

Single Mother Status and Children Education: Evidence from Indonesian Panel Data

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ABSTRACT

This study explores children education of single mother households using panel data from the Indonesia Family Life Survey (IFLS) wave 4 and 5 in 2007 and 2014. Using 7,324 children from single mother families in the age range of 6-15 years in IFLS 4 and the same children age 13-22 years in IFLS 5, estimate several children education outcomes such as: level of education, cognitive, grade repetition and possible working for pay. Apply probit and ordered probit, the results show that single mothers negatively affect children education outcomes. Children from single mother families have a lower probability of having a higher education level, have less score of cognitive assessment, more likely to repeat grade in school and join works for pay while school than those children from families with two parents. This study contributes to literature not only it investigate using longitudinal data but it also estimate several children educational outcomes of single mother households.

ملخص

تستكشف هذه الدراسة تعليم الأطفال في الأسر التي تعيلها أمهات عازبات باستخدام بيانات لوحة من استطلاع الحياة الأسرية في إندونيسيا (IFLS) الموجة 4 و 5 في عامي 2007 و 2014. باستخدام 7324 طفلاً من أسر أمهات عازبات تتراوح أعمارهم بين 6 و 15

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عاماً في IFLS 4 ونفس الأطفال الذين تتراوح أعمارهم بين 13 و 22 عاماً في IFLS 5، تم تقدير العديد من نتائج تعليم الأطفال مثل: مستوى التعليم، والقدرات المعرفية، وتكرار الصفوف الدراسية، واحتمال العمل مقابل أجر. باستخدام ordered و probit، أظهرت النتائج أن الأمهات العازبات يؤثرن سلباً على نتائج تعليم الأطفال. الأطفال من أسر أمهات عازبات لديهم احتمالية أقل في الحصول على مستوى تعليمي أعلى، ويحصلون على درجات أقل في التقييم المعرفي، ويكونون أكثر عرضة لتكرار الصف في المدرسة والانضمام إلى العمل مقابل أجر أثناء الدراسة مقارنة بالأطفال من أسر ذات والدين. تساهم هذه الدراسة في الأدبيات ليس فقط من خلال استخدام البيانات الطولية، ولكنها تقدر أيضاً العديد من النتائج التعليمية للأطفال من أسر أمهات عازبات.

RESUMÉ

Cette étude examine l'éducation des enfants dans les familles monoparentales dirigées par une femme à partir des données panel issues des vagues 4 et 5 de l'enquête sur la vie familiale en Indonésie (IFLS) menées en 2007 et 2014. À partir d'un échantillon de 7 324 enfants âgés de 6 à 15 ans issus de familles monoparentales dirigées par une femme dans l'IFLS 4 et des mêmes enfants âgés de 13 à 22 ans dans l'IFLS 5, plusieurs résultats scolaires ont été estimés, tels que le niveau d'éducation, les capacités cognitives, le redoublement et le travail rémunéré. À l'aide des modèles probit et probit ordonné, les résultats montrent que les mères célibataires ont un impact négatif sur les résultats scolaires de leurs enfants. Les enfants issus de familles monoparentales ont moins de chances d'atteindre un niveau d'éducation élevé, obtiennent des scores cognitifs moins élevés, sont plus susceptibles de redoubler à l'école et de travailler pendant leurs études que les enfants issus de familles biparentales. Cette étude contribue à la littérature non seulement en utilisant des données longitudinales, mais aussi en estimant plusieurs résultats scolaires des enfants issus de familles monoparentales.

Keywords: Single Mother, Children's Educational Outcomes, IFLS, Indonesia

JEL Classification: A20, I21, J13

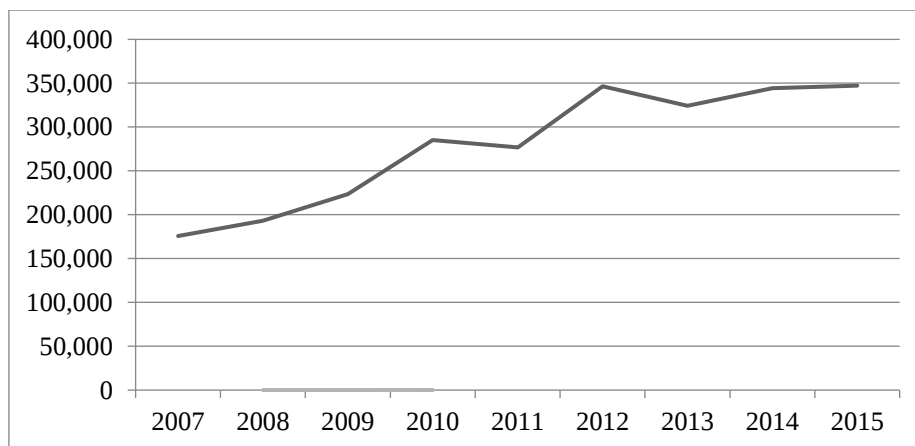
1. Introduction

The family is the smallest social group in society and the only social institution with full functions and roles as the main source of education (Popenoe, 2020). In general, an ideal family consists of a father, mother,

and children (Lan, 2020). The interaction between family members will give birth to status and roles, especially for parents who want to create and maintain family values in their children. In the process of self-development in children, the integrity of a family is one of the most influential factors (Dennison et al., 2019). In addition, the family also acts as a channel of informal education for the child (Bonal & González, 2020). This educational path is given to every individual from birth and throughout his life and will be the basis that will shape a person's habits, character, and behaviour in the future (Arina et al., 2019).

