# Healthcare Finance and Climate Risk

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ABSTRACT: This paper examines the impact of climate risk on health expenditure. Using pooled regression analysis across multiple countries, the study finds that higher climate risk, measured through carbon dioxide emissions and other proxies, generally leads to a significant increase in health expenditure. The results suggest that climate-related adversity contributes to the rising medical expenses and strains the healthcare budget. This study recommends proactive investment in climate-resilient healthcare infrastructure and mitigating climate risk to prevent long-term costs and ensure sustainability in healthcare access.

KEYWORDS: Behavioral and Social Sciences, Healthcare Finance, Climate Risk.

## Introduction

Nearly every individual worldwide has been directly or indirectly affected by the healthcare industry. Therefore, health expenditure is a critical component of public policy in how it is shaping the accessibility, quality, and sustainability of healthcare systems worldwide. For policymakers, understanding the factors driving healthcare costs is essential for ensuring the efficient allocation of resources and promoting public well-being. When examining existing literature, there is a lack of studies that use climate risk as a determinant of health expenditures, going beyond the traditionally examined variables such as economic growth, demographic shifts, technological advancements, and policy reforms.[1] Therefore, this paper fills the gap in the existing literature by focusing on climate risk as a determinant of health expenditure, using carbon emissions as one of the proxies (though carbon emissions are globally distributed and closely correlated with national income, this paper addresses these concerns by controlling for GDP per capita and other macroeconomic indicators).

Climate risk is a growing threat to public health and economic stability. Rising temperatures, extreme weather events, and environmental degradation contribute to the spread of infectious diseases, respiratory conditions, and heat-related illnesses, all of which impose substantial financial burdens on healthcare systems. Moreover, climate-related disasters exacerbate healthcare disparities by disproportionately affecting vulnerable populations, further worsening this already prominent issue. Given these implications, policymakers must integrate climate risk into healthcare planning to mitigate long-term negative effects and promote the well-being of the rest of the population.

The contribution of this paper is multifaceted. First, it extends the literature on health expenditure determinants by further exploring climate risk as a determinant, offering new insights into how environmental factors shape public health financing. Second, it provides policy recommendations for integrating climate resilience into healthcare budgeting, equipping policymakers with evidence-based strategies to mitigate climate-induced health costs. By bridging the gap between climate economics and health policy, this study underscores the need for interdisciplinary approaches to address emerging global challenges. In summary, this paper advances the study of climate risk and health expenditure by using multiple proxies and employing richer analytical techniques across multiple countries.

## Literature Review

The studies reviewed span diverse regions, including OECD countries,[2,3] G7 countries,[4] African nations,[5-7] Asian countries,[8] and European countries.[9] Several also focus on specific nations such as Russia,[10] China,[11-13] Bangladesh,[14-16] Spain,[1] and the United States.[17,18] While most of these papers primarily investigate the determinants of health expenditure, none incorporated climate risk as a central variable.[11] This paper aims to address this gap by focusing on OECD countries to offer a comprehensive understanding of the factors shaping health expenditure. Existing literature on health expenditure typically explores determinants such as economic indicators,[1,5,19,20] demographic variables,[8] and health system characteristics.[1],[2] Economic factors—GDP, per capita income, and wage growth—are among the most commonly cited determinants.[1,5,19,20] Demographics and health system features have also been widely analyzed.[1,2,8] Studies that include climate variables, by contrast, tend to examine their influence on other indicators like education or household consumption rather than directly linking them to health expenditure.[11,14]

This pattern is reflected in the works of Gao *et al.*,[11] Islam *et al.*,[14] and Leppänen *et al.*[10] Gao *et al.*[11] assess the effect of climate risk on regional education spending in China, uncovering spatial dependencies and disparities in response across provinces. Islam *et al.*[14] explore how repeated climatic shocks influence household expenditures in Bangladesh, leading to significant reductions in food and non-food consumption. Leppänen *et al.*[10] evaluate how temperature fluctuations affect regional government spending in Russia, identifying reduced costs in colder regions and higher expenditures in warm areas. Though none of these studies directly address health expenditure, their insights into climate risk's broader socioeconomic implications



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highlight the relevance of further investigating health-related impacts in conjunction with climate risk.

