

Impact of Health Care Spending on Health Outcomes

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Introduction

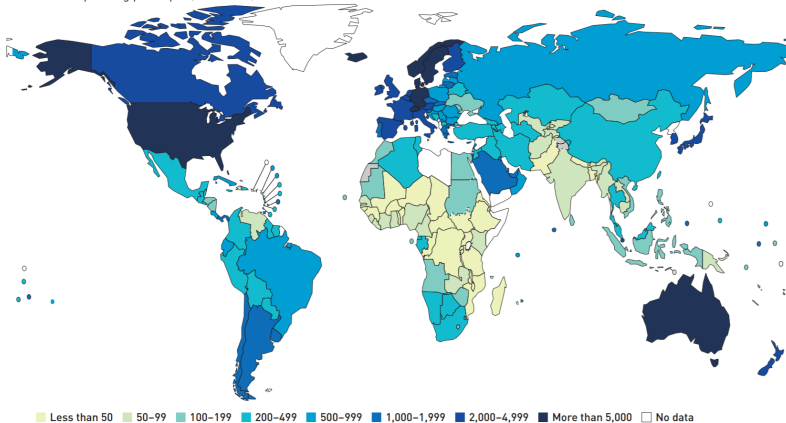
- Countries around the world have limited spending budgets and should invest in ways that will yield net positive returns for their populations
- Empirical evidence has been inconclusive regarding the strength of the connection between health care spending and respective health outcomes

World Bank - Health Nutrition and Population Statistics

- 5185 observations with 436 variables
- 259 unique countries
- 2001 - 2020
- Health Spending/Gross National Income (GNI) and its effect on death rate, crude (per 1,000 people), incidence of HIV, life expectancy at birth, total (years), malnutrition prevalence, weight for age (% of children under 5), mortality from cardiovascular disease, cancer, diabetes or chronic respiratory disease, number of infant deaths, number of maternal deaths, number of people who are undernourished, and people using at least basic sanitation services (% of population)

Data

Health care spending per capita, 2017 (US\$)



Definitions

- GNI: Gross National Income - total income received by the country from its residents and businesses regardless of whether they are located in the country or abroad.
- GDP: Gross Domestic Product - total market value of all finished goods and services produced within a country in a set time period.
- R^2 within: Amount of variance *within separate panel units* that the model accounts for
- R^2 between: Amount of variance *between separate panel units* that the model accounts for
- R^2 overall: weighted average of R^2 within and R^2 between

Nine simple linear regression models using fixed effects to determine the impact, if any, health spending as a percent of GNI has on health outcomes.

$$Y_i = \beta_0 + \beta_1 * X_1 + u$$

$$X_1 = \log.\text{HealthSpending} / \log.\text{GNI}$$

$$Y_1 = \log.\text{DeathRate} \quad Y_2 = \log.\text{HIV}$$

$$Y_3 = \log.\text{LifeExpectancy} \quad Y_4 = \log.\text{Malnutrition}$$

$$Y_5 = \text{Mortality} \quad Y_6 = \log.\text{InfantDeaths}$$

$$Y_7 = \log.\text{MaternalDeaths} \quad Y_8 = \log.\text{Undernourished}$$

$$Y_9 = \text{Sanitation}$$

Summary Statistics

	Unique (#)	Missing (%)	Mean	SD
log.GNI	2540	15	8.4	1.5
log.HealthSpending	4049	21	5.5	1.7
log.DeathRate	3154	15	2.0	0.4
log.HIV	680	51	-1.3	1.7
log.LifeExpect	4097	16	4.2	0.1
log.Malnutrition	293	87	2.2	1.1
Mortality	380	83	20.0	5.5
log.InfantDeaths	3417	14		
log.MaternalDeaths	471	26		
log.Undernourished	606	49	14.8	2.4
Sanitation	3928	18	72.4	29.0

Findings

	log.DeathRate	log.HIV	log.LifeExpectancy
HealthSpend/GNI	-0.322 (0.237)	0.025 (0.896)	0.141 (0.063)
Num.Obs.	3900	2303	3878
R2	0.945	0.961	0.970
R2 Adj.	0.941	0.959	0.968
R2 Within	0.231	0.160	0.590

Findings

	log.Malnutrition	Mortality	log.InfantDeaths
HealthSpend/GNI	-0.703 (0.463)	1.535 (2.829)	-0.740 (0.237)
Num.Obs.	638	864	3971
R2	0.980	0.975	0.999
R2 Adj.	0.974	0.966	0.999
R2 Within	0.450	0.615	0.599

Findings

	log.Maternal	log.Undernourished	Sanitation
HealthSpend/GNI	-0.610 (0.312)	-1.387 (0.573)	31.523 (9.176)
Num.Obs.	3605	2548	3725
R2	0.998	0.990	0.987
R2 Adj.	0.998	0.989	0.986
R2 Within	0.456	0.109	0.434

Findings

- Health Spending as a percent of GNI has a significant effect on all variables **except** mortality from cardiovascular disease, cancer, diabetes or chronic respiratory disease and the incidence of HIV
- Health spending has a significant, beneficial impact on all other variables, most significantly on the percent of the population using at least basic sanitation and number of people who are undernourished

Conclusion

- Health spending has a significant effect on almost all desirable health outcomes
- Health spending is limited by size of country and respective GNI. These models show that health spending is worthwhile to improving health outcomes regardless of country size and GNI
- Continued study: non-naive models, imputation, multiple linear regression