



Determinants of Fertility in South Kalimantan in 2022

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Abstract. Efforts to reduce fertility constitute a significant concern in population policy planning. The handling of declining fertility in South Kalimantan from 2010 to 2020 has only decreased by 0.04. The main aim of this study is to determine the variables that significantly affect the fertility of women of childbearing age in the Province of South Kalimantan, Indonesia. This study makes use of Freedman's population studies theory. The data used is from the National Social-Economic Survey (SUSENAS) 2022. The independent variables included are the education of women of childbearing age, household income, age at first marriage for women of childbearing age, length of marriage for women of childbearing age, and infant mortality. Meanwhile, the dependent variable is the total fertility rate. The statistical method used is multiple linear regression. The results showed that all variables significantly affect fertility with infant mortality having the greatest influence on fertility. The Infant Mortality Rate has a very substantial impact on the statistical model.

Keywords: fertility, infant mortality, population studies.

1 Introduction

Population is the most important factor in development planning. Because the population is both the subject and object of development, this is the case. The composition and distribution of a large population should be uniform [1]. Moreover, if these conditions are accompanied by a healthy and sufficient population, it can be a catalyst for development progress [2].

In accordance with the results of the 1990 to 2020 Population Census (SP), Indonesia's population increased from 179.4 million to 270.20 million [3]. This represents an annual increase of approximately three million people. This number makes Indonesia the fourth most populous nation on the planet [2]. According to the Central Statistics Agency (BPS), Indonesia's population will reach 318.9 million in 2045 [4].

South Kalimantan is one of the provinces located on the island of Kalimantan. The province of South Kalimantan consists of eleven districts and two municipalities. Based on the results of the 2020 Longform Population Census, South Kalimantan will have a population of 4.18 million in 2022. South Kalimantan's population was 4.07

million in 2010; ten years ago. Over the past decade, South Kalimantan's population increased by 1.51 percent [5].

It is impossible to separate population growth from the impact of demographic factors, which include birth (fertility) and death (mortality) rates and migration [6]. One effort that really needs attention at this time is efforts to reduce fertility. This is due to the fact that fertility is more complex than mortality, as a woman can only die once but can have multiple children [2, 7]). One of the indicators used is the fertility level, which is measured by the Total Fertility Rate (TFR), which indicates the average number of children born during a woman's lifetime from the age of 15 to 49 [8].

In Presidential Regulation Number 18 of 2020 pertaining to the National Medium Term Development Plan (RPJMN), the TFR target for 2024 is specified as 2.10 children per woman. It is hoped that Indonesian women will be able to have two children during their reproductive years. Given that the results of the 2020 Long Form Population Census in 2022 indicate that the TFR for Indonesian women is 2.18 children per woman, this will be implemented effectively.

The total fertility rate (TFR) is a measurement of fertility. According to the results of the 2020 Long Form Population Census, South Kalimantan's total fertility rate (TFR) is 2.31. This figure means that the average child a woman has until the end of her reproductive period (15-49 years) in South Kalimantan Province is 2.31 children or in other words 2 to 3 children. In comparison to the total national fertility rate, however, Indonesia's TFR is 2.18. The TFR in South Kalimantan is higher than the national average. In accordance with Presidential Regulation No. 18 of 2020 pertaining to the National Medium Term Development Plan (RPJMN), the TFR target for 2024 is set at 2.10 children per woman. This is why efforts are being made to reduce the TFR by examining the variables that can influence and reduce fertility rate.

The purpose of limiting population growth is to alleviate concerns regarding the availability of natural resources to meet demand. If we do not curb population growth, available natural resources will deplete each year, resulting in food shortages and diminished quality of life [9].

This study will investigate the relationship between education of women of childbearing age, household income, age at first marriage, duration of marriage, and infant mortality.

