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Economic Growth, Poverty Gap, and Health Inequality: Implications Based on Panel Analysis of Organization for Economic Cooperation and Development Data

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Abstract

This study investigated the impact of economic growth and income distribution on health inequality using data from the Organization for Economic Cooperation and Development (OECD). Employing a panel analysis, this study amalgamated 21 years of data (spanning from 2000 to 2020) from 37 OECD countries. The dependent variables (life expectancy and avoidable mortality) were scrutinized against independent variables (gross domestic product and poverty gap). Control variables encompassed body mass index, consumption patterns, smoking rates, health workers availability, number of beds in health facilities, national medical expenses, and unemployment rates. This study revealed significant associations between economic growth, poverty gap, and both life expectancy and avoidable mortality. This underscored the necessity of prioritizing not only income distribution but also overall economic growth to address health inequality effectively. This study established that an increase in the poverty gap corresponded to elevated life expectancy and reduced avoidable mortality rates, suggesting a mechanism distinct from a medical security system targeting lower-income individuals or an enhancement of societal welfare. Proposing policy measures to alleviate health inequality, this study advocates for policy interventions to mitigate the adverse impacts of income inequality within healthcare policies.

Keywords: fixed effect model, health disparity, health inequality, panel analysis

Introduction

The Gross Domestic Product (GDP), traditionally employed as a metric for national income, has historically served as an indicator for assessing the quality of life. Rooted in post-World War II conditions, this evaluation is predicated on the empirical assumption that income fundamentally impacts the quality of life, coupled with a pragmatic framework for enhancing living standards.[1] Income, as the primary material underpinning, is deemed pivotal for augmenting happiness levels, with economists positing an individual's happiness as contingent upon income. However, recent paradigms challenge this association, positing that a rise in absolute income does not necessarily correlate with increased happiness,[1] introducing nuances such as the Easterlin paradox, wherein incremental income reaches a saturation point in contributing to heightened happiness.

The authors agreed that the intricate interplay between income and health should be examined, given the manifold and unequal differences observed in both. Variances in health levels, attributed to diverse factors encompassing genetic predispositions and the social and economic status of individuals, persistently influence lives. Educational backgrounds further contribute to income differentials, impacting qualitative and quantitative aspects of medical services.

The debate over whether health outcomes primarily stem from individual behaviors or systemic issues remains contentious,[2] necessitating an exploration of reformist and historical materialistic perspectives. Reformism underscores the role of social and environmental determinants, advocating improvements in lifestyle and nutrition management. In contrast, historical materialism accentuates structural factors such as social inequality and poor living conditions, positing health outcomes as more systemic than individualized.[3,4] This dichotomy carries implications for the attribution of health responsibility, with reformist positions often neglecting socioeconomic factors in favor of individual behavior.

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To comprehensively understand health, one must scrutinize the intricate relationship between health and the environment, spanning individual, community, and macro-political dimensions. Scholars like McKeown argue that changes in the socioeconomic environment hold more relevance for health than the quality of medical care.[5] The Black Report (1990)[6] and Acheson Report (1998)[7] are two of the most prominent reports on health inequalities published in the UK. Those reports emphasize the significant impact of living conditions, socioeconomic factors, cultural influences, and environmental conditions on health, challenging the predominant focus on income distribution. Despite empirical studies examining the link between health and income inequality, the relationship remains contentious.[6,7]

Income influences health in two key conditions: insufficient absolute income necessary for maintaining proper health conditions and negative effects of an intense income gap on health through various social side effects.[8] The absolute income hypothesis (AIH) posits a diminishing return effect, suggesting that the impact of income on health lessens as income increases.[8] In contrast, the relative income hypothesis (RIH) asserts that income inequality affects health independently of individual income levels, emphasizing contextual effects and group influences on health outcomes.[9-14]

The literature on the contextual effects of the RIH delves into diverse perspectives. Macinko, adopting a new materialistic perspective, asserts that income deficiencies, including poverty, influence health due to an increase in poor individuals as income inequality intensifies.[15] Additionally, social investment reduction in regions with heightened income inequality leads to underinvestment in human capital.[9] Moreover, social psychology perspectives posit that income inequality weakens social cohesion, adversely impacting social capital and mutual trust ultimately influencing public health.[10] The last, from a social psychology standpoint, income inequality's impact on social status exacerbates individual social status inequality, contributing to health deterioration due to heightened stress among individuals with lower social status.[13]

Numerous empirical studies have scrutinized the nexus between income inequality and health, consistently revealing a deleterious impact on health outcomes and key societal values such as trust and fairness.[10-14] This adverse influence on health assumes particular significance as a hindrance to global sustainable development. Recognizing this, the United Nations (UN) has prioritized health as a focal point in its Sustainable Development Goals (SDGs), specifically SDG-3, underscoring the imperative of mitigating health inequality for holistic sustainability.[16] Consequently, a comprehensive empirical exploration of diverse socioeconomic variables contributing to health inequality across varied dimensions emerges as a paramount concern within sustainable development.[17]

