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THE INFLUENCE OF HEALTH, EDUCATION, AND INFORMATION AND COMMUNICATION TECHNOLOGY ON POVERTY IN JAVA ISLAND WITH COVID-19 AS A DUMMY VARIABLE IN 2015-2024

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Abstract

This study aims to analyze the influence of health, education, and information and communication technology (ICT) on poverty in Java, using Covid-19 as a dummy variable. In the context of economic development, poverty alleviation is often accompanied by economic development, so it is important to understand how these variables influence poverty. This study uses panel data covering six provinces in Java from 2015 to 2024. Data were obtained from various official sources, such as Statistics Indonesia (BPS) and the Ministry of Health. The analytical method used is panel data regression with EViews software. The analysis results show that health, using stunting rates, has a positive but insignificant effect on poverty. Conversely, education has a positive but insignificant effect on poverty. ICT has a negative and significant effect on poverty, while Covid-19 has a positive and significant effect on poverty. Simultaneously, the third independent variable and Covid-19 as a dummy variable are proven to have a significant effect on poverty.

Kata kunci: Health, Education, Information and Communication Technology, Poverty, Java Island

1. Introduction

Poverty alleviation is integral to economic development, as the success or failure of development is often measured by changes in poverty levels. Poverty has been a phenomenal issue throughout Indonesia's history, particularly during the COVID-19, which has significantly impacted various aspects of the country. As is well known, rising poverty is a serious problem in countries worldwide, where access to human resources is a crucial factor in eradicating it. Poverty has a significant impact on the sustainability of a country's economic development and can directly impact public welfare. Poverty can be influenced by various key factors, such as health, education, and information and communication technology. Investments in health and education can increase human capital, which in turn will impact poverty reduction. Furthermore, the balance and advancement of information and communication technology in people's economic activities are also crucial for preventing poverty. Therefore, research exploring the relationship between these three factors and poverty is highly relevant to addressing poverty.

This research focuses on three independent variables: health, education, and information and communication technology, with COVID-19 as a dummy variable. The health variable uses the stunting rate, education uses the average years of schooling, and information and communication technology uses the development index. This third variable will analyze poverty on the island of Java for the period 2015-2024. This quantitative study uses secondary

data sourced from the Central Statistics Agency (BPS) and the Ministry of Health. This study not only examines the linear relationship between variables but also examines the simultaneous influence of variables on poverty reduction.

Research (Arina & Masron, 2026) shows that stunting has a positive and significant effect on poverty. Meanwhile, research (Kustanto, 2021) shows that stunting prevalence is influential in preventing poverty and long-term economic growth. Research (Bahtia et al., 2025) shows that health and education levels significantly influence poverty. Meanwhile, research (Mindayanti et al., 2021) shows that education levels have a positive but insignificant effect on poverty. Furthermore, research (Ishak & Kartiasih, 2025) shows that ICT has a negative and significant impact on poverty, and research (Sani et al., 2022) shows that the Covid-19 pandemic has a significant impact on increasing poverty. The results of previous studies indicate that there are still irregularities in empirical studies that examine one variable and the simultaneous impact of a third variable and a dummy variable on poverty, especially in Java. This study aims to address this problem by providing a new contribution through a quantitative approach for the period 2015 to 2024. This study aims to analyze the impact of health, education, and information and communication technology on poverty with Covid-19 as a dummy variable for the years 2015-2024.

2. Literature Review

Health is a state of physical, mental, and social well-being that enables every individual to live a productive life socially and economically. Health can be seen from a person's productivity in daily life, such as school, work, and social activities for the elderly. According to Todaro (2000), human capital can be measured through health, as health awareness is linked to an individual's productivity in carrying out their activities. The Human Capital Theory, proposed by Theodore Schultz and Gary Becker in 1964, states that human capital is the combination of knowledge and skills possessed by individuals, groups, or organizations, with individuals having economic value. Health is a key indicator of societal well-being, representing a measure of well-being. Good health reflects an individual's quality of life. Health is influenced by environmental factors, genetics, and daily lifestyle. Health is a key determinant of an individual's standard of living, so good health is essential for carrying out all daily activities.

