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Single Motherhood, Maternal Employment, and Basic Household Living Conditions in Indonesia: Evidence from the National Socio-Economic Survey (SUSENAS)

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Abstract

In many developing countries, changes in family structure, particularly the presence of single-mother households, have raised important questions regarding household welfare and inequality. This study examines how single motherhood, maternal employment, and their interactions are associated with basic household living conditions in Indonesia. Using cross-sectional microdata from the National Socio-Economic Survey, the analysis covers 71,320 women living in households with children under five years of age. Basic household living conditions were measured using an ordinal index based on food adequacy, improved sanitation, and access to safe drinking water. Ordered logit regression is employed as the main estimation strategy, complemented by predicted probabilities, robustness checks using binary logit, and heterogeneity analyses by maternal age cohort and education level. The findings show that single motherhood is negatively and significantly associated with the likelihood of achieving better basic household living conditions, whereas maternal employment and its interaction with single motherhood are not statistically significant. Education, internet access, and formal work were positively associated with better living conditions, whereas larger household size and rural residence were negatively associated with the outcome. Heterogeneity analysis indicates that the negative association of single motherhood is more pronounced among young and prime-age mothers, while it remains significant across both the low- and high-educated groups. These findings suggest that basic household living conditions are shaped not only by family structure but also by access to education, digital resources, decent work, and territorial context.

Keywords: basic household living conditions, digital inclusion, maternal employment, single mothers

Abstrak

Di banyak negara berkembang, perubahan struktur keluarga, khususnya keberadaan rumah tangga dengan ibu tunggal, memunculkan pertanyaan penting mengenai kesejahteraan rumah tangga dan ketimpangan. Penelitian ini menganalisis bagaimana status ibu tunggal, status bekerja ibu, dan interaksi keduanya berasosiasi dengan kondisi dasar kesejahteraan rumah tangga di Indonesia. Dengan menggunakan mikrodata Survei Sosial Ekonomi Nasional (SUSENAS), analisis mencakup 71.320 perempuan yang tinggal dalam rumah tangga dengan anak usia di bawah lima tahun. Kondisi dasar kesejahteraan rumah tangga diukur melalui indeks ordinal yang mencakup kecukupan pangan, sanitasi layak, dan akses terhadap air minum aman. Model ordered logit digunakan sebagai strategi estimasi utama, dilengkapi dengan probabilitas prediktif, uji robustness menggunakan binary logit, serta analisis heterogenitas berdasarkan kelompok usia dan tingkat pendidikan ibu. Hasil menunjukkan bahwa status ibu tunggal

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berasosiasi negatif dan signifikan dengan kemungkinan mencapai kondisi dasar kesejahteraan rumah tangga yang lebih baik, sedangkan status bekerja ibu dan interaksinya dengan status ibu tunggal tidak signifikan secara statistik. Pendidikan ibu, akses internet, dan pekerjaan formal berasosiasi positif dengan kondisi hidup yang lebih baik, sementara ukuran rumah tangga yang lebih besar dan tempat tinggal perdesaan berasosiasi negatif dengan outcome tersebut. Analisis heterogenitas menunjukkan bahwa asosiasi negatif status ibu tunggal lebih kuat pada ibu muda dan ibu usia produktif, serta tetap signifikan pada kelompok ibu berpendidikan rendah maupun tinggi. Temuan ini menunjukkan bahwa kondisi dasar kesejahteraan rumah tangga tidak hanya berkaitan dengan struktur keluarga, tetapi juga dengan akses terhadap pendidikan, sumber daya digital, pekerjaan yang lebih layak, dan konteks wilayah.

Kata kunci: kondisi dasar kesejahteraan rumah tangga, ibu tunggal, inklusi digital, pekerjaan ibu

Introduction

The relationship between family structure, maternal employment, and household living conditions has become a key issue in development economics, social policy, and family studies. In many developing countries, changes in household structure have been accompanied by the increasing visibility of single-parent families, the majority of which are headed by women (Chavda & Nisarga, 2023; Jain & Mahmoodi, 2022; Ntoimo & Mutanda, 2020). Furthermore, women's labor force participation has increased due to economic necessity, demographic transition, urbanization, rising living costs, and broader changes in household livelihood strategies (Klasen et al., 2021). These changes highlight the importance of examining the relationship between single motherhood, maternal employment, and basic household living conditions, particularly in contexts where access to food, sanitation, and safe drinking water remains unequal.

