designed for the LMA and previously tested (Nogueira 2010).

Following the OECD's guidelines (OECD 2011), premature mortality was defined as all deaths occurring before age 70. Because mortality varies from year to year, we aggregated data from two periods around the census, (2001-2003 and 2010-2012), and represented these data as (indirectly) age-standardised premature mortality ratios (SPMRs). The SPMRs were calculated by dividing the observed by the expected deaths; expected number of deaths were calculated by using the age-specific mortality rates for LMA during the same periods (2001-2003 and 2010-2012). The standardization process takes into account differences in the age structures of populations, meaning that comparisons can be reliably made over time and between areas.

To analyze socioeconomic inequalities in premature mortality, the MDS, calculated at the parish level, were ranked from the least deprived to the most deprived and then divided into fifths (quintiles) and tenths (deciles) based on the parishes' population size. Parishes were grouped together so that each deprivation category contained approximately the same number of people; number of parishes in each category varies between 30 and 58, but population size is similar: quintiles represent about 20% of the LMA population (varying between 552 968 and 578 127 inhabitants), and deciles represent 10%). Finally, the crude mortality data – number of deaths occurring before age 70 – for each deprivation category were aggregated to recalculate one SPMRs for each deprivation category. Confidence intervals (at the 95% level) were calculated for each SPMR. Differentials between mortality rates in the 10% (decile) or 20% (quintile) of the population living in the most deprived and least deprived areas were expressed as ratios that were calculated by dividing the SPMR in the highest deprivation category by the SPMR for the lowest category. Similarly to other authors (Romeri et al. 2006; Gregory 2009) we chose this method because the wide variation in the size of the parishes' population (from 350 up to more than 79000 inhabitants) would have an impact on the SPMRs. In fact, as SPMRs depend on population size (since its variance is inversely proportional to the expected values), parishes with low population tend to have high variance estimates. Thus, creating groups with equal populations is preferred because it allows a more reliable interpretation of the results.

To analyze the changes in the number of people living in each deprivation category from 2001 to 2011, we used deprivation categories with equal number of parishes but varying population sizes. In this case MDS were ranked from the least deprived to the most deprived and then

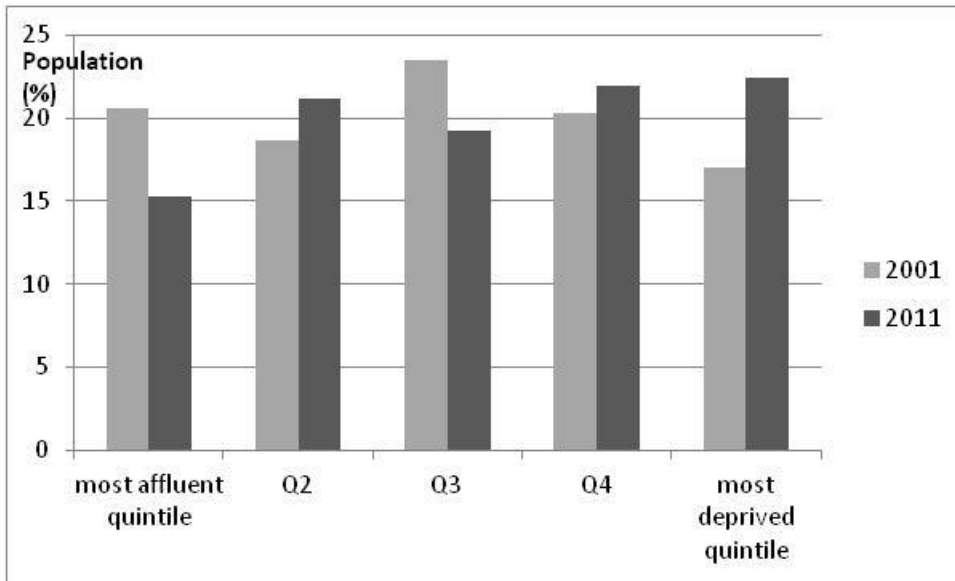
divided into categories based on the number of parishes - in relation to fifths, this categorization has generated three quintiles containing 41 parishes and two quintiles with 42. A third type of categorization was also used to analyze changes in the SPMRs regardless of deprivation. In this analysis, parishes were ranked according to their SPMRs value (and not to the MDS) and quintiles and deciles were again based on the parishes' population size.

Associations between the deprivation index and the mortality ratios were tested using Pearson's product moment correlation coefficients. Variability between categories (quintiles and deciles) was compared by performing an ANOVA using SPSS 21.0.