Methodologically, the studies' approaches vary widely. Panel data analysis is used by Islam *et al*. and Dritsaki and Dritsaki to address unobserved heterogeneity across time and space.[4,14] Regression models are widely applied, including in studies by Bae *et al*.,[15] Chen *et al*.,[12] and Ampon-Wireko *et al*.[21] Hartwig and Sturm utilize Extreme Bounds Analysis (EBA) to test the robustness of economic determinants.[20] Gao et al. apply spatial econometric models to account for geographic dependencies.[11] Quantile regression, as used by Wang and Chen *et al*.,[12,19] provides insight into distributional effects across different levels of health expenditure. O'Neill *et al*.[22] take a distinct approach by using the Shared Socioeconomic Pathway Middle of the Road scenario (SSP2) to explore the link between educational attainment and climate resilience. Chaabouni and Saidi implement simultaneous equation models and GMM to examine causal interactions between $CO_2$ emissions, economic growth, and health spending.[23] The methodological diversity across studies offers a multifaceted perspective, revealing both strengths and limitations in assessing these complex relationships.

Despite differences in scope and method, the literature consistently identifies economic growth as a primary driver of health expenditure, with GDP and income levels emerging as robust predictors. However, the elasticity of this relationship differs from region to region. For example, in African nations, a 10% increase in GDP is associated with a 1% rise in health spending,[5] whereas studies from OECD countries suggest more elastic responses.[2] Demographic factors—especially aging—present mixed findings. For instance, while some suggest older populations elevate healthcare costs,[8] others emphasize the role of proximity to death and medical technology.[2] Additionally, many studies point out the importance of structural features such as governance models, insurance coverage, and fiscal autonomy in shaping national health expenditure.[1,20] What remains notably absent in this expansive literature is a direct exploration of how climate risk influences health expenditure.

Overall, the literature underscores the complex interaction between economic, demographic, and institutional factors in shaping health expenditure. However, the absence of studies directly connecting climate risk to health expenditure reveals a critical gap. This paper seeks to fill that gap by examining climate risk as a determinant of health expenditure within OECD countries, offering new insights into how environmental factors intersect with health system sustainability.

## Methods

***Model:***

$$Y_i = \beta_0 + \beta_1 X1_i + \beta_2 X2_i + \beta_n Xn_i + \varepsilon_i$$

$Y_i$ is the dependent variable for observation i, which refers to current health expenditure. $\beta_0$ is a constant term representing the expected value of a dependent variable when all independent variables are zero. $\beta_1$ to $\beta_n$ are the coefficients for independent and control variables, which include climate risk as an independent variable and life expectancy at birth, inflation, GDP growth, government expenditure on education, real effective exchange rate index, age dependency ratio, out-of-pocket expenditure, and population as control variables. While keeping all other variables constant, each coefficient chooses how much the dependent variable changes when the corresponding independent variable changes by one unit. $\varepsilon_i$ is the error term, which represents the difference between the actual value and the predicted value from the model.

## Result and Discussion

***Data:***

Appendix 1 presents health expenditure, climate risk, and various economic indicators sourced from the World Bank World Development Indicators and Our World and Data.[24,25] The data sample covers the period from 1974 to 2022. The variable includes current health expenditure as a percent of GDP, climate risk as carbon dioxide emission and ND-GAIN, life expectancy at birth, inflation as an annual percentage of consumer prices, GDP growth, government expenditure on education as a percentage of total GDP, real effective exchange rate index, age dependency ratio as a percentage of working-age population, out-of-pocket expenditure as a percentage of current health expenditure, and population. Following existing literature, this paper estimates a pooled regression analysis to investigate the relationship between health expenditure and climate risk.