Several studies have delved into the relationship between income and health using national data, acknowledging healthcare systems' divergent characteristics and developmental trajectories in different countries. Rodgers conducted an analysis revealing a significant correlation between income levels and life expectancy, demonstrating that countries with equitable income distribution exhibit an average life expectancy of up to 10 years longer than those characterized by disparate income distribution.[18] Wilkinson substantiated this correlation by examining the relationship between the Gini coefficient and life expectancy in 11 the Organization for Economic Cooperation and Development (OECD) countries, elucidating that income distribution exerts a more pronounced impact on health inequality than GDP.[19]

Notably, the effect of GDP on life expectancy remains below 10%, while the income share of low-income families contributes to approximately 75% of life expectancy.[20-21] Le Grand found a close link between mortality rates and income redistribution across 17 countries.[22] Investigating the income of the lower 20% of the population and its proportion to the country's total income, Le Grand emphasized the pivotal role of income distribution.[22] Hill's study on the relationship between income and total mortality accounted for in 50 states in the United States underscored the significant correlation between income distribution and age-standardized mortality—a universal phenomenon, irrespective of sex.[23] In light of these insights, this study contributed to the discourse by undertaking a rigorous panel analysis utilizing OECD statistics spanning 21 years, from 2000 to 2020. Through this investigation, this study aimed to unravel the nuanced dynamics of how economic growth and distribution levels substantively contribute to the intricate landscape of health inequality.

Method

This study employed OECD statistical data to investigate health inequalities across OECD countries. The data was downloaded from the OECD's official website.[24] The OECD offers comprehensive annual data covering health, healthcare, and various fields such as employment, social policy, family, and pension. Pooled data spanning 21 years, from 2000 to 2020, were amalgamated into a time series for analysis. A total of 37 countries (countries provided by OECD), including Australia, Austria, Belgium, Canada, the Republic of Chile, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, South Korea (ROK), Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States, were included in the analysis.

This study empirically scrutinized factors influencing the growth and distribution of health inequality using OECD statistics. Dependent variables encompassed life expectancy and avoidable mortality (% per 100,000 people). Employing various variables as proxies for health inequality, life expectancy represented the average age individuals were expected to survive at 40, 60, 65, and 80 years. The avoidable mortality rate combined preventable mortality before accidents and diseases occurred with treatable mortality, calculated as the mortality rate per 100,000 people according to OECD population standards.

Independent variables included GDP per capita, measured in USD, as an indicator of a country's basic income. Distribution was assessed using a poverty gap based on the concept of relative poverty, calculated after taxes and income transfers based on 50% of the poverty line. To control for potential influences on health inequality, health-risk variables such as drinking, smoking, and obesity were considered. Drinking was measured as consumption per person aged 15 years or older, smoking as the smoking rate among the population aged 15 years or older (%), and overweight or obesity as the percentage of people with a body mass index (BMI) of 25 or more. The OECD uses the age of 15 as a benchmark.[24] Variables indirectly measuring healthcare resources, such as the number of health workers and beds per 1,000 people, health and medical expenses (% of GDP), and the share of government and compulsory schemes in national medical expenses, were also controlled. Additionally, the unemployment rate (%) was considered a major variable influencing health inequality, given its direct relationship with individual income and reported associations with increased mortality rates. The ratio of the unemployed to the economic population aged 15 years or older was controlled by OECD standards.