Results

Using quintiles with an equal number of parishes (three groups with 41 and two with 42, thereby allowing variation in the population size), our results show that, in the LMA, 20.5% of the population lived in the least deprived fifth of parishes in 2001, and 17% lived in the highest deprivation quintile. From 2001 to 2011, there was an increase in the number of people living in higher deprivation conditions (from 17% to 22.45%) and a decrease in the number of people living in the lowest deprivation quintile (from 20.5% to 15.3%) (Figure 1). A similar trend emerges when the analysis is performed with deciles (not shown).

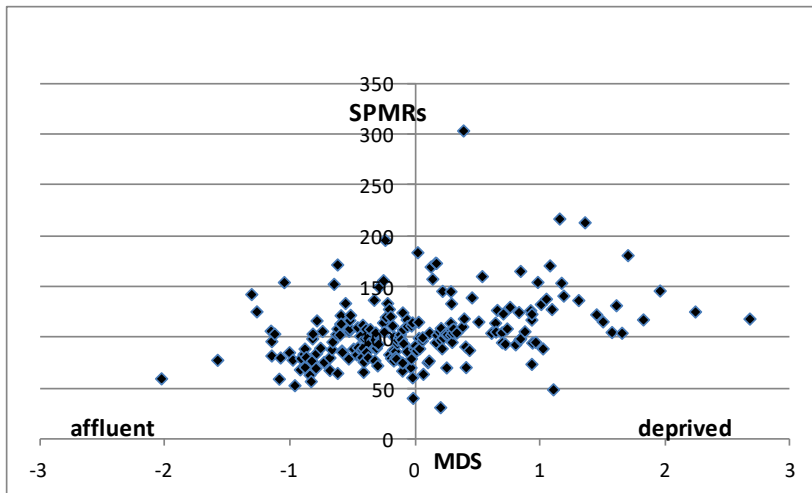
Fig. 1. Population (%) living in the LMA by quintiles of deprived parishes, 2001-2011



Significant variability between quintiles (2001: $F= 174$; $p<0.00$; 2011: $F=134$; $p<0.00$)

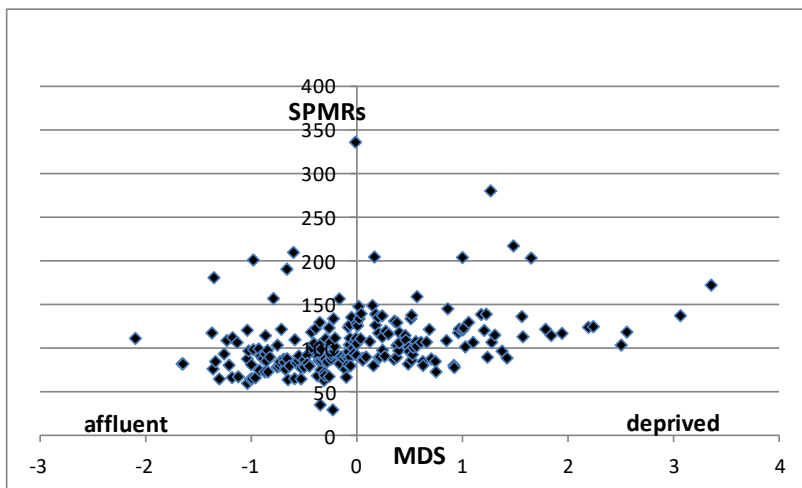
The association between the standardized premature mortality ratios (SPMRs) and the deprivation score (MDS) at the parish level is positive and significant for both periods (Figures 2 and 3). Despite the similarity in the correlation values— $r=0.36$ ($p<0.000$) and $r=0.32$ ($p<0.000$) in 2001 and 2011, respectively—there was a significant decrease in the strength of this relationship over the course of the decade ($p<0.000$). Furthermore, from 2001 to 2011 we observe an increase in the higher SPMRs (the highest SPMR rose from 304 to 337) and stability in the lower values.

Fig. 2. SPMRs (2001-2003) for parishes plotted against multiple deprivation scores (2001)



