THE IMPACT OF INCOME INEQUALITY ON MORTALITY IN THE EUROPEAN UNION

Prof. Gheorghița Dincă Ph.D
Transilvania University of Brasov
Faculty of Economic Sciences and Business Administration
Brasov, Romania
Master Student Camelia Negri
Transilvania University of Brasov
Faculty of Economic Sciences and Business Administration
Brasov, Romania
Master Student Mariana Cassiana Ioniță
Transilvania University of Brasov
Faculty of Economic Sciences and Business Administration
Brasov, Romania

Abstract: Our paper aims to determine the correlation between income inequality and mortality, within the European Union, using a fixed-effects regression model. We studied the influence of inequality on population health using a panel database, which includes the 28 Member States of the European Union, for the 2000-2018 period. After regressing our logarithmic variables and performing the main statistical tests, we determined that, as a whole, the explanatory variables considered in our model significantly influence life expectancy at birth, while at an individual level, only GDP per capita and the level of education have a significant influence on life expectancy variable. The statistical tests' results show that, from a mathematical point of view, the Gini coefficient, which reflects income inequality, does not influence life expectancy at birth. However, the Gini coefficient was not excluded from the model, given the importance it has from a theoretical point of view.

JEL classification: I14, C23.

Key words: Income inequality, mortality, Gini coefficient, panel data, fixed effects regression

1. INTRODUCTION

The actual economic context urges us to say that the income distribution as well as the wealth inequality problem represent one of the most debated subjects in the world. Therefore, in the last decade, a consistent number of scientists looked forward to the impact and evolution of this social phenomenon, claiming that the major inequality of income and absence of development opportunities can lead to economic and social instability (Piketty, 2014).

This subject was considerably studied by public healthcare researchers. Their work focuses on the way that reduced wealth, low standard of living, or limited access to medical assistance contribute to increasing inequality in the public healthcare system, and thus lead to an uninterrupted growth of the life expectancy gap between poor and rich people. While the relationship within revenues and life expectancy is regarded as justified and proven on several occasions, it is impossible not to ask ourselves if this income gap can be the reason for a high mortality rate. We should not be surprised by the fact that previous studies indicate that the standard of living is closely connected to the revenues affecting risks of disease and premature mortality.

The purpose we are pursuing in this article is to prove a direct connection between income inequality and mortality in the European Union states. In order to achieve a well-founded conclusion, we will run an econometric model and analyze the results since this phenomenon is of particular importance.

2. LITERATURE REVIEW

The aim of determining the link between income inequality and mortality represents a subject that brought the attention of many researchers over time. This subject represents an interesting topic of research and is of great interest in both the actual and the future context, taking into consideration the increasing polarization of social classes and the growing discrepancies between them, realities that any society faces, regardless of its degree of development.

The importance of this phenomenon was pointed out by Wilkinson (1996), who considered the income distribution one of the most powerful and important factors of influence when it comes to the health of the population from developed countries (Herzer și Nunnenkamp, 2015).

According to the article published by Dahl et al. (2006), studies such as those of Deaton (2003), Lynch et al. (2004), Macinko et al. (2003), Subramanian and Kawachi (2004) as well as Wilkinson and Pickett (2006) outline the fact that the specialty literature has shown a correlation between income inequality and population health, at least from a theoretical point of view.

According to a study by Marmot (2002), the revenue is connected to health in three different ways: by gross national product of the countries, by people's earnings, and by income inequalities among rich countries but also among geographical areas. Therefore, there are two ways through which income can affect health status, firstly through a direct impact on the material conditions necessary to biological survive, and secondly, by an effect on the social participation and opportunity to control life circumstances. The fewer goods and public services provided by the community, the more important and relevant individual revenue is for health.

In the past, those who rule the countries took the view that there is no relationship between poverty and access to health services. They were convinced that the problem is due to the ignorance of the citizens. It can be said, with amiability, that vision was then limited, but nowadays things have changed.