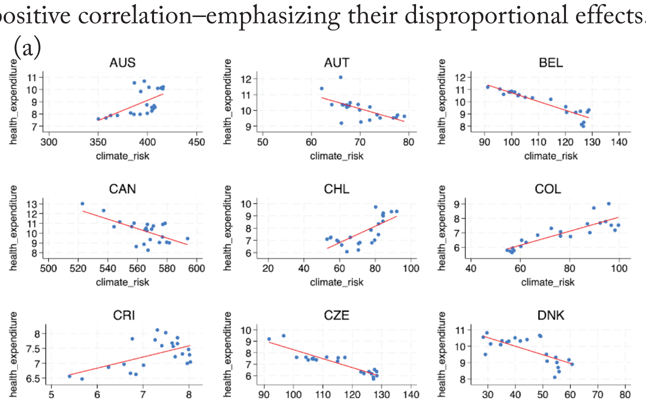
***Findings:***

Table 1 provides descriptive statistics for current health expenditure, climate risk, and other key indicators used in the analysis. Current health expenditure has 854 observations with a mean of 8.405 and a standard deviation of 2.207, ranging from a minimum of 3.855 to a maximum of 18.756. Climate risk, as annual total emissions of carbon dioxide, has 1862 observations with a mean of 325.19 and a standard deviation of 858.094, ranging from a minimum of 1.543 to a maximum of 6132.183. Inflation as an annual percentage of consumer prices has 1802 observations with a mean of 12.489 and a standard deviation of 55.082, ranging from a minimum of -4.448 to a maximum of 1281.443. GDP growth as an annual percentage has 1781 observations with a mean of 2.666 and a standard deviation of 3.618, ranging from a minimum of -32.119 to a maximum of 24.475. Government expenditure on education as a percentage of GDP has 1308 observations with a mean of 4.985 and a standard deviation of 1.229, ranging from a minimum of 0 to a maximum of 8.614. The real effective exchange rate index has 1446 observations with a mean of 99.37 and a standard deviation of 16.64, ranging from a minimum of 43.112 to a maximum of 194.383. The age dependency ratio as a percentage of the working-age population has 1900 observations with a mean of 52.981 and a standard deviation of 7.994, ranging from a minimum of 36.479 to a maximum of 99.671. Out-of-pocket expenditure as a percentage of current health expenditure has 842 observations with a mean of 20.744 and a standard deviation of 9.096, ranging from a minimum of 7.138 to a maximum of 55.664. The population in terms of people in a country has 1862 observations, with a mean of 30973870 and a standard deviation of 50209359, ranging from a minimum of 215291 to a maximum of 338000000.

**Table 1:** Numerical statistics for all variables examined in this research paper, including the number of observations, mean, standard deviation, minimum, and maximum values. The extensive data set reduces the source of errors in findings.

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| He | 854 | 8.405 | 2.207 | 3.855 | 18.756 |
| $CO_2$ | 1862 | 325.19 | 858.094 | 1.543 | 6132.183 |
| Inf | 1802 | 12.489 | 55.082 | -4.448 | 1281.443 |
| GDP Growth | 1781 | 2.666 | 3.618 | -32.119 | 24.475 |
| Gov Exp Edu | 1308 | 4.985 | 1.229 | 0 | 8.614 |
| Exchange Rate | 1446 | 99.37 | 16.64 | 43.112 | 194.383 |
| Age Dep | 1900 | 52.981 | 7.994 | 36.479 | 99.671 |
| Out Of Pocket | 842 | 20.744 | 9.096 | 7.138 | 55.664 |
| Population | 1862 | 30973870 | 50209359 | 215291 | 338000000 |

Figure 1 presents a positive correlation between climate risk and health expenditure across countries such as Australia (AUS), Chile (CHL), Colombia (COL), Costa Rica (CRI), Hungary (HUN), Luxembourg (LUX), Latvia (LVA), and New Zealand (NZL). This means that as climate risk increases in these countries, current health expenditure also increases. Possible explanations for the data range from extreme climate-related challenges to a lack of healthcare infrastructure or a mix of both. Negative Correlation is seen across countries such as Austria (AUT), Belgium (BEL), Canada (CAN), Czech Republic (CZE), Denmark (DNK), Germany (DEU), Estonia (EST), Finland (FIN), France (FRA), Ireland (IRL), Iceland (ISL), Israel (ISR), Italy (ITA), Japan (JPN), South Korea (KOR), Mexico (MEX), Norway (NOR), Poland (POL), Portugal (PRT), Slovakia (SVK), Slovenia (SVN), Sweden (SWE), Turkey (TUR), Great Britain (GBR), and the United States (USA). Possible explanations for the data range from well-developed healthcare systems built to handle health challenges attributed to climate risk to established climate adaptation strategies that mitigate the health impact of climate change. In general, more developed nations with higher GDPs, such as Germany (DEU), Canada (CAN), and the United States (USA), are expected to show a negative correlation. Smaller or more vulnerable countries, such as New Zealand (NZL) and Costa Rica (CRI), are expected to show a positive correlation–emphasizing their disproportional effects.



