Analysis of the Influence of Investment in Education and Health on Economic Growth in Malaysia

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Abstract

This study aims to determine the effect of education as seen from the mean year of schooling and literacy rate, health as seen from life expectancy and infant mortality rate on economic growth in Malaysia. This study uses the panel regression analysis method to see the effect of the independent variables on the dependent variable as seen from data in 2016 to 2020 in Malaysia. By using the Classic Assumption Test and Multiple Linear Regression Analysis methods to see whether the independent variables can affect the dependent variable in Malaysia. The results of this study indicate that mean year of schooling, literacy rate, life expectancy and infant mortality rate have no significant effect on economic growth in Malaysia. From the research results, it is suggested to the government to be able to improve the quality of education and health in the community by providing facilities evenly throughout the country. The need to raise awareness that the importance of education and health as human capital investment. In addition, there is a need for good education and health planning in an effort to improve the quality of human resources.

INTRODUCTION

Economic growth, which refers to the economy's long-term productive potential, has been a hot topic of discussion among scholars and development economists (Andreoni & Chang, 2019; Cai, 2010; Lawal et al., 2016). Malaysia is on track to meet its goal of becoming a developed country by focusing on the stabilisation of economic growth, which may be impacted and measured by a variety of indicators such as GDP (Daly & Frikha, 2016; Kynčlová et al., 2016). Many elements including human resources, natural resources, capital creation, technical advancement and innovation have an impact on economic growth. Human resources include labour supply, workforce skills and other factors including pay scales, health, skill levels and educational attainment (Fortin et al., 2015; Liu et al., 2017). The building up of financial resources to support economic expansion, which is also accompanied by technical

advancements (Hsu et al., 2021; Mazur et al., 2016; Samuelson, 2004). According to Harrod-Domar, growth necessitates investment, which is a net increase in capital stock (Mazur et al., 2016).

Investment in human resources can be done through education and health. Long-term investments in education and health, for example, are focused at increasing the quantity and quality of human capital (Aganbegyan, 2017; Mazelis et al., 2021). Many ways exist for determining the quality of human capital through education, one of which is looking at the mean year of schooling. School students in Malaysia are between 11 and 13 years of age for formal education. Literacy rate are computed based on the proportion of the population in the Labour Force Survey aged 10 years and over as well as 15 years and over who are in school or have completed schooling (Hanushek et al., 2017; Klasen & Pieters, 2015). Literacy rate is a lifelong process of learning that allows a person to attain their goals, expand their knowledge and potential and fully participate in society.

Health is also a kind of long-term investment in increasing human resource quality. Health, as demonstrated by Arrow, (1962); Baird et al., (2016); Ehrlich & Chuma, (1990); Schultz, (2002), is another key source of economic growth, healthy people, according to Frankenberg & Thomas, (2011), have a longer life expectancy, which encourages growth by hastening the demographic shift. As a result, health is critical to economic growth since it stems from a healthy body and mind, both of which assist an individual in accomplishing everyday activities and allowing people with good health to enjoy life without relying on others. In addition to life expectancy, infant mortality rates are another way to assess the quality of human capital through health. Infant mortality rate is the probability that a child born in a certain year or period would pass away before turning one, given the prevailing age-specific death rates of the time.

Table 1. Malaysia's education and health data from 2016 to 2020

	2016	2017	2018	2019	2020
Education					
Mean year of schooling	10.4	10.5	10.6	10.6	10.6
Literacy rate	95.8	96.1	96.1	96.2	96.45
Health					
Life Expectancy	74.55	74.6	74.75	74.9	75.1
Infant Mortality Rate	6.7	7.9	7.2	6.4	5.9

As Table 1 shows above, in the years 2016 to 2020, the mean year of schooling was 10.6 years consecutively, which is the same as a Form 4 in senior high school. In 2016 to 2017, the mean years of schooling climbed from 10.4 to 10.5 years, which is also equivalent to Form 4 in senior high school. As a result, the mean years of schooling in Malaysian's population were completed at the senior high school. In general, the greatest literacy rate in the last five years was 96.45% in 2020 while the lowest literacy rate of 95.8% was recorded in 2016. More over 95% of the population aged 15 and up can read and write, according to average literacy rates.

While for life expectancy, the highest in the last five years is 75.1 years old in 2020, while the lowest life expectancy is 74.55 years old in 2016. The life expectancy and growth rate have steadily increased in Malaysia over the last five years. The average life expectancy during the next five years is around 74.78 years old with growth rate of less than 1%. Following that, the highest growth rate in infant mortality rate was recorded in 2018 at 4.3%, while the lowest growth rate was recorded in 2019 at a negative 11.1%. It can be seen that the infant mortality in

Malaysia fluctuates every year.