However, the specialty literature does not provide a clear answer on the true effect of income inequality on population health and, thus, on mortality. An important part of the current research did not determine significant associations between income inequality and health, the true effect of these inequalities on the health of the population being considered still uncertain, raising some questions in certain regards, as pointed out by Clough-Gorr

and Egger (2015) in their work. Within this research topic, the methodology proves to be extremely important, especially considering the fact that it raises the issue of regional or national particularities and at the same time the issue considering the level of aggregation at which the analysis is performed.

Most studies elaborated to the present date have based their analysis on aggregated data at the county, state, or country level (Dahl et al, 2006). Clough-Gorr and Egger (2015) point to Linch's conclusion (2004), who determined that, at a country/state level, most research stated that income inequality has a negative effect on the health of the population, while studies based on inferior levels of aggregation, such as regions and municipalities, have generated mixed findings on the same hypothesis. Furthermore, Wilkinson and Prickett (2006) explained in their publications that this hypothesis cannot be thoroughly tested when inequality is measured in small, narrow areas, taking into consideration the fact that significant social differences across the country cannot be included in this type of scenario. Both Lynch as well as Wilkinson and Prickett have their arguments based on studies that took into consideration the correlation between income inequality and population health at the level of larger countries, states, or regions. In contrast to the research undertaken considering local levels, these studies proved the correlation between income inequality and population health, and implicitly on mortality (Dahl et al., 2006).

As we have mentioned before, the main problem raised by this research topic is represented by the heterogeneous results of previews studies. Dahl et al. (2006) summarize in his paper a conclusion regarding the discrepancy of research results at that time. According to these results, research papers aimed at linking income inequality and health status, respectively mortality, in countries such as Canada, New Zealand, and Japan, did not record results to support their hypothesis. In addition, the same situation is found in the case of research regarding the Nordic countries, considered welfare states, with relatively equal distributions of income. In other words, research in both Finland and Sweden or Denmark has not found significant correlations between income inequality and mortality. At the same time, however, a negative correlation has been determined by the authors Clough-Gorr and Egger (2015) in the case of Switzerland. In their study, in Switzerland, higher income inequality has been associated with lower levels of mortality, both for general causes as well as for major causes, such as cardiovascular disease or cancer. On the other hand, when it comes to the United States, both the national level analysis as well as the analysis based on data collected from lower administrative levels, highlighted a significant link between income inequality and mortality. Moreover, Lynch et al. (1998) concluded on a tragic note that mortality due to income inequality in the United States "is comparable with the combined mortality due to lung cancer, diabetes, car accidents, human immunodeficiency virus infection, suicide and homicide in 1995" (Herzer and Nunnenkamp, 2015).

In their papers, Wagstaff and Van Doorslaer (2000), as well as Wilkinson and Pickett (2007) explain the negative effect of income inequality on the general health of a country's population, especially upon general mortality. The authors emphasize the lower standard of living of poor people from areas with high inequalities, as the main factor of influence for the level of health, mainly through low quality of life, with reduced access to health care services, poor working conditions, lack of resources or harmful habits. The differential access to resources and health services will eventually lead to less-efficient preventive health care services as well as higher criminality rates, which overall affects the population health and mortality risk (Daly and Wilson, 2013).

Secondly, apart from material conditions, Wilkinson highlights in his research papers the psychological argument. The author points out that the poverty felt by people in the lower ranks of society in terms of income, leads to an increased "psychosocial stress", mainly due to deprivation of status, which in the end is considered to have negative health implications.

Research in this field possesses significant importance. Demonstrating the possible correlation between inequality in income distribution and mortality could represent an important pillar in elaborating future social policies aimed at reducing mortality and serious illnesses. However, if inequality produces little to insignificant impact on the lives of the citizens, this situation transcends the economic sphere, and falls rather into the moral and social sphere, as stated by Daly et al. (1998).