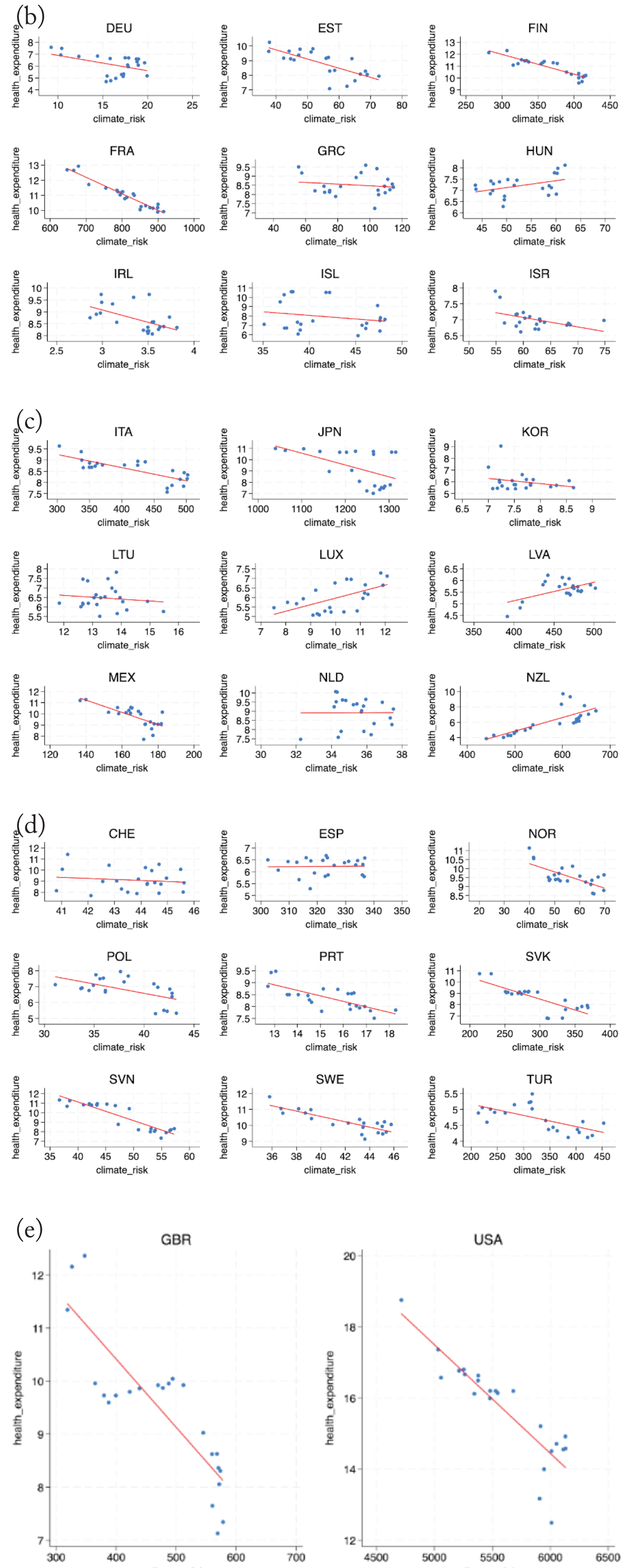




**Figure 1:** The scatter plot illustrates the relationship between current health expenditure and climate risk for 38 individual OECD countries: *a) AUS, AUT, BEL, CAN, CHL, COL, CRI, CZE, DNK; b) DEU, EST, FIN, FRA, GRC, HUN, IRL, ISL, ISR; c) ITA, JPN, KOR, LTU, LUX, LVA, MEX, NLD, NZL; d) CHE, ESP, NOR, POL, PRT, SVK, SVN, SWE, TUR; e) GBR, USA.* It finds a dynamic of relationships between different countries.