As restated by Eriyanti et al., (2020); Piętak, (2014) it is claimed by Solow and Swan that economic growth is dependent on increases in the supply of production inputs, such as population growth, labour force expansion, and capital accumulation (investment). Economic growth is an increase in the production of goods and services in an economy (Chisholm et al., 2016; Ferreira et al., 2019). Increases in capital goods, labour force, technology and human capital can all contribute to economic growth. Education is crucial in producing excellent human capital and improving the quality of human capital is critically necessary for this. A number of variables, including primary and secondary enrolment ratios, literacy rates and educational spending, have been included to account for the role of human capital of growth. There may also be very long lags associated with education investments and economic growth (Belloumi, 2014; Goczek et al., 2021). The Human Development Index (HDI) is a composite indicator used by the United Nations Development Program (UNDP) to measure a country's average achievement in human development, specifically education as measured by mean year of schooling and literacy rate of the 15 years old population upward.

Barnay, (2016) claims that better health enhances worker productivity and wages by lowering disability, weakness and the number of sick days. Poor health, on the other hand and the resulting loss of working time leads to a decrease in employee physical and mental capacity, productivity and overall pay (Ehsan & Ali, 2019; Merkel et al., 2019). Life expectancy is a metric for assessing an individual's health in a certain area. The average number of years a person can live in a lifetime is called life expectancy (UNDP) (Atherwood, 2022; Jafrin et al., 2021). Life expectancy is also used to evaluate the government's effectiveness in terms of enhancing the population's well-being in general and health standards in particular. The infant mortality rate (IMR), in addition to life expectancy, can be used to gauge the state of public health. The death of a little kid under the age of one year is known as infant mortality (Zhang et al., 2022).

Education and health have the ability to contribute to the country's development through facilitating the accumulation of human capital and the growth process (Sarwar et al., 2021; Wang et al., 2021). One of every nation's key goal is to raise its level of living. Investing in education and health can help achieve important social goals because a sufficient level of human capital improves employee's skills, productivity and quality of life (Baharin et al., 2020; Tvaronavičienė et al., 2022). Furthermore, the accumulation of human capital has been proved to be a crucial determinant of economic growth due to its impact on productivity. A link may be drawn between economic progress and the accumulation of human capital through education and health. According to the data above, Malaysia's economic growth has been increasing and decreasing throughout the last five years from 2016 to 2020, as evidenced by GDP.

METHODS

In order to solve a problem, a research method is a scientific method or approach for gathering information about a topic through study (Darmaji et al., 2019; Sarker et al., 2020). The data analysis approach that will employ in this study is a quantitative analysis method with the aid of SPSS version 21 and 16 because the data of mean year of schooling (X1), literacy rate (X2), life expectancy (X3) and infant mortality rate (X4) are all quantitative. Panel data with data pooling and time series

approaches were employed in this investigation (Asteriou et al., 2021; Lv & Xu, 2019). The district in Malaysia from 2016 to 2020 is where the data is pooled in this study.

This study uses a descriptive and correlational technique to evaluate the relationship between the independent variables of education and health and the dependent variable of economic growth in Malaysia (Nawaz et al., 2022; Saleem et al., 2020). Secondary data sources will be used by researcher which a type of data that has already been collected in the past. In simple terms, secondary data is every dataset not obtained by the author, or "the analysis of data gathered by someone else" Boslaugh, (2007) to be more specific. The collection techniques were employed in this study through proper documentation and library research. Technique analysis data used in this study namely descriptive research, normality, multicollinearity, heteroscedasticity and autocorrelation test. Hypothesis test that used in this study are determination coefficient (R2), t-statistic and F-statistic test.

RESULT AND DISCUSSION
Classi Assumption Test

The purpose of this study is to determine the effect of the independent variables namely mean year of schooling, literacy rate, life expectancy and infant mortality rate on dependent variable which is economic growth in Malysia for the last five years from 2016 to 2020. In this study, the normality, multicollinearity, heteroscedasticity and autocorrelation test were carried out first and will do hypothesis test to see the results of this study.

Table 2. Test of Normality

Test of Normality		
Unstandardized Residual		
N		75
Normal Parametersa	Mean	.0000000
	Std. Deviation	3.83268471
Most Extreme Differences	Absolute	.185
	Positive	.110
	Negative	-.185
Kolmogorov-Smirnov Z		1.599
Asymp. Sig. (2-tailed)		.012

Test distribution is Normal.
Calculate from data

The Kolmogorov-Smirnov method's findings for the normality test yielded a residual Asymp. Sig. (2-tailed) value of 0.12. The normality test in this study indicates that the distribution is normally distributed because the result is larger than 0.05 (0.12 > 0.05), so this analysis can be continued.