2 Literature Review

2.1 Women of Childbearing Age

Women within the reproductive age range (15–49 years), regardless of their marital status, are childbearing women. The reproductive capability of women aged 20-45 remains optimal. Males have a shorter fertility span than women. There is a 95% chance of conception between the ages of 20 and 29, when fertility is at its peak [10]. During the 30s, the probability drops to 90%. In contrast, the likelihood of becoming pregnant decreases to 40% upon reaching the age of 40. After the age of 40, a woman's peak probability of becoming pregnant drops to 10%. Understanding

challenges associated with reproductive fertility is crucial. Throughout this fertile period, women should prioritize the maintenance and hygiene of their reproductive organs, including the early detection of cervical cancer in women [11].

According to the BKKBN, a woman of childbearing age is a wife who is between 20 and 35 years of age, or who is less than 15 years of age and has experienced menstruation or menstruation, or who is over 50 years of age but is still experiencing menstruation or menstruation. According to the Indonesian Ministry of Health, women of childbearing age are those who are still of reproductive age, between the ages of 15 and 49, and who are unmarried, married, or widowed. Women of Reproductive Age (WRA) are women whose reproductive organs are fully functional between ages 20 and 29 [12].

2.2 Education of Women of Reproductive Age

Women are essential to society. A woman/woman is a mother, sibling, child, spouse, or aunt. In Islam, women play an important role in a variety of spheres, including the religious, social, political, and economic spheres[13]. Education for women is the first step in reducing fertility in Indonesia. When women have a higher level of education, they will have a broader perspective, so they will choose to work first and delay marriage. The findings of this study indicate that women's education has a negative and statistically significant effect on fertility in Indonesia [2]. Women's education has a negative and significant effect on the fertility [9].

2.3 Household Income

Births cannot occur without adequate financial support [14]. Consequently, household income plays a significant role in maintaining fertility levels. Parenthood can be evaluated from an economic perspective, in terms of its utility and expense. In terms of utility, parents can benefit if their child is employed, which is frequently the case in low-income families, thus influencing the optimal number of children [15, 16, 17].

In the meantime, the costs associated with raising children are the costs associated with owning children, as children are considered durable consumer goods [18]. The benefits obtained from a child are consumer goods, specifically as solace for the parents [19 , 20]. Moreover, the use of a child as a means of production, i.e., the expectation that a child can work to increase family income. Lastly, the use of a child as a source of comfort for elderly parents.

2.4 Age of First Marriage

One of the individual characteristics believed to influence childbirth is the age at first sexual activity [21]. The age of marriage is one of the factors that determine a woman's fertility; the age of a woman's first marriage is closely related to her risk of early pregnancy. Younger women who marry are more likely to become pregnant. Women who marry younger have more children than those who marry later in life. The longer the reproductive period, the younger the age of marriage [22].

2.5 Length of Marriage

The length of time a person is in a marriage relationship is closely related to the age of their first marriage. The younger a woman is when she marries for the first time, the longer she will be married, and thus the longer her reproductive period will be. This is only the case if the marriage is intact and there is no dissolution of the marriage through live divorce, death divorce, or the use of contraception [23].

A longer duration of marriage increases the likelihood that couples of childbearing age will have children. The duration of a couple's marriage is an important factor in fertility studies [24]. Long-married women will be endowed with a higher fertility rate.

2.6 Infant Death

The greater number of children who die, the greater likelihood that a woman will bear children [25]. This is consistent with the theory proposed that explained who proposed three mechanisms to describe the relationship between infant mortality and fertility [26]. First, the death of a baby will have a direct effect on the mother's fertility because she will no longer breastfeed her child. This is related to the mother's psychological state and the role of breast milk in contraception. Second, the family's psychology dictates that if a baby or child dies, they will want to quickly replace it by becoming pregnant and giving birth again. Third, view children as savings in the event that one of the infants dies unexpectedly. In this case, a couple typically has a large number of children in the event of an unexpected death.

2.7 Fertility of Women

Fertility can be considered the concrete results of a woman's capacity to reproduce. From a demographic perspective, fertility refers to the count of live births [2, 27]. In addition to this, fertility can be defined as the occurrence of a live birth, specifically the emergence of a newborn from a woman's uterus, accompanied by indications of vitality, such as vocalization, tears, respiration, heartbeat, and similar manifestations [2, 9, 27].

