



UNIVERSITI BRUNEI DARUSSALAM

SM-4290 (PROJECT RESEARCH)

RESEARCH PROPOSAL'S TITLE:

STATISTICAL ANALYSIS ON LIFE EXPECTANCY AND GDP

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Introduction

Throughout history, it has been well known that Gross Domestic Product per capita (GDP) has a strong correlation with the life expectancy that the higher the income of a person, the longer he may live. However, an economics professor from University of Virginia, United States of America, Christopher J. Ruhm has studied on this matter and conclude that there is a strong inverse relationship between the economy and the health condition of the country (2000). Therefore, this study will investigate whether what Ruhm has found applied to the dataset of the World Health Organization (WHO) from the year of 2001 until 2015 using a multilevel logistic modelling with the help of the R software. With the outcome, the researchers hope to be able to produce a statistical evidence of how GDP correlates with life expectancy and what are the factors that might affect them.

Background

Efforts are made by all nations, rich and poor, to improve the health of their people. While not all aim to minimize mortality and improve health at the same pace or with the same level of success, the majority still make every effort to achieve a great result for the people (Giroso & King, 2007). As Sickles and Taubman (1997) stated, life expectancy increases as a country improves its standard of living as higher income is usually associated with the growth of the goods and services consumed by a household.

However, it is also possible for a country to have an inverse relationship between its GDP and life expectancy. Study by Ruhm (2000) shows that one of the factors that might be the causes

for this rarity to happen is due to the increase in preventable death such as obesity and alcohol consumption. In fact, obesity affects over 300 million adults where the majority of them are from economically developed countries (Bleich, Cutler, Murray & Adams, 2008). In addition to that, obesity can also lead to heart disease, stroke, type 2 diabetes, including cancer, of which are the leading causes of death in most of the developed countries (National Heart, Lung, and Blood Institute 1998). For this reason, the mortality rate might drop as the economy deteriorate because people will have more time to exercise or maintain healthy diets, reducing the likelihood of being overweight.

Objectives and Research Questions

The goal of this study is to investigate whether or not the dataset that will be used shows an inverse correlation between the life expectancy and the economic growth of the countries. This study will also answer the research questions listed below:

1. Does economic growth can lead to the improvement of the health status of the nation?
2. Does the preventable death diseases such as obesity and alcohol consumption affects the mortality rates?

Data and Special Needs

The data that will be used in this research project was the Global Health Observatory (GHO) data repository under World Health Organization (WHO) shared by my supervisor which

can be accessed through Kaggle website. I have chosen this dataset with a purpose to investigate if the statement stated by Ruhm can be applied to the dataset from 2000-2015.

In this research project, with the addressed objective, I have intended to estimate at what magnitude life expectancy along with adult and infant mortality changes as a response to changes in the determinants of health care expenditures. The correlation between these variables will then be estimated using multilevel model analyses using a statistical computing and graphics software, R.

As this study will be presented using a multilevel model, the year from the dataset will be on the first level and the countries as the second level of the nested data models. Furthermore, life expectancy will be designed as a dependent variable, including adult and infant mortality and the regressors will be the GDP and the determinants of health care expenditures. It is plausible to say that the highest number of life expectancy is limited at one-point, even if the regressors may go towards infinity which can be seen from Figure 1. Hence, it is expected that this study will use a multilevel logistic modelling instead of the linear model.

Additionally, this study will also use Pearson's Chi-square test (χ^2) as well as ANOVA test in order to determine if the variables have a correlation between them and if the experiment results are significant or not.

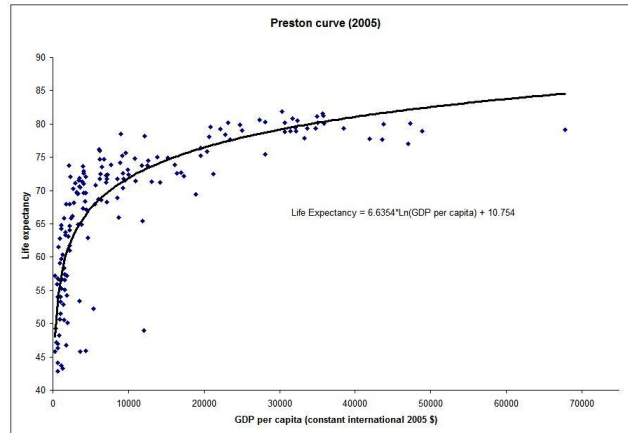


Figure 1: The Preston curve, using cross-country data for 2005. The x-axis shows GDP per capita in 2005 international dollars, the y-axis shows life expectancy at birth. Each dot represents a particular country. (Wikipedia, 2021)

Timeline and Activities

SM-4290 Research Project is taken by Mathematics students for 2 whole semesters.

Below is my timeline for completing the module with an estimated date that might change in the future as I am still in my 1st semester of taking the module.

Date(DD/MM/YYYY)	Activity
11/1/2021	Successfully registered SM-4290 Research Project module
27/01/2021	Supervisor preference vote
3/2/2021	First meeting with my supervisor
10/2/2021	Introduction to linear regression
17/02/2021	Introduction to R software
24//02/2021	Exploring WHO and Education data using R software

01/03 – 07/03/2021	Mid-Semester break
22/03/2021	Practicing multilevel model using R software
23/03 – 06/04/2021	Exploring WHO data and plan for research proposal
7/4/2021	Meeting with my supervisor to discuss on my research proposal
08/04 – 24/04/2021	Writing research proposal
25/04/2021	Submitting research proposal
16/08 – 19/09/2021	Data Analysis
20/09 – 26/09/2021	Mid-Semester break
27/09 - 14/11/2021	Writing a journal article
15/11/2021	Oral presentation

Table 1: Timeline for my research project

Summary

A vast number of studies and efforts have been made on the economy, aiming to minimize mortality and improve the health of the people. One of them is the study done by Christopher J. Ruhm stating that when there is a recession, people tend to live longer. For this reason, this research is designed to investigate if the statement above applies to the dataset from the year 2000 until 2015 using multilevel logistic modelling, Pearson's Chi-square test (χ^2) and ANOVA test. This study begins on March 23rd, 2021, and expected to end on November 14th, 2021.

References

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