Table 3. Test of Multicollinearity

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Toleranre	VIF
1 (Constant)	-45.866	26.797		-1.712	.091		
Mean Year of	1.556	.991	.180	1.570	.121	.909	1.100

School

Literacy Rate	.004	.045	.009	.081	.935	.957	1.045
Life Expectancy	.294	.343	.106	.858	.394	.789	1.268
Infant Mortality Rate	1.502	.444	.407	3.383	.001	.827	1.209

a. Dependent Variable: Economic Growth

It is clear from the results of the multicollinearity test above that all of the tolerance value's numbers are higher than 0.1. While it is also known that no number larger than 10 may be found in VIF value. It is evident that there is no multi-collinearity between the independent variables because both the tolerance and VIF value fall within the range of values that satisfy the traditional assumptions.
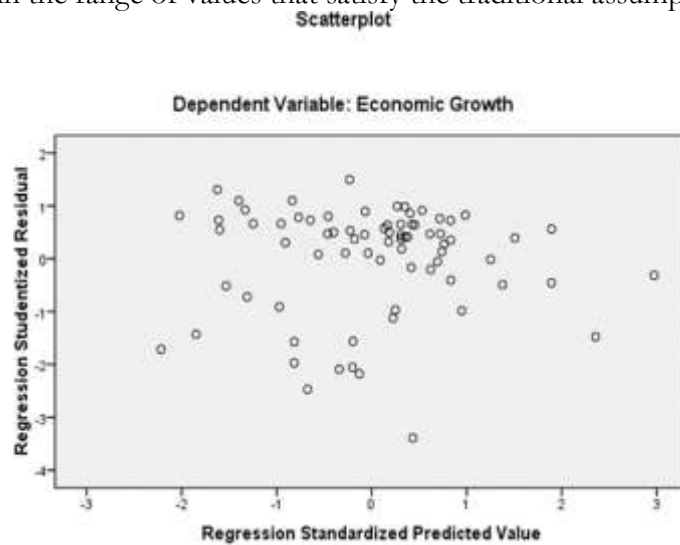

Fig 1. Dependent Variable: Economic Growth

From the scatterplot graphic above can be seen that the data points are scattered above and below the number 0. The data points do not gather only above and below, and also their distribution does not form a pattern. It can be concluded that in this multiple linear regression study there was no heteroscedasticity.

Table 4. Test of Autocorrelation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.402[a]	.162	.114	3.9407	2.220

a. Predictors: (Constant), Infant Mortality Rate, Literacy Rate, Mean Year of School, Life Expectancy

b. Dependent Variable: Economic Growth

It is shown in the Table 3 above that the Durbin Watson value is 2.22 with a sample size of 75 and a total of 4 independent variables (k = 4), the comparator employs a significance value of 5%. Both the dU and 4-dU values are 1.5151 and 2.485 respectively. The DW test indicates that there is no autocorrelation in the regression analysis because the DW value is between dU and 4-dU value (1.5151 < 2.22 < 2.485).

Hypothesis Test

The hypothesis test is used to determine whether the regression coefficient produced in this study is significant or not. Testing the hypothesis there are three tests carried out in this study, namely the coefficient of determination test, T-statistic (partial test) and F-statistic test (simultaneous test).

Table 5. Determination Coefficient Test (R2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.402a	.162	.114	3.9407

a. Predictors: (Constant), Infant Mortality Rate, Literacy Rate, Mean Year of School, Life Expectancy

b. Dependent Variable: Economic Growth

Source: SPSS version 16.0

Based on Table 4 above, it is known that the R2 value is 0.162. The implies that the influence of variables X1, X2, X3 and X4 simultaneously on variable Y is by 16.2%. This means that 16.2% of economic growth can be explained by the mean year of schooling, literacy rate, life expectancy and infant mortality rate. While other factors that were not considered in this study can explain the remaining 83.8% of the economic growth variable.