$r=0.36$; $p<0.000$

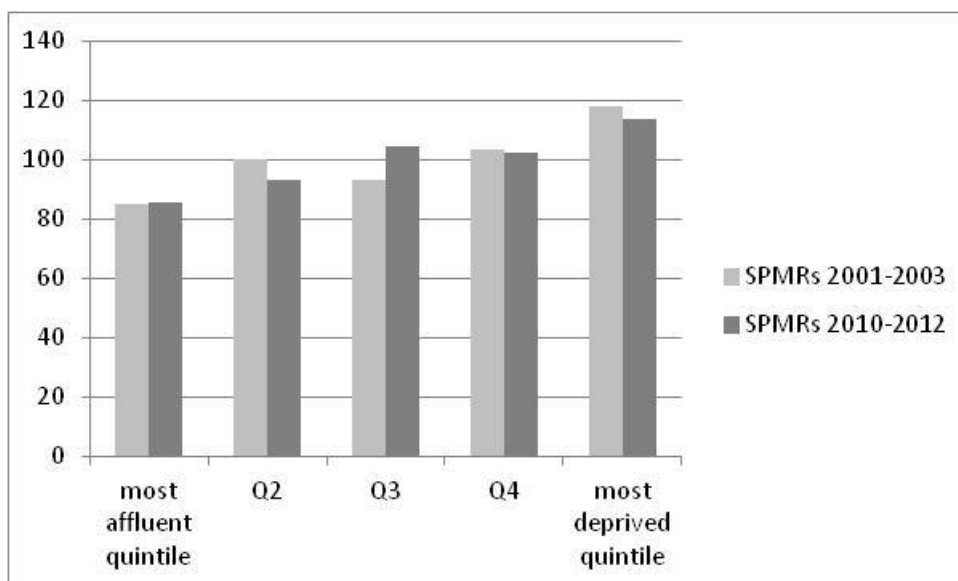
Fig. 3. SPMRs (2010-2012) for parishes plotted against multiple deprivation scores (2011)



$r=0.32$; $p<0.000$

Figures 4 presents the 2001-2003 and 2010-2012 SPMRs for quintiles of the population ranked according to MDS.

Fig. 4. SPMRs for LMA parishes ranked by deprivation score (MDS) and grouped into quintiles of the population.



Significant variability between quintiles (2001: $F= 309.1$; $p<0.00$; 2011: $F=392.1$; $p<0.00$).

Figure 4 indicates that mortality tends to increase across the deprivation scale. In 2001, the gradient in mortality was clearer across the last three quintiles (the more deprived ones); in 2011, the gradient became clearer among the first three quintiles (the more affluent ones). Comparing 2001 and 2011, the figure shows an increase in the SPMR in the top (an increase of 1%) and middle (an increase of 12%) quintiles and a decrease in all other quintiles (Q2 and the two most deprived quintiles); therefore, the ratio between extreme quintiles becomes smaller. (Tenths that contain 10% of the population were also used showing a similar pattern. Quintiles were chosen for the figure because tenths, measured using a more detailed range, are more susceptible to the most extreme values).

Table I. Inequality in standardised premature mortality ratios and deprivation in 2001 and 2011

Date	Lowest 10th (5th)	Highest 10th (5th)	Ratio of highest to lowest
SPMRs and CI at 95% of the population deciles (quintiles) with the lowest/highest mortality rates			
2011	66.9; 95% CI: 62,7-71,1 (70.8); 95% CI: 67,7-73,9)	163.8; 95% CI: 159,5-168,1 (148.0); (95% CI: 144,8-151,2)	2.45 (2.09)
2001	64.3; 95% CI: 60,3-68,3 (69.8); (95% CI: 67,0-72,6)	156.2; 95% CI: 152,1-160,3 (152.7); (95% CI:149,8-155,6)	2.43 (2.18)
SPMRs of the population deciles (quintiles) with the lowest/highest MDS values			
2011	84.3; 95% CI: 80,0-88,6 (85.9); (95% CI: 82,8-89,0)	122.9; 95% CI:118,5-127,3 (113.9); (95% CI: 110,8-117,1)	1.46 (1.33)
2001	79.5; 95% CI: 75,5-83,6 (85.1); (95% CI: 82,3-87,9)	128.0; 95% CI: 123,9- 132,0 (118.0); (95% CI: 115,1-120,8)	1.61 (1.39)

The first lines of Table I present the SPMRs and respective CI at 95% of the areas containing the best and worst population deciles and quintiles ranked according to mortality ratios. In 2001, the average SPMR, weighted by population, of the population tenths with the lowest mortality values was 64.3, whereas the average for the highest tenths was 156.2. Therefore, in 2001, the 10% of the population living in the highest mortality areas had mortality ratios that were 2.43 times higher than the 10% living in areas with the lowest ratios. In 2011, the average for the highest tenths was 2.45 times higher than the lowest tenths (SPMRs range from 66.9 to 166.8), showing stability or a slight increase in the mortality gap between the best and worst areas over the decade. Across the entire range of SPMRs (207) (figure 2 and

3), the mortality ratio was 9.59 in 2001 and 11.1 in 2011; the worst SPMRs rose from 304 in 2001 to 337 in 2011.

