**UMB College1.png**

**MBA AF 636 Applied Econometric Analysis**

**Fall Semester 2023 Project**

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**First Name Last Name**

­­­­­Keerthanaa Chidella

**FINAL PROJECT**

Title: "Unraveling Mortality rates: An Econometric Analysis"

by: Anusha Devanahalli Satishkumar and Keerthanaa Chidella

**INTRODUCTION:**

Understanding the intricate dynamics that shape health outcomes is fundamental for improving overall well-being and reducing health disparities within societies. It's critical to understand how healthcare expenditure, alcohol consumption, and HIV/TB incidence have an effect in shaping individual health outcomes. Investigating how these variables - healthcare expenditure, alcohol consumption, and HIV/TB incidence - collectively influence health outcomes through a multiple regression equation can offer valuable insights. Through an examination of the interplay between these variables, policymakers can acquire a more thorough comprehension of the pathways that culminate in enhanced health and devise focused approaches to augment community health and wellness.

**LITERATURE:**

Studies underscore the significance of healthcare spending in influencing mortality rates, indicating a positive correlation between them (Raeesi P, Harati-Khalilabad T, Rezapour A, Azari S, Javan-Noughabi J. - 2016). Studies suggest limited reduction in mortality risk associated with low alcohol consumption (Jinhui Zhao - 2023). Furthermore, there's a positive link between HIV/TB incidence and mortality rates (K Naidoo – 2022).

**RESEARCH HYPOTHESIS:**

This study aims to understand how various aspects such as healthcare spending, access to medical services, lifestyle choices, and income levels collectively impact people's health. The hypotheses are:

* Higher HIV/TB Incidence rates are likely to correlate with increased mortality rates. Populations with elevated incidences of HIV or Tuberculosis often experience higher mortality rates due to the severity and impact of these diseases on overall health.
* Higher levels of Alcohol Consumption may contribute to an increased mortality rate. Excessive or prolonged alcohol intake is associated with various health issues and can exacerbate conditions, potentially leading to higher mortality rates due to alcohol-related diseases or accidents.
* Increased Health Expenditure tends to be associated with improved health outcomes and lower mortality rates. When healthcare systems receive higher investments, it typically leads to better access to medical care, treatments, and preventive measures, which can reduce mortality rates.

This study delves into the intricate interplay of social and economic factors that shape health outcomes. By analyzing the individual and combined effects of these factors, we aim to uncover crucial insights for improving population health and addressing disparities across diverse groups.

**DATA ACQUISITION AND SAMPLE SELECTION FOR EMPERICAL ANALYSIS:**

We have compiled a dataset that spans 20 years, from 2000 to 2020, and contains an extensive information on the different factors that affect mortality rates. Our study focuses on figuring out how mortality rates—which are regarded as the dependent variable—relate to several important independent variables. These independent variables include important factors like GDP per capita, health spending, life expectancy rates, and alcohol intake in liters. We want to investigate the relationship between these important parameters and death rates using an ordinary least squares regression model. Using this dataset, we hope to determine how life expectancy, healthcare spending, economic indicators, and alcohol consumption interact to determine death rates over the course of these two decades with the help of the estimated equation specified below,

Mortality Rate(Y) = β0 + β1 \* HIV/TB Incidence(X1) + β2 \* Alcohol Consumption(X2) + β3 \* Health Expenditure(X4) + u

While,

β1 indicates the percentage increase in the mortality rates with increase in HIV/TB Incidence.

β2 indicates the percentage increase in mortality rates with increase in Alcoholic Consumption.

β3 indicates the percentage decrease in mortality rates with increase in Health expenditure.

These coefficients will shed light on how to quantify the relevant variables, which will improve our comprehension of how mortality rates fluctuate.