Table 6. T-Statistic Test

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-45.866	26.797		-1.712	.091
	Mean Year of School	1.556	.991	.180	1.570	.121
	Literacy Rate	.004	.045	.009	.081	.935
	Life Expectancy	.294	.343	.106	.858	.394
	Infant Mortality Rate	1.502	.444	.407	3.383	.001

a. Dependent Variable: Economic Growth

For first hypothesis, it is known that the significant value for the effect of the mean year of school is 0.121 > 0.05 which H0 is accepted and H1 is rejected. It can be concluded that the mean year of school has no significant effect on economic growth. For second hypothesis, it is known that the significant value for the effect of the literacy rate is 0.935 > 0.05 which H0 is accepted and H1 is rejected. It can be concluded that the literacy rate has no significant effect on economic growth. For third hypothesis, it is known that the significant value for the effect of the life expectancy is 0.394 > 0.05 which H0 is accepted and H1 is rejected. It can be concluded that the life expectancy has no significant effect on economic growth. Lastly, for fourth hypothesis, it is known that the significant value for the effect of the infant mortality rate is 0.001 < 0.05 which H0 is rejected and H1 is accepted. It can be concluded that the infant mortality rate has no significant effect on economic growth.

The effect of Mean Year of Schooling (X1) on Economic Growth (Y) in Malaysia

Using the regression analysis results shown in table 4.13, with a t-count value of 1.570 and a significance value of 0.121 > 0.05. These results suggest that Malaysia's economic development is not much effects by the mean year of schooling. As a result, H01 is accepted and Ha1 is denied, proving that the mean year of schooling in Malaysia does not have effects on economic growth. Research by Abdullah (2013), which asserts that education has little effect on economic growth in Malaysia, lends credibility to the study's findings. Contrary to several previous studies that found substantial nonlinearities between education and growth, Delgado et al., (2014) claim that their findings indicate that mean years of schooling is not a statistically significant variable in growth regressions. The results of this study are at odds with those of Jansson et al., (2011) study, which found that the mean year of schooling variable is one that the researcher found previously had significant explanatory power for economic growth education and schooling had a positive and substantial effect on economic growth. The researchers, Hanushek et al., (2008) found, as other economists before them, that when the mean year of schooling in a country was higher, the economy grew at a higher annual rate over subsequent decades. According to Kruger et al., (2005) study, increasing education and schooling have a large and favourable effect on economic growth. This demonstrates that accelerating economic growth does not involve forcing students to complete their education earlier or later than expected. According to the applicable year, a student who is unable to complete their education cannot become more productive.

The effect of Literacy Rate (X2) on Economic Growth (Y) in Malaysia

A t-count value of 0.81 and a significance value of 0.935 > 0.05 are based on the regression analysis results shown in table 4.13. These results suggest that Malaysia's economic development is not much effects by the literacy rate. As a result, H02 is approved and Ha2 is denied, proving that the literacy rate has no bearing on Malaysia's economic growth. Similar research from Banerjee et al., (2010) argues it must be said at the outset that formal economics analysis has been little used in monitoring and evaluating literacy interventions. According to Rose & Krausmann, (2013) argues in technical economics terms, there are significant joint production problems with literacy inputs combined with other inputs, so that identifying the precise role of the literacy component and attribution of costs and benefits is empirically impossible. The results of this study go counter to studies by Khan et al., (2016) which found that education significantly effects Malaysia's economy. According to Afzal et al., (2011) research in Pakistan, general higher education boosts the nation's economy. In this study, the literacy rate's effect on economic growth was not statistically significant, indicating that there is still some correlation between the literacy rate and economic growth in Malaysia.

The effect of Life Expectancy (X3) on Economic Growth (Y) in Malaysia

A t-count value of 0.58 and a significance value of 0.394 > 0.05 were used to calculate the regression analysis results in table 4.13. These results suggest that Malaysia's economic development is not much effects by life expectancy. As a result, H03 is accepted and Ha3 is denied, proving that life expectancy in Malaysia has no bearing on economic growth. However, data by Acemoglu & Johnson, (2007) shows that life expectancy has a smaller effect on total GDP than on population. It leads to the conclusion that there is no evidence that the increase in life expectancy raises GDP per capita. Based on data from Acemoglu & Johnson, (2007); Desbordes,

(2011), shows that life expectancy had a nonlinear effect on income per capita over the 1940–1980 period by a regression with quadratic function of life expectancy. It means that the effect of life expectancy on income per capita relies on the initial level of life expectancy. MacBride, (1931) show that an increase in life expectancy has a positive effect on economic growth. Aghion et al., (2010) establish a positive and significant relationship between life expectancy and growth. Finally, at the micro economic level, Savedoff & Schultz, (2012); Schultz, (2002), show that health has a positive impact on the economic growth through the increase in worker productivity. It further indicates that the positive effects of life expectancy from increase in savings and human capital exceed the negative effects from rise in population and dependency rate in the long run. However, there is no consensus on viewpoint that the economic growth is affected positively or negatively by life expectancy.