But in fact, there are various social realities that exist in life. One of these social realities is the phenomenon of single-parent families, which can be caused by divorce or the death of one partner (Cancian & Meyer, 2018; Kroese et al., 2021). The Central Bureau of Statistics (BPS) reports that the divorce rate in Indonesia continues to increase. In 2015, as many as 5.89% of married couples divorced. This is reinforced by statistical data on divorce cases in Indonesia from 2007 to 2015, whose number is relatively increasing across the years.

Figure 1: Divorce in Indonesia, 2007-2015



Source: Central Bureau of Statistics

Figure 1 shows that during this period, the decline in divorce cases in Indonesia only occurred in 2011 and 2013. In 2011, there was a decrease of 2.94%, and 6.41% in 2013. The highest spike in divorce cases occurred in 2012, by 25.1% and the highest number of divorce cases in Indonesia

during this period occurred in 2015, when there were 347,256 divorce cases in Indonesia.

On the other hand, when compared to single fathers, single mothers tend to stand up for themselves to educate their children as well as earn a living alone (Koh, 2018). Single mother status also brings the consequences of changing the role of the mother and having full responsibilities both in the economy, education, or making the right decisions for the survival of herself and her children (Soomar, 2019).

A single-parent family tends to have economic limitations and a lack of parental attention (Nieuwenhuis & Maldonado, 2018). Single-mother families have relatively lower incomes and higher poverty rates (Härkönen et al., 2021). Parents with higher incomes are able to provide various educational resources that can create an intellectual atmosphere at home and are able to provide more educational facilities, both academic and non-academic (Pearce, 2004). In addition, the attention and involvement of parents in various daily activities of children is also one of the important things that affect their learning achievement (Dini et al., 2019). A single mother is forced by circumstances to fill two roles simultaneously, which can make them lose time and cause stress. This can lead to inconsistent parenting, less time with their children at home, and a lack of involvement in their children's academic matters (Winter et al., 2018).

Several studies related to single mothers have been conducted in various countries, both developed countries (Glauber et al., 2023; Harkness, 2022; Van Gasse & Mortelmans, 2020)—such as in Canada (Lipman et al., 2002), in Japan (Nonoyama-Tarumi, 2017), and in South Korea (Park, 2007)—as well as developing countries (Adeyeye, 2023; Ayebeng et al., 2022; Ghanney, 2024). The results of these studies are consistent, namely that children from single-mother families tend to have lower levels of education and academic achievement than children with complete parents, and there is an increased risk of psychosocial morbidity in children. However, the study conducted by (Amato et al., 2015) in the United States had different and inconsistent results with these studies. The results show that the increase in single mothers in general does not affect the learning achievement of children in the United States.

In addition, children raised in single-mother families due to divorce have significantly lower levels of education, employment status, and happiness in the future compared to children raised in single-mother families due to the death of the father (Biblarz & Gottainer, 2000). A recent study regarding the role of single-parent mothers in childcare in Indonesia concluded that single-parent mothers carry out dual roles well in meeting the needs of children in the affective function, socialization function, protection function, and education function (Bani et al., 2021). However, the function of the economy is not going well. Kharisma et al. (2022) found that children of single mothers tend to enter the workforce at an earlier age. This is primarily due to the need to meet financial pressures, particularly among children of low-income single mothers (Sandra et al., 2022).

Building on the issues previously outlined, it is apparent that empirical studies investigating the impact of single motherhood on children's educational outcomes in Indonesia remain limited. While various government initiatives—such as the Indonesia Pintar Program (PIP), School Operational Assistance (BOS), and the Family Hope Program (PKH)—have been implemented to improve educational quality nationwide, these programs have not explicitly addressed the specific challenges faced by children in single-mother households. Given the persistent economic and education disparities in Indonesia, a comprehensive understanding of these contextual factors is essential for informing the development of effective policy interventions. Such insights are not only critical for addressing educational challenges faced by children of single mothers within Indonesia but may also hold relevance for other regions and countries with comparable socioeconomic conditions.

More specifically, this study aims to examine the determinants influencing educational outcomes among children raised by single mothers in Indonesia. Educational outcomes are assessed using several indicators, including the highest level of education attained, cognitive ability, grade repetition, and engagement in paid work while attending school. This research uses a quantitative approach and uses panel data from the Indonesia Family Life Survey (IFLS) in 2007 and 2014 with statistical dataset collection methods.

2. Literature Review

In a single-mother family, there are many tasks, functions, and roles that are empty, missing, and not going well because there are only single parents and the absence of a father figure in the family. In particular, there are two important functions that are not fulfilled or family dysfunction, namely educational and economic functions, or interpersonal parenting resources and economic parental resources (Downey, 2016; Park, 2007).

Educational functions or interpersonal parenting resources that do not work well are due to the lack of parental involvement in children's daily activities and especially the lack of attention to their education. This is because a single mother has greater duties and obligations so that they have less time to spend on their education. They allocate time to be involved in their children's activities (Shirakawa, 2010). Meanwhile, the economic functions or economic parental resources are not fulfilled due to the limited sources of income received by single mother families. Single mothers tend to have lower incomes and higher poverty levels so that they cannot provide various educational resources or are unable to provide more opportunities for education (McLanahan & Sandefur, 1994; Pearce, 2004).

Children's needs that are not met are associated with family functions that do not work well. The three basic needs of children that have been described are physical-biomedical needs, emotional and affection needs, and mental stimulation needs. All three are interconnected and depend on the function of the family. Therefore, this is the cause of the negative impact given by single mother families on the level of children's education, academic achievement, the impact of dropping out of school, and the value of subjects in school (Astone & McLanahan, 1991; FINN & OWINGS, 1994; Mulkey et al., 1992).