3.DATA AND METHODOLOGY

The correlation between income inequality and mortality is analyzed in our paper using an econometric model which follows a similar approach to the one built by Torre and Myrskylä (2011), in which the authors analyze the link between life expectancy at birth and variables such as GDP per capita and the Gini coefficient. In addition, taking as an example the model built by Muller (2002), we have chosen to introduce in our model a variable that summarizes the population level of education in each member state of the European Union.

Our analysis uses a sample composed of all the European Union countries, including the United Kingdom for the 2000-2018 period, being the most recent period in which we did not encounter the problem considering the non-publication of data by statistical institutions, except for a few isolated cases.

Life expectancy at birth (years) is defined as the average number of years that a newborn can expect to live, if it were subjected, throughout his life, to the current mortality conditions. High life expectancy can be attributed to several factors, including increased living standards, improved lifestyles, and a higher level of education, as well as higher access to quality health services, according to the OECD (2019). Moreover, we consider that this variable is appropriate to the present research, considering that life expectancy at birth allows comparisons with existing research papers, as it was used as a dependent variable in other comparable studies, according to the authors (Torre and Myrskylä, 2011).

Gross domestic product per capita (purchasing power/capita). In our paper, GDP per capita provides a perspective both on the economic prosperity and level of development in each member state considered. At first sight, it can be argued that in a developed society, life expectancy is high, being influenced by the increased standard of living. On the other hand, according to the European Commission (2017), economic growth is not always favorable for inclusion, arguing that not all households feel this growth reflected in their income. In its report, the European Commission cites Saez's article (2019), which draws attention to the fact that, in the recent years, GDP growth in the United States has, almost exclusively, promoted income growth of households from the upper social classes, which deepens the problem regarding social polarization.

Gini coefficient is our main independent variable considered in this research, which describes the income inequality from selected countries. The higher the value of the Gini coefficient, the more unequally population income is distributed.

The level of education is another significant variable in our econometric model, taking into consideration its implications on society. Lack of education or even the lack of

a higher education level in a country theoretically leads to altered social conditions as well as altered living standards, which, in the end, can influence life expectancy. Furthermore, according to Coady and Dizioli (2018), a high level of education is considered to be a key factor in combating rising income inequality, at least in the medium term, taking into consideration the fact that it contributes to reducing poverty and inherited poverty as well as reducing inequalities of opportunity among the population. Moreover, a higher level of education contributes to the improvement of fiscal and social policies, distorted these days due to the high expenditures on social protection and assistance encountered in the countries with low levels of education. In our analysis, the level of education is illustrated by the percentage of the population aged 25-64, who have a higher education degree.

For all variables considered in the model, all data were collected using mainly the *European Database "Eurostat"* and *World Income Inequality Database*, published and updated by the United Nations University, useful for checking and completing our database especially in the case of the Gini coefficient. The isolated cases in which we encountered difficulties in collecting data were mainly for the Gini coefficient, particularly for Cyprus, Croatia, Malta, and Portugal, but only at the beginning of the period. For the GDP/capita variable, in the considered period 2000-2018, only the first two years of observations in the case of Romania were missing. Also, in the first years of the analysis, we found limitations in the case of Austria (2000-2003) and Croatia (2000-2001), in terms of the percentage of the population that graduated from a higher education cycle. However, the shortcomings in the collected data did not represent an impediment to the carried analysis, given the size of our built database.

Because the reviewed phenomenon is a complex one, we have chosen to perform our econometric analysis on a panel database. Before running the regression, we turned the variables into logarithmic data to easily compare and describe the results. Also, these transformations into logarithmic data allow better control of heteroscedasticity and meeting linearity. The regression equation is as follows:

$$lnlife\_expit=\alpha+\beta 1lngdpit+\beta 2lnginiit+\beta 3lnet\_attainmit+\Upsilon t+\varepsilon t$$

where the dependent variable is life expectancy at birth (life_exp), and the independent variables are gross domestic product per capita (GDP), the Gini coefficient (Gini) and education attainment (ed_attainm); Υt is a dummy variable which controls fixed effects over time; εt represents the error term which is correlated with the independent variables.