National education is a conscious and well-programmed effort that creates a learning climate and an active learning process. This enables students to develop their potential, supported by spiritual strength, religious character, noble morals, self-control, intelligence, and the skills needed by individuals, society, the nation, and the state. Education, in general, is a learning process through teaching and training, enabling individuals to acquire higher-quality knowledge and understanding of specific subjects. Education plays a crucial role in a country's economic development. Education improves the quality of human resources. According to Todaro (2003), the government plays a crucial role in enhancing human capital development by pursuing education to increase and encourage productivity, which in turn drives a country's economic progress. Average years of schooling is an indicator or benchmark for the level of education in a region. Education is a form of human capital that indicates the quality of human resources. According to Tobing in Hastarini and Dwi (2005), someone with a higher level of education, as measured by the length of schooling, will have better jobs and wages than someone with a lower level of education.

Technology is the result of the continuous development of existing technologies from a long time ago, which is from the teachings of different experts. The origin of the word technology comes from the Latin verb texere which means to make or build. Everett M. Rogers in his 1983 book Diffusion and Innovation stated that the purpose of technology is to transfer

tools to achieve goals and reduce ambiguity in cause-effect relationships. J.B. Wahyudi (1990) defines information technology by arguing that information technology is electronic technology that can eliminate the limitations of space and time in the flow of information while increasing its speed and quality. The International Telecommunication Union (ITU) has developed the Information and Communication Technology Development Index (IP-ICT), also known as the ICT Development Index (ICT-DI), first published in 2009 in the book "Measuring the Information Society." The Indonesian Central Bureau of Statistics (BPS) created the ICT Development Index at the provincial and national levels based on ITU procedures and methods. According to BPS (2019), the ICT Development Index is a composite index that serves as a standard measurement for monitoring and comparing the development of information and communication technology across time and regions.

The Vicious Circle of Poverty theory was developed by Ragnar Nurske (1953), who stated that "a poor country is poor because it is poor." Based on the Vicious Circle of Poverty theory, poverty is caused by imperfect market conditions, a lack of capital, and underdeveloped human resources, which lead to low productivity. In this theory, Nurske stated that poverty is caused not only by a lack of past development but also by obstacles to future development. "A poor country is poor because it is poor," he explained, "a country with low productivity will produce a low-income population, only sufficient to meet minimal consumption needs. Therefore, they cannot save, which should be the primary source of capital formation in society. Low savings will lead to a decline in investment, leading to a cycle of capital shortages, and the cycle continues.

3. Hypotheses Development

The research hypotheses can be formulated as follows:

a) There is a positive relationship between health and poverty. This means that if health, which is related to stunting rates, decreases, poverty will decrease.
b) There is a negative relationship between education and poverty. This means that if education increases, poverty will decrease.
c) There is a negative relationship between information and communication technology and poverty. This means that if information and communication technology increases, poverty will decrease.
d) There is a positive relationship between COVID-19 and poverty. This means that if COVID-19 decreases, poverty will decrease

4. Method, Data, and Analysis

This study uses panel data, a combination of cross-sectional and time-series data. The population consists of data on stunting rates, average years of schooling, the information and communication technology development index, COVID-19, and the percentage of the poor in six provinces on the island of Java. The sample size consists of 60 samples from a 10-period panel data set. Data were obtained from six provinces on the island of Java from 2015 to 2024.

In this study, there are four variables, with poverty as the dependent variable (Y). The independent variables are health (X1), education (X2), information and communication technology (X3), and COVID-19 (X4). The provinces covered in this study are Jakarta, West Java, Central Java, Yogyakarta, East Java, and Banten. The data sources used in this study were the Central Statistics Agency (BPS) and the Ministry of Health for the periods 2015 to 2024. This study used EViews software.

5. Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.18088	6.133658	2.638047	0.0111
KH	0.009501	0.034705	0.273757	0.7854
PD	-0.212246	0.806426	-0.263194	0.7935
TIK	-1.035365	0.308749	-3.353416	0.0015
COVID	1.028858	0.172679	5.958226	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.976031	Mean dependent var	8.689667
Adjusted R-squared	0.971716	S.D. dependent var	3.114612
S.E. of regression	0.523809	Akaike info criterion	1.695632
Sum squared resid	13.71878	Schwarz criterion	2.044689
Log likelihood	-40.86895	Hannan-Quinn criter.	1.832167
F-statistic	226.2223	Durbin-Watson stat	0.789224
Prob(F-statistic)	0.000000		

Picture 1. FEM Regression Test Results

The health variable, using the stunting rate, shows a coefficient of 0.009501, with a calculated t-value of 0.273757, which is smaller in absolute terms than the t-table of 2.001717, and a probability value of 0.7854. Probability values above 0.05 indicate that stunting levels have no significant effect on poverty. A positive coefficient indicates that a decrease in stunting levels tends to be followed by a decrease in poverty levels, although the effect is not statistically significant.

The education variable shows a coefficient of -0.212246, with a calculated t-value of -0.263194, which is smaller in absolute terms than the t-table of 2.001717, and a probability value of 0.7935. Probability values above 0.05 indicate that education has no significant effect on poverty. A negative coefficient indicates that an increase in education tends to be followed by a decrease in poverty levels, although the effect is not statistically significant.

The information and communication technology variable shows a coefficient value of -1.035365 with a calculated t-value of -3.353416, which is greater in absolute terms than the t-table of 2.001717, and a probability value of 0.0015. A probability value below 0.05 indicates that information and communication technology plays a significant role in poverty. A negative coefficient indicates that improvements in information and communication technology contribute to poverty reduction.

The Covid-19 dummy variable shows a coefficient value of 1.028858 with a calculated t-value of 5.958226, which is greater in absolute terms than the t-table of 2.001717, and a probability value of 0.0000. A probability value below 0.05 indicates that COVID-19 plays a significant role in poverty. A positive coefficient indicates that the increase in COVID-19 contributes to an increase in poverty.

Furthermore, the F-statistic value, which is greater than the F-table, indicates that the variables of health (X1), education (X2), information and communication technology (X3), and Covid-19 (dummy) simultaneously have a significant effect on poverty (Y) in Java. Based on the results of the Coefficient of Determination test, an R-squared value of 0.976031 was obtained, or approximately 97.6% of the variation in poverty levels can be explained by the

variables of health, education, information and communication technology, and Covid-19 (dummy) used in the regression model. Meanwhile, the remaining approximately 2.4% is influenced by other variables outside this research model.

6. Discussion

These findings demonstrate that the health variable, using the stunting rate, has a positive but insignificant impact on poverty in Java. While other independent variables are assumed to be constant, a one percent reduction in the stunting rate is associated with a reduction in poverty, but the impact has not yet demonstrated statistical significance. The positive regression coefficient indicates that reducing the stunting rate as a policy tends to reduce poverty. However, because the effect is not statistically significant, it cannot be concluded that the impact of the stunting rate on poverty reduction is strong or empirically significant. These findings indicate that the stunting rate, although positive, does not directly and significantly reduce poverty. This finding aligns with the view that the relationship between stunting rates and poverty is not direct but is felt over a long period of time, and is influenced by various intermediary mechanisms, such as efforts to increase income and increase labor productivity, among others, through increasing and expanding social assistance and security. The negative impact of stunting rates on poverty does not occur immediately in a single year but is felt over a longer period of time as stunted children enter their productive years. These findings align with human capital theory, which states that good health serves as an investment in improving the quality of human resources, ultimately leading to a reduction in poverty. However, reducing poverty requires improving the quality of human resources through increased access to and quality of health services, and expanding social assistance and security, which in turn will contribute to poverty reduction. This demonstrates that reducing stunting rates does not directly impact poverty reduction in the short term.

These findings demonstrate that the education variable, using the average length of schooling, has a negative but insignificant impact on poverty in Java. While other independent variables are assumed to be constant, a one percent increase in education is associated with a reduction in poverty, but the impact has not yet demonstrated statistical significance. However, in this study, the insignificant effect is due to the education variable using the average length of schooling, which is the average number of years an individual has completed. Because the average length of schooling is quantitative, it is insufficient to assess the quality of education, the skills acquired by individuals, equitable access to education, or the suitability of graduates to labor market needs. In other words, although the effect is negative, it has not yet demonstrated statistical significance. This also aligns with endogenous growth theory, which states that in long-term economic growth, the accumulation of knowledge is a driving internal factor. Knowledge and skills will increase human capital, thereby increasing productivity and wages, ultimately driving inclusive economic growth and reducing poverty. This also aligns with human capital theory, which argues that education is an investment in improving human capital, which in turn contributes to poverty reduction.