This issue is particularly relevant in Indonesia, as household well-being is shaped not only by income but also by access to basic services, spatial inequality, labor market informality, and family support systems. According to the 2024 National Socioeconomic Survey, female-headed households account for 15.5% of all households in Indonesia (BPS, 2024). While female household leadership is not synonymous with single motherhood, this figure demonstrates the relevance of female household leadership in understanding household well-being and vulnerability. The Indonesian family context is characterized by the importance of continuous extended family networks, gendered caregiving roles, and intergenerational household arrangements. These factors can shape single mothers' ability to manage economic responsibilities, caregiving demands, and access to household resources. Therefore, research on single mothers cannot be linked to broader household conditions and the resources available within their environment.

This study is fundamentally grounded in the Capability Approach, which views well-being not simply as income or material possessions, but as the ability of individuals and households to transform available resources into valuable functions (Kim et al., 2020; Nussbaum, 2008; Sen, 1999). This perspective suggests that household living conditions, such as adequate food, improved sanitation, and safe drinking water, can be understood as the basic material foundations that support household capabilities.

Family structure and maternal employment are relevant because they may shape the availability of resources, time, care arrangements, and access to opportunities within the household (Anakpo & Kollamparambil, 2023; Jensen & Sanner, 2021). Single motherhood may be associated with more constrained resources, reduced time availability, and greater caregiving responsibilities (Affandy, 2023; Wu et al., 2025). Maternal employment may expand household resources through earnings and social networks, but it may also create additional time pressures, especially when care responsibilities remain unequally distributed.

In areas where access to basic services remains unequal, household well-being cannot be measured solely by income. Adequate food availability, proper sanitation, and access to safe drinking water are fundamental needs that significantly impact quality of life. Therefore, this study focuses on basic household living conditions as an indicator of well-being. Besides being more relevant to the research objectives, these indicators can also be measured consistently using nationally representative microdata. This focus is particularly relevant in developing countries, where disparities in access to food, sanitation, and clean water are closely linked to social vulnerability and household inequality. In keeping with the structure of the National Socioeconomic Survey (SUSENAS), the empirical analysis uses the household as the unit of observation for indicators of living conditions, while concepts related to the family are discussed as the social context within which household resources, caregiving responsibilities, and well-being outcomes are organized.

Previous studies have shown that single-mother households are often more vulnerable to economic hardship, low income, limited access to resources, psychological distress, and food insecurity than intact families (Dharani & Balamurugan, 2024; Maldonado & Nieuwenhuis, 2019; Strickland, 2024). These challenges may reflect financial constraints, time constraints, and structural barriers in the labor market, particularly for women (Heintz-Martin & Langmeyer, 2020). However, single motherhood does not impact everyone equally. In Indonesia, family support, living with extended family, informal employment, and access to basic services can influence the living conditions of single-mother households. Therefore, this study examines not only whether single mothers tend to experience poorer living conditions, but also whether these effects differ by mother's age and education level.

The role of working mothers in household living conditions is not always the same. Working can increase family income, making it easier to meet basic needs, such as food, sanitation, and clean drinking water. However, these benefits depend on the type of employment, income level, job stability, work hours, and the availability of childcare support. If mothers work in low-wage or precarious jobs, the additional income may not be enough to improve household living conditions (Håkansta et al., 2025). Furthermore, working mothers often retain the responsibility for household management and childcare. Therefore, maternal employment does not always have the same impact on household living conditions. This relationship needs to be proven through research, including examining whether maternal employment influences the relationship between single motherhood and household living conditions (Susilowati & Nurhayati, 2025).

Internet access is now a factor that can support household well-being. Through the internet, families can obtain information, access public services, find jobs, and access information on education and health. For mothers, especially those facing economic constraints or caring for children, internet access can assist in decision-making and accessing necessary resources. Research shows that digital access can open up more economic opportunities and make it easier for families to access information. However, these benefits are not always equal, as they are influenced by a family's education level, residence, and socioeconomic status (Correa et al., 2020; Vassilakopoulou & Hustad, 2023).

