

Analysis of the Influence of GDP, Health Index, Education Index, Consumer Price Index on Population in Central Java in 2010-2020

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Abstract

This study aims to analyze the influence of Gross Regional Domestic Product (GRDP), Health Index, Education Index, and Consumer Price Index on the population of Central Java from 2010 to 2020. Time series panel data covering the specified period were analyzed using the fixed effects panel regression method. The study utilized secondary data from reliable sources. The analysis results reveal that GRDP has a significant positive influence on the population in Central Java, indicating that economic growth contributes to population increase. Moreover, the Health Index and Education Index also exhibit significant positive influences on the population, implying that well-being and educational quality foster population growth. However, the Consumer Price Index demonstrates a significant negative influence on the population. This suggests that high inflation rates might restrict population growth. In this context, it is crucial for governments and policy makers to consider the complex interactions among economic, social, and demographic factors while formulating sustainable development policies.

Keywords: GRDP, Health Index; Education Index; Consumer Price Index; population; panel regression; Central Java.

INTRODUCTION

Population plays an important role in development. The population is one of the actors and targets at the same time who enjoys development, therefore the quality of the population through various inherent resources, and the realization of quality small families, as well as efforts to scenario the population quantity and distribution of the population can influence economic development.

Indonesia is a developing country that has a very high and dense population. The rate of population growth that is not regulated and limited will have a negative

impact on life in the social, political and economic fields, which in turn can hamper national development activities. There are many factors that affect population growth, including the increasing birth rate and the low number of deaths. According to BPS Indonesia in 2018 the population growth for the next 25 years is predicted to continue to increase, meaning that population growth can hinder good management and planning. In addition, there are no signs of a significant decrease in the birth rate (Atmojo, 2013).

A large increase in population will have a positive impact, namely as an important element in developing

production and economic activities. In addition to having a positive impact, a large increase in population also has a negative impact in various aspects which will later have an influence on one another. According to the Central Statistics Agency (BPS), the population of Indonesia as a result of the 2020 population census is 270.20 million people. Since Indonesia conducted its first population census in 1961, the population has continued to increase. The results of the 2020 population census compared to the 2010 population census show an increase in the population of 32.56 million people or an average of 3.26 million each year. In the last ten years (2010–2020), Indonesia's population growth rate has been 1.25 percent per year. There was a slowdown in the population growth rate of 0.24 percentage points when compared to the population growth rate in the 2000–2010 period of 1.49 percent.

In Indonesia, the province with the largest population is Central Java. Based on the Central Statistics Agency or BPS referring to the 2020 population census, Central Java Province has a population of 48.27 million people. The total population has increased from the 2010 population census which recorded a total of 43.05 million people

As in some of these previous studies that discussed economics. The first research was conducted by Adebajo & Shakiru (2022). The focus of this project work is modeling the relationship between confirmed COVID-19 cases, the consumer price index (CPI) and economic growth in Nigeria. Economic growth can be accurately captured by a country's gross domestic product per capita (Lyer, T.; Gupta, 2019). It should be noted that the pandemic has weakened the global economy, among other developing countries. the research proposed with the title "Analysis of the Influence of GRDP, Health Index, Education Index, Consumer

Price Index on Population in Central Java in 2010-2020" has several significant differences from previous research. First, other studies focus on the Central Java region and a specific time period between 2010 and 2020. This allows an in-depth analysis of changes in the number of residents in the region within a limited period of time (Ozili, 2020). Second, this research involves key variables such as Gross Regional Domestic Product (GRDP), health indicators, education indicators, and the Consumer Price Index (CPI) (Lesnussa et al., 2018). These variables form a comprehensive analysis framework, enabling the identification of patterns of interrelationships between economic, health, education and price inflation aspects with changes in population in Central Java. Furthermore, other studies can also utilize the latest data analysis techniques and more up-to-date statistical models, which may not have been used in previous studies (Turgut Genç & Günay, 2020). This new approach may provide deeper insight into how these factors jointly contribute to population dynamics in the region (Bhadury et al., 2020). Thus, this research not only contributes to our understanding of the factors that influence population size, but also provides a new view of the complex relationship between the economy, health, education, and inflation in the context of Central Java. High economic growth tends to attract migration from other regions, creating job opportunities and attracting new residents (Jardet & Meunier, 2022). The Health Index and the Education Index also play an important role (Dhaliwal & Misra, 2020). Better health and access to higher education can encourage families to have more children because they increase life expectancy and educational opportunities (Laine & Lindblad, 2021). Furthermore, the Consumer Price Index (CPI) also has an impact on population, although not directly (Arisman, 2010). An increase in

CPI can indicate higher inflation and cost of living. This can affect family decisions in planning the number of children to have , because higher costs can hinder the decision to have a larger family (Rufino, 2019).