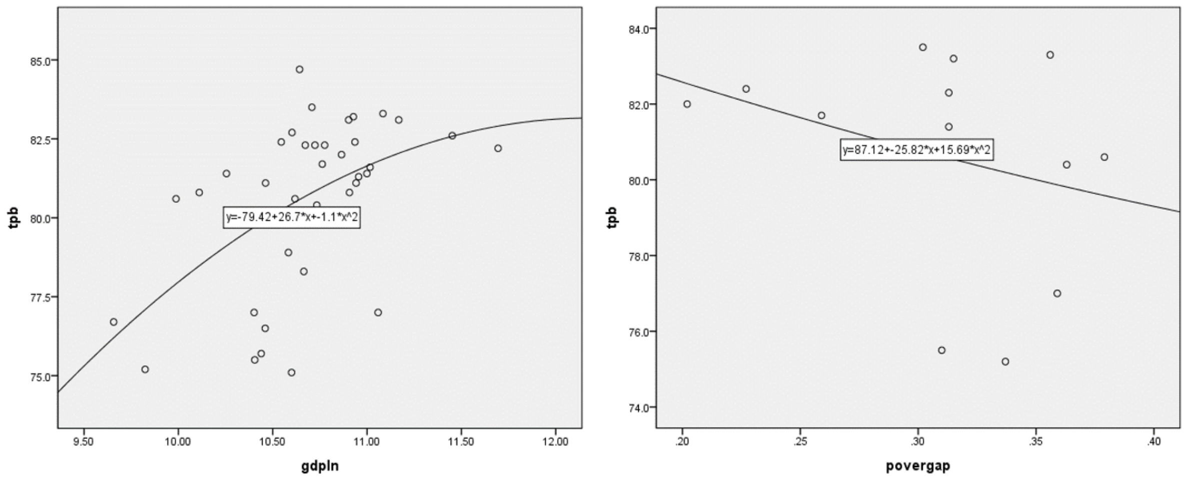
Data for this analysis were arranged by combining spatially and chronologically different cases (Number×Time). This combination allowed simultaneous analysis of cross-sectional and temporal fluctuations, increasing the degree of freedom. Panel analysis was conducted using generalized Ordinary Least Square (OLS). However, OLS could violate the basic assumptions of several estimates. First, combined data exhibited autocorrelation, a correlation between different time points, owing to the characteristics of independent observation values over time. Second, there was a heteroscedastic characteristic in which the dispersion of errors varied depending on the unit of time. Third, the errors tended to show contemporaneous correlations across spatial units at certain points in time. Fourth, the errors included both time and unit effects. Because OLS has biased, inefficient, or inconsistent estimation problems, this study considered the applicability of Generalized Least Square (GLS).

The analysis procedure was as follows: First, the average and standard deviation of the variable were reviewed using descriptive statistics of the major variables (Table 1). Second, the Lagrange multiplier test proposed by Breusch and Pagan was conducted to confirm the simultaneous correlation and determine the appropriate model between the pooled OLS and random effects models. Third, through an F-test, an appropriate model was identified between the pooled OLS model and the fixed-effect model. Fourth, to compare the suitability of the fixed effects and pooled OLS model, a Hausman test was conducted to determine a valid model. The final model, validated through these tests, was then utilized to identify factors influencing health inequality. The results of the analysis procedure are detailed below.

Results

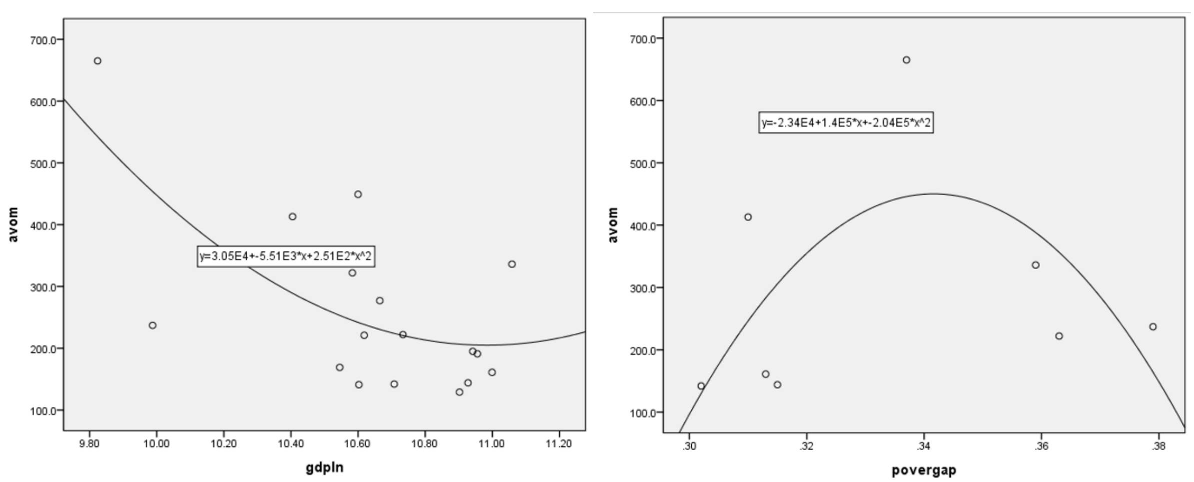
Figure 1 depicts the relationship between major variables based on the 2020 cross-sectional data. Concerning the link between economic growth and life expectancy, a country's life expectancy increases with rising GDP per capita. However, when a country's income reaches a certain level or higher, the increase in life expectancy becomes statistically insignificant. Conversely, the poverty gap does not intuitively correlate with life expectancy. Although life expectancy generally decreases as the poverty gap increases, the statistical significance of this trend is not apparent.

A regression analysis was conducted based on cross-sectional data to delve into these relationships further. The model, with an adjusted R2 of .196, explains approximately 19.6% of the variation in economic growth, poverty gap, and life expectancy. Notably, GDP per capita did not exert a statistically significant effect on life expectancy ($\beta = 0.508$, $t = 1.977$, p-value = 0.090). However, the relationship between economic growth and life expectancy was significant at the 0.1 level. As anticipated, the poverty gap exhibited no statistically significant effect ($\beta = -0.157$, $t = -0.581$, p-value = 0.574).