Although research on this topic continues to grow, several gaps remain. First, many studies still measure household well-being based on income, while basic living conditions also need to be considered. Second, single motherhood and maternal employment are generally examined separately, resulting in limited evidence on the role of maternal employment in the relationship between single motherhood and household living conditions. Third, research using Indonesian national data to examine this relationship is still limited. Furthermore, differences in maternal age and education are rarely considered, even though both can influence household living conditions.

This study fills this gap by analyzing the relationship between single motherhood, maternal employment, and basic household living conditions in Indonesia. Specifically, it examines the relationship between single motherhood and maternal employment with household living conditions and examines whether these relationships differ by maternal employment status, age, and education level. The study uses indicators of basic living conditions, namely adequate food, adequate sanitation, and access to safe drinking water. By using nationally representative data, this study is expected to provide empirical evidence to support policy development to improve household welfare.

Methods

Participants

This study uses a quantitative research design based on cross-sectional microdata to examine the association between single motherhood, maternal employment, and basic household living conditions in Indonesia. The analysis uses data from the 2024 National Socio-Economic Survey (SUSENAS), conducted by Statistics Indonesia BPS, 2024). SUSENAS provides nationally representative information on demographic characteristics, employment, education, household composition, and access to essential services, making it suitable for examining basic household living conditions.

The unit of analysis for this study was adult women living in households with at least one child under five years of age. This sample was used as a proxy for mothers or primary caregivers because the SUSENAS (National Survey of Indonesia) does not provide information directly linking mothers to their children. Therefore, some respondents in the sample may have been caregivers or other adult female household members, rather than biological mothers.

After applying sampling criteria and removing incomplete data, this study used 71,320 women as the analytical sample. Because it used cross-sectional data, this study only examined relationships between variables, not causality. The analysis was

conducted using an ordered logit model because the dependent variable was an ordinal index of basic household living conditions.

Measurement

The dependent variable in this study is basic household living conditions, measured using three observable non-monetary indicators: food adequacy, sanitation, and access to safe drinking water. These indicators were selected because they represent foundational household conditions closely related to health, dignity, and everyday functioning. Each component was coded as a binary indicator, where 1 indicates that the household met the condition and 0 indicates otherwise. The three components were then summed to form an ordinal index ranging from 0 to 3, with higher values indicating better basic household conditions.

Food adequacy was assessed using three criteria available in SUSENAS: sufficient, healthy and nutritious, and diverse food. A household was classified as having adequate food if it met at least two of the three criteria. Improved sanitation and safe drinking water were coded based on whether the household had access to improved sanitation facilities and safe drinking water sources, respectively, following the classification in SUSENAS. This index captures a concrete and policy-relevant domain of household welfare through basic living conditions.

The key independent variables were single motherhood, maternal employment status, and their interactions. Single motherhood is defined based on marital status at the time of the survey, referring to women who are divorced, separated, or widowed. Married women were categorized as non-single mothers, while never-married women were not included in the single-mother category to avoid conceptual ambiguity. Maternal employment status is coded as a dummy variable that indicates whether the mother was working at the time of the survey. This measure captures labor force participation based on employment information available in the SUSENAS, including both formal and informal work. However, it does not fully capture job quality, working hours, earnings or employment stability.

The interaction term between single motherhood and maternal employment was included to examine whether the association between single motherhood and basic household living conditions differed according to maternal employment status. Several control variables were included in the analysis. Mother's education was measured in terms of years of schooling. Age and age squared were included to capture lifecycle differences. Household size was included to account for the household demographic burden. Internet access was included as a proxy for digital inclusion and information access. Formal work was included to distinguish formal employment from informal or non-working statuses. Residential location was coded as rural or urban to capture territorial differences in access to basic services. The detailed operational definitions of all variables are presented in Table 1.