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Table 2 presents the results of four regression models. The dependent variable is the current health expenditure as a percentage of GDP (He), and the independent variable is CO2 as a proxy of climate risk. Each column represents different models with different control variables such as Inf, a proxy of economic stability; GDP growth, a proxy of economic development; and Government expenditure on education, a proxy of human capital development. In model 1, climate risk is positively associated with current health expenditure, with a coefficient of 0.0013–equivalent to an increase of approximately $0.40 per capita in OECD countries.

The result at the 1% level statistically emphasizes a high positive correlation between climate risk and current health expenditure, which suggests that higher climate risk leads to higher health expenditure. In model 2, after controlling for the effect of inflation, climate risk is still positively associated with current health expenditure at a 1% level. However, in several models, inflation shows a negative effect at the 1% level, indicating a negative correlation between inflation and health expenditure. In model 3, in addition to inflation, the effect of GDP growth on the effect of health expenditure is controlled. The result indicates a constant positive and statistically significant effect of climate risk on health expenditure. In this case, GDP growth negatively correlates with health expenditure at a 1% level. Finally, in model 4, with the additional control variable of government expenditure on education, the model continues to highlight the robust contribution of climate risk to health expenditure. Government expenditure on education also positively and significantly affects current health expenditure, with a p-value below 0.01.

**Table 2:** Four regression models analyzing current health expenditure show a strong positive correlation with climate risk. It provided evidence that a change in health expenditure is directly correlated with climate risk.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | He | He | He | He |
| $CO_2$ | 0.0013*** | 0.0013*** | 0.0013*** | 0.0014*** |
| | (0.0001) | (0.0001) | (0.0001) | (0.0001) |
| Inf | | -0.1497*** | -0.1318*** | -0.2236*** |
| | | (0.0264) | (0.0215) | (0.0207) |
| GDP Growth | | | -0.1496*** | -0.1004*** |
| | | | (0.0197) | (0.0183) |
| Gov Exp Edu | | | | 0.5777*** |
| | | | | (0.0391) |
| Constant | 7.9371*** | 8.3848*** | 8.7125*** | 5.8127*** |
| | (0.0658) | (0.0952) | (0.0927) | (0.2328) |
| Observations | 854 | 854 | 854 | 780 |
| R-squared | 0.3092 | 0.3842 | 0.4386 | 0.5421 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3 presents the results of four additional regression models where the dependent variable is still current health expenditure (% of GDP) and the independent variable is $CO_2$. Additional control variables include the real effective exchange rate index as a proxy of international trade, the age dependency ratio as a proxy of social and economic factors, out-of-pocket expenditure as a proxy of health system efficiency, and population as a proxy of country size. In model 1, climate risk is positively associated with current health expenditure after controlling for the effect of inflation, GDP growth, government expenditure on education, and the real effect of the exchange rate, with a coefficient of 0.0014. The result, statistically significant at the 1% level, indicates a higher positive correlation between climate risk and current health expenditure. In addition to model 1, model 2 controls for the age dependency ratio. The result is consistent with model 1; climate risk remains positively associated with current health expenditure, which is still statistically significant at 1%. Beyond model 2, model 3 and model 4 add out-of-pocket expenditure of health expenditure and population as additional control variables, respectively. The results are consistent with the previous models, emphasizing the positive relationship between climate risk and current health expenditure at a 1% level.