Notes: the circle represents individual countries; gdpln: the log of GDP per capita; povergap: the poverty gap; tpb: life expectancy.

Figure 1. Relationship Between Economic Growth, Poverty Gap, and Life Expectancy (2020 Data)

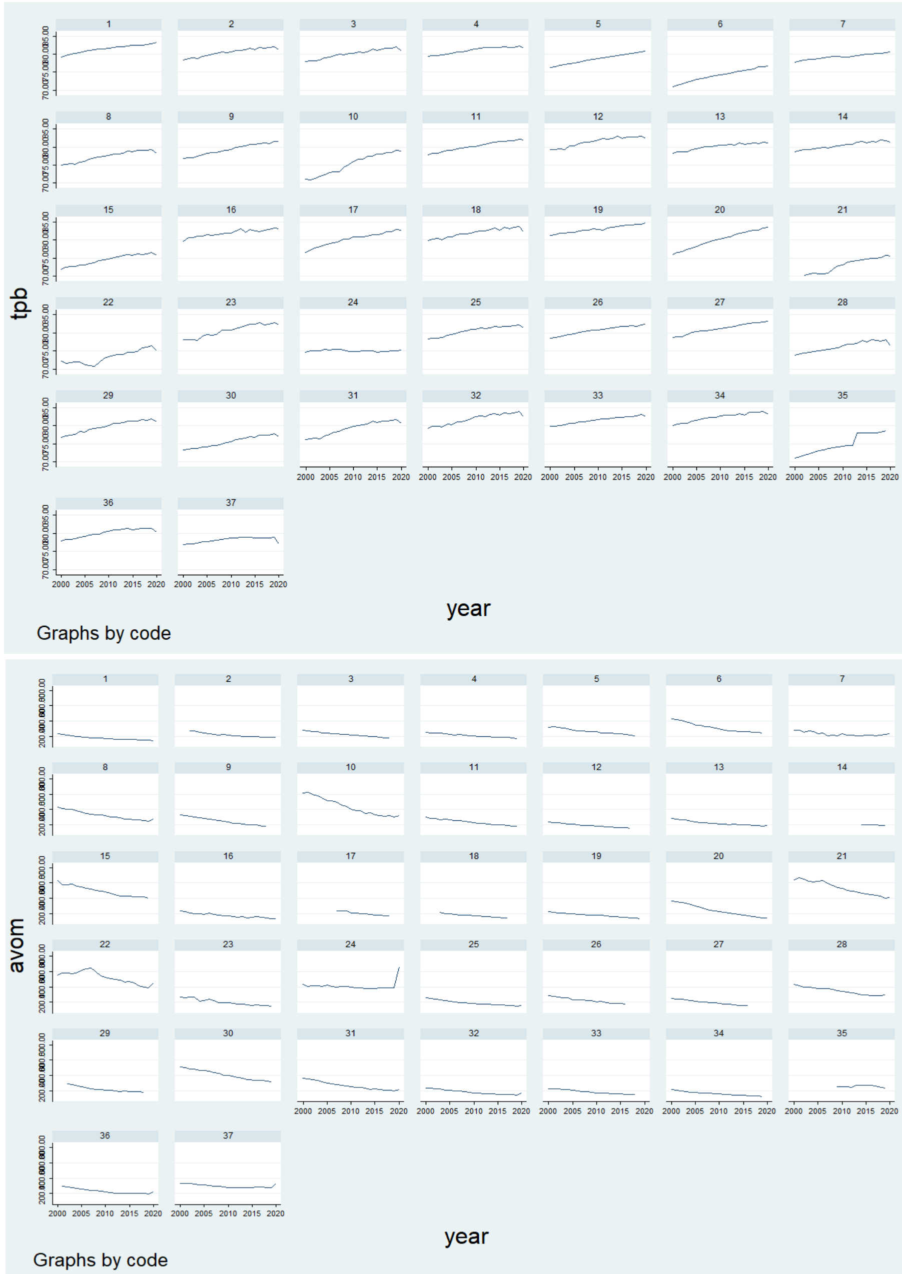


Notes: the circle represents an individual country; gdpln: the log of GDP per capita; povergap: the poverty gap; avom: avoidable mortality.

Figure 2. Relationship Between Economic Growth, Poverty Gap, and Avoidable Death (2020 Data)

Figure 2 explains the relationship between economic growth, the poverty gap, and avoidable deaths. As GDP per capita increases, the avoidable death rate of a country continues to decrease. Similar to life expectancy, it was confirmed that if a country's income reaches a certain level or higher, a flat section of avoidable deaths appears, even if income increases. However, the poverty gap did not intuitively reveal a relationship with the avoidable mortality rate. As the poverty gap increases, the avoidable mortality rate initially increases and then decreases when it reaches a certain level; however, this is not statistically significant. As a result of conducting a regression analysis based on cross-sectional data, both economic growth (β = -0.676, t = -1.929, p-value = 0.112) and the poverty gap (β = -0.056, t = -0.161, p-value = 0.879) could not confirm statistical significance in the avoidable mortality rate.

