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The Relationship between Literacy Rate, Primary School Enrolment Rate, Death Rate and GDP per Capita

Lianna Ooi Pei Wen

Faculty of Business, Economics and Accountancy, Universiti Malaysia Sabah, Jalan UMS, 88400, Kota Kinabalu, Sabah, Malaysia

Email: bb18110588@student.ums.edu.my

Jia Qi Cheong

University of Teknologi MARA (Uitm) Sri Iskandar, Centre for Economic Development and Policy, Universiti Malaysia Sabah, Malaysian Inbound Tourism Association (MITA)

Corresponding Author Email: jiaqi@uitm.edu.my

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Abstract

In developing nations, the literacy rate, primary school enrollment rate, and death rate are all low, yet these variables significantly influence the gross domestic product (GDP) per capita. This is because a high literacy rate and primary school enrollment rate can raise productivity and income per capita. Conversely, a low death rate ensures a fair distribution of the GDP among the population over time. The global data was retrieved from The World Bank to examine the relationship between literacy rate, primary school enrollment rate, death rate, and GDP per capita from 1978 to 2018 by using the Multiple Regression Model (MRM). The result findings for MRM show that there was a significant relationship between literacy rate, primary school enrollment rate, death rate, and GDP per capita. However, only the primary school enrollment rate is statistically significant to the multiple regressions because its p-value is less than 0.05. Furthermore, literacy and health policy were suggested to improve the literacy rate, primary school enrollment rate, and death rate to sustain economic growth, especially in developing nations.

Keywords: Literacy Rate, Primary School Enrolment, Death Rate, GDP Per Capita, Developed Country, and Developing Country.

Introduction

Literacy can be defined as the ability to understand, evaluate, and use written text to involve oneself in society; thus, better literacy skills enable individuals to communicate well and develop their knowledge easily (OECD, 2013). Elizabeth et al. (2021) mentioned that adult literacy is important because it can increase employees' productivity and contribute to

national development in Nigeria. According to World Health Organisation (WHO, 2021), primary school enrollment is a proportion of kids who have reached the age of attending primary school and registered in primary education. GDP per capita means the total of national income divided by the total population. For example, developed nations typically have higher GDP per capita due to their high national income, and vice versa, but this also depends on the total population.

Furthermore, previous research has concentrated on the relationship between school enrollment and economic growth in the nation. However, the results may vary depending on the specific nation. This is because primary and secondary education will be more effective for developing nations; however, tertiary education will be more productive for developed nations. According to The World Bank (2021), the global literacy rate and primary school enrollment rate are increasing steadily. In 1978, 67.58% of people aged 15 years and above were able to read and write, and the percentage has risen to 86.25% after forty years. Consequently, the global primary school enrollment rate was at its lowest in 1978, which was 76.07%, and it reached its peak in 2018 with 89.41%.

Next, divide the proportion of deaths in a given timeframe by the proportion of people who were at risk of dying at that time to determine the death rate (OECD, 2003). The World Bank (2021) illustrates the global death rate from 1978 to 2018 is decreasing gradually. The highest global death rate is in the year 1978, which is 10.48%, and the lowest is 7.558% in 2018. According to Ritchie et al. (2018), the top cause of death globally is cardiovascular diseases, followed by cancers. In the case of Malaysia, non-communicable diseases (NCDs) have hit the Malaysian economy with a bill of RM 8.91 billion, which is 0.65% of the nation's gross domestic product (GDP) (WHO, 2020).

In underdeveloped countries, the literacy rate, primary school enrollment rate, and mortality rate are all weak, and these factors have a significant influence on GDP per capita. Thus, the objective of this paper is to examine the relationship between literacy rate, primary school enrollment rate, death rate, and GDP per capita from 1978 to 2018. This paper is organized as follows. In Section 2.0, we conduct a literature review, analyzing relevant theories and past studies to support our understanding of the impact of education and health on economic growth. The methodology for this paper is presented in Section 3.0. Section 4.0 presents the results, while Section 5.0 delves into the discussions. Section 6.0 will bring this paper to a close.

