

## Case Study 2 Write Up

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For this case study, we wanted to investigate whether countries that spent more on healthcare per capita or devoted more of their GDP to healthcare see better health outcomes.

According to The European Journal of Health Economics in 2006, increasing health care expenditure significantly associated with large decreases in infant mortality rates but were only marginally related to life expectancy. To research more extensively, we looked at data sets from the <sup>1</sup>World Bank between 2000 and 2015. We first grouped the countries according to World Bank's classifications based on Gross National Income per Capita (US dollars) – low income (< 1005), lower-middle income (1006 – 3955), upper-middle income (3956 – 12235) and high income (> 12235). One limitation to note is that we only kept complete records without any missing data from the datasets we downloaded. Therefore, there may be some bias towards the types of countries that the World Bank has data on.

We created a Shiny app that would show different proxies to health outcomes and plotted that against how much a country spent per capita as well as how much a country spent as part of their GDP. The motivation behind using both of these variables was that because per capita is measured in dollars, perhaps some country has a really low exchange rate, but a lot of their GDP is dedicated to health. There may be a better indicator of health outcomes, as the fact that the government is spending more of their GDP on healthcare implies that they care more about their citizens despite not having that much relative wealth, but it can also mean that they have a lot of health issues that they need to address in their country.

One weakness of visualizing the data in Shiny, however, is that we do not get to see a lot of information for a given country all at once. So turning to Tableau, we have aimed to fill that gap. Some of the interesting variables we explored in Tableau include life expectancy of female and male at birth, infant mortality rate, as well as maternal mortality rate. We broke down the healthcare expenditure into three categories: Domestic General Government Health Expenditure (e.g. social health insurance contributions, compulsory prepayment etc.), External Health Expenditure (e.g. direct foreign transfers, financial inflows to the national health system from outside the country etc.), and Domestic Private Health Expenditure (e.g. direct household spending, private insurance, charitable donations etc.), all of which are shown as a percentage of current health expense.

Together, these two visualizations are meant to offer a comprehensive starting point to examining the relationship between health expenditures and health outcomes. Moving forward, we think it would be more interesting to examine what is going on in the health outcomes for countries that spend between 0 to 2000 per capita on health, since that is where we are seeing the most variability with respect to a lot of our data.

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<sup>1</sup><http://databank.worldbank.org/data/source/world-development-indicators>