Several studies on single mothers' effects on their children have been widely used. Studies related to comparisons between children raised in single-mother families due to the death of the father and those due to divorce have been carried out. Harkness (2022) found similarly that single mothers in 12 high-income countries have a negative correlation with educational outcomes for children. Single mothers face different economic disadvantages that may adversely affect their children's academic performance. This notion is supported by Ayebeng et al. (2022),

who also found that single mothers are correlated with lower educational outcomes and increased poverty levels. This is due to limited resources in households headed by single parents. Children who come from single mothers and have low incomes often find it difficult to engage and achieve in school and even struggle to access quality education, ultimately perpetuating the cycle of disadvantage (Glauber et al., 2023; Van Gasse & Mortelmans, 2020).

In the context of developing countries, the consequences of single mothers are often exacerbated by poverty, limited institutional support, and cultural stigma. A study conducted in West African showed that no direct negative impact of parental status, but children's self-motivation and institutional and community roles played an important role in children's academic outcomes (Adeyeye, 2023). Similarly, Ghanney (2024) found that although children of single mothers in Ghana often received more academic support, their children performed lower than children in two-parent households. This highlights the importance of household structure and socioeconomic support systems.

To the best of our knowledge, only a handful of studies in Indonesia have addressed the impact of single mother status on child educational outcomes. The study conducted by Saiin et al. (2024) found that single mothers often struggle to balance financial responsibilities and educational support for their children, which ultimately leads to a negative impact on educational outcomes. Lack of social and financial resources results in lower schooling opportunities for children compared to children with both parents (Njoku et al., 2020). Furthermore, a study conducted by Agustina et al. (2023) indicates that having both parents present has a positive impact on children's continuity in education. This finding aligns with Becker (1973) theory of marriage, which asserts that the capital of two-parent families is higher than that of single-parent families. Differences in family structures, particularly between complete and incomplete families, result in varying parenting styles. An incomplete family structure refers to a situation where one parent is absent or unable to actively contribute to the child's education. Children from two-parent families typically receive better financial support and educational resources compared to those raised by a single parent (Agustina et al., 2023).

In this study, we focused on various proxies for educational outcomes, including children's education level, cognitive abilities, grade repetition, and school attendance while working. Regarding cognitive abilities, several studies have shown different results. Arini et al. (2022) found that single mothers with lower self-efficacy are more likely to have children at risk for cognitive deficits, primarily due to insufficient stimulation and support. In addition, Steventon Roberts et al. (2022) discovered that young, less-educated single mothers can transmit cognitive deficits to their children, perpetuating the cycle of educational and economic disadvantage. Furthermore, Mbanjwa & Harvey (2023) highlighted that single mothers face significant stress and challenges in raising their children, which negatively impacts children's cognitive development. The emotional and financial burdens placed on these mothers hinder their ability to adequately support their children's cognitive growth.

The absence of a father not only affects a child's cognitive development but also influences the mother's behavior toward her child. One such effect is the encouragement of children to enter the labor market at an earlier age (Kharisma et al., 2022). Sandra et al. (2022) found that children living with single mothers are more likely to work due to financial pressures. Similarly, Nyariki et al. (2023) observed that children from single mothers with disadvantaged backgrounds are more likely to engage in work. This involvement in work is concerning, as it can negatively impact children's physical, psychological, and social development. Moreover, it has long-term detrimental effects on the accumulation of human capital in children.

We also consider grade repetition as one of the indicators for assessing educational outcomes, as it reflects the academic performance of children in incomplete families. Several studies have identified a positive correlation between single motherhood and grade repetition in children. Mahmood et al. (2023) concluded that children living with single mothers often face academic challenges, including grade repetition, due to emotional, behavioral, and psychological issues. In contrast, Lee & Shin (2021) found that single mothers who support their children's autonomy positively influence their self-confidence and academic discipline. This support helps children avoid procrastination and reduces the likelihood of grade repetition.

When looking at some of the research that has been done, it is impossible to separate the selection of proper control variables from the research. Some of the variables used are often related to parental education (Lipman et al., 2002), gender (Shook et al., 2010), age (Jones et al., 2002; Shook et al., 2010), number of siblings (Park, 2007), and parental income (Richter & Lemola, 2017).

In a single-mother family, family dysfunction occurs, which affects the child, the mother, and even the family itself. However, there are background characteristics, such as the characteristics of children, mothers, and households, that provide control over the dysfunction of the family. Characteristics of children such as gender, health status, travel time to school, and educational assistance. The characteristics of the mother are age, years of schooling, and working status. Furthermore, household characteristics such as level of expenditure, asset value, living environment, ownership of farming or non-farming businesses, social assistance, and number of household members should be considered.

According to Downey (2016), there are two dysfunctions in single-mother families that are not fulfilled, namely economic parental resources and interpersonal parental resources. The focus of this research is the influence of a single mother on children's educational and social outcomes, especially the impact on the education level of children from single-mother families.

3. Data and Methodology

This research is quantitative in nature, using secondary and panel data sourced from the Indonesia Family Life Survey (IFLS) wave 4 of 2007 and wave 5 of 2014. The IFLS is part of a longitudinal survey obtained from a survey of 13,500 households and 43,500 individuals in IFLS 4 and 15,000 households and 50,000 individuals in IFLS 5 in 13 provinces, namely North Sumatra, West Sumatra, South Sumatra, Lampung, DKI Jakarta, West Java, Central Java, Yogyakarta, East Java, Bali, West Nusa Tenggara, South Kalimantan and South Sulawesi (RAND, 2021). IFLS 4 is carried out by a collaboration between Research and Development (RAND) Corporation, the Center for Population and Policy Studies (CPPS) Gadjah Mada University and Survey Measurement Training Research (Survey METER). Meanwhile, IFLS 5 is only carried out by RAND Corporation and Survey METER.