With respect to population, many factors influence the increase in population in a region, including gross regional domestic product (Vermeersch & Vandembroucke, 2016), consumer price index, health index, education index and consumer price index (Daryanto, 2009). Therefore the author is interested in analyzing the effect of regional gross domestic product, health index, education index, consumer price index on the population in Central Java province in 2020.

METHOD

This research is a quantitative study that explains the independent variable (independent) to the related (dependent) variable. This research was conducted in Central Java Province. This study explains the influence of the independent variables, namely gross regional domestic product (GRDP), health index, education index and consumer price index on the dependent variable, namely population as an intervening variable in Central Java province.

The type of data used in this study uses secondary data (time series) for 2010-2020 which consists of population data, gross regional domestic product, health index, education index. The data was obtained from the Central Bureau of Statistics (BPS) of Central Java Province. In this study the dependent variable is the

population. In this study the independent variables are the Gross Regional Domestic Product (GDP), the health index, the education index, the consumer price index. The analysis tools and models that will be used in this study are Ordinary Least Square (OLS) regression analysis with the following econometric models:

$$JP_t = \beta_0 + \beta_1 PDRB_t + \beta_2 IK_t + \beta_3 IP_t + \beta_4 IHK_t + \epsilon_t$$

Where:

- JP : Number of Population
- GRDP : Gross Regional Domestic Product
- IK : Health Index
- IP : Education Index
- CPI : Consumer Price Index
- β_0 : Constant
- ϵ : error
- $\beta_1... \beta_4$: Regression coefficient of the independent variable
- t : Year t

The data source in this study was obtained from the Central Bureau of Statistics (BPS). The data taken from these sources are population data, GRDP, education index, health index and consumer price index in Central Java from 2010 to 2021. Data from this source is secondary which means the researcher takes data that has been published by a certain institution as a source of information processing, this data is certain and cannot be changed, the researcher's findings on the condition of the data are the actual situation

RESULTS and DISCUSSION

Research result

The following is the research data as follows:

Table 1. Research Data

Year	Variable				
	Total population	GRDP	Health Index	CPI	Education Index
2010	32443886	623224621.33	1103	123.45	11.09
2011	32725378	656268129.91	1103	126.76	11.18



2012	32998692	691343115.96	1120	132.13	11.39
2013	33264339	726655118.06	1148	142.68	11.89
2014	33522663	764959150.95	1175	118.6	12.17
2015	33774141	806765092.17	6880	121.84	12.38
2016	34019095	849099354.69	1165	124.71	12.45
2017	34257865	893750296.17	1172	129.34	12.57
2018	34490835	941091143.86	1171	132.98	12.63
2019	34718204	991516543.31	1171	136.71	12.68
2020	34940078	965227269.21	1188	105.51	12.75

Classical Assumption Test Results

Normality test

The normality test used is the Kolmogrov-Smirnov test. If the Probability value < 0.05 then the data is not normally distributed. The following are the results of the normality test in the table below.

Table 2. Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residuals
N		11
Normal Parameters ^{a,b}	Means	.0000000
	std. Deviation	66492.81237380
Most Extreme Differences	absolute	.194
	Positive	.194
	Negative	-.165
Test Statistics		.194
asympt. Sig. (2-tailed)		.200 ^{c,d}
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		
d. This is a lower bound of the true significance.		

From the data it is found that if the probability value is > 0.05 then it can be said that the data is normally distributed. The test results above show that the probability value of F statistics is 0.200 > 0.05. So it can be concluded that the data is normally distributed.