This correlation between the error term and the independent variables is a characteristic of the fixed effects models. When this model is used, it is assumed that a factor from inside the entity (in this case, the countries) can have an impact or prejudice on the explanatory variables, and must be controlled. This is the reason behind the hypothesis of the correlation between the error term and independent variables. When using a fixed-effects model, the impact of invariant in time characteristics is eliminated, so that effect of the output variable on the control variables can be assessed.

The first step in our regression analysis was performing the Hausman test to determine if the regression needs a fixed-effects or a random effect analysis. Considering that the panel database is quite comprehensive, the results of this test indicate choosing the fixed effects model.

Further, we have run the Pesaran test to identify cross-sectional dependence among the variables (contemporary correlation). The results indicate accepting the null

hypothesis, that the residuals are not correlated, so we can say that a cross-sectional dependence exists. To sustain this hypothesis we pursued the Lagram-Multiplier test for cross-sectional independence, which also led us to the same conclusion, there is no first-order autocorrelation. Finally, it was required to perform a heteroscedasticity test. The Wald test's results indicated that heteroscedasticity is not present in this model, (acceptance of the null hypothesis) according to Appendix 1.

4. EMPIRICAL RESULTS

Table no 1. Descriptive statistics of the results

Variable	Obs	Mean	Std. Dev.	Min	Max
life_exp	532	78.3438	3.275237	70.2	83.5
gdp	530	24792.23	11454.77	5630	80870
gini	514	29.70191	3.999789	20.9	40.2
ed_attainm	526	26.1365	9.081839	5.4	46.9

Source: Data processed by the authors through Stata Software

Table 1 summarizes the main descriptive characteristics of the variables used, from a statistical point of view. An important aspect of this analysis is the standard deviation. We can easily see that the most significant deviation from the average is in the case of gross domestic product, which records the value of 11.454,77 PPS/capita, indicating the economic heterogeneity of the analyzed countries. The countries with the farthest GDP/capita compared to the European Union average are Luxembourg, registering in 2018 also the maximum value from the considered data set (80.870 PPS/capita), Ireland and the Netherlands, and at the opposite pole, we find Bulgaria (registering the value of a minimum of 5.630 PPS/capita in 2000), Romania, Latvia, and Croatia.

The lowest standard deviation is assigned to the variable Life expectancy at birth (3,2752). On average, in all 19 years considered in our analysis, in the European Union, the average life expectancy was 78,34 years. The countries with the highest life expectancy are Spain and Italy, with an average of about 81,8 years, and at the opposite side are situated countries such as Latvia, Lithuania, Romania, and Bulgaria, where life expectancy at birth is on average, in the last 19 years, around 73 years.

We also find a low standard deviation in the case of the Gini coefficient (3,9997). This is due to the relatively uniform character of European countries, where we do not find sharp discrepancies between countries in terms of income inequality, as we find for example in the case of the United States and Mexico or the case of the countries from Asia or Africa. The average Gini coefficient in our database is 29,70, in line with the OECD average for OECD-EU countries of around 30 (OECD, 2017). The above-mentioned report also points out that the lowest levels of income inequality are found in countries such as Slovenia, the Czech Republic, and Slovakia, but the Nordic countries Sweden and Finland also occupy top positions. As it can be seen from our analysis, the minimum value is recorded by Slovakia (20,9). Western and Central European countries, such as France, Germany, Croatia, and the Netherlands, are around the European average, while the level of income inequality is above average in all countries in southern and south-eastern

Europe. The highest levels of income inequality in the European Union in 2018 are found in Bulgaria, the Baltic states Latvia and Lithuania, and in Romania.

On average, in the 2000-2018 period, the percentage of the population aged between 25 and 64 who graduated from higher education in the European Union was 26,13%. The European countries that had, on average, the lowest level of the population with higher education in the period 2000-2018 are Romania, followed by Italy and Malta, and at the opposite pole, we find Finland, Ireland, and Great Britain. The lowest value of the variable is found in the case of Malta in 2000 when only 5,4% of people aged between 25 and 64 had a higher education diploma. Although most EU countries register an increasing trend in terms of participation in higher education during the period under review, the higher level of education is assigned to Ireland, which is at its peak in 2018, when 46,9% of the population over the age of 25 graduated a form of higher education.