**Table 3:** An additional 4 regression models were added to Table 2, analyzing current health expenditure and showing a strong positive correlation with climate risk. Table 3 highlights the paper's findings by demonstrating how climate risk is the factor affecting current health expenditure while controlling for 7 other factors.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | He | He | He | He |
| $CO_2$ | 0.0014*** | 0.0014*** | 0.0013*** | 0.0017*** |
| | (0.0001) | (0.0001) | (0.0001) | (0.0002) |
| Inf | -0.2136*** | -0.1938*** | -0.1509*** | -0.1479*** |
| | (0.0239) | (0.0252) | (0.0230) | (0.0225) |
| GDP Growth | -0.0955*** | -0.0898*** | -0.0911*** | -0.0976*** |
| | (0.0188) | (0.0182) | (0.0156) | (0.0161) |
| Gov Exp Edu | 0.6031*** | 0.5440*** | 0.4180*** | 0.3650*** |
| | (0.0409) | (0.0412) | (0.0434) | (0.0477) |
| Exchange Rate | -0.0146*** | -0.0107** | -0.0036 | -0.0029 |
| | (0.0044) | (0.0045) | (0.0040) | (0.0039) |
| Age Dep | | 0.0539*** | 0.0551*** | 0.0650*** |
| | | (0.0115) | (0.0094) | (0.0106) |
| Out of Pocket | | | -0.0624*** | -0.0603*** |
| | | | (0.0063) | (0.0062) |
| Population | | | | -0.0000** |
| | | | | (0.0000) |
| Constant | 7.2010*** | 4.3190*** | 5.4516*** | 5.2180*** |
| | (0.4482) | (0.8111) | (0.7137) | (0.7269) |
| Observations | 702 | 702 | 699 | 699 |
| R-squared | 0.5356 | 0.5549 | 0.6163 | 0.6198 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Robustness was further established by using the ND-GAIN index as an alternative proxy of climate risk in OECD countries (Appendix 2 and Appendix 3). Results remained consistent with those reported in the main specification, indicating a positive relationship between health care expenditure and climate risk. Moreover, to cross-check the validity of our findings, additional measures were conducted: re-estimating the models excluding the U.S. and other outliers, applying log transformations to $CO_2$ emissions, and introducing lag structures to capture delayed effects. Across these specifications, the results remain consistent with those previously reported.

Lastly, it is also important to note that our primary objective was not to interpret the coefficients of each control variable individually, but rather to assess whether the effect of $CO_2$ emissions on health expenditure remains robust once different sets of controls are introduced.

## Conclusion

This paper examines the impact of climate risk on health expenditure, highlighting the significant strain it places on healthcare systems and emphasizing the need for sustainable and resilient reforms. Among the 38 OECD countries, eight exhibit a significant direct relationship between rising climate risk, carbon emissions, and health expenditure. The overall relationship between climate risk and healthcare spending is positive across all OECD nations, which points out the extent of impact directed by these eight countries, underscoring the urgency of addressing climate-related health costs. The findings are further strengthened, evidenced by controlling for many variables. The paper urges policymakers to invest in healthcare infrastructure that can withstand extreme weather events, implement policies to reduce climate-induced illnesses, and integrate climate risk considerations into healthcare budgeting. Future research should explore the long-term economic implications of climate-related health expenditures, including their effects on government debt, insurance systems, and private healthcare spending. Additionally, further studies should assess the effectiveness of climate adaptation policies in mitigating healthcare costs and examine country-specific variations in climate health dynamics. A deeper understanding of these relationships will help develop more sustainable and adaptive healthcare financing strategies in response to increasing climate risk.