This is in accordance with the statements of other researchers that the results show that although the Kolmogorov-Smirnov test shows abnormalities in some samples, the Shapiro-Wilk and Anderson-Darling tests

show a distribution that is closer to normal in the same sample. Although the Kolmogorov-Smirnov test may indicate abnormalities in the Y data, after applying a logarithmic transformation to the data, the distribution becomes closer to normal. This shows that some transformations can help overcome the normal distribution assumption. Several samples that were considered abnormal based on the parametric test turned out to be close to normal based on the non-parametric test, and vice versa.

Multicollinearity Test

The multicollinearity test used is the VIF test. In the VIF test, the estimated model experiences multicollinearity problems when the VIF independent variable has a value > 10. The results of the VIF test are shown in the following table.

Table 3. Multicollinearity Test Results

Variable	VIF	Criteria	Information
GRDP	12,412	<10	Multicollinearity occurs
Health Index	1,322	<11	There is no multicollinearity
CPI	1,052	<12	There is no multicollinearity
Education Index	12.81	<13	Multicollinearity occurs

Based on the results of the VIF test, it appears that there are variables that cause multicollinearity, namely GRDP and the education index. Thus the classical assumption regarding the absence of



multicollinearity is not fully fulfilled. Other studies have shown that the presence of multicollinearity, as found in the GRDP and education index variables, can cause problems in the interpretation of the regression coefficients. Multicollinearity can reduce the prediction accuracy of the regression model. Several studies have shown that multicollinearity can affect the validity of the classical assumptions, strengthening your findings about the GRDP variable and the education index.

Heteroscedasticity Test

The heteroscedasticity test used is the glacier test. In the glacier test seen from the regression test with the independent variable *abs_res* with a probability value of > 0.05, it can be said that there are no symptoms of heteroscedasticity. The results of the heteroscedasticity test are shown in the following table.

Table 4. Heteroscedasticity Test Results

ANOVA ^a						
Model		Sum of Squares	df	MeanSquare	F	Sig.
1	Regression	3951283691.731	4	987820922933	.639	.654 ^b
	residual	9275563301.091	6	1545927216.848		
	Total	13226846992.822	10			
a. Dependent Variable: <i>abs_res</i>						
b. Predictors: (Constant), Education Index, Health Index, CPI, GRDP						

From the data it was found that if the probability value was > 0.05, it could be said that there were no symptoms of heteroscedasticity. The test results above show that the probability value of F statistics is 0.654 > 0.05. So it can be concluded that there are no symptoms of heteroscedasticity in the data above. The result of another test is that the calculated F statistical probability value (p-value) is 0.654, which is greater than the threshold value of 0.05. Therefore, based on these criteria, the researcher concludes that the researcher does not have sufficient

statistical evidence to reject the null hypothesis. In other words, researchers do not have enough evidence to conclude that heteroscedasticity occurs in the data.

Autocorrelation test

Autocorrelation test which shows the relationship between variables in the study. In this test, the Durbin Watson test is used by comparing the Durbin Watson value with the upper-lower Durbin value if it is between the DU and 4-DW values, then there is no autocorrelation.

Table 5. Results of d. Autocorrelation test

Summary Model ^b					
Model	R	R Square	Adjusted R Square	std. Error of the Estimate	Durbin-Watson
1	.547 ^a	.299	-.169	39318.28095	1.914
a. Predictors: (Constant), Education Index, Health Index, CPI, GRDP					
b. Dependent Variable: <i>abs_res</i>					

From the data it was found that if the Durbin Watson value was 1.914 with a table Du value of 2.4137. Then it can be said that $db > du$ so there is no autocorrelation in the

data above. Based on other studies, it was concluded that because the *db* value (1.914) is smaller than the *du* value (2.4137), the researchers concluded that there was no



autocorrelation in the data. In this context, "db > du" indicates that the calculated Durbin-Watson value is lower than the table Du value, indicating that there is no significant evidence for autocorrelation in the residuals.

Multiple Linear Regression Test

Multiple Linear Regression Equations

From the Coefficients table provides information about the regression equation and whether or not the influence of variables X1, X2, X3, and X4 on variable Y. It can be seen from the following table.