In brief, the analysis results using cross-sectional data provided variables with intuitive implications. However, in most cases, statistical significance was not observed. Individual-level data were verified based on the statistical data for each country. This approach was chosen to secure a larger number of samples than when using aggregated data. However, in this case, it became difficult to compare or control the level of social security, healthcare fiscal expenditure, and the influence of medical indicators in individual countries. Therefore, a panel analysis combining space and time data can offer more realistic and practical implications when analyzing country-specific data.

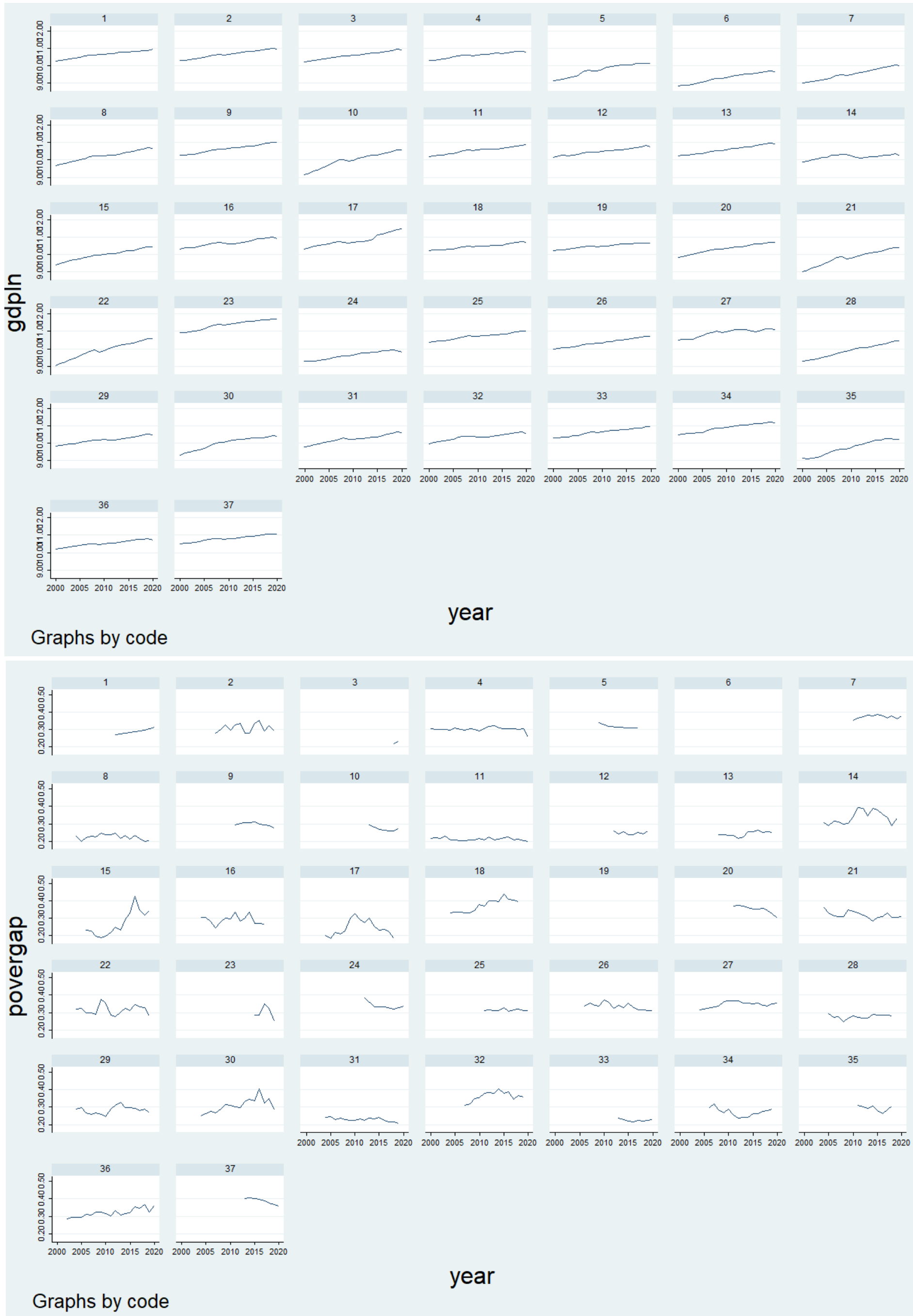


Notes: (1) Australia, (2) Austria, (3) Belgium, (4) Canada, (5) the Republic of Chile, (6) Colombia, (7) Costa Rica, (8) Czech Republic, (9) Denmark, (10) Estonia, (11) Finland, (12) France, (13) Germany, (14) Greece, (15) Hungary, (16) Iceland, (17) Ireland, (18) Italy, (19) Japan, (20) South Korea (ROK), (21) Latvia, (22) Lithuania, (23) Luxembourg, (24) Mexico, (25) the Netherlands, (26) New Zealand, (27) Norway, (28) Poland, (29) Portugal, (30) Slovakia, (31) Slovenia, (32) Spain, (33) Sweden, (34) Switzerland, (35) Turkey, (36) United Kingdom, (37) United States