Problem Statement

Developed nations can invest parts of their GDP in education and health. However, developing countries could not afford the cost. Unfortunately, a child's living circumstances frequently influence the quality of their early childhood education. For instance, children living in poverty are less likely to receive better education and health care (Julia, 2012). Moreover, adults with low literacy and education levels are less likely to receive precautionary healthcare tests or to take prescription medications as directed. This is due to their limited comprehension of health information, which in turn, hinders their ability to make informed health decisions. Additionally, this situation will lead to a decrease in their productivity levels and a widening of the wage gap, both of which directly hinder economic growth. In this era, employers are less likely to hire low-literate and low-educated people because the cost of

hiring them is higher than for highly educated people. This issue is leading to extended periods of unemployment for individuals with low literacy and education levels. High unemployment rates can lead to a decrease in tax income and an increase in national costs, ultimately resulting in a reduction in GDP.

Significance of Study

The developing nations are facing low literacy rates, low primary school enrollment rates, and high death rates. Furthermore, the majority of the studies do not mix literacy rate and primary school enrollment rate along with death rate; however, this study is including all of them in determining their relationship with GDP per capita. For developing nations, the improvement in literacy skills, number of primary school enrollments, and death risk are keys to decreasing the poverty rate. When the poverty rate decreases among younger generations, they can become positive contributors to the economy as well as have lower health risks. Furthermore, the never-ending COVID-19 pandemic shows the significance of literacy skills and primary school enrollment in terms of economic growth. Consider that literacy empowers individuals to recognize the current global disease, enabling them to wear masks and accept vaccinations, thereby accelerating recovery and restoring normal economic activities. Therefore, it is significant for policymakers and individuals to realize the relationship between the literacy rate, primary school enrollment rate, death rate, and GDP per capita.

Research Gap

There are plenty of past empirical studies that show the relationship between literacy rate, primary school enrollment rate, death rate, and GDP per capita. However, this study opted to conduct its analysis using recent data, specifically from 1978 to 2018. Furthermore, while most empirical studies focus on the individual relationships between the literacy rate, primary school enrollment rate, death rate, and GDP per capita, this study aims to combine these relationships and examine their correlation.

Scope of Study

This study uses global data from The World Bank as its scope. The time frame for this study is forty-one years, which is from 1978 to 2018. Next, this study will be focusing on the relationship between independent variables and dependent variables. We will also test the correlation between the independent variables.

Literature Review

This section is to investigate the correlation between the literacy rate, primary school enrolment rate, death rate and GDP per capita through theoretical and empirical review.

Theoretical Review

This part of the review shows the theory applied in this paper such as human capital theory and demographic transition theory.

Human capital Theory

Western philosophers invented the human capital theory in the 1960s to emphasize that investing in education and health can generate economic growth (Scott, 1996). Human capital encompasses all the advancements in health and education, aimed at maximizing production levels to boost economic growth (Fabricant, 1959). Moreover, from 1307 to 1900 in England,

the literacy rate and primary school enrollment extended human capital formation (Alexandra, 2018). The literacy rate and primary school enrollment showed a positive correlation with the progress of economic growth in the centuries prior to the Industrial Revolution, following long-term trends. According to Becker (1993), education level can help to control population growth and raise average quality of life. This is because highly educated people tend to get a better job with higher pay.

Demographic Transition Model

Warren Thompson invented this model in 1929, which illustrates the four stages of death and birth rate transition (John, 2007). However, this study will solely focus on the death rate. Every nation across the globe applies the model, which displays natural increases in both birth and death rates. Economic growth can correlate with demographic transitions (Kirk, 1996). For instance, in the first stage, where agriculture is the main economic activity and is still underdeveloped, the death rate is high, indicating a lack of development in health facilities and economic activities (Mehrotra, 2000). The death rate decreases when there is an expansion of health facilities at stage 2 and an increase in education at stage 3. At the fourth stage, the population is getting stable or slow to increase and has grown highly urbanized, as well as technical advancement is adequate, with purposeful attempts towards rate dominance (Steven, The population shares the GDP well, resulting in a correlation between death rates and GDP per capita.

Empirical Review

This review is divided into three categories; the first part will discuss the relationship between literacy rate and GDP per capita. Next, the literature explains the relationship between primary school enrollment rate and GDP per capita. Finally, discuss the relationship between the death rate and GDP per capita.