The last lines show the SPMRs and respective CI at 95% of the areas containing the best and worst population deciles and quintiles ranked by deprivation scores. In 2001, the SPMR of the population decile with the lowest deprivation scores was 79.5; the SPMR for the worst deprivation decile was 128. Thus, the ratio between extreme deciles was 1.61. In 2011, the SPMR for the 10% of the population living in the lowest deprivation areas was 84.3, whereas the SPMR for the 10% of the population living in the highest deprivation areas was 122.9, indicating that the mortality gap between the more and less deprived areas decreased from a ratio of 1.61 in 2001 to a ratio of 1.46 in 2011.

Discussion

Between 2001 and 2011, deprivation increased in the LMA, making more people socioeconomically vulnerable. For both periods, it is clear that increasing deprivation is associated with higher mortality values; this pattern emerges when the entire range of values, quintiles and deciles are considered. However, results show that the positive association between deprivation and premature mortality was stronger in 2001 (Pearson coefficient significantly declines from 0.36 in 2001 to 0.32 in 2011). The findings also shows an increase in the highest SPMRs which may be a consequence of increased vulnerability. Moreover, the gap between the best and worst mortality values tends to increase over the decade. Unexpectedly, our findings show that considering the worst and the best deprivation quintiles, the mortality gap narrowed, indicating a decrease in socioeconomic inequalities in health. This decrease is due not to an overall improvement of the population's health but to the stability

or decrease in the values of the middle and upper-middle social groups and improvement in the most disadvantaged ones. Above all, the mortality values of the middle socioeconomic status group significantly worsen. This pattern conflicts with previous studies showing that the poorest are at risk of health declines during recessions, whereas those with a higher socioeconomic status experience benefits (WHO 2009; Edwards 2008).

According to Suhrcke and Stuckler (2012), the health effects of the current economic crisis depend primarily on the country's income level: the population's health worsens as the income level decreases. Nevertheless, these authors argue that even in high-income countries, the health of population groups that are particularly economically affected is likely to suffer. Our findings show a decline in health among the middle social classes, suggesting that the deterioration of living conditions that characterized this global crisis primarily affected these groups. This may be because austerity policies have particularly affected the middle social classes, leading to the emergence of a new deprived group. State-employees, including some senior- and especially many middle-rank civil servants, experienced significant losses in benefits and wages after the onset of the economic crisis. According to the media, more than 70,000 jobs were lost in the public sector after the onset of the crisis, and the weight of the public sector wages in the GDP has been decreasing since 2002 (18% between 2005 and 2011) (Jornal Negócios ONLINE 2015a). This is consistent with the changes observed in the S80/S20, the inequality of income distribution ratio (S80/S20 is a ratio of total income received by the 20% of the population with the highest income to that received by the 20% of the population with the lowest income), which fell from 6.5 to 5.7 between 2001 and 2011 (this ratio increased in all EU countries except Portugal and the UK) (Pordata 2015). The International Labour Office indicates that income inequality among high-income families and

low-income households decreased in Portugal because of the wage reductions among families with greater purchasing power, a 'flattening effect' resulting from austerity policies (ILO, 2015). Therefore, middle and upper-middle income groups can also experience significant declines in health.

Our findings show that in the LMA, socioeconomic health inequalities tended to decrease between 2001 and 2011. However, inequality reductions should occur in the context of health improvements for all, albeit at different rates, and should never be achieved at the cost of the health degradation of some. According to our results the health of the LMA middle classes is at increased risk. We argue that this is probably an unexpected effect of the austerity policies, which promote the emergence of a newly deprived group, of extreme vulnerability. Whereas the relationship between socioeconomic status and health is ubiquitous and occurs across the entire social hierarchy, policies that affect the middle and upper-middle social classes, usually seen as having great potential to reduce health inequalities (Eikemo et al. 2014), may not be an attractive option. In this context, it seems that austerity policies, which operate by removing advantages, are merely removing the successful group's social benefits and, consequently, jeopardizing their health. More than income level, governmental responses to the crisis may be crucial to sustain health.

These findings can be misleading and must be compared with separate analyzes for each gender, with other mortality and health indicators and with different statistical methodologies. However, assuming that the health of some social groups is continuing to worsen, we urge the promotion of the secular trends of social and health improvement and those that contribute to maintaining a rising life expectancy, thus creating better health. This

is possible by reducing the disadvantaged population and increasing the number of people in the more prosperous groups, which might be difficult during economically unstable periods. However, in addition to economic and financial austerity, actions and strategies directed toward a wide democratization of opportunities should be implemented, thereby allowing all individuals to take advantage of the opportunities and benefits reserved for those in the upper-middle classes and not reducing the opportunities of the latter to the level of the disadvantaged.

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Declaration of interest

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The author reports no conflict of interest.

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