The effect of Infant Mortality Rate (X4) on Economic Growth (Y) in Malaysia

A t-count value of 3.383 and a significance value of $0.001 > 0.05$ were used to calculate the regression analysis results in table 4.13. These results suggest that Malaysia's economic development is significantly has effect by the infant mortality rate. As a result, H04 is denied and Ha4 is accepted, proving that the infant mortality rate has a major effect on Malaysia's economic growth. According to Li & Liang, (2010) statistical results, there is a significant correlation between health and economic growth, making it more likely that East Asian policymakers will prioritize investing in human capital's health. Conversely, Akinlo & Sulola, (2019) revealed that government health expenditure increased infant and child mortality in sub-Saharan Africa due to the high level of corruption of public health expenditure. Infant mortality will decline as health advances, which will eventually boost the population. This is shown by the fact that Malaysia's population is growing annually. According to this study, infant mortality rate has a considerable effect on economic growth in Malaysia, which is demonstrated by the health index as measured by the infant mortality rate.

The effect of mean year of schooling, literacy rate, life expectancy and infant mortality rates on economic growth in Malaysia

According to the results of the analysis, it can be concluded that the variables of mean years of schooling, literacy rates, life expectancy, and infant mortality rates simultaneously have no effect on economic growth in Malaysia. Therefore, it can be stated that changes in the mean year of schooling, the literacy rate, life expectancy, and infant mortality rate will result in an increase in Malaysia's economic development. The size of the contribution to economic growth in Malaysia from factors including the mean year of schooling, literacy rate, life expectancy, and infant mortality rate is 0.162 at =5%. This indicates that factors such as the mean year of schooling, the literacy rate, life expectancy, and infant mortality rate affect Malaysia's economic development by 16.2% while the other 83.8% is determined by other variables. Communities with high levels of health have the chance to engage in productive economic activities, boosting the chances for individuals to make a living. A healthy population will boost the area's human capital. A population with higher productivity will produce more products and services, earn more money, and contribute to greater economic growth. This is accomplished through investing more in human capital.

CONCLUSION

From the results of data processing carried out by researchers using panel regression analysis and discussion of the results of research between independent variables consisting of the mean year of schooling, literacy rate, life expectancy and infant mortality rate on the dependent variable, namely economic growth in Malaysia together. The conclusions from this study are firstly, education in terms of the mean year of schooling in 13 countries and 3 federal territories in Malaysia in 2016 to 2020 will not have a significant effect on economic growth. Secondly, education in terms of literacy rate in 13 countries and 3 federal regions in Malaysia in 2016 to 2020 does not have a significant effect on economic growth. Thirdly, health in terms of life expectancy in 13 countries and 3 federal territories in Malaysia in 2016 so that 2020 will not have a significant effect on economic growth. Next, health in terms of infant mortality rate in 13 countries and 3 federal territories in Malaysia in 2016 to 2020 has a significant influence on economic growth. Lastly, the regression model in this study passed the classical assumption test. With a coefficient of determination (R^2) of 0.162, it indicates that 16.2% of the dependent variable, namely economic growth in Malaysia, can be well explained by independent variables, while the remaining 83.8% is explained by variables outside this study. Independent variables consist of the mean year of schooling, literacy rate, life expectancy and infant mortality rate which together have no significant effect on economic growth in Malaysia.

REFERENCES

Acemoglu, D., & Johnson, S. (2007). Disease and development: The effect of life expectancy on economic growth. *Journal of Political Economy*, *115*(6), 925–985. https://doi.org/10.1086/529000

Afzal, M., Rehman, H. U., Farooq, M. S., & Sarwar, K. (2011). Education and economic growth in Pakistan: A cointegration and causality analysis. *International Journal of Educational Research*, *50*(5–6), 321–335. https://doi.org/10.1016/j.ijer.2011.10.004

Aganbegyan, A. G. (2017). Investments in fixed assets and human capital: Two interconnected drivers of socioeconomic growth. *Studies on Russian Economic Development*, *28*(4), 361–363. https://doi.org/10.1134/S1075700717040025

Aghion, P., Howitt, P., & Murtin, F. (2010). The Relationship Between Health and Growth: When Lucas Meets Nelson-Phelps. In *Review of Economics and Institutions* (Vol. 2, Issue 1). National Bureau of Economic Research. https://doi.org/10.5202/rei.v2i1.22