The data collection method employs statistical dataset methods by accessing datasets of survey results from other institutions, namely the results of the RAND Corporation survey and the METER Survey related to the problem being studied. This statistical method uses data that is already available and has been collected by an authorized third party.

The determination of the sample in this study was made using a purposive sampling technique. The population in this study consists of households and individuals in Indonesia who were registered and interviewed in the 2007 IFLS wave 4 survey and the 2014 wave 5 survey. The unit of analysis used in this study is a sample of individuals aged 6–15 years in IFLS 4 who are the same individuals who were aged 13–22 years in IFLS 5, with a total of 7,324 individuals. The selection of analysis units for children aged 6–15 and those aged 13–22 aims to focus more on the impact of parental presence, especially in the case of single-mother households. With a sample size based on these inclusion criteria, the study may represent the unit of analysis on a national scale, as the sample is drawn from 13 provinces in Indonesia. Although waves 4 and 5 of the IFLS provide rich longitudinal data, the dataset may be susceptible to sample attrition and underrepresentation of temporary or marginalized populations, such as informal single-mother households, which could lead to biased estimates of the impact on children's educational outcomes. Therefore, we use several model control variables to minimize potential bias in the estimation model.

Furthermore, to explain the dependent variable, which is a discrete variable displayed as ordinal or nominal, with independent variables consisting of continuous, discrete or mixed variables, we applied the estimation method of the probit regression model (random effect ordered probit) for panel data. In addition, this study also employs the binary probit regression estimation method with panel data (random effect probit model) to estimate other educational and social outcomes as measured by cognitive, grade repetition, and children who go to school while working. Given that the dependent variables in the model we used—grade repetition, working while attending school, education level, and cognitive ability—are dummy and ordinal variables, the probit and ordered probit regression models allow for more accurate estimates of the underlying probability structure and address the non-linearity inherent in binary outcomes.

This study adopts an ordered probit regression model in a study conducted by Fountas & Anastasopoulos (2017), which begins by considering the following model:

$$y_{it}^* = x_{it}\beta + \varepsilon_{it}; i = 1, 2, \dots, n \text{ and } t = 1, 2, \dots, T \quad (1)$$

where,

$$y_{it}^* = \begin{cases} 1 & \text{if } y_{it}^* \leq \kappa_1 \\ 2 & \text{if } \kappa_1 < y_{it}^* \leq \kappa_2 \\ \vdots & \\ K & \text{if } \kappa_{K-1} < y_{it}^* \end{cases} \quad (2)$$

$$\varepsilon_{it} = u_i + v_{it} \quad (3)$$

The combination of errors (ε_{it}) contains two error components, namely u_i , which is a cross-section error component, and v_{it} , which is a combination of cross-section and time series error components (Wallace & Hussain, 1969). Therefore, the Random Effect Model (REM) is also called the Error Components Model (ECM). The random effect ordered probit model assumes an equicorrelation between successive errors belonging to the same individual and there is no correlation between u_i and v_{it} . In addition, u_i and v_{it} are assumed to be independent, identical, and normally distributed $u_i \sim IIN(0, \sigma_u^2)$, $v_{it} \sim IIN(0, \sigma_v^2)$.

According to Harris et al. (1998), to get a consistent and efficient estimator, the estimator to be used is the Maximum Likelihood Estimation (MLE) in the log likelihood function. The model constructed in this study is as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \beta_8 X_{8it} + \beta_9 X_{9it} + \beta_{10} X_{10it} + \beta_{11} X_{11it} + \beta_{12} X_{12it} + \beta_{13} X_{13it} + \beta_{14} X_{14it} + \beta_{15} X_{15it} + \beta_{16} X_{16it} + \varepsilon_{it} \quad (4)$$

Where the dependent variable which is the outcome of a child from a single mother uses the approach of the child's education level, the child's cognitive score, grade repetition and children who go to school while working. The children's education level refers to the questionnaire in book

K section AR16. Meanwhile, the child's cognitive score refers to the EK1 and EK2 books with 3 value categories, namely a score of 0–15, including a low category, a score of 16-30 in the medium category, and a score of 31–45, including a high score.

To avoid biased estimation results, in addition to the single mother variable, which is the main independent variable in this study, control variables such as the characteristics of children, mothers, and households are also added. Some of these variables include the child's gender, child's health status, school travel time and BOS (educational assistance), the mother's age, years of schooling, working status, level of expenditure per capita, asset value, living environment, ownership of farming and non-farming businesses, social assistance, and the number of household members. Table 1 describes the operational definitions of variables and summary statistics in this paper.