**RESULTS AND DISCUSSION:**

**Table 1: Variable Definitions and Descriptive Statistics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **VARIABLE NAME** | **DEFINITION** | **MEAN** | **STD DEVIATION** | **MIN** | **MAX** |
| Mortality Rate | Mortality Rate per 1000 | 7.43 | 0.66 | 6.59 | 8.70 |
| HIV/TB Incidence | HIV/TB Incidence per 1000 | 171.66 | 56.42 | 87 | 287 |
| Alcohol Consumption | Alcohol, recorded per capita (15+ years) consumption (in litres of pure alcohol) | 2.23 | 0.88 | 0.93 | 3.26 |
| Health Expenditure | Current health expenditure per capita (current US$) | 41.79 | 15.45 | 18.44 | 60.66 |

**The presented Table 1 provides an overview of the variable definitions and descriptive statistics, offering a comprehensive insight into the characteristics and measurements of the analyzed variables.**

**Table 2: OLS Regression Results for Mortality Rates per 1000**

|  |  |  |  |
| --- | --- | --- | --- |
| **VARIABLE NAME** | **COEFFICIENT** | **STANDARD ERROR** | **P-VALUE** |
| HIV/TB Incidence | 0.002 | 0.001 | 0.101 |
| Alcohol Consumption | 0.151 | 0.175 | 0.401 |
| Health Expenditure | -0.042 | 0.012 | 0.003 |
| Constant | 8.456 | 0.444 | 0.000 |
| Adjusted R-Squared | 0.93 | | |
| N | 21 | | |

**Table 2 displays the Ordinary Least Squares (OLS) regression outcomes, showcasing the estimated coefficients for the variables in the model predicting the dependent variable.**

The table indicates a positive but non-significant correlation between Mortality Rates and both HIV/TB Incidence and Alcohol Consumption, evidenced by their p-values of 0.101 and 0.401, respectively. This suggests that within this dataset, there is no strong evidence for linear relationship between these variables and the mortality rate.

Conversely, Health Expenditure shows a statistically significant negative correlation with Mortality Rates, indicated by a coefficient of -0.042 and a p-value of 0.003. This significant finding supports the idea that higher per capita health spending is linked to reduced mortality rates, and this relationship is statistically robust.

The coefficient for the constant is 8.456, which is statistically significant (p-value of 0.000), indicating a base level of the mortality rate even when independent variables are not present, hinting at other influencing factors not captured in the model.

With an Adjusted R-Squared value of 0.93, the model accounts for a substantial portion of the variability in Mortality Rates. Nevertheless, it's important to acknowledge the potential for omitted variable bias. This type of bias may occur if there are variables not included in the model that are associated with both the independent variables and Mortality Rate. Unaccounted factors such as genetics, environmental conditions, access to quality healthcare, and broader socioeconomic elements could lead to inaccuracies in the estimated impacts of the included variables.

For instance, areas with increased health spending might also have other beneficial health characteristics that are not accounted for in the model, potentially exaggerating the observed negative link between health spending and mortality. Additionally, higher observed rates of HIV/TB might coincide with other factors like economic deprivation or inadequate sanitation, which could contribute to mortality independently, thereby affecting the accuracy of the HIV/TB Incidence coefficient.

**CONCLUSION:**

In summary, the regression analysis indicates a negative correlation between health expenditure and mortality rates, implying that higher healthcare spending may positively influence health outcomes. Nevertheless, the study does not uncover substantial proof that mortality rates are significantly predicted by HIV/TB incidence or alcohol consumption within this particular sample. It is essential to interpret the findings cautiously, taking into account the potential for omitted variable bias, which may impact the identified associations. Subsequent research endeavors could enhance their insights by including supplementary data that encompasses these unobserved factors, thereby contributing to a more thorough comprehension of the factors influencing mortality rates.

**CODE AND DATA APPENDIX:**

This submission includes the Stata dataset used in this study, as well as.do and log file(s) (in text format) describing all statistical/regression estimations.

**REFERENCES:**

Mortality in HIV and tuberculosis patients following implementation of integrated HIV-TB treatment: Results from an open-label cluster-randomized trial

(Source Link: https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(22)00028-1/fulltext)

Association Between Daily Alcohol Intake and Risk of All-Cause Mortality

A Systematic Review and Meta-analyses

(Source Link: https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2802963)

Effects of private and public health expenditure on health outcomes among countries with different health care systems: 2000 and 2014

(Source Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6108280/)