Akinlo, A. E., & Sulola, A. O. (2019). Health care expenditure and infant mortality in sub-Saharan Africa. *Journal of Policy Modeling*, *41*(1), 168–178. https://doi.org/10.1016/j.jpolmod.2018.09.001

Andreoni, A., & Chang, H. J. (2019). The political economy of industrial policy: Structural interdependencies, policy alignment and conflict management. *Structural Change and Economic Dynamics*, *48*, 136–150. https://doi.org/10.1016/j.strueco.2018.10.007

Arrow, K. J. (1962). The economic implications of learning by doing. In *Review of Economic Studies* (Vol. 29, Issue 3). Palgrave Macmillan UK. https://doi.org/10.2307/2295952

Asteriou, D., Pilbeam, K., & Pratiwi, C. E. (2021). Public debt and economic growth: panel data evidence for Asian countries. *Journal of Economics and Finance*, *45*(2), 270–287. https://doi.org/10.1007/s12197-020-09515-7

Atherwood, S. (2022). Does a prolonged hardship reduce life span? Examining the longevity of young men who lived through the 1930s Great Plains drought. *Population and Environment*, *43*(4), 530–552. https://doi.org/10.1007/s11111-022-00398-w

Baharin, R., Syah Aji, R. H., Yussof, I., & Saukani, N. M. (2020). Impact of human resource investment on labor productivity in Indonesia. *Iranian Journal of Management Studies*, *13*(1), 139–164. https://doi.org/10.22059/IJMS.2019.280284.673616

Baird, S., Hicks, J. H., Kremer, M., & Miguel, E. (2016). Worms at work: Long-run impacts of a child health investment. *Quarterly Journal of Economics*, *131*(4), 1637–1680. https://doi.org/10.1093/qje/qjw022

Banerjee, A. V., Banerji, R., Duflo, E., Glennerster, R., & Khemani, S. (2010). Pitfalls of participatory programs: Evidence from a randomized evaluation in education in India. *American Economic Journal: Economic Policy*, *2*(1), 1–30. https://doi.org/10.1257/pol.2.1.1

Barnay, T. (2016). Health, work and working conditions: a review of the European economic literature. *The European Journal of Health Economics*, *17*(6), 693–709. https://doi.org/10.1007/s10198-015-0715-8

Belloumi, M. (2014). The relationship between trade, FDI and economic growth in Tunisia: An application of the autoregressive distributed lag model. *Economic Systems*, *38*(2), 269–287. https://doi.org/10.1016/j.ecosys.2013.09.002

Boslaugh, S. (2007). Secondary data sources for public health: A practical guide. In *Secondary Data Sources for Public Health: A Practical Guide*. Cambridge University Press. https://doi.org/10.1017/CBO9780511618802

Cai, F. (2010). Demographic transition, demographic dividend, and Lewis turning point in China. *China Economic Journal*, *3*(2), 107–119. https://doi.org/10.1080/17538963.2010.511899

Chisholm, D., Sweeny, K., Sheehan, P., Rasmussen, B., Smit, F., Cuijpers, P., & Saxena, S. (2016). Scaling-up treatment of depression and anxiety: a global return on investment analysis. *The Lancet Psychiatry*, *3*(5), 415–424. https://doi.org/10.1016/S2215-0366(16)30024-4

Daly, S., & Frikha, M. (2016). Banks and economic growth in developing countries: What about Islamic banks? *Cogent Economics & Finance*, *4*(1), 1–26. https://doi.org/10.1080/23322039.2016.1168728

Darmaji, D., Kurniawan, D. A., & Irdianti, I. (2019). Physics education students' science process skills. *International Journal of Evaluation and Research in Education*, *8*(2), 293–298. https://doi.org/10.11591/ijere.v8i2.28646

Delgado, M. S., Henderson, D. J., & Parmeter, C. F. (2014). Does education matter for economic growth? *Oxford Bulletin of Economics and Statistics*, *76*(3), 334–359. https://doi.org/10.1111/obes.12025

Desbordes, R. (2011). The non-linear effects of life expectancy on economic growth. *Economics Letters*, *112*(1), 116–118. https://doi.org/10.1016/j.econlet.2011.03.027

Ehrlich, I., & Chuma, H. (1990). A model of the demand for longevity and the value of life extension. *Journal of Political Economy*, *98*(4), 761–782. https://doi.org/10.1086/261705

Ehsan, M., & Ali, K. (2019). The Impact of Work Stress on Employee Productivity: Based in the Banking sector of Faisalabad, Pakistan. *International Journal of Innovation and Economic Development*, *4*(6), 32–50.