3 Method

This is a quantitative study that focuses on married women of childbearing age as its primary subjects. Quantitative research is a method for validating established theories or previous research by examining the relationships between variables. These variables are quantifiable and are subsequently analyzed using statistical techniques. This study modifies Freedman's model of adolescent fertility and human capital investment. The secondary data utilized is compiled and obtained from the Central Bureau

of Statistics for the Province of South Kalimantan's March 2022 National Socio-Economic Survey. Using quantitative analysis on secondary data, the dominant variable that influences fertility in South Kalimantan Province is identified. Path analysis is the technique used for analysis.

4 Results and Discussion

Before examining the impact of the independent variable on the dependent variable, standard regression assumption tests such as the normality test, multicollinearity test, and heteroscedasticity test will be conducted.

4.1 Normality test

Using the Kolmogorov-Smirnov test, The model satisfies the normality assumption when the Kolmogorov-Smirnov test results have a significance value greater than 0.05.

Table 1. Normality test results.

Kolmogorov-Smirnov	Significance Value	Normal distribution criteria	Conclusion
(1)	(2)	(3)	(4)
0,311	0,133	Significance level >0,05	Unstandardized Residuals are normally distributed

Source: Susenas data processed

The significance value for the Kolmogorov-Smirnov test is 0.133, so it can be concluded that the data utilized for the structural equation model are normally distributed.

4.2 Multicollinearity Test

The multicollinearity test determines whether the regression model identifies a correlation between independent variables. By examining the correlation matrix of independent variables, multicollinearity can be observed. A Variance Inflation Factor (VIF) value of less than 10 and a Tolerance value close to 0 indicate the absence of collinearity.

Table 2. Multicollinearity Test Results.

Independent Variables	Tolerance	VIF	Conclusion
(1)	(2)	(3)	(4)
Education	0,741	1,349	Multicollinearity does not occur

Independent Variables	Tolerance	VIF	Conclusion
Household Income	0,898	1,113	Multicollinearity does not occur
Age of First Marriage	0,798	1,253	Multicollinearity does not occur
Length of Marriage	0,793	1,261	Multicollinearity does not occur
Infant Death	0,958	1,044	Multicollinearity does not occur

Source: Susenas data processed

The multicollinearity test yields Variance Inflation Factor (VIF) values that do not exceed 10 and Tolerance values that are close to 0 for all variables examined. Therefore, we can conclude that collinearity does not exist.

4.3 Heteroscedasticity Test

The heteroscedasticity test is to test whether the regression model has unequal variance from the residual or observation to the next observation. Detecting heteroscedasticity in this study used the Glejser Test. If the significance value is above 0.05 then the regression model does not experience heteroscedasticity.

Table 3. Heteroscedasticity Test Results.

Independent Variables	Tolerance	VIF	Conclusion
(1)	(2)	(3)	(4)
Education	0,143	Significance Level > 0,05	Heteroscedasticity does not occur
Household Income	0,125	Significance Level > 0,05	Heteroscedasticity does not occur
Age of First Marriage	0,115	Significance Level > 0,05	Heteroscedasticity does not occur
Length of Marriage	0,186	Significance Level > 0,05	Heteroscedasticity does not occur
Infant Death	0,195	Significance Level > 0,05	Heteroscedasticity does not occur

Source: Susenas data processed

The results of the heteroscedasticity test indicate that each variable has a significance level greater than 0.05. This demonstrates that heteroscedasticity is not present.

4.4 Simultaneous Model Test (F Test)

The F significance test determines whether the independent variables have an effect on the dependent variable when considered together. In this investigation, the F count and F table values are compared, or the significance level is less than 0.05. When F

count is greater than F table, the independent variable influences the dependent variable simultaneously.

Table 4. F Test results

Ftable	Significance Level	Conclusion
(1)	(2)	(3)
43741,552	0,000	Has Simultaneous effect

Source: Susenas data processed

In accordance with the Significance F test results table, the significance value is less than 0.05. In South Kalimantan, the variables Education, Household Income, Age at First Marriage, Length of Marriage, and Infant Mortality influence the fertility of women of childbearing age.