Figure 3. Trends in Life Expectancy and Avoidable Mortality

Figure 3 illustrates trends in life expectancy and avoidable mortality rates in individual countries from 2000 to 2020. There is variation in life expectancy among countries; however, it has been confirmed that life expectancy continues to increase. This tendency is thought to reflect factors such as economic growth and improvements in medical services. Simultaneously, even in the case of the avoidable mortality rate, a relatively decreasing tendency was confirmed. This can also be interpreted as improvements in living standards, changes in the value of life, and enhancements in the quality and quantity of medical services.

From 2000 to 2020, the GDP per capita of individual countries continued to increase. However, determining uniform tendencies among countries was challenging. In general, the poverty gap (based on 50% of the poverty line) represents how much income people in the lower-income class must earn to escape poverty and the degree of insufficient income. Therefore, the lower the average income of the lower-income class, the greater the poverty gap. Confirming a tendency to increase or decrease in most countries is difficult. The observed tendency was evidence that individual countries have prioritized economic growth in the direction of state affairs or have not implemented policies advantageous to the lower class, even if various social security systems and redistribution policies exist.



Note: See Figure 3. For the list of countries

Figure 4. Trends in GDP Per Capita and Poverty Gap

This study utilized a panel group comprising 37 countries for analysis, with a total of 798 observations. Descriptive statistics for the major variables are presented in Table 1. In terms of dependent variables, the average life expectancy was 79.14 years, with a minimum of 70.2 years (recorded in 2002 in Latvia) and a maximum of 84.7 years (noted in 2020 in Japan). The average avoidable mortality rate stood at 267.23%, with a minimum mortality rate of 124.0% (observed in Switzerland in 2019) and a maximum mortality rate of 667.0% (recorded in Latvia in 2021). Among the independent variables, the average GDP per capita was USD34,735, ranging from a minimum value of USD6,886 (observed in Colombia in 2000) to a maximum value of USD119,883 (noted in Luxembourg in 2020). The average poverty gap was 0.29%, with the minimum value at 0.18% (Ireland, 2005) and the maximum at 0.44% (Italy, 2015).

Table 1. Descriptive Statistics of Variables

Variables	N	Min	Max	Mean	SD
Life expectancy	795	70.2	84.7	79.14	3.08
Avoidable mortality	712	124.0	667.0	267.23	113.71
GDP per capita (Log conversion)	798	6,886.4 (8.84)	119,883.0 (11.69)	34,735.09 (10.34)	16,982.44 (0.56)
Poverty gap	436	0.18	0.44	0.29	0.05
Body Mass Index	127	23.7	75.2	52.41	16.37
Alcohol consumption	785	1.2	14.8	9.03	2.91
Smoking rate	435	7.3	40.0	19.71	5.89
Health workers	727	8.1	110.9	45.41	23.01
The number of beds in health facilities	744	0.95	14.69	4.89	2.60
The national medical expenses	798	3.89	18.81	8.33	2.17
Unemployment	747	2.01	27.46	7.57	4.01

Notes: SD = standard deviation; GDP = gross domestic product

Examining the proportion of individuals with a BMI of 25 or higher in various countries revealed an average of 52.41%, a minimum of 23.7% (Japan in 2012), and a maximum of 75.2% (Mexico in 2018). The average alcohol consumption per person aged 15 years and older was 9.03 liters, with the minimum observed in Turkey (1.2 liters per person in 2006 and 2020) and the maximum in Estonia (14.8 liters in 2007). Among the population aged 15 years and over, the average smoking rate was 26.67%, with a minimum of 7.3% (Iceland in 2020) and a maximum of 40.0% (Greece in 2006).

Indirectly measuring healthcare resources in OECD countries, the average number of health workers per 1000 people was 45.41, ranging from a minimum of 8.1 (Turkey in 2010) to a maximum of 110.9 (Norway in 2019). The average number of hospital beds per 1,000 people was 4.89, spanning from a minimum of 0.95 (Mexico in 2019) to a maximum of 14.69 (Japan in 2000). Regarding health and medical costs in OECD countries, the ratio of national medical expenses to GDP fell within the range of 8.33%, with a minimum of 3.89% (South Korea in 2000) and a maximum of 18.81% (the United States in 2020). The average unemployment rate was 7.57%, with values ranging from a minimum of 2.01% (Czech Republic in 2019) to a maximum of 27.46% (Greece in 2013).