At the same time, in this descriptive analysis, we followed the variables' interpretation by grouping the considered countries according to the EU accession criteria. Thus, we considered two main categories: countries that joined the EU before 2004 (15): Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and The United Kingdom, as well as countries that joined the EU after 2004 (13): Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, and Slovenia. Following the application of the EU accession criteria, we found that, in the case of Life expectancy at birth, GDP/capita and level of education, the average of EU veteran states is higher than the average of countries that joined the EU structure after 2004. In addition, the level of inequality among the EU veteran state is slightly lower, on average, than that of new states, according to the average value of the Gini coefficient for the considered period.

Table no. 2 The correlation between variables

	ln_lif~e	ln_gdp~p	ln_gini	ln_educ
ln_life_e	1.0000			
ln_gdp_cap	0.8105	1.0000		
ln_gini	-0.2219	-0.2827	1.0000	
ln_educ	0.4011	0.5276	-0.0193	1.0000

Source: Data processed by the authors through Stata Software

Table no. 2 shows us the correlation between our variables. It can be seen that the highest level of this coefficient is present among life expectancy and GDP, proving the strong connection between these two variables. On the opposite side, we can see the weaker correlation between the Gini coefficient and education level. This does not raise issues in our model because the education level shows an acceptable level of association with the explained variable. Also, the education level has a normal correlation with GDP per capita variable. Gini coefficient affects in a negative way all the variables in our model, even life expectancy and GDP per capita have proven an unsteady correlation with the explanatory variables. Nevertheless, this negative correlation between the Gini coefficient and life expectancy may suggest the idea according to which greater inequality between income can harm life expectancy.

The regression's results

To identify if this econometric model is valid, we perform the Fisher test (global semnification test). In this case, we reject the hypothesis whose statement says that all variables are not significantly different from 0. This test shows that the entire group of independent variables in this model significantly affect our dependent variable. A separate analysis of variables is performed using the Student test. The t-test is used to verify if the variables are significantly different from each other. To determine if these variables are different from 0 and also to determine if they have significant influence on the model, the "p-value" must be smaller than the significance level (in this case 0,05). As we have shown in Appendix 2, the variables GDP per capita, and education attainment have the p-value smaller than 0,05, showing that these two variables are slightly significant to life expectancy. On the other hand, the p-value of the Gini coefficient is 0,514, so it does not influence the predicted variable. This fact does not lead us to exclude this variable from our model, considering the theoretical importance it has in the equation. Also, the t-test results regarding the Gini coefficient may be due to the fact that our database includes data from EU countries, that do not experience severe income inequalities (as in countries from Africa or even America, as numerous studies have shown) and neither a short life expectancy.

One way to establish the importance of the Gini coefficient in this model, along with the other variables, is the coefficient of determination. This coefficent reaches the value of 0,9676, which tells us that the considered variables explain in proportion of 96,76% the movement of life expectancy variable, while only 3,24% is explained by other factors. The "rho" indicator suggests that 93,66% of the variance is due to differences between panels, and, because the "corr(u_i, Xb)" indicator is negative, the hypothesis which assumes that the error term is correlated with the explanatory variables is sustained.

5. DISCUSSIONS

Numerous researches have investigated the income inequality issue over time. Smith (1996), Kennedy, Kawachi, and Prothrow-Stith (1996), Duleep (1995), and Kawachi et al. (1997) were among those who testify that the substantial gap of income can negatively affect people's life expectancy. Another important point of view relates to opposite results (that the revenue inequality and mortality are not correlated) if the analysis is performed on countries with high degree of development. This represents one of the problems which we have encountered in this paper, because the analysis was performed on data from the European Union states. It is well known the fact that more than half of these countries are highly developed, have an elaborate healthcare system, and a low-income inequality. We have considered all of these issues and adapted the analysis to the current circumstances so we can draw correct conclusions. Though, after some in-depth analysis, Gerdtham and Johannesson (2004) conclude that regardless of the country's level of development, the mortality rate significantly decreases as the earnings increase.