4.5 Testing Partial Model (T Test)

The t test indicates the extent to which an independent variable influences the dependent variable. When t count is greater than t table and p-value is less than 0.05, the independent variable has an effect on the dependent variable.

Table 5. T test results.

Independent Variables	tcount	Significance Level	Conclusion
(1)	(2)	(3)	(4)
Education	-84,748	0,000	Negative influence
Household Income	-94,890	0,000	Negative influence
Age of First Marriage	-62,913	0,000	Negative influence
Length of Marriage	64,041	0,000	Positive influence
Infant Death	440,910	0,000	Positive influence

Source: Susenas data processed

According to the results of the t test, education, household income, and age at first marriage have a negative impact on fertility. In other words, the lower the fertility rate of women of childbearing age in South Kalimantan Province, the higher the education of women of childbearing age, the household income, and the age at first marriage. This is also true in reverse. At the same time, the variables of duration of marriage and mortality have positive effects on the rate of reproduction. This indicates that an increase in the duration of marriage and infant mortality will result in a rise in the fertility rate.

4.6 Structural Equation Model

Based on the results of the classic linear regression assumption test, the structural equation model formed is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon \tag{1}$$

Fertility (Y) = 2,134 - 0,033 Education (X1) -0,000000002983 Household Income (X2) - 0,002 Age of First Marriage (X3) + 0,001 Length of Marriage (X4) + 0,014 Infant Mortality (X5) + ε

Displayed equations are centered and set on a separate line.

This equation model can be explained as follows:

- a) The constant value (β₀) of 2.134 indicates that when the variables Education, Household Income, Age at First Marriage, Length of Marriage, and Infant Mortality have the value 0, the fertility of women of childbearing age in the province of Kalimantan is 2.134.
- b) The coefficient of the Education variable (β₁) has a negative value (-0.033). This means that the fertility of women of childbearing age will decrease by 0.033 for every 1 point increase in their education.
- c) The coefficient of the variable Household Income (β₂) has a negative value (-0.000000002983). The fertility of women of childbearing age decreases by 0.000000002983 for every 1 rupiah increase in household income.
- d) The coefficient value of the variable Age at First Marriage (β₃) is -0.002 with a negative value, which indicates that the fertility of women of childbearing age will decrease by 0.002 each time the age at first marriage increases by 1 year.
- e) The coefficient value for the variable duration of marriage (β₄) is 0.001 with a positive value, indicating that the fertility of women of childbearing age will increase by 0.001 for every 1-year increase in age at first marriage.
- f) The coefficient value of the Infant Mortality variable (β₅) is 0.014, which indicates that the fertility of women of childbearing age will increase by 0.014 for every 1-point increase in the risk of infant mortality.

4.7 Coefficient of Determination (R²)

R² or the coefficient of determination measures how well the independent variable explains the dependent variable. The closer R² is to 1, the greater the ability of the independent variable to explain the dependent variable, and thus the superiority of the resulting model.

Table 6. Coefficient of Determination of Structural Equations

R	R square
(1)	(2)
0,948	0,898

Source: Susenas data processed

Based on the data in the preceding table, the R² value is 0.898%. This value indicates that the variables Education of Women of Childbearing Age, Household Income, Age at First Marriage, Length of Marriage, and Infant Mortality can explain 89.8 percent of the variation in fertility in South Kalimantan Province.

4.8 The Effect of Education on Fertility

Education plays a pivotal role in enhancing an individual's cognitive capacity. Reflecting on and resolving matters pertaining to fecundity entails deliberating on the age at which an individual enters onto matrimony for the first time and the quantity of living offspring. An individual's study time tends to extend in tandem with the level of education attained. Therefore it conclude that the number of surviving births is declining [28]. Women will be more receptive to new values, such as the notion that happiness and prosperity can be achieved with a smaller family size, if they acquire a greater level of education [29].