Table 1: Description of Variables and Summary Statistics

Variable	Type/Description	Mean	S.D.
Children education level	Ordinal/level	1,63	0,53
Cognitive	Ordinal/level	2,73	0,50
Grade repetition	Dummy (1: Yes, 0: Otherwise)	0,09	0,29
School while work	Dummy (1: Yes, 0: Otherwise)	0,06	0,24
Single mother	Dummy (1: Single mother)	0,11	0,31
Child gender	Dummy (1: Boy)	0,52	0,49
Children health status	Dummy (1: Health, 0: Otherwise)	0,63	0,48
Travel time to school	Minute/ratio	16,24	11,68
BOS	Dummy (1: Yes, 0: Otherwise)	0,29	0,45
Mother age	Years/ratio	39,63	13,26
Mother age square	Square	1746,93	1247,67
Mother education level	Years/ratio	7,68	4,43
Mother working status	Dummy (1: Yes, 0: Otherwise)	0,55	0,49
Expenditure level (log)	Ratio	13,28	0,70
Asset (log)	Ratio	14,25	1,27
Residence	Dummy (1: Urban, 0: Rural)	0,57	0,49
Farm business	Dummy (1: Yes, 0: Otherwise)	0,36	0,48
Non-farm business	Dummy (1: Yes, 0: Otherwise)	0,45	0,49
Social assistance	Dummy (1: Yes, 0: Otherwise)	0,18	0,39
Household member	Ratio	5,07	1,84

Source: IFLS 4 and 5 (processed data)

4. Empirical Results

Prior to data processing and hypothesis testing, it is necessary to carry out descriptive statistical analysis, which aims to obtain an overview and description of the variables used in this study. Based on the data that has been collected from IFLS wave 4 in 2007 and IFLS wave 5 in 2014, there were 7,324 individuals who met the criteria for the research sample.

4.1. Findings

Table 1 shows that the mean value for the dependent variable, namely the children's education level, is 1.63, which means that the individuals sampled in this study on average have an education in categories 1 and 2, namely primary and secondary schools. Furthermore, the cognitive variable has a mean value of 2.73, meaning that the individuals sampled in this study on average have cognitive scores in the medium and high categories. Meanwhile, the mean value of the grade repetition variable is 0.09, which means that the average individual never stays in class. Meanwhile, the school variable while working has an average value of 0.06, which means that the average individual sampled in this study does not attend school while working. Subsequently, the single mother variable, as the main independent variable in this study, has a mean value of 0.11, which indicates that on average a mother has married status. The value of the standard deviation of the variables representing children's education and cognitive levels is homogeneous because it has a smaller value than the mean value. Meanwhile, the variables grade repetition, school while working, and single mother are heterogeneous because their standard deviation is greater than their mean value.

When viewed based on the frequency distribution of each of the main variables in this study, it shows that the education level of children is dominated by the secondary and high school categories. A total of 675 individuals or 33.05% only attended elementary school, then 63.71% had secondary and high school education levels, while the remaining 3.24% took college. Similar to the level of children's education, cognitive is also divided into 3 categories, namely low, medium, and high, for each of which a sample of 45 individuals, or 3.04%, had a low cognitive score, 307 individuals, or 20.78%, had a moderate cognitive score, and 1,125 individuals, or 76.18%, had high cognitive scores. Meanwhile, for grade repetition and school while working, it was dominated by individuals who

had never stayed in class and did not go to school while working, as many as 6,631 individuals, or 90.53%, and 6,848 individuals, or 93.50%.

Table 2: Sample Frequency Distribution

Variable	Category	Observation	Percent
Children education level	1	675	33,05
	2	1.301	63,71
	3	66	3,24
Cognitive	1	45	3,04
	2	307	20,78
	3	1.125	76,18
Grade repetition	0	6.631	90,53
	1	693	9,47
School while work	0	6.848	93,50
	1	476	6,50
Single mother	0	27.55	88,15
	1	3.703	11,85

Source: IFLS 4 and 5 (processed data)

The results of descriptive statistical analysis of sample data also describe the characteristics of each category on the level of children's education based on several variables, including child gender, children's health status, ownership of farming and non-farming businesses, social assistance received by households, and classification of living environment.

Based on gender, children's education at the elementary and junior high school levels was dominated by males by 55.92% compared to females. Meanwhile, at the tertiary level, women were dominated by 69.69%. This is thought to be because most boys, after graduating from high school, prefer to enter the world of work rather than continue their studies in college. Meanwhile, for the variable of children's health status, which was measured based on their respective subjectivity, the majority of respondents had good health status, which reached 62.02%, and the remaining 37.98% had poor health status. A total of 2,370 respondents, or 66.58%, answered that they did not receive educational assistance from the government in the BOS program, and 57.99% of respondents lived in urban areas. Based on family business ownership, non-farm businesses are mostly owned, reaching 45.27% compared to farming business ownership which is only 36.58%. For recipients of social assistance, namely social assistance from the government in the BLT/Cash Direct

Assistance program, only 5,612 households, or 17.96%, and the remaining 82.04%, were households that did not receive social assistance from the government.

Furthermore, in this section, various tests are carried out on the parameters used, data processing to obtain estimates of the parameters of the random effect ordered probit model and random effect probit panel data using Maximum Likelihood Estimation (MLE), as well as evaluating the suitability and accuracy of the model.

If there is at least one independent variable that is significant to the dependent variable, the test criteria indicate that the value of G^2 is greater than the value of $\chi^2_{(df,\alpha)}$ and has a higher p-value. the level of significance or with the hypothesis $H_0 : \beta_1 = \beta_2 = \dots = \beta_{16} = 0$ and $H_1 :$, there is at least one $\beta_k \neq 0$.

Table 3: Likelihood Ratio Test

G^2	$\chi^2_{(15,\alpha)}$	<i>p-value</i>	α	Decision
86,91	24,996	0,000	0,05	H_0 rejected

Source: STATA Results

Based on the results of the likelihood ratio test, it shows that the parameter significance test simultaneously meets the criteria H_0 rejected. This is evidenced by $G^2 > \chi^2_{(16,0,05)}$ or $86.91 > 7.9616$ and $p\text{-value} < \alpha$ or $0.000 < 0.05$. Thus, it can be concluded that with a 95% confidence level, there is at least one parameter or independent variable that is significant to the model.