Relationship between Literacy Rate and GDP Per Capita

According to Rabbi et al. (2021), a 1% increase in the literacy rate will result in a 13% decline in the growth of disease in Bangladesh. Similarly, a decline in disease growth correlates with a higher GDP per capita. Therefore, accounting for malnutrition, a rise in the literacy rate indirectly contributes to an increase in GDP per capita. Davoli et al. (2020) found an interesting connection between people's literacy level and their country-of-origin GDP per capita in the US but found a negative relationship between capitalization and literacy levels. In addition, Prete (2013) discovered that when GDP per capita is one of the testing variables, the income disparity widens less in nations with higher levels of economic literacy, such as Australia, Canada, and Japan. Rahman (2013) results show that there is a positive correlation between literacy rate and GDP per capita in Arab League nations. He also mentioned that a nation's initiative to raise literacy rates can positively impact its GDP per capita. Following, Mehmood et al. (2014) show that literacy rate and GDP per capita are bi-causality and there is a long-term relation between literacy rate and GDP per capita, however, with the addition of health expenditures in 26 Asian countries.

Moreover, Desai's (2012) study asserts that an increase in literacy rates can lead to a decrease in population size, thereby boosting India's per capita income. This study demonstrates a strong correlation between literacy rate and fertility rate, which explains why a high literacy rate in India leads to a decrease in population growth. Therefore, a sharp drop

in the population growth rate occurs in India when the literacy rate increases. The survey by Klapper et al. (2015) reveals a strong correlation between the financial literacy rate and GDP per capita in rich nations. However, for poor nations (India, China, Brazil, and South Africa) with GDP per capita below $12,000, there is no evidence of a global relationship between these variables. This most certainly indicates that national-level policies, such as those relating to education, have a greater influence on financial literacy in richer nations than any other aspect. Furthermore, Liu et al. (2018) investigated the correlation between financial literacy and GDP per capita in the United States (US). Next, Seng (2021) mentioned that financial literacy can benefit Cambodians in managing their remittances for higher levels of income.

Relationship between Primary School Enrolment Rate and Gdp Per Capita

Gumus's (2010) study shows that there is a strong link between income per capita and elementary school enrollment in Turkey. Furthermore, a two-stage least squares approach in Cameroon, Africa, from 1970 to 1980 reveals a positive relationship between GDP per capita and school enrollment rate (Njong et al., 2006). This is because when the economy grows, it will raise the quality of life and, at the same time, increase the school enrollment rate. Kayhan et al. (2012) explored a bidirectional statistically significant link between GDP per capita and primary school enrollment rate in Turkey. In addition, Yusoff (2014) found that the primary school enrollment rate is the second highest effect on the GDP per capita in Malaysia.

Shaari's (2014) findings show that primary education does not influence GDP, and conversely, informal and secondary education do influence GDP without critique in Malaysia. Furthermore, Kotaskova et al. (2018) employed the Granger Causality Method to establish a 42-year relationship between primary, secondary, and tertiary education as independent variables and GDP as the dependent variable in India. Consequently, developed nations show a strong correlation between tertiary education and economic growth when compared to primary and secondary education. Subsequently, Jelilov (2018) carried out a study that examined the government's spending on education and the primary involvement rate in Nigeria. The findings indicate a significant positive relationship between the primary school enrolment rate and GDP per capita. Jelilov (2018) also mentioned that primary school enrollment rates do benefit Nigeria's economy. However, in the case of Turkey, the primary school enrollment rate does not lead to GDP per capita (Ozturk, 2016).

Relationship between Death Rate and GDP Per Capita

According to Casasnovas et al. (2005), better health improves labour productivity by lowering disability, debility, and the number of days lost due to illness, as well as increasing an individual's chances of landing a better-paying job, which can lower the unemployment rate in Spain. Mayer (2001) found that there is a high association between health and income in current economic development in Latin America. Next, Bloom et al. (2004) suggested that health has a positive correlation and significant impact on economic growth for 104 countries. Akram et al. (2008) proposed that variables related to health, such as death rate, have an impact on economic growth in Pakistan. Next, Nwachukwu et al. (2016) found a negative correlation between the death rate of SMEs and GDP per capita in the Visegrad nations, which include the Czech Republic, Hungary, Poland, and Slovakia. Similarly, Berislav et al. (2020) discovered a significant negative correlation between the death rate of enterprises and GDP per capita, albeit in European nations.