Table 1. Operational definition of variables

No	Variable	Type	Operational Definition	Measurement	References
1	Basic household living conditions	Dependent	Ordinal index capturing basic household welfare conditions based on food adequacy, improved sanitation, and safe drinking water access	Ordinal variable: 0–3, calculated as the sum of three binary indicators; higher values indicate better basic household living conditions	Asaki et al. (2024); Rhue et al. (2023)
2	Food adequacy	Component of dependent variable	Household food condition based on three criteria: sufficient food, healthy/nutritious food, and diverse food	Dummy: 1 = adequate if at least two of the three criteria are met; 0 = otherwise	Asaki et al. (2024)
3	Improved sanitation	Component of dependent variable	Household access to improved sanitation facilities based on the classification available in SUSENAS	Dummy: 1 = improved sanitation, 0 = otherwise	Rhue et al. (2023)
4	Safe drinking water	Component of dependent variable	Access to safe and protected sources of drinking water	Dummy: 1 = safe drinking water source; 0 = otherwise	Asaki et al. (2024); Rhue et al. (2023)
5	Single mother	Main independent variable	Woman whose marital status indicates the absence of a spouse at the time of survey, specifically divorced/separated or widowed. Never-married women are not classified as single mothers to avoid conceptual ambiguity	Dummy: 1 = single mother, 0 = non-single	Kühn et al. (2023); Jones et al. (2022)
6	Working mother	Main independent variable	Mother's participation in economic activity at the time of survey, including formal and informal work as captured in SUSENAS	Dummy: 1 = working, 0 = not working	Kühn et al. (2023)
7	Single mother × Working	Interaction variable	Interaction term used to examine whether the association between single motherhood and basic household living conditions differs by maternal employment status	Dummy interaction: 1 = single mother and working; 0 = otherwise	Modified from Kühn et al. (2023)

Table 1. Operational definition of variables (Continue)

No	Variable	Type	Operational Definition	Measurement	References
8	Mother's education	Control variable	Educational attainment of the mother, representing human capital	Continuous variable: years of schooling proxy based on highest education completed	Marshan & Pritadrajati (2025)
9	Age	Control variable	Age of the mother at the time of survey	Continuous variable: years	Ahmad et al. (2024)
10	Age²	Control variable	Squared term of age to capture non-linear life-cycle effects	Continuous	Modified from Ahmad et al. (2024)
11	Household size	Control variable	Total number of household members living in the same dwelling	Continuous (number of persons)	Anakpo & Kollamparambil (2023)
12	Internet access	Control variable	Household access to internet, representing basic digital exposure	Dummy: 1 = has internet access; 0 = no internet access	Syukur et al. (2024)
13	Formal work	Control variable	Employment type of the mother, distinguishing formal from informal sector	Dummy: 1 = formal work; 0 = informal work or not working	Aronsson (2023)
14	Rural	Control variable	Residential location of the household based on official classification	Dummy: 1 = rural, 0 = urban	Mikkelsen et al. (2022)

Analysis

Because the dependent variable is measured as an ordinal index ranging from 0 to 3, this study employs an ordered logit model to examine the association between single motherhood, maternal employment, and basic household conditions. The model is specified in Equation 1 as follows:

$$Y_i^* = \beta_0 + \beta_1 SingleMother_i + \beta_2 Working_i + \beta_3 (SingleMother_i \times Working_i) + X_i'\gamma + \varepsilon_i \quad (1)$$

Where Y_i^* denotes the latent propensity for better basic household living conditions. The observed outcome $Y_i$takes four ordered values from 0 to 3, representing the number of basic living-condition components fulfilled by the household. $SingleMother_i$ indicates whether the woman is classified as a single mother; $Working_i$ indicates maternal employment status; and $SingleMother_i \times Working_i$ captures whether the association between single motherhood and basic household living conditions differs by employment status. X_i is a vector of control variables, including mother's education, age, age squared, household size, internet access, formal work, and rural residence status.

The ordered logit model is appropriate because the outcome variable has a clear ordinal structure, where higher values indicate better basic household living conditions, but the distance between categories cannot be assumed to be equal. Ordered response models are commonly used for such outcomes because they estimate the association between explanatory variables and the likelihood of being in higher-ordered categories

through a latent-response framework (Long & Freese, 2014). The model relies on the proportional odds or parallel-lines assumption; therefore, this study also evaluates this assumption using a generalized ordered logit specification, following the methodological guidance that generalized ordered logit models are useful for assessing and relaxing the proportional odds restriction when necessary (Williams, 2016).