https://doi.org/10.18775/ijied.1849-7551-7020.2015.46.2003

Eriyanti, F., Engkizar, E., Alhadi, Z., Moeis, I., Murniyetti, M., Yulastri, A., & Syafril, S. (2020). The Impact of Government Policies towards the Economy and Education of Fishermen's Children in Padang City. *IOP Conference Series: Earth and Environmental Science*, *469*(1), 1–7. https://doi.org/10.1088/1755-1315/469/1/012057

Ferreira, A. I., Costa Ferreira, P., Cooper, C. L., & Oliveira, D. (2019). How daily negative affect and emotional exhaustion correlates with work engagement and presenteeism-constrained productivity. *International Journal of Stress Management*, *26*(3), 261–271. https://doi.org/10.1037/str0000114

Fortin, N. M., Oreopoulos, P., & Phipps, S. (2015). Leaving boys behind gender disparities in high academic achievement. *Journal of Human Resources*, *50*(3), 549–579. https://doi.org/10.3368/jhr.50.3.549

Frankenberg, E., & Thomas, D. (2011). Global aging. In *Handbook of Aging and the Social Sciences* (pp. 73–89). Academic Press. https://doi.org/10.1016/B978-0-12-380880-6.00006-X

Goczek, Ł., Witkowska, E., & Witkowski, B. (2021). How does education quality affect economic growth? *Sustainability (Switzerland)*, *13*(11), 6437. https://doi.org/10.3390/su13116437

Hanushek, E. A., Jamison, D. T., Jamison, E. A., & Woessmann, L. (2008). Education and economic growth: It's not just going to school, but learning something while there that matters. In *Education Next* (Vol. 8, Issue 2). Education Next.

Hanushek, E. A., Schwerdt, G., Woessmann, L., & Zhang, L. (2017). General education, vocational education, and labor-market outcomes over the lifecycle. *Journal of Human Resources*, *52*(1), 48–87. https://doi.org/10.3368/jhr.52.1.0415-7074R

Hsu, C. C., Quang-Thanh, N., Chien, F., Li, L., & Mohsin, M. (2021). Evaluating green innovation and performance of financial development: mediating concerns of environmental regulation. *Environmental Science and Pollution Research*, *28*(40), 57386–57397. https://doi.org/10.1007/s11356-021-14499-w

Jafrin, N., Masud, M. M., Saif, A. N. M., Mahi, M., & Khanam, M. (2021). a Panel Data Estimation of the Determinants of Life Expectancy in Selected Saarc Countries. *Operations Research and Decisions*, *31*(4), 69–87. https://doi.org/10.37190/ord210404

Jansson, J., Marell, A., & Nordlund, A. (2011). Exploring consumer adoption of a high involvement eco-innovation using value-belief-norm theory. *Journal of Consumer Behaviour*, *10*(1), 51–60. https://doi.org/10.1002/cb.346

Khan, H. N., Razali, R. B., & Shafei, A. B. (2016). On the relationship between health, education and economic growth: Time series evidence from Malaysia. *AIP Conference Proceedings*, *1787*(1), 80007. https://doi.org/10.1063/1.4968146

Klasen, S., & Pieters, J. (2015). What explains the stagnation of female labor force participation in urban India? *The World Bank Economic Review*, *29*(3), 449–478. https://doi.org/10.1093/wber/lhv003

Kruger, J., Epley, N., Parker, J., & Ng, Z. W. (2005). Egocentrism over E-mail: Can we communicate as well as we think? *Journal of Personality and Social Psychology*, *89*(6), 925–936. https://doi.org/10.1037/0022-3514.89.6.925

Kynčlová, P., Upadhyaya, S., & Nice, T. (2016). Composite index as a measure on achieving Sustainable Development Goal 9 (SDG-9) industry-related targets:

The SDG-9 index. *Applied Energy*, *265*(1), 114755. https://doi.org/10.1016/j.apenergy.2020.114755

Lawal, A. I., Nwanji, T. I., Asaleye, A., & Ahmed, V. (2016). Economic growth, financial development and trade openness in Nigeria: An application of the ARDL bound testing approach. *Cogent Economics & Finance*, *4*(1), 1–15. https://doi.org/10.1080/23322039.2016.1258810

Li, H., & Liang, H. (2010). Health, education, and economic growth in east asia. *Journal of Chinese Economic and Foreign Trade Studies*, *3*(2), 110–131. https://doi.org/10.1108/17544401011052267

Liu, J. X., Goryakin, Y., Maeda, A., Bruckner, T., & Scheffler, R. (2017). Global health workforce labor market projections for 2030. *Human Resources for Health*, *15*(1), 1–12. https://doi.org/10.1186/s12960-017-0187-2