Ozcan's (2002) findings suggest that reducing the mortality rate can sustain economic growth in western countries. This is because when people are cautious about infant mortality, a decrease in external factors of mortality will reduce the precaution for children while encouraging parents to invest in their children. In the case of COVID-19, high mortality rates could potentially impact economic growth. Doerr et al. (2020) found a systematic relationship between recessions and increased death rates across nations and age groups, with developing nations experiencing more hardship and children experiencing more distress than adults. Furthermore, mortality rates increase continuously for years after an economic downturn, and simultaneously, greater economic downturns result in greater mortality rates.

Methodology

This study is using positivism research philosophy to study all of the three objectives, which are the significant relationship between literacy rate and GDP per capita, the significant relationship between primary school enrollment rate and GDP per capita, and the significant relationship between death rate and GDP per capita from 1978 to 2018. Essentially, positivist research philosophy refers to a method of studying society that focuses solely on scientific data, like experiments and statistics, to reveal the real nature of how society functions (Pranas, 2018). Next, the data is being analyzed by using quantitative data analysis. This is because quantitative data analysis can analyze numerical data and use statistical models to study the correlations between independent variables and dependent variables. Similarly, testing multicollinearity between independent variables is possible. Therefore, the use of quantitative analysis can help this study achieve its objectives.

The data that have been used are from The World Bank, which is known as secondary data. This study employs secondary data because it provides reliable and relevant information, which saves time compared to primary data. Furthermore, the data that is retrieved online (The World Bank, 2021) is GDP per capita, literacy rate, primary school enrollment rate, and death rate for the past 40 years from 1978 to 2018 globally. This study is using global data for the past 40 years as indicators due to the completion of the time series data. Next, this study is employing two methods in determining the relationship, which are the Multiple Regression Model (MRM) and the Variance Inflation Factor test (VIF).

Conceptual Framework

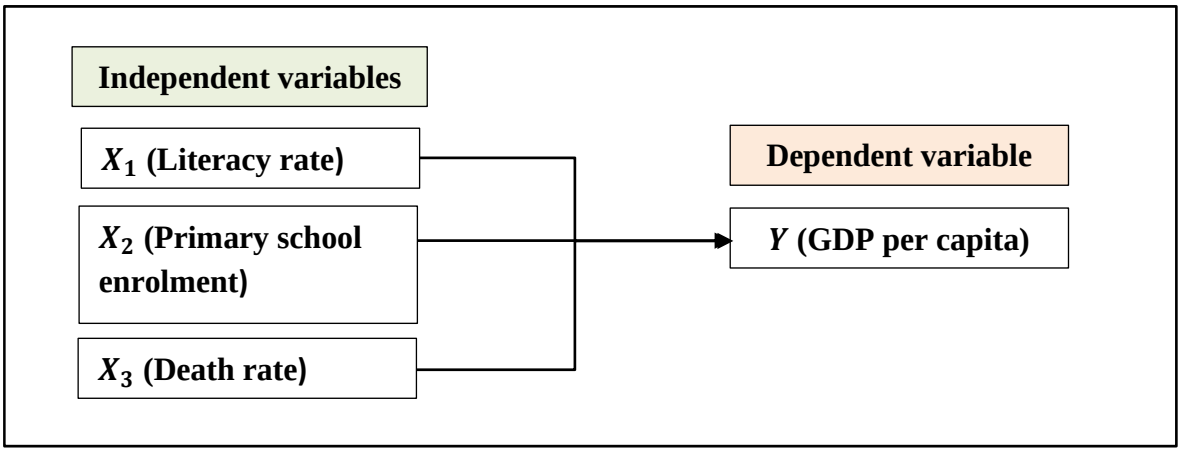

Figure 1. Diagrams the relationship between independent variables and dependent variable
Definition of Variables

In this section, the definition of each variable is explained. There is one dependent variable (GDP per capita) and three independent variables (literacy rate, primary school enrolment rate and death rate). The GDP of a country is determined by considering the monetary value of the country's products and services after a particular length of time, generally one year and it can also be used as a measurement of economic activity (Amadeo et al, 2020).