The Lagrange multiplier test was employed for the two dependent variables to select the appropriate model for panel analysis. The objective was to discern whether the random effects or pooled OLS model was more fitting. For life expectancy as the dependent variable, the null hypothesis was decisively rejected at the 1% significance level, given the p-value (0.001) falling below 0.01. Consequently, it was deemed appropriate to estimate a probability effects model, considering the panel's individual characteristics, rather than opting for the pooled OLS model. In the case of avoidable mortality rate as the dependent variable, the p-value (0.036) being less than 0.05 led to the rejection of the null hypothesis at the 5% significance level.

An F-test, conducted on 798 observations and 37-panel groups (countries), aimed to validate that the estimated coefficients are in close proximity to zero. The p-value of the F-test, being less than 0.010, resulted in the null hypothesis being rejected at the 1% significance level. Thus, the fixed-effects model, which accounts for the individual characteristics of the panel, was deemed more suitable than the pooled OLS model.

Following the Lagrange multiplier test and F-test, which indicated the inadequacy of the pooled OLS model, the Hausman test was employed to determine the suitability between fixed- and random-effect models. The Stata command "sigmamore" was utilized to enhance the robustness of the test. The Hausman test outcomes where the null hypothesis was rejected at the 5% significance level, given that the prob>chi2 value (0.019) was less than 0.050. This result implied that the fixed-effects model might be considered more appropriate than the random-effects model.

For the avoidable mortality rate, the prob>chi2 value was 0.021, and the null hypothesis was not rejected. Consequently, the fixed-effects model was deemed a more appropriate analytical model. Similarly, the null hypothesis was rejected at the 1% significance level with a prob>chi2 value of (0.002) being less than 0.010. These results indicated that the fixed-effects model was more suitable than the random-effects model.

Hence, the final model for this study was estimated as a fixed-effects model, as illustrated in Equation 1, where "i" denotes the number of cross-sectional data, "t" is the number of time-series data, and "k" is the number of independent and control variables. β1yit-1 represents the incorporation of a lagged dependent variable into an independent variable to address autocorrelation.

$$y = a_1 + \beta_1 y_{-1} + \sum_{k=2}^{k} \beta_k X_{kit} + e,$$
$$(i = 1,2,\dots,n,\ \ t = 1,2,\dots,Ti)$$

In scrutinizing the influence of growth and distribution on health inequality, the impact on life expectancy was examined utilizing a fixed-effects model. While controlling for variables affecting life expectancy inequality, the findings revealed that GDP per capita significantly influenced life expectancy (β = 3.943, p-value <0.01). In essence, as GDP per capita increases, life expectancy improves. Additionally, the poverty gap exhibited a statistically significant impact on life expectancy (β = 5.711, p-value <0.01). These results may appear somewhat unconventional compared to prevailing social norms.

This result differs from the common perception that life expectancy gradually decreases as income inequality increases. However, the interpretation of income inequality may differ when measured as a poverty gap instead of the Gini coefficient. Unlike the Gini coefficient, which represents the overall income imbalance in society, the poverty gap focuses on the average income of the lower classes. Therefore, an increase in the Gini coefficient did not necessarily imply a poverty gap rise. Even with improvements in living conditions, increased access to medical services, and enhanced economic growth within a country, the lack of appropriate redistribution policies, particularly for the lower class, or the absence of effective social security measures could explain these results. These results were proved by the longitudinal graph, which did not confirm a decrease in the poverty gap despite the presence of national redistribution policies and a social security system.

A country's health and medical resources encompass hospital facilities (total hospital beds), health and medical workers (number of doctors and nurses), medical equipment, and medical technology (CT scanners and MRI equipment). Among these, health and medical workers (β = 0.089, p-value <0.05) significantly impacted the increase in life expectancy. Furthermore, the unemployment rate (β = 0.183, p-value <0.01) had a statistically significant effect on life expectancy. Unexpectedly, higher unemployment rates correlated with increased life expectancy. Moreover, the analysis of variables affecting the avoidable mortality rate corroborated that GDP per capita, poverty gap, and control variables such as health workers and unemployment had a statistically significant impact. As the economy grows and the number of health and medical workers increased, the socially preventable mortality rate decreased. Conversely, the avoidable mortality rate decreased as the poverty gap and unemployment rates rose.