These findings demonstrate that the information and communication technology (ICT) variable, measured using the ICT development index, has a significant negative impact on poverty in Java. This finding aligns with endogenous growth theory, which states that technological innovation will drive sustainable economic growth and ultimately reduce poverty. Technological innovation contributes to increased access to job opportunities, enabling workers to secure good, decent jobs and receive higher incomes, thus preventing individuals from escaping poverty. Increasingly advanced technological innovation will support digital economic activities, making it easier for people to engage in economic activities, such as through online marketplaces and other online-based activities.

These findings demonstrate that the COVID-19 dummy variable has a significant positive effect on poverty in Java. These findings align with research conducted by Sani et al. (2022), which states that COVID-19 has a positive and significant effect on poverty. The COVID-19 pandemic has had a serious impact on several macroeconomic indicators. The spread of the virus to Indonesia has had a negative impact on the economy. Economic activity has been affected since the implementation of large-scale social restrictions (PSBB) and lockdowns, resulting in decreased job opportunities, lower incomes, and increased poverty and unemployment rates.

This probability value is less than 0.05, indicating that the variables health (X1), education (X2), information and communication technology (X3), and Covid-19 (dummy) simultaneously have a significant effect on poverty (Y) in Java. This finding aligns with research conducted by Ratri & Sholeh (2019), which states that health, education, and information and communication technology simultaneously influence poverty. This also aligns with endogenous growth theory, which states that in long-term economic growth, improvements in human capital, technological innovation, knowledge, and skills are internal factors that drive sustainable economic growth. Technological innovation and improving the quality of human resources through education and skills will increase productivity, thereby driving inclusive and sustainable economic growth, ultimately reducing poverty. Furthermore, human capital theory emphasizes that investments in education and health will increase human capital, thereby preventing individuals from escaping poverty.

7. Conclusion, Limitations, and Suggestions

Conclusion

This study has several conclusions: health, using stunting rates, has a positive but not yet significant impact on poverty. This suggests that a decrease in stunting rates tends to be followed by a decrease in poverty, although the impact is not statistically strong enough. This may be due to the impact of stunting on poverty not occurring immediately in the same year but occurring over the long term, and may be due to unequal access to health services or other variables not yet included in the model. Education, using the average length of schooling, has a negative but not yet significant effect on poverty. This indicates that an increase in the average length of schooling tends to be followed by a decrease in poverty, although the impact is not statistically strong enough. This could be due to a lack of job opportunities appropriate to educational background, a lack of practical skills, or even because the average length of schooling does not reflect the quality of education and skills possessed by individuals. Information and communication technology, using the information and communication technology development index, has a significant negative effect on poverty. This indicates that as information and communication technology improves, poverty will decrease. Covid-19, as a dummy variable, has a significant positive effect on poverty. This indicates that as Covid-19 declines, poverty will decrease.

Limitation and suggestions

This study faces limitations in that other factors influencing poverty on Java that are not included in the model may exist, such as life expectancy, labor absorption, income inequality, minimum wages, or other government policies. Furthermore, because this study focuses on Java, it will have different impacts on other regions or Indonesia as a whole. Suggestions for further research can use comparative studies by comparing one region with another, or adding other factors related to poverty, such as inflation, economic growth, minimum wages, or other indicators related to health and education.

Recommendations

Improving public health, education, and information and communication technology, including services and infrastructure, ensures quality, accessibility, equity, and affordability. Raising public awareness of disease prevention, health promotion, the importance of adequate nutrition, healthy lifestyles, and immunization programs is crucial for health policy. Quality education and the provision of skills relevant to the labor market will support individuals in securing jobs and earning better wages. The presence of information and communication technology in economic and social activities will have a positive impact on society, such as increasing the breadth and ease of finding jobs relevant to the labor market, establishing online businesses to increase income, and so on. Furthermore, a long-term strategy is needed to ensure community economic resilience in the face of major shocks, such as the COVID-19 pandemic, for example, by increasing access to healthcare services during economic shocks.

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