The literacy rate is described as the number of a specific age group's population who can read and write (UNESCO, 2021). There are three categories for the literacy rate based on age, which are the youth literacy rate (aged 15 to 24 years), adult literacy rate (aged 15 years and above) and elderly literacy rate (aged 65 and above). This study is using adult literacy rate as an indicator for education.

The primary school enrolment rate is demonstrated as net primary enrolment rates and is defined as an accumulation of children with formal age that are registered in primary education as a percentage of the entire children of the formal school age population (WHO, 2021). The death rate, also known as mortality rate, is an estimate of the total number of deaths in each population, adjusted to the population's number, given a given period of time (Porta, 2014).

Findings and Discussions

Table 1
Shows the Regressions Statistics

Multiple R	R Square	Adj. R Square	Std. Error	Observations
0.9723	0.9454	0.9410	728.4751	41

Table 2
Illustrates the Analysis of Variance (ANOVA)

	df	SS	MS	F	Significance F
Regression	3	339890652.8	1.13	213.4954	2.1048
Residual	37	19635012.11	530676		
Total	40	359525665			

	Coefficients	Std. Error	t Stat	P-value
Intercept	15156.208	33249.5149	0.455832	0.6511746
X1	-225.7362	172.8832522	-1.30571	0.1997102
X2	410.90275	125.7880616	3.266628	0.0023515
X3	-2940.8176	1504.559122	-1.9546	0.0582177

The R value is 0.9723, which indicates a positive relationship between dependent variable and independent variables. Next, the R^2 is 0.9454; the 94.54% of independent variables (X_1, X_2, and X_3) is explaining GDP per capita. In addition, the value of adjusted R^2 is 0.941. The independent variables are statistically significantly in assuming the GDP per capita, F (3,37) = 213.5, $p < 0.0005$. The coefficient of X_1 is -225.74; X_2 is 410.9; and X_3 is -2940.82. The coefficients of X will determine the value of GDP per capita. For instance, for every increasing rate of literacy and death rate will decrease the GDP per capita by $3166.56. However, for every increase of primary school enrolment rate will raise the GDP per capita by $410.9. The X_2 is the only independent variable that is statistically significantly to the multiple prediction due to $p < 0.05$, which is significant to 5%. This result is supported by Jelilov (2018) and Tasel et al. (2013) due to their similar findings that primary school enrolment rate is positive and significant to GDP per capita. This is because when a country funds more on education and creates a better quality of education will make primary school enrolment to be significant to GDP per capita.

In contrast, the X_1, and X_3 are statistically insignificantly to the multiple regression because $p > 0.05$ that is insignificant to 5%. The relationship between literacy rate and GDP per capita is mostly found to be significant for short run and long run (Rabbi et al., 2021; Saiful, 2020). A population with high literacy rate will reduce population growth rate and enable a country's income to be divided better among fewer people (Desai, 2012). Similarly, a significant relationship between death rate and GDP per capita is mostly found (Berislav et al., 2020; Nwachukwu et al., 2016). For instance, during COVID-19 pandemic the death rate increased dramatically in a year that caused many companies to downsize and cut costs on employees' wages, which influenced the GDP per capita to decrease. Therefore, the death rate is negatively significant to GDP per capita.

Table 3
Indicates the Summary Output Between Literacy Rate, Primary School Enrolment Rate and Death Rate, and Vif Values

	Coefficients	**Std. Error**	**t Stat**	**P-value**	**Std. Dev**	**VIF**
X1	-225.7362	172.8833	-1.3057	0.1997	6.0541	82.5738
X2	410.9027	125.7881	3.2666	0.0024	4.1101	20.1476
X3	-2940.8176	1504.5591	-1.9546	0.0582	0.8809	132.4053

The VIF value for literacy rate is 82.57; VIF value for primary school enrolment rate is 20.15; and VIF value for death rate is 132.41. At this point, all the VIF values are greater than 10, which suggest a possibly undesired correlation between one and other independent variables in the model. The coefficient estimates and p-values in the regression output are most likely inaccurate in this situation. Multicollinearity is an issue in this case due to each of the VIF values for the independent variables in the MRM is exceeding 5.