After testing the parameters simultaneously, the parameters are tested partially by using the Wald test. Partial testing aims to determine the independent variables that are significant to the dependent variable. If the value of W is greater than $\chi^2_{(1,\alpha)}$ and the p-value is smaller than the significance value, it can be concluded that the parameter is significant to the model.

Based on the results of the Wald test in Table 4, it shows that there are nine independent variables that have a significant effect on the probability

of a child's education level. These variables include single mother, child health status, travel time to school, BOS, mother education level, expenditure level, asset, farmer business, and social assistance.

Table 4: Wald Test

Variable	W	p-value	Decision
Single mother	-5,51	0,000	Rejected
Child gender	-0,54	0,587	Accepted
Children health status	3,13	0,001	Rejected
Travel time to school	-3,97	0,000	Rejected
BOS	3,75	0,000	Rejected
Mother age	-1,31	0,189	Accepted
Mother age square	1,07	0,287	Accepted
Mother education level	2,28	0,023	Rejected
Mother working status	0,98	0,325	Accepted
Expenditure level (log)	4,32	0,000	Rejected
Asset (log)	2,17	0,030	Rejected
Residence	0,39	0,698	Accepted
Farm business	0,87	0,386	Accepted
Non-farm business	2,53	0,012	Rejected
Social assistance	3,65	0,000	Rejected
Household member	1,16	0,246	Accepted

Source: STATA Results

After testing the significance test parameters, regression analysis was carried out using two analytical methods. First, using the random effect ordered probit panel data model method, second using the random effect probit panel data model method. The first method was used to find out the relationship between a single mother and the level of her children's education and their cognitive abilities and the second method was used to find out the relationship between a single mother and grade repetition and school while working. The coefficient value on the results of the random effect ordered probit regression model shows the direction of the influence of the independent variable on the dependent variable.

Table 5: Random Effect Ordered Probit Panel Data Model

Variables	Child Education Level		Cognitive	
	<i>Coef.</i>	<i>p-value</i>	<i>Coef.</i>	<i>p-value</i>
Single mother	-0,2277*** (0,6093)	0,000	-0,0559*** (0,1291)	0,000
Child gender	-0,1719 (0,3161)	0,587	0,1257 (0,0696)	0,071
Children health status	0,1033** (0,2351)	0,001	0,5375*** (0,0909)	0,000
Travel time to school	-0,0172*** (0,0135)	0,000	0,4492 (0,0743)	0,646
BOS	1,3071*** (0,3484)	0,000	0,6351 (0,0348)	0,289
Mother age	-0,0908 (0,0691)	0,189	-0,0012 (0,0055)	0,820
Mother age square	0,0007 (0,0007)	0,287	0,0000 (0,0000)	0,726
Mother education level	0,1456* (0,0639)	0,023	0,0568*** (0,0091)	0,000
Mother working status	0,2351 (0,2390)	0,325	0,1274 (0,0732)	0,082
Expenditure level (log)	1,0508*** (0,2434)	0,000	0,1493* (0,0599)	0,013
Asset (log)	0,2872* (0,1323)	0,030	0,1421 (0,0808)	0,079
Residence	0,5601 (14,459)	0,698	0,2606*** (0,0702)	0,000
Farm business	10,068 (11,608)	0,386	0,0928 (0,0721)	0,199
Non-farm business	0,9065* (0,3588)	0,012	0,2467** (0,0713)	0,001
Social assistance	1,2227*** (0,3348)	0,000	0,0820 (0,0832)	0,325
Household member	0,1577 (0,1360)	0,246	0,0062 (0,0227)	0,783

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: STATA Results

The first regression model, as shown in Table 5, shows that there are seven independent variables that have a positive slope coefficient, namely the variables of child health status, BOS, mother education level, expenditure, asset, non-farm business, and social assistance. While the rest, namely the single mother and travel time to school variable, have a negative slope coefficient. The negative effect of the single mother variable on the child's education level explains that when compared to

children from families with complete parents, children from single mother families have a lower probability of having a higher level of child education.

Meanwhile, in the second model, there are five independent variables that have a positive slope coefficient, namely child health children, mother education level, expenditure, residence, and non-farm business. Whereas a single mother variable has a negative effect on the cognitive score. Based on these results, it shows that when compared to children from complete parents, children from single-mother families have a lower probability of having a higher cognitive score.

Furthermore, different methods were used for the outcome of grade repetition and school while working, namely using binary probit because these two variables were dummy variables which only had categories 0 and 1. As shown in Table 6, the results of the random effect probit regression model for grade repetition show that there are three independent variables that have a positive slope coefficient, namely the single mother variable, the child's gender variable, and the travel time to school. Meanwhile, the remaining five independent variables have a negative slope coefficient, namely the child's health status variable, mother's age, the mother education level, asset, and residence. This explains that children who come from families with single mothers have a higher probability of staying in class.

Then the regression results of the school while working model show that there are five independent variables that have a positive slope coefficient, namely single mother, child's gender, mother's age, mother's age squared, and level of expenditure. Therefore, it can be stated that children who come from families with single mothers have a higher probability of going to school while working.

However, the coefficient values in the regression results in the two methods above cannot be directly interpreted. The coefficient value can only provide the direction of the influence of changes in the independent variable on the dependent variable. Therefore, to interpret the results of the analysis, the marginal effect is used, which states the magnitude of the influence of each significant independent variable on the probability of each category on the independent variable.