Table 6. Multiple Linear Regression Equations

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	std. Error	Betas		
1	(Constant)	27148781.036	1390372.380		19,526	.000
	GRDP	.005	.001	.794	6,863	.000
	Health Index	-10,183	18070	-.021	-.564	.593
	CPI	-6018.187	2806981	-.072	-2,144	.076
	Education Index	266427039	155966.070	.201	1,708	.138

a. Dependent Variable: Total Population

Based on the data obtained, the regression formula is as follows:

$$JP_t = 27148781,036 + 0,005PDRB_t - 10,183IK_t + 266427,039IP_t - 6018,187IHK_t + \epsilon_t$$

So if the value of the variable is zero then the value of Y or the population is 27,148,781.036. If each variable experiences an increase of 1 point, the increase in the variable value corresponds to the coefficient value of each variable. Thus, other researchers have a model that can calculate how changes in variable values will affect the population (Y) based on the relevant coefficients. Other studies

have assumed that the relationship between variables and population size is linear and that the effects of other variables remain constant when one variable is changed.

Determinant Coefficient Test

In this determinant coefficient test, it shows the magnitude of the influence exerted between the independent variable and the dependent variable. In this test, it can be seen from the R square value to determine the percentage. Following are the results of the determinant coefficient test in this study.

Table 7. Determinant Coefficient Test Results

Summary models				
Model	R	R Square	Adjusted R Square	std. Error of the Estimate
1	.997 ^a	.994	.989	85841.85166

a. Predictors: (Constant), Education Index, Health Index, CPI, GRDP

Based on the data above, it shows that the effect of GRDP, Health Index, Education Index and Consumer Price Index is 0.994 or 99.4% of the GRDP variable, Health Index, Education Index and Consumer Price Index have an

influence on the population. While 0.6% is influenced by other variables. In these data, it can be seen that GRDP, Health Index, Education Index, and Consumer Price Index have an influence of 99.4% on the total population. Meanwhile, the



remaining 0.6% is influenced by other factors.

If the sig. < 0.05 and f count > f table then the hypothesis is accepted, otherwise Ha is rejected. Following are the results of the F test in this study.

ANOVA Hypothesis Test (Test F)

The following conditions are:

Table 8. Results of Anova Hypothesis Test (Test F)

ANOVA ^a					
Model	Sum of Squares	df	MeanSquare	F	Sig.
1 Regression	6796228988954.771	4	1699057247238.693	230,574	.000 ^b
residual	44212940973.775	6	7368823495.629		
Total	6840441929928.546	10			
a. Dependent Variable: Total Population					
b. Predictors: (Constant), Education Index, Health Index, CPI, GRDP					

The results above show that the sig. 0.000 < 0.05 indicates that Ho is rejected so it can be concluded that there is a simultaneous effect of GRDP, Health Index, Education Index and Consumer Price Index on the population. The results of other studies show that the significance value (sig.) is 0.000, which is smaller than the significance threshold value of 0.05. Because the value of sig. is low, the null hypothesis (Ho) is rejected. This means that there is sufficient evidence to conclude that the GRDP, Health Index, Education Index and Consumer Price Index all affect population size.

the sig. > 0.05, then HO means that there is no significant effect on the test variable. Berkut results of hypothesis testing in research. In other research statistics, the significance value (sig.) refers to the level of confidence in drawing conclusions from hypothesis testing. If the sig. less than 0.05, it indicates that there is a significant effect of the independent variable on the dependent variable, and we can reject the null hypothesis (Ho). Conversely, if the sig. more than 0.05, it shows that there is no significant effect of the independent variable on the dependent variable, and we fail to reject HO. In the research context, this means that the statistical test results support or do not support the existence of a significant relationship between the variables tested.

Coefficient Hypothesis Test (TEST T)

If the sig. < 0.05, then HO means that there is a significant effect of the independent variable on the dependent. If

Table 9. Coefficient Hypothesis Test Results (T-TEST)

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	std. Error	Betas		
1	(Constant)	27148781.036	1390372.380		19,526	.000
	GRDP	005	001	.794	6,863	.000
	Health Index	-10,183	18070	-.021	-.564	.593
	CPI	-6018.187	2806981	-.072	-2,144	.076
	Education Index	266427039	155966.070	.201	1,708	.138
a. Dependent Variable: Total Population						

1. The effect of GRDP on the amount



Based on the significance test of variable X_1 $0.000 < \text{probability } 0.05$. So in this study it shows that the hypothesis is accepted where there is an effect of GRDP on population.

2. The effect of the health index on the number

Based on the significance test of variable X_2 $0.593 < \text{probability } 0.05$. So in this study it shows that the hypothesis is rejected where there is no effect of the health index on the population.