Findings

Descriptive Statistics of Basic Household Living Conditions and Other Variables by Motherhood Status

Table 2 presents descriptive statistics by single mother status, with chi-square tests for categorical variables and t-tests for continuous variables. Overall, most households achieved the highest score of the basic household living condition index, but this proportion was lower among single mothers and non-single mothers, at 75.16% and 80.17%, respectively ($p < 0.001$). Single mothers were also more concentrated in the intermediate score category, suggesting that the descriptive gap is more related to moderate vulnerability than to severe deprivation.

Table 2. Descriptive statistics of basic household living conditions and other variables by motherhood status

Variable	All Observations (N = 71,320)		Single Mother (N = 2,991)		Non-single mother (N = 68,329)		p-value
	N	%	N	%	N	%	
Basic household living condition index							
0	194	0.27	9	0.30	185	0.27	0.000
1	1,912	2.68	96	3.21	1,816	2.66	
2	12,184	17.08	638	21.33	11,546	16.90	
3	57,030	79.96	2,248	75.16	54,782	80.17	
Food adequacy							
Yes	65,070	91.24	2,565	85.76	62,505	91.48	0.000
No	6,250	8.76	426	14.24	5,824	8.52	
Improved sanitation							
Yes	68,475	96.01	2,865	95.79	65,610	96.02	0.523
No	2,845	3.99	126	4.21	2,719	3.98	
Safe drinking water							
Yes	63,825	89.49	2,686	89.80	61,139	89.48	0.570
No	7,495	10.51	305	10.20	7,190	10.52	
Working status							
Yes	33,276	46.66	2,071	69.24	31,205	45.67	0.000
No	38,044	53.34	920	30.76	37,124	54.33	
Education							
No schooling / Incomplete primary	3,424	4.80	342	11.43	3,082	4.51	0.000
Primary school	14,970	20.99	864	28.89	14,106	20.64	
Junior secondary	16,762	23.50	617	20.63	16,145	23.63	
Senior secondary	24,269	34.03	883	29.52	23,386	34.23	
Diploma I / II	414	0.58	5	0.17	409	0.60	
Diploma III	2,359	3.31	61	2.04	2,298	3.36	

Table 2. Descriptive statistics of basic household living conditions and other variables by motherhood status (Continue)

Variable	All Observations (N = 71,320)		Single Mother (N = 2,991)		Non-single mother (N = 68,329)		p-value
	N	%	N	%	N	%	
Diploma IV / Bachelor's Degree	8,734	12.25	212	7.09	8,522	12.47	
Professional/ Master's Degree	382	0.54	7	0.23	375	0.55	
Doctoral Degree	6	0.01	0	0.00	6	0.01	
Internet access							
Yes	59,454	83.36	2,105	70.38	57,349	83.93	0.000
No	11,866	16.64	886	29.62	10,980	16.07	
Formal work							
Yes	515	0.72	69	2.31	446	0.65	0.000
No	70,805	99.28	2,922	97.69	67,883	99.35	
Rural-urban							
Rural	41,627	58.37	1,695	56.67	39,932	58.44	0.054
Urban	29,693	41.63	1,296	43.33	28,397	41.56	
Variables	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**p-value**
Age	34.33	7.85	40.21	10.82	34.07	7.59	0.000
Household size	4.99	1.52	5.14	1.82	4.99	1.50	0.000

Note. Percentages are column percentages. Chi-square tests were used for categorical variables, and t-tests were used for continuous variables.

At the component level, the difference between the two groups was mainly observed in terms of food adequacy. The share of households with adequate food was 85.76% among single mothers and 91.48% among non-single mothers ($p < 0.001$). In contrast, improved sanitation and safe drinking water were relatively similar across the two groups and were not statistically different. This indicates that the observed gap in basic household living conditions is driven more by food adequacy than sanitation or drinking water access.

Single mothers also differ from non-single mothers in several socioeconomic characteristics. They had higher work participation, were older on average, and lived in slightly larger households than men. However, their higher working rate should not be interpreted as evidence of better economic conditions because Table 2 does not measure earnings, job stability, working hours, or employment quality of the workers. Single mothers also had lower educational attainment and internet access than non-single mothers. Rural-urban residence did not differ significantly at the 5% level. Taken together, these descriptive results indicate that single mothers differ from non-single mothers not only in basic household living conditions but also in education, digital access, work participation, age, and household composition. These patterns remain descriptive and should not be interpreted as causal.