Table 6: Random Effect Probit Panel Data Model

Variables	Grade Repetition		School While Working	
	Coef.	p-value	Coef.	p-value
Single mother	0,0941*** (0,3947)	0,000	0,4838** (0,3511)	0,001
Child gender	0,0430** (0,2046)	0,009	0,3795* (0,1870)	0,042
Children health status	-0,0398** (0,2254)	0,001	0,1573 (0,1986)	0,428
Travel time to school	0,0078* (0,0080)	0,013	0,0011 (0,0092)	0,898
BOS	-0,2368 (0,2270)	0,297	-0,1296 (0,2037)	0,525
Mother age	-0,0387** (0,0385)	0,004	0,1066* (0,0490)	0,030
Mother age square	0,0003 (0,0004)	0,458	0,0012* (0,0005)	0,033
Mother education level	-0,0286** (0,0243)	0,005	-0,0273 (0,0240)	0,255
Mother working status	0,2527 (0,2030)	0,213	-0,0124** (0,2043)	0,001
Expenditure level (log)	0,3114 (0,2088)	0,136	0,0520** (0,1622)	0,004
Asset (log)	-0,2786** (0,0889)	0,002	0,0919 (0,0844)	0,276
Residence	-0,3626*** (0,2811)	0,000	-0,1381 (0,1991)	0,488
Farm business	-0,0080 (0,2635)	0,976	-0,6929** (0,2048)	0,001
Non-farm business	-0,0283 (0,2030)	0,889	0,2028 (0,1783)	0,256
Social assistance	0,1546 (0,2499)	0,536	-0,3889 (0,2329)	0,095
Household member	0,1213 (0,0660)	0,066	0,0501 (0,0589)	0,395

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: STATA Results

Based on the estimation results in Table 7, namely the education level outcome model, it shows that if children from single mothers are compared to individuals from complete parents, the probability of being able to take an education is 0.40 percentage points lower for elementary schools, 0.51 percentage points for middle school and 0.71 percentage points for college. In the cognitive scores model showed the same results. When compared with individuals who come from families with complete

parents, individuals with single mothers have a lower probability of getting a cognitive score in the low category of 0.40 percentage points, 1.35 percentage points for the medium category, and 1.76 percentage points for the high category.

Table 7: Marginal Effect of Random Effect Ordered Probit Panel Data Model

Independent Variable: Single Mother	First Category	Second Category	Third Category
	dy/dx	dy/dx	dy/dx
Child Education Level	-0,0040***	-0,0051***	-0,0071***
	(0,0093)	(0,0275)	(0,0364)
Cognitive Level	-0,0040***	-0,0135***	-0,0176***
	(0,0097)	(0,0316)	(0,0413)

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: STATA Results

Furthermore, the marginal effects for outcome grade repetition and school while working are shown in Table 8. Based on the estimation results, it is shown that an individual who comes from a single mother family has a 1.14 percentage point higher probability of staying in class compared to an individual who comes from a family with two complete parents. Meanwhile, the outcome of school while working shows that an individual who comes from a single mother family has a higher probability of 9.74 percentage points for school while working when compared to an individual who comes from a family with two parents.

Table 8: Marginal Effect of Random Effect Probit Panel Data Model

Independent Variable: Single Mother	dy/dx
Grade Repetition	0,0114***
	(0,0453)
School While Working	0,0974**
	(0,0884)

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: STATA Results

4.2. Discussion

The results of the random effect ordered probit regression model show that there is a negative and significant relationship between the dependent variable used in this study, namely the education level of the child, and the main independent variable, namely the single mother. This means that children who come from families with single mothers, either because of divorce or the death of their father, have a lower probability of achieving this level of education compared to children who come from families with two parents (Glauber et al., 2023; Harkness, 2022; Van Gasse & Mortelmans, 2020). According to Downey (2016) there are two factors in the analysis of the influence of a single mother family on the level of children's education, namely economic parental resources and interpersonal parental resources.

First, for economic parental resources, a child who comes from a family with a single mother who is also the head of household in the family has more serious difficulties due to the absence of a father figure who is the leader of the family and the main source of earning a living to meet the family needs and in the end the mother must be the figure and fill that role. In addition, due to limited sources of family income, single mother families tend to have lower incomes and experience economic difficulties (Nonoyama-Tarumi, 2017). When a single mother family experiences economic limitations, it is difficult for the family to meet various needs, especially the educational needs of their children. As a result, single mother families are unable to provide various educational resources, which causes a lack of intellectual atmosphere and educational facilities at home.

Second, in interpersonal parental resources, because a single mother is forced by circumstances that require her to fill two roles simultaneously, making them not have enough time to pay attention and be involved in various children's daily activities, causing inconsistent parenting patterns, having limited quality time with children at home, and less share in their children's education. However, the consequences are also influenced by the relatively low level of education. This is in accordance with the results of a study conducted by Richter & Lemola (2017) which states that the risk factors that influence single mother status is because their education level is relatively low, so they have the potential to experience mental disorders, poor parenting skills, family dysfunction, and low levels of

maternal social support. Meanwhile, the motivation, support, and involvement of parents in their children's education affect the child's focus on continuing studying (Green et al., 2007).

Furthermore, the educational and social outcomes of children used in this study were measured using the child's cognitive score, whether the child had experienced a class stay at school, and whether the child helped his parents earn a living by going to school while working. Single mothers have a negative and significant impact on children's cognitive, which means that children from single mother families have a lower probability of having a higher cognitive score than children from families with two parents. Meanwhile, for staying in class and going to school while working, single mothers have a positive and significant impact, which means that children from single mother families have a higher probability of staying in class and school while working compared to children from families with two parents.