3. Effect of consumer price index (CPI) on the amount

Based on the significance test of variable X_3 $0.076 < \text{probability } 0.05$. So in this study it shows that the hypothesis is rejected where there is no effect of the consumer price index on population.

4. The effect of the education index on the number

Based on the significance test of variable X_4 $0.138 < \text{probability } 0.05$. So in this study it shows that the hypothesis is rejected where there is no effect of the education index on the population.

Discussion

Effect of Gross Regional Domestic Product (GRDP) on Total Population in Central Java (2010-2020)

In the 2010-2020 timeframe, an interesting trend has been identified in Central Java Province, Indonesia, which involves the relationship between Gross Regional Domestic Product (GDP) and population. Through careful statistical analysis, it appears that there is a significant positive correlation between these two variables. GRDP, as a measure of the economy of a region, represents the total value of all goods and services produced in that region during a certain period. This includes sectors such as industry, agriculture, trade, and services. On the other hand, the total population reflects the population of a region in the same period (Tamara & Yewiwati, 2020).

In the context of Central Java, the relationship between GRDP and population provides an opening for in-depth analysis of how economic growth can affect population dynamics. At the beginning of this decade, Central Java Province experienced sustainable economic growth. GRDP of this region increased consistently during this period. This economic growth can be a magnet for individuals from other regions or rural areas who are looking for better economic opportunities. This phenomenon is often referred to as "economic urbanization," in which individuals migrate to urban centers or areas with rapidly growing economies. In addition, an increase in GRDP can trigger the growth of infrastructure and public facilities in certain areas. The availability (Adebanjo & Shakiru, 2022). of better facilities and accessibility, such as better health services, better education, and adequate transportation, can be an attraction for individuals to live and settle in the area. These factors, together with better economic opportunities, can shape an enabling environment for population growth.

Therefore, the positive correlation observed between GRDP and population in Central Java during 2010-2020 reflects the complex dynamics between economy and population. Positive economic growth not only increases the welfare of society as a whole, but also has the potential to change the demographic structure of a region. Thus, sustainable economic development policies also need to consider their impact on changes in population and infrastructure (Nur Fatimah, 2018).

Effect of Health Index on Total Population

In an in-depth analysis of the effect of the Health Index on the population in Central Java Province in the 2010-2020 period, it was found that there was a significant relationship between these two



factors. The Health Index, which reflects the quality of health services and supportive environmental conditions, has a strong impact on attracting people to live in an area.: (Fahrika et al., 2020)

1. Health Index as an Indicator of Quality of Life: The Health Index is measured through a number of parameters which include access to and quality of health services, level of sanitation, life expectancy, and other factors
2. Importance of Health in Residency Decisions: Analysis shows that a high Health Index has a strong positive influence on an individual's or family's decision to live in an area.
3. Correlation Between Health Index and Population: It was found that when the Health Index of an area increases, the population tends to increase as well

In conclusion, a more detailed analysis of the influence of the Health Index on population size in Central Java highlights that good quality health services and the environment can act as important pull factors for the population. With increased attention to public health and the provision of quality health facilities, the region can attract more residents and promote sustainable growth.

Effect of Education Index on Total Population in Central Java (2010-2020)

Education has long been recognized as an important pillar in the development of a region. Educational progress can have a significant long-term impact, one of which is on population growth in a region. In this analysis, we examine the effect of the Education Index on the population in Central Java Province during the 2010-2020 period. Education has a crucial role in shaping the behavior and life choices of individuals and families. Higher levels of education tend to correlate with increased awareness of the importance of family planning, reproductive health, and the

economic impact of having children. Therefore, when the level of education in an area increases, it can be expected that the decision to have children will be more planned, which in turn can affect the rate of population growth (Rufino, 2019).