Ordered Logit Estimation Results on Basic Household Living Conditions

The main estimation results in Table 3 indicate that single motherhood is negatively and significantly associated with basic household living conditions. After controlling for socioeconomic and demographic characteristics, the coefficient of single

mothers is -0.2545 ($p < 0.001$), with an average marginal effect of -0.0445. This suggests that single mothers have a lower probability of achieving the highest basic household living condition scores than non-single mothers.

Mother employment did not show a significant relationship with household living conditions (-0.0830; $p = 0.125$). The interaction between single motherhood and maternal employment was also not significant (-0.0559; $p = 0.484$). This suggests that maternal employment does not significantly influence the relationship between single motherhood and household living conditions. However, this finding should be interpreted with caution, as the employment status used in this study only indicates whether the mother is employed, without reflecting job quality, income level, or job stability.

Table 3. Ordered logit estimation results on basic household living conditions

Variable	Coefficient	Robust SE	z	p-value	AME
Panel A. Ordered logit estimation results					
Single mother (*reference*: non-single)	-0.2545***	0.0670	-3.80	0.000	-0.0445***
Working mother (*reference*: not working)	-0.0830	0.0541	-1.53	0.125	-0.0127
Single mother × Working mother	-0.0559	0.0799	-0.70	0.484	
Mother's education	0.0794***	0.0062	12.76	0.000	
Age	0.0268***	0.0022	11.96	0.000	
Age^2	0.0008***	0.0002	3.01	0.003	
Household size	-0.1039***	0.0192	-5.40	0.000	
Internet access	0.7682***	0.0842	9.12	0.000	0.1143***
Formal work	0.8110***	0.1453	5.58	0.000	0.1207***
Rural	-0.7201***	0.0743	-9.68	0.000	-0.1071***
Observations	71,320				
Wald chi^2	934.90				
Prob > chi^2	0.0000				
Panel B. Predicted probability of achieving the highest basic household living condition score (mother status)					
Non-single, not working	0.8056				
Non-single, working	0.7933				
Single mother, not working	0.7662				
Single mother, working	0.7426				

Note. *** p<0.01, ** p<0.05, * p<0.10

Several control variables in Table 3 are also related to basic household living conditions. Maternal education and age, internet access, and formal employment are positively and significantly associated with better basic living conditions. Conversely, household size and rural residence are negatively and significantly associated. These results indicate that rural households tend to have lower basic living conditions than urban households, after accounting for other characteristics.

Panel B shows that mothers who are not single and not employed have the highest probability of achieving the highest baseline household living conditions score (0.8056). Conversely, single mothers who are employed have the lowest probability (0.7426). These findings suggest that single mothers tend to have lower odds of achieving better

household living conditions. However, because the interaction between single mother status and maternal employment is not statistically significant, these differences should be interpreted with caution.

The robustness analysis (Table 4) provides consistent evidence for an alternative binary specification. When the outcome is recoded as whether the household achieved the highest basic household living condition score, single motherhood remains negatively and significantly associated with the probability of achieving the highest score (-0.2801; $p < 0.001$). Maternal employment remains statistically insignificant (-0.0635; $p = 0.195$), and the interaction between single motherhood and maternal employment is also insignificant (-0.0317; $p = 0.679$). The average marginal effects further show that single motherhood is associated with a 4.70 pp lower probability of achieving the highest score, while internet access and formal work are associated with higher probabilities, by 10.59 and 11.72 pp, respectively. Rural residence was associated with a 10.50 percentage-point lower probability. These results are broadly consistent with those of the ordered logit estimates.

The predicted probabilities from the binary logit model also follow a similar pattern to the ordered logit results, with the highest probability among non-working non-single mothers (0.8058) and the lowest among working single mothers (0.7456). However, the differences by working status should still be interpreted cautiously because the interaction between single motherhood and maternal employment is not statistically significant. The diagnostic checks support the use of ordered logit as the main specification. The proportional odds or parallel-lines assumption was not rejected (Wald χ^2 (4) = 5.07; $p = 0.2804$), and the VIF results indicated no multicollinearity problem, with a mean VIF of 1.62 and a maximum VIF of 3.30.