Park et al. (2015), Ross et al. (2000), Deaton and Paxson (2001) analyzed the connection between income and population status in developed countries, by considering the impact of data from only one or two states. These studies results have shown that a detailed examination, even on a micro-level, can demonstrate a strong correlation between the above-mentioned variables.

There are also authors as Lochner et al. (2001), Wolfson et al. (1999), Fisscela and Franks (1999), Kondo et al. (2009) who have not found any relationship between income inequality and mortality, or, in other words, the results of their studies do not show a strong

correlation among these two. Thereby, we can highlight the point that it is required to adjust the collected data and include, in addition to actual analysis, a theoretical or a factor of different nature. To make sure that we avoid this problem and in order to achieve clear statistic results, we transformed our input into logarithmic data and introduced a dummy variable. In this way, the regression's result is not enough to prove the studied phenomenon's impact, being necessary to connect the results with the literature.

In the articles where the writers have studied this phenomenon on a panel database, Daly and Wilson (2011), Leigh and Jencks (2006) obtained similar results, in the sense that the connection between the studied variables is not demonstrated in a very high proportion. The correlation is weak and it cannot be sustained without theoretical support. Muller (2002) has demonstrated the importance of education attainment regarding life expectancy and income inequality. This conclusion is supported by the idea that a country which invests more in human capital shows insignificant revenues variation between the population. It is not surprising that education is significantly correlated with GDP per capita.

Even though there are mixed opinions and different results from a study to another, it is clear that the relationship between these two variables is deeply analyzed and represents one of the biggest challenges of the XXI century, both economically and socially.

6. CONCLUSIONS

Our study's main objective was to analyze the influence which income inequality exercise on population health status, in the member states of the European Union. If the specialty literature as well as the existing research papers in the field, offers us support, providing us with a consistent theoretical basis, from a statistical point of view our regression results suggest that income inequality, measured by the Gini coefficient, is negatively correlated with life expectancy at birth, and does not significantly influence our dependent variable. However, this result is in line with the findings of the aforementioned research papers, whose analysis shows that, mathematically, there was no demonstrated influence or strong correlation between our two main variables: income inequality and life expectancy at birth, respectively mortality.

Starting from the model built by Torre and Myrskylä (2011) and, inspired by the study undertaken by Muller (2002), completing this model with a variable that captures the level of education in a community, the present study has three main findings.

The first significant finding was also pointed out previously. Given the database used, made up exclusively of EU Member States, income inequality, represented by the Gini coefficient, does not affect life expectancy at birth.

On the other hand, the second finding is represented by the fact that the gross domestic product per capita as well as the level of education, both influence in a significant way our dependent variable, taking into consideration our model. The fact that these variables influence the life expectancy of the population at a greater extent than income inequality may be due to the fact that our analysis was performed on a relatively uniform sample of countries, formed with mostly developed or developing states, where there are no strong discrepancies regarding income inequality, so that investment in education and the level of development of each state are the main factors that contribute to the differentiation of life expectancy from one state to another. However, according to the

Fisher test of global significance, as a whole, the variables considered in the model have a significant influence on life expectancy at birth variable.

The third finding of the study is that the level of inequality in the veteran states of the European Union is, on average, slightly lower, than in the case of the new states, according to the average value of the Gini coefficient in the considered period, while the GDP per capita, level of education and life expectancy at birth are, on average, higher in EU veteran states, that joined the EU structure before 2004.

The main improvements that can be made to our current research state could consist in a more in-depth analysis, focusing on the main regions of the Member States of the European Union. However, the limitations we have encountered consist in the lack of data for the considered variables at the regional level, especially for long periods. A more detailed analysis, at the regional level of the Member States, could better capture the influence of income inequality on mortality, given the fact that, in recent years, there have been significant differences between the divergence of countries and those of regions in the European Union: EU countries managed to converge, however, EU regions show significant growing discrepancies. Nowadays, both regional convergence as well as reducing such strong disparities between regions are considered to be the real challenges the European Union has to face.