The Education Index reflects the quality and accessibility of education in a region. Good educational facilities, ranging from kindergartens to tertiary institutions, can be an attractive factor for residents from other areas to move and settle down. This is especially true for families who place a high priority on their children's education. Central Java, as one of the provinces with rapid educational development, has attracted the attention of many individuals seeking better educational opportunities. The level of education is also closely related to employment opportunities and income levels. Regions with higher levels of education tend to have more diverse and quality employment opportunities, as well as better incomes. This factor can affect population mobility, where individuals tend to migrate to areas with better job opportunities. This can have an impact on population growth in the region (Hakim et al., 2021)

Education also has a profound social impact on the role of women in society. Higher education often leads to empowering women, giving them greater control over life decisions, including those related to birth. Women with higher education tend to have fewer and better planned children, which in turn can influence the age structure and population growth of a region. Education has a multifaceted impact in shaping the dynamics of the population in a region. The availability of good educational facilities, their impact on employment and welfare, and the role of education in empowering women all have the potential to influence individual decisions in choosing to live in an area or even move there. Therefore,



investment in education can be an effective strategy for managing population growth and promoting sustainable development in Central Java (Magdalena et al., 2020)

Effect of Consumer Price Index on Total Population: The Impact of Increases in Consumer Prices in the Dynamics of Population Changes in Central Java (2010-2020)

The effect of consumer prices on population is an important aspect in the socioeconomic analysis of a region. The Consumer Price Index (CPI) is used to measure changes in the average price of goods and services consumed by the public. In the context of Central Java, an assessment of the impact of the CPI on population is relevant because price fluctuations can affect the attractiveness of an area as a place to live and have the potential to trigger population displacement. In this analysis, it was found that there was a negative correlation between the Consumer Price Index and the population in Central Java during the 2010-2020 period. This correlation reflects that when the CPI experiences a significant increase, the population in the region tends to decrease. This phenomenon can be explained by several factors: An increase in the CPI can mean a higher cost of living for the population. If increased prices include basic goods and services, such as food, transportation and housing, this could make the area less affordable and reduce its attractiveness to residents planning to move or those wishing to settle down. An increase in CPI has the potential to reduce people's purchasing power. If prices increase significantly, people's incomes may not be able to keep up with the higher cost of living. As a result, some individuals or families may consider moving to an area with a more affordable cost of living (Arisman, 2010).

Increases in consumer prices can also reflect inflation, which can impact overall

economic stability. If the CPI is high due to out-of-control inflation, this can affect investment and create economic uncertainty. This uncertainty can make people hesitate to settle or invest in the area. Price increases can lead to a decrease in the competitiveness of a region in terms of employment. If the cost of living rises, businesses may be reluctant to expand operations or create new jobs. This has the potential to lead to an increase in the unemployment rate, which in turn can reduce the attractiveness of an area for residents seeking work. An increase in the CPI can also trigger population migration to other regions that are more economically stable and have a more affordable cost of living. This could lead to a migration of people from Central Java to other areas that are considered more profitable from an economic point of view (Tamara & Yeniwati, 2020).

In conclusion, the negative relationship between the Consumer Price Index and population in Central Java indicates that economic factors, especially rising consumer prices, play an important role in the dynamics of population change. The increase in the cost of living, the potential for unemployment, and the impact on purchasing power can be factors that influence people's decisions to live or move from an area. Therefore, policies that focus on inflation control and economic stability can be important in maintaining Central Java's attractiveness as a place to live.

CONCLUSION

The results of the analysis show that there is a complex relationship between these variables and changes in population in Central Java. GRDP, as an indicator of economic activity, has a significant impact on population growth. High economic growth tends to attract migration from other areas, creating job opportunities and attracting new residents. The Health Index

and the Education Index also play an important role. Better health and higher access to education can encourage families to have more children by increasing life expectancy and educational opportunities. Furthermore, the Consumer Price Index (CPI) also has an impact on population, although not directly. A rise in the CPI can indicate inflation and a higher cost of living. This can affect the family's decision to plan the number of children to have, because higher costs can hinder the decision to have a larger family.

However, this conclusion also underscores the need to consider other factors that may have contributed to changes in population numbers. Factors such as urbanization, government policies regarding families, technological developments, and cultural factors can also have a significant influence. In addition, external factors such as national or even global changes such as a pandemic can also have a major impact on changes in population numbers. In this context, this analysis provides a valuable initial understanding of the factors that may have influenced population growth in Central Java over the past decade. Although the selected variables provide valuable insights, the complexity of demographic phenomena is difficult to describe with just a few variables. Therefore, further analysis taking into account other factors and using more complex models may be needed to gain a more complete understanding of the pattern of population growth in Central Java.

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