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## Appendix

**Appendix 1.**

| Variable Name | Definition | Source |
|---|---|---|
| He (Current health expenditure (% of GDP)) | Level of current health expenditure expressed as a percentage of GDP. Estimates of current health expenditures include healthcare goods and services consumed during each year. This indicator does not include capital health expenditures such as buildings, machinery, IT, and stocks of vaccines for emergencies or outbreaks. | WDI: World Bank |
| $CO_2$ (Climate Risk) | Annual $CO_2$ emissions - Annual total emissions of carbon dioxide ($CO_2$), excluding land-use change, measured in million tonnes. $CO_2$ is measured in million tons per capita | Our World and Data |
| ND-GAIN (Climate Risk) | A measure of a country's vulnerability to climate change and its readiness to adapt. The index is scaled from 0 (highest risk, least prepared) to 100 (lowest risk, most prepared). | University of Notre Dame |
| Inf (Inflation, consumer price index (annual %)) | Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. | WDI: World Bank |
| GDP Growth (GDP growth (annual %)) | Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2015 prices, expressed in U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy, plus any product taxes, minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. | WDI: World Bank |
| Gov Exp Edu (Government expenditure on education, total (% of GDP)) | General government expenditure on education (current, capital, and transfers) is expressed as a percentage of GDP. It includes expenditure funded by transfers from international sources to the government. General government usually refers to local, regional, and central governments. | WDI: World Bank |
| Exchange Rate (Real effective exchange rate index (2010 = 100)) | The real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs. | WDI: World Bank |
| Age Dep (Age dependency ratio (% of working-age population)) | Age dependency ratio is the ratio of dependents–people younger than 15 or older than 64–to the working-age population–those ages 15-64. Data are shown as the proportion of dependents per 100 working-age population. | WDI: World Bank |
| Out of Pocket (Out-of-pocket expenditure (% of current health expenditure)) | Share of out-of-pocket payments of total current health expenditures. Out-of-pocket payments are spending on health directly out-of-pocket by households. | WDI: World Bank |
| Population (persons) | Population by country, available from 10,000 BCE to 2100, based on data and estimates from different sources | Our World and Data |

**Appendix 2:** Robustness check regression models analyzing current health expenditure reveal a strong positive association with climate risk (ND-GAIN index), providing evidence that changes in health expenditure are directly linked to climate risk.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | He | He | He | He |
| ND-GAIN | 0.1906*** | 0.1636*** | 0.2162*** | 0.2140*** |
| | (0.0369) | (0.0344) | (0.0320) | (0.0408) |
| Inf | | -0.2391*** | -0.1003 | -0.1018* |
| | | (0.0868) | (0.0613) | (0.0601) |
| GDP Growth | | | -0.2883*** | -0.2863*** |
| | | | (0.0545) | (0.0495) |
| Gov Exp Edu | | | | 0.0241 |
| | | | | (0.2306) |
| Constant | -2.4803 | -0.4613 | -5.1238** | -5.1021** |
| | (2.3026) | (2.1463) | (2.0423) | (2.0899) |
| Observations | 38 | 38 | 38 | 38 |
| R-squared | 0.2876 | 0.3242 | 0.4647 | 0.4648 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1


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**Appendix 3:** Robustness check with 4 additional regression models on current health expenditure shows a strong positive correlation with climate risk (ND-GAIN index), providing evidence that variations in health expenditure are directly associated with climate risk.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | He | He | He | He |
| ND-GAIN | 0.2070*** | 0.2046*** | 0.1476*** | 0.1679*** |
| | (0.0399) | (0.0483) | (0.0528) | (0.0337) |
| Inf | -0.1321 | -0.1131 | -0.2243 | -0.3990* |
| | (0.2103) | (0.2541) | (0.2251) | (0.2016) |
| GDP Growth | -0.2630*** | -0.2604*** | -0.2952*** | -0.2248*** |
| | (0.0522) | (0.0589) | (0.0556) | (0.0508) |
| Gov Exp Edu | 0.0417 | 0.0399 | 0.0596 | 0.3879 |
| | (0.2641) | (0.2632) | (0.2777) | (0.2343) |
| Exchange Rate | -0.0034 | -0.0020 | 0.0041 | -0.0205 |
| | (0.0395) | (0.0451) | (0.0446) | (0.0161) |
| Age Dep | | 0.0098 | -0.0027 | -0.0438 |
| | | (0.0636) | (0.0665) | (0.0480) |
| Out of Pocket | | | -0.0969 | -0.0494 |
| | | | (0.0674) | (0.0460) |
| Population | | | | 0.0000*** |
| | | | | (0.0000) |
| Constant | -4.2275 | -4.7392 | 0.6139 | 0.7505 |
| | (4.0259) | (6.1673) | (5.1563) | (3.6034) |
| Observations | 34 | 34 | 34 | 34 |
| R-squared | 0.3832 | 0.3837 | 0.4405 | 0.7959 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

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