Table 2. Analysis Results

Section		Variables	Life Expectancy	Avoidable Mortality
Independent variables		GDP per capita	3.943**	-137.647**
			(0.939)	(28.664)
		Poverty gap	5.711**	-120.890**
			(1.825)	(53.288)
Controlled variables	Health risk	Body Mass Index	0.012	0.391
			(0.018)	(0.531)
		Alcohol consumption	0.004	0.280
			(.079)	(2.188)
		Smoking rate	0.009	-0.640
			(0.031)	(0.893)
	Health care resources	Health workers	0.089**	-2.430**
			(0.026)	(0.766)
		Number of beds in health facilities	-0.030	1.682
			(0.051)	(1.420)
	Employment	The National Medical Expenses	0.095	0.097
			(0.112)	(3.381)
		Unemployment	0.183**	-5.238**
			(0.046)	(1.300)
A Constant			29.978**	1,844.684**
			(9.677)	(286.219)
F			55.05**	87.61**

Notes: GDP = gross domestic product, *p-value <0.05, **p-value <0.01

Discussion

This study delved into the significant correlation between a country's growth, distribution, and health inequality, utilizing a panel analysis spanning 21 years for 37 OECD countries. The key findings are summarized as follows. Variables that lacked significance in cross-sectional analysis revealed statistical significance in panel analysis. GDP per capita and the poverty gap, which showed no statistically significant effects on life expectancy and avoidable mortality in cross-sectional analysis, gained significance in the panel analysis of 37 OECD countries. The shift in results could be attributed to the relatively small sample size in cross-analysis and the fixed nature of social security, healthcare fiscal expenditure, and medical indicators in each country during cross-sectional analysis. Panel analysis, incorporating both spatial and temporal data, proved to be more robust and offers practical implications for studying health inequality.

Economic growth, as measured by GDP per capita, positively influenced life expectancy and avoidable mortality rates. A rise in GDP per capita correlated with increased life expectancy and decreased avoidable mortality. Individual-level income, as a socioeconomic indicator, directly impacted material resources affecting health. Economic growth at the national level influenced countries in diverse ways, such as improvements in living standards, shifts in individual values, advancements in medical services, and developments in medical technology—all contributing to increased life expectancy and decreased preventable deaths.

Contrary to the expected negative impact of income inequality on health, this study found that an increase in the poverty gap positively influences life expectancy and reduces the avoidable mortality rate. It illustrates Easterlin's proposed concept of a "flat section of life expectancy"—the idea that beyond a certain income level, the statistical relationship between life expectancy and income becomes negligible.[25] The poverty gap, focusing on the average income of the lower class, might indicate improved health inequality even when the Gini coefficient suggests otherwise. This study suggested that a growing poverty gap may prompt the establishment of new medical security systems for the deprived or expansions of existing systems. As the poverty gap grows, new healthcare programs targeting people experiencing poverty may be established in response, or coverage of existing programs may be expanded. It is important to note that income inequality does not necessarily negatively affect health inequality, as in this study, i.e., an increase in the poverty gap may trigger medical interventions for the poorest and the expansion of social security, leading to an improvement in health inequality. These findings are difficult to confirm in a cross-sectional analysis and can only be concluded from a panel analysis. It is crucial to differentiate between relative and absolute inequality variables in health inequality measurement. While GDP per capita represents an absolute inequality variable, the poverty gap functions as a relative inequality variable. Relative inequality variables alone cannot determine the intensity of health inequality in a country. This underscores the importance of utilizing both absolute and relative indicators in health inequality studies.

As COVID-19 has shown, pandemics exacerbate the relationship between socioeconomic vulnerability and poorer health outcomes, negatively impacting sustainability.[26] This study advocated increased attention to income inequality and healthcare policies targeting the lower class. Strengthening social protection systems, enhancing comprehensive medical services, and implementing effective poverty policies are essential. Policy interventions should aim to mitigate the adverse effects of income inequality and promote overall health equity. As health is intricately tied to basic rights and opportunities for participation in democracy, addressing health inequality becomes crucial for sustaining societal well-being.

Conclusion

Considering the intricate relationship between economic growth, income inequality, and health, future policies should prioritize social protection, comprehensive medical services, and poverty alleviation to address health inequality effectively. The study emphasizes the need for a holistic approach incorporating health and non-health policies to uplift vulnerable groups and bridge the gap exacerbated by income inequality. To derive more precise results on health inequality, future research should focus on improving health inequality measurement indicators and accumulating national-level data. Developing sophisticated indicators that directly measure health inequality and including observable indicators for social and psychological factors influencing health is imperative. Additionally, efforts should be directed towards designing health policies that reduce social gaps and promote equity, complementing macroscopic measures to reduce income inequality.

Abbreviations

GDP: gross domestic product; RIH: relative income hypothesis; SDG: Sustainable Development Goal; OECD: Organization for Economic Cooperation and Development; BMI: Body Mass Index; OLS: Ordinary Least Square.

Ethics Approval and Consent to Participate

Not applicable.

Competing Interest

The authors declare that they have no competing interests related to the research, authorship, and publication of this article.

Availability of Data and Materials

All data and materials are available through the website of OECD. Stat (OECD Statistics) Portal.

Authors' Contribution

SH conducted all procedures of this study.

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