REFERENCES

1. Clough-Gorr, K.M., Egger, M., Spoerri, A. — A Swiss paradox? Higher income inequality of municipalities is associated with lower mortality în Switzerland. European journal of epidemiology, 30(8), pp.627-636, 2015
2. Coady, D., Dizioli, A. — IMF Working Paper: Income inequality and education revisited: persistence, endogeneity and heterogeneity. Applied Economics, 50(25), pp.2747-2761, 2017
3. Dahl, E., Elstad, J.I., Hofoss, D., Martin-Mollard, M. — For whom is income inequality most harmful? A multi-level analysis of income inequality and mortality în Norway. Social science & medicine, 63(10), pp.2562-2574, 2006
4. Daly, M.C., Wilson, D.J. — Inequality and mortality: New evidence from US county panel data. Federal Reserve Bank of San Francisco, 2013 Available at https://www.frbsf.org/economic-research/files/wp2013-13.pdf
5. Daly, M.C., Duncan, G.J., Kaplan, G.A., Lynch, J.W. — Macro-to-micro links în the relation between income inequality and mortality. The Milbank Quarterly, 76(3), pp.315-339, 1998
6. Deaton, A. — Health, inequality, and economic development. Journal of economic literature, 41(1), pp.113-158, 2003
7. Deaton, A., Paxson, C — Mortality, Income, and Income Inequality over Time in Britain and the United States. NBER Working Paper No. 8534, 2001, Available at https://www.nber.org/papers/w8534.pdf
8. Duleep, H.O. — Mortality and Income Inequality Among Economically Developed Countries. Social Security Bulletin vol. 58 no. 2, pp 34-50, 1995

9. European Commission — European semester thematic factsheet - addressing inequalities, 2017, Available at https://ec.europa.eu/info/sites/info/files/file_import/european-semester_thematic-factsheet_addressing-inequalities_ro.pdf

10. Fiscella, K., Franks, P. — Individual Income, Income Inequality, Health, and Mortality: What Are the Relationships?. Health Services Research 35:1, Part II pp 307-318, 2000

11. Gerdtham, U.G., Johannesson, M. — Absolute Income, Relative Income, Income Inequality and Mortality. Journal of Human Resources, 2004
Available at https://pdfs.semanticscholar.org/74e9/f59fcef1c5ad7556ff7270ad704750b99aef.pdf

12. Herzer, D., Nunnenkamp, P. — Income inequality and health: Evidence from developed and developing countries. Economics: The Open-Access, Open-Assessment E-Journal, 9(2015-4), pp.1-56, 2015

13. Kawachi, I., Kennedy, B.P., Lochner, K., Prothrow-Stith, D — Social Capital, Income Inequality and Mortality. American Journal of Public Health vol.87 no. 9 pp 1491-1498, 1997

14. Kennedy, B.P., Kawachi, I., Prothrow-Stith, D. — Income distribution and mortality: cross sectional ecological study of the Robin Hood index in the United States. Bill Moyers Journal vol. 312 pp 1004-1007, 1996

15. Kondo, N., Sembajwe, G., Kawachi, I., M van Dam, R., Subramanian, S.V., Yamagata, Z. — Income inequality, mortality, and self rated health: metaanalysis of multilevel studies. Bill Moyers Journal, 2009
Available at https://www.bmj.com/content/339/bmj.b4471

16. Leigh, A., Jencks, C. — Inequality and Mortality: Long-Run Evidence from a Panel of Countries. The Australian National University – Centre for Economic Policy Research, 533, 2006
Available at https://openresearch-repository.anu.edu.au/bitstream/1885/45253/2/DP533.pdf

17. Lochner, K., Pamuk, E., Makuc, D., Kennedy, B.P., Kawachi, I. — State-Level Income Inequality and Individual Mortality Risk: A Prospective, Multilevel Study. American Journal of Public Health vol 91 no 3 pp 385-391, 2001