In this research, the education variable has a significant influence with a total influence value of -0.156. A negative value indicates that the higher the level of education women of childbearing age receive, the smaller the number of live children born to women of childbearing age and vice versa. The ideal reproductive period for women aged 15 to 49 years will decrease when women spend more time pursuing higher education. Thus, when women have higher education, they will have a tendency to have fewer children.

4.9 The Effect of Household Income on Fertility

The impact of household income on fertility is -0.172. According to the findings of the study, household income negatively affects fertility; that is, as household income increases, the number of live births decreases, and vice versa. In households with lesser incomes, the probability of having a greater number of children increases.

The expenses accrued by parents in the process of raising their children as durable consumer commodities [18]. For parents, the role of children as consumer products elicits joy and comforts sorrow. Parents and children can maintain friendships into old age. In affluent communities where parents are predominantly career-oriented, procreation is perceived as an expensive endeavor and a financial burden. Consequently, a social stigma develops. A decline in the desire to have children is observed as the household income increases [30].

4.10 The Effect of Age at First Marriage on Fertility

The impact of age at first marriage on overall fertility is -0.025. According to the findings of the study, there is a negative relationship between the age of first marriage and fertility. Specifically, the number of live births among women of reproductive age in South Kalimantan Province decreases as the age of first marriage increases. As the

age of a woman of reproductive age increases, her likelihood of conceiving or the frequency of her pregnancies decreases in her first marriage.

Fertility is adversely affected by the age of first marriage [29]. Similarly, according to another research, the older a person is when they enter into matrimony, the more rational and emotionally stable they are [31], which leads them to prefer having fewer children. By maintaining a limited number of children, parents are able to furnish optimal educational facilities for their offspring. More specifically, a small family consisting of a few children enables its members to afford superior amenities for each child, including educational resources [32].

4.11 The Effect of Duration of Marriage on Fertility

By a factor of 0.069, the length of marriage variable affects fertility. There exists a positive correlation between the duration of matrimony and fecundity. This indicates that the fecundity of women of childbearing age increases with the length of their marriage. The age of an individual's first marriage exhibits a strong correlation with the duration of their matrimonial union. As the age at which a woman enters into her first matrimonial union decreases, the duration of her matrimonial union also increases. This will result in an extension of the reproductive cycle [23].

4.12 Effect of Infant Mortality on Fertility

The variable representing infant mortality exerts a coefficient of 0.432 on fertility. Infant mortality exhibits the most substantial impact on fertility when compared to the other variables incorporated in this research. Fertility is positively correlated with infant mortality; thus, an increase in the number of live births of children corresponds to a decrease in the number of infant fatalities. Concern for the loss of a child can increase the desire to have more children in situations with a high death rate [33].

Angeles attempted to determine the relationship between neonatal mortality rates and the number of live births in 2010. As a consequence, fluctuations in mortality rates significantly influenced the decline in fertility. Subsequently, Endeavors to raise life expectancy or diminish infant mortality, particularly in low and middle income nations, would ultimately result in a reduction in birth rates and an improvement in the health conditions of mothers and children through the facilitation of unrestricted access to high-quality family planning services [34].

5 Conclusion

This study reveals that several factors significantly influence the fertility rate of women of childbearing age in South Kalimantan Province. It is worth noting that the education level attained by women of childbearing age has a significant influence on fertility patterns in the region. Furthermore, economic factors are also crucial, in which household income plays a role in regulating the birth rate. Another interesting finding is that the age at first marriage also influences birth rates, where a higher age

at first marriage tends to be associated with lower fertility rates. Moreover, the results of this study identify the direction of influence of these factors on the fertility of women of childbearing age. In particular, education of women of childbearing age, household income, and age at first marriage were found to have a negative effect on birth rates. Higher education, income, and older age at first marriage tend to contribute to lower birth rates.

On the other side, factors related to the continuity of marriage, such as length of marriage and infant mortality, have the opposite effect. Longer marriage duration and infant mortality in the family are associated with higher fertility rates. This research provides deeper insight into the dynamics of fertility in South Kalimantan Province and the factors that contribute to birth patterns in the region. Policy steps can be taken to manage population growth in this area by understanding these factors.

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