Based on the results of a study conducted by Carlson & Corcoran (2001), the main factors that affect the cognitive scores of children from single-parent families are the level of family income and the mother's talent. Children from single mother families are at a higher risk of having poor cognitive outcomes (Carlson & Corcoran, 2001). In general, compared to children in two-parent families, single-parent children have lower cognitive scores (Youngblut et al., 2001). This is because in the family structure, income is one of the biggest factors that affect children's cognitive scores. However, single mother families have a much lower average income than families with two parents (Carlson & Corcoran, 2001). Therefore, children from single mother families have worse cognitive test results (Arini et al., 2022; Mbanjwa & Harvey, 2023; Steventon Roberts et al., 2022). In addition, the mother's talent is also very influential on the child's cognitive score because, genetically, the mother's talent and ability are passed on to her children (Armstrong-Carter et al., 2020).

Furthermore, in the outcome grade repetition, children from single mother families face an increased risk of poor academic results and stay in class (Colorado, 2016). According to the results of a study conducted by Kalil & Ziol-Guest (2005) which examined the work patterns and welfare of single mothers and their effects on their children. The results show that children whose mothers lose their jobs without getting back to work have

the impact of decreasing children's self-control and self-esteem. Then, children whose mothers continue to work in bad places, show an increased probability of staying in class. Meanwhile, children whose mothers are constantly unemployed or have lost more than one job show an increased probability of dropping out of school.

In social outcomes measured through children who do school activities while working, it shows that children with single mother families have a greater chance of going to school and working to help their mothers earn a living. This is related to the welfare of single mother families, which is relatively lower when compared to families with two parents who force children to help their mothers in meeting family needs (Omokhodion et al., 2006). However, there is an adverse effect that occurs on child labor on their psychological development and has a negative impact on their performance at school (Emerson & Souza, 2015).

The impact of single mother status on child educational outcomes shows a negative correlation, particularly due to economic disadvantages and limited resources. In high-income countries, single mothers face financial challenges that hinder children's academic success (Ayebe et al., 2022; Harkness, 2022). In developing countries, these effects are compounded by poverty, stigma, and lack of institutional support, with factors like self-motivation and external support playing key roles (Adeyeye, 2023; Ghanney, 2024). In Indonesia, single mothers also struggle with balancing financial and educational responsibilities, resulting in lower educational outcomes for their children compared to those from two-parent families (Agustina et al., 2023; Njoku et al., 2020; Saiin et al., 2024). This supports Becker (1973) theory, which suggests that two-parent families provide greater resources, enhancing children's educational opportunities.

According to human capital theory, education and skills are critical assets that enhance individual productivity and long-term income potential (Fix, 2018). In developed nations, this principle is more effectively realized due to comprehensive social welfare systems that support single mothers—such as subsidized childcare and educational assistance (Nugroho et al., 2023; Sakamoto, 2024). However, in the Indonesian context, where institutional support for low-income households remains limited, the link between maternal education and children's educational outcomes appears tenuous. Empirical evidence indicates that mothers with higher

educational attainment are more likely to invest in their children's nutrition and schooling, thereby exerting a significant influence on their academic achievement (Nugroho et al., 2023).

This study is subject to several limitations. While the findings align with previous research conducted in both developed and developing contexts, one notable limitation is the absence of detailed data on the economic conditions of children residing in single-mother households. Furthermore, the analysis does not account for variations in children's outcomes based on the age at which paternal absence occurred. Incorporating this dimension in future research could offer more nuanced insights, thereby enabling policymakers to design and implement educational interventions that are better tailored to the specific needs of these children.

Based on the findings of this study, it highlights the importance of targeted government interventions to address the challenges and compounded disadvantages faced by this vulnerable group. In recent years, Indonesia has initiated various programmes to enhance educational accessibility and mitigate child labour, including the *Program Indonesia Pintar* (PIP) and the *Program Harapan Keluarga* (PKH). These programmes provide conditional cash transfers to families classified as low-income to encourage school attendance (Felestin et al., 2022; Noor & Monita, 2022; Septiana et al., 2022). Additionally, the government is striving to extend compulsory education to 12 years and implement the *Bantuan Operasional Sekolah* (BOS) program to reduce financial barriers (Mulya & Rahaju, 2021; Sari & Tanaka, 2019). However, while these policies have contributed to improving the quality of education in Indonesia, they may not adequately address the specific needs of children from single-mother families. Therefore, it is important for the government to integrate more precise targeting mechanisms, provide psychosocial services, and offer educational flexibility that accommodates the challenges and barriers faced by these children.

5. Conclusion

The integrity of a family has a significant influence on the development process of a child. However, the facts show that single mothers are a phenomenon that often occurs in social reality. This has ramifications for a child's development, particularly in terms of schooling, since single mother are responsible for a variety of obligations.

This study concludes that children who come from single mother families have a lower probability of having a higher level of education. There are two factors in the analysis of the influence of single mother families on children's education levels. First, economic parental resources caused by economic limitations. Second, interpersonal parental resources resulting from parents' inadequate attention and commitment, particularly in their children's schooling. In addition, being a single mother also affects the educational and social outcomes of children as measured by cognitive scores, grade repetition, and children who go to school while working.

Based on these findings, it is necessary to have government policies in an effort to increase the school participation rate (APS) of children in Indonesia, especially for children from single mother families who have a lower probability of being able to pursue higher education. Efforts that have been made in other countries, such as providing scholarships for learning facilities and purposes, as well as freeing up educational operational costs until children graduate from college and get a bachelor's degree, these efforts are essential in reducing the dropout rate (APTS) and increasing the gross enrollment rate higher education (APKPT).

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