18. Lynch, J., Smith, G.D., Harper, S.A., Hillemeier, M., Ross, N., Kaplan, G.A., Wolfson, M. — Is income inequality a determinant of population health? Part 1. A systematic review. The Milbank Quarterly, 82(1), pp.5-99, 2004, Available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2690209/

19. Macinko, J.A., Shi, L., Starfield, B., Wulu Jr, J.T. — Income inequality and health: a critical review of the literature. Medical Care Research and Review, 60(4), pp.407-452, 2003

20. Marmot, M. — The Influence Of Income On Health: Views Of An Epidemiologist. Vol. 21, No. 2: The determinants of health, Health Affairs, 2002,Available at https://www.healthaffairs.org/doi/full/10.1377/hlthaff.21.2.31
21. Muller, A. — Education, income inequality, and mortality: a multiple regression analysis. Bmj, 324(7328), p.23, 2002
22. OECD — Health at a Glance 2019: OECD Indicators, OECD Publishing, Paris, 2019, Available at http://www.oecd.org/health/health-systems/health-at-a-glance-19991312.htm
23. OECD — Understanding the socio-economic divide în Europe - Background Report , OECD Publishing, 2017 Available at https://www.oecd.org/els/soc/cope-divide-europe-2017-background-report.pdf
24. Park, J., Ryu, S.Y., Han, M., Choi, S.W. — The association between income inequality and all-cause mortality across urban communities in Korea. BMC Public Health, 2015, Available at https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-015-1924-x
25. Piketty, T — Capital în the Twenty-First Century. Harvard University Press, 2014, Available at https://dowbor.org/wp-content/uploads/2014/06/14Thomas-Piketty.pdf
26. Ross, N.A., Wolfson, M.C., Dunn, J.R., Berthelot, J.M., Kaplan, G.A., Lynch, J.W. — Relation between income inequality and mortality in Canada and in the United States: cross sectional assessment using census data and vital statistics. Bill Moyers Journal, 2000 Available at https://www.bmj.com/content/320/7239/898
27. Saez, E. — Striking it Richer: The Evolution of Top Incomes în the United States (Updated with 2017 Final Estimates), 2019 Available at https://eml.berkeley.edu/~saez/saez-UStopincomes-2017.pdf
28. Smith, G.D. — Income inequality and mortality: why are they related? Bill Moyers Journal vol 312 pp 987-988, 1996
29. Subramanian, S.V., Kawachi, I. — Income inequality and health: what have we learned so far?. Epidemiologic reviews, 26(1), pp.78-91, 2004
30. Torre, R., Myrskylä, M. — Income inequality and population health: a panel data analysis on 21 developed countries. Max-Planck-Institut für demografische Forschung, 2011, Available at https://www.demogr.mpg.de/papers/working/wp-2011-006.pdf
31. Wagstaff, A., Van Doorslaer, E. — Income inequality and health: what does the literature tell us?. Annual review of public health, 21(1), pp.543-567, 2000
32. Wilkinson, R.G., Pickett, K.E. — Income inequality and population health: a review and explanation of the evidence. *Social science & medicine*, *62*(7), pp.1768-1784, 2006
33. Wilkinson, R.G., Pickett, K.E. — The problems of relative deprivation: why some societies do better than others. Social science & medicine, 65(9), pp.1965-1978, 2007

34. Wilkinson, R.G. Unhealthy societies: the afflictions of inequality. Routledge, 1996, Available at https://onlinelibrary.wiley.com/doi/pdf/10.1111/1467-9566.ep10938939

35. Wolfson, M., Kaplan, G., Lynch, J., Ross, N., Backlund, E. Relation between income inequality and mortality: empirical demonstration. Bill Moyers Journal vol. 319, pp 953-957, 1999, Available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1070713/

36. Zheng, H. Do people die from income inequality of a decade ago?. Social science & medicine, 75(1), pp.36-45, 2012