Lv, Z., & Xu, T. (2019). Trade openness, urbanization and CO 2 emissions: Dynamic panel data analysis of middle-income countries. *Journal of International Trade and Economic Development*, *28*(3), 317–330. https://doi.org/10.1080/09638199.2018.1534878

MacBride, E. W. (1931). Death and development. In *Nature* (Vol. 128, Issue 3226, pp. 382–383). https://doi.org/10.1038/128382b0

Mazelis, L. S., Krasko, A. A., & Krasova, E. V. (2021). Distribution of financial resources by areas of investments in human capital of the region. *Economic Consultant*, *36*(4), 4–16. https://doi.org/10.46224/ecoc.2021.4.1

Mazur, V. V, Barmuta, K. A., Demin, S. S., Tikhomirov, E. A., & Bykovskiy, M. A. (2016). Innovation clusters: Advantages and disadvantages. *International Journal of Economics and Financial Issues*, *6*(1), 270–274. https://doi.org/https://dergipark.org.tr/en/pub/ijefi/issue/31979/352582

Merkel, S., Ruokolainen, M., & Holman, D. (2019). Challenges and practices in promoting (ageing) employees working career in the health care sector-case studies from Germany, Finland and the UK. *BMC Health Services Research*, *19*(1), 1–12. https://doi.org/10.1186/s12913-019-4655-3

Nawaz SOOMRO, A., Kumar, J., Kumari, J., & Author Scholar, F. (2022). The Dynamic Relationship Between FDI, ICT, Trade Openness, and Economic Growth: Evidence from BRICS Countries. *Journal of Asian Finance*, *9*(2), 295–0303.

Piętak, Ł. (2014). Review Of Theories And Models Of Economic Growth. *Comparative Economic Research. Central and Eastern Europe*, *17*(1), 45–60. https://doi.org/10.2478/cer-2014-0003

Rose, A., & Krausmann, E. (2013). An economic framework for the development of a resilience index for business recovery. *International Journal of Disaster Risk Reduction*, *5*, 73–83. https://doi.org/10.1016/j.ijdrr.2013.08.003

Saleem, H., Shabbir, M. S., & Bilal khan, M. (2020). The short-run and long-run dynamics among FDI, trade openness and economic growth: using a bootstrap ARDL test for co-integration in selected South Asian countries. *South Asian Journal of Business Studies*, *9*(2), 279–295. https://doi.org/10.1108/SAJBS-07-2019-0124

Samuelson, P. A. (2004). The backward art of investing money. *Journal of Portfolio Management*, *30*(SUPPL.), 30–33. https://doi.org/10.3905/jpm.2004.442612

Sarker, I. H., Kayes, A. S. M., Badsha, S., Alqahtani, H., Watters, P., & Ng, A. (2020). Cybersecurity data science: an overview from machine learning perspective. *Journal of Big Data*, *7*(1), 1–29. https://doi.org/10.1186/s40537-020-00318-5

Sarwar, A., Khan, M. A., Sarwar, Z., & Khan, W. (2021). Financial development, human capital and its impact on economic growth of emerging countries. *Asian Journal of Economics and Banking*, *5*(1), 86–100. https://doi.org/10.1108/ajeb-06-2020-0015

Savedoff, W. D., & Schultz, T. P. (2012). Earnings and the Elusive Dividends of Health. In *SSRN Electronic Journal*. Education and Economic Growth. Teachers College Record. https://doi.org/10.2139/ssrn.1814678

Schultz, T. P. (2002). Wage Gains Associated with Height as a Form of Health Human Capital. *American Economic Review*, *92*(2), 349–353. https://doi.org/10.1257/000282802320191598

Tvaronavičienė, M., Mazur, N., Mishchuk, H., & Bilan, Y. (2022). Quality of life of the youth: assessment methodology development and empirical study in human capital management. *Economic Research-Ekonomska Istrazivanja* , *35*(1), 1088–1105. https://doi.org/10.1080/1331677X.2021.1956361

Wang, M., Xu, M., & Ma, S. (2021). The effect of the spatial heterogeneity of human capital structure on regional green total factor productivity. *Structural Change and Economic Dynamics*, *59*, 427–441. https://doi.org/10.1016/j.strueco.2021.09.018

Zhang, Z., Zhang, G., & Su, B. (2022). The spatial impacts of air pollution and socio-economic status on public health: Empirical evidence from China. *Socio-Economic Planning Sciences*, *83*, 101167. https://doi.org/10.1016/j.seps.2021.101167