The literacy (X_1), primary school enrolment (X_2) and death rate (X_3) have a relationship with GDP per capita (Y). The X_1, X_2 and X_3 are included in MRM to test the relationship with Y. Therefore, the results show that there is a negative significant relationship between the X_1, X_3 and Y, however, only X_2 is positively significant to Y. in fact, the R^2 value shows that 94.5% of GDP per capita is explained by the literacy, primary school enrolment and death rate. Increasing literacy can improve one's health prevention and condition, which can decrease the chances of getting infectious and non-infectious disease that might lead to death especially in the case of elderly (Sudore et al., 2006). Moreover, literacy rate also found to be highly correlated to primary school enrolment rate. Therefore, these might explain the reason behind the existence of high multicollinearity in this study's result that causes the relationship between X_1 and Y changed to negative in MRM. However, there is a lack of study that proves there is a insignificant negative relationship for literacy rate with GDP per capita.

Implications

Firstly, developing nations' governments should implement literacy policy to improve literacy rates. For instance, government schools have the right to provide free compulsory education to children under the age of 14, and they must foster an environment that motivates them to read and speak. Furthermore, the government school also covers the costs of books and uniforms for underprivileged pupils, thereby encouraging their attendance in class. Second, the government can promote the construction of new primary and secondary schools in rural regions to make it easier for underprivileged children to attend school. As a result of the increased number of underprivileged children attending school, the primary school enrollment rate will rise. Thus, literacy skills and primary school enrollment are significant for low-income and developing countries as they can lower poverty rates by increasing GDP per capita.

Third, low-income and developing governments are urged to implement and develop health policy to impact health systems and healthcare organizations, in order to improve patient health outcomes. Improving the health status of society can lead to increased productivity and economic growth, thereby increasing GDP per capita (Raghupathi et al., 2020). Therefore, the establishment of a functional healthcare system necessitates the employment of doctors, nurses, and pharmacists who must meet national requirements. Furthermore, front-line workers such as nurse practitioners are typically in charge of the implementation and development of health policy. This is because they engage with a diverse variety of patients and understand their needs, allowing nurse practitioners to design health policy to better serve society. Therefore, it is crucial for low-income and developing countries to establish national standards for health professionals. This is necessary to ensure a well-functioning health care system, which in turn supports the health of society through health policy.

Limitations and Suggestions

This study exhibits several limitations. Firstly, this study suffers from sample bias as it retrieves data from global sources, making it incapable of accurately representing a specific country. Secondly, this study only considers three independent variables to determine the relationship with GDP per capita, potentially leaving out other relevant factors. According to Frost (2020), high multicollinearity can cause the coefficients to switch signs, making it more challenging to specify an accurate model. In fact, there is a limitation of time for this study to be completed; therefore, the multicollinearity problem is not taken into consideration, and the years of variables are not long enough to be examined, so this can be the reason for the inaccuracy. Thus the suggestion for the limitations is that in-depth study can be conducted to explore the other potential indicators that can intensify the significant relationship between literacy rate, primary school enrollment rate, death rate, and GDP per capita in developing and developed nations. Furthermore, it is also recommended to resolve the existence of high multicollinearity and extend the year of variables in this study so that the results can be more accurate.

Conclusion

In conclusion, the study employs Human Capital Theory and the Demographic Transition Model to guide its direction. The study also draws on past empirical studies to support its findings. This study utilizes global data from The World Bank to investigate the relationship. The research process employs a time series analysis to gather data for the test. Moreover, MRM and VIF tests utilize the global data, also referred to as secondary data, to generate their results. The results show that there is a significant relationship between literacy rate, primary school enrollment rate, death rate, and GDP per capita. For instance, the MRM test shows that independent variables are statistically significant in predicting GDP per capita. The literacy rate and death rate show a negative relationship with GDP per capita in MRM; however, the primary school enrollment rate illustrates a positive relationship. Furthermore, only the primary school enrollment rate, with a p-value less than 0.05, demonstrates a statistically significant relationship with GDP per capita.

Lastly, the VIF test reveals undesired relationships between the independent variables, as all its values are greater than 10. The literacy and health policy are recommended to the government in low-income and developing nations to increase their society's human capital at the same time as raising the GDP per capita. Next, suggest expanding the number of schools in rural areas to encourage underprivileged children to attend primary education. Additionally, this study has few limitations and suggests that researchers interested in this title continue their research.

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