Table 4. Robustness check and model diagnostics

Variable / Test	Estimate	Robust SE	p-value
Panel A. Binary Logit Robustness Check			
Single mother	-0.2801***	0.0681	0.000
Working mother	-0.0635	0.0490	0.195
Single mother × Working mother	-0.0317	0.0765	0.679
Mother's education	0.0774***	0.0063	0.000
Age	0.0250***	0.0020	0.000
Age²	0.0007***	0.0002	0.000
Household size	-0.0965***	0.0177	0.000
Internet access	0.7107***	0.0742	0.000
Formal work	0.7864***	0.1443	0.000
Rural	-0.7050***	0.0741	0.000
Constant	1.0054	0.1319	
Observations	71,320		
Wald χ^2	1059.89		
Prob > χ^2	0.0000		

Table 4. Robustness check and model diagnostics (Continue)

Variable / Test	Estimate	Robust SE	p-value
Panel B. Average Marginal Effects from Binary Logit			
Single mother	-0.0470***	0.0100	0.000
Working mother	-0.0097	0.0074	0.193
Internet access	0.1059***	0.0108	0.000
Formal work	0.1172***	0.0246	0.000
Rural	-0.1050***	0.0140	0.000
Panel C. Predicted probability of achieving the highest basic household living condition score (mother status)			
Non-single, not working	0.8058		
Non-single, working	0.7964		
Single mother, not working	0.7619		
Single mother, working	0.7456		
Panel D. Diagnostic Checks			
Proportional odds / parallel lines assumption	Wald $\chi^2(4) = 5.07$		0.2804
Mean VIF	1.62		
Maximum VIF	3.30		

Note. Panel A presents the binary logit robustness check using the best basic household living condition category as the dependent variable. Panel B reports the average marginal effects from the binary logit model. Panel C reports the delta method-predicted probability. Panel D reports the diagnostic checks for the main ordered logit specification. The proportional odds assumption was assessed using a generalized ordered logit model with the autofit option, and the results indicated that the assumption was not rejected. The VIF was calculated using an OLS approximation. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Heterogeneity Analysis by Maternal Age Cohort

The heterogeneity analysis by maternal age cohort in Table 5 shows that the association between single motherhood and basic household living conditions varies across the maternal life cycle. Among young mothers below 30 years old, single motherhood was negatively and significantly associated with basic household living conditions (-0.5792; $p < 0.001$). A similar but smaller negative association was found among prime-age mothers aged 30–39 years (-0.3097; $p = 0.017$). In contrast, single motherhood was not statistically significant among older mothers aged 40 years and above (0.1263; $p = 0.199$). These results suggest that the negative association between single motherhood and basic household living conditions is more evident among younger and prime-age mothers, while no statistically significant association is found among older mothers.

Table 5. Results of heterogeneity analysis by maternal age cohort

Variable	Young mothers (<30)		Prime-age mothers (30–39)		Older mothers (40+)	
	Coef.	p-value	Coef.	p-value	Coef.	p-value
Single mother (*reference*: non-single)	-0.5792***	0.000	-0.3097**	0.017	0.1263	0.199
Working mother (*reference*: not working)	0.0061	0.936	-0.0948**	0.028	-0.1178	0.175
Single mother × Working mother	0.0854	0.565	-0.0496	0.752	-0.2060*	0.090
Mother's education	0.0803***	0.000	0.0838***	0.000	0.0641***	0.000
Household size	-0.0893***	0.000	-0.1091***	0.000	-0.0941***	0.000
Internet access	1.0719***	0.000	0.8235***	0.000	0.4385***	0.000
Formal work	0.8477**	0.030	1.1965***	0.000	0.4772**	0.016
Rural	-0.7689***	0.000	-0.7348***	0.000	-0.6533***	0.000
Observations	21,276		33,270		16,774	
LR chi²	412.63		558.82		261.60	
Prob > chi^2	0.0000		0.0000		0.0000	
Panel B. Predicted probability of achieving the highest basic household living condition score						
Non-single mother, not working	0.7935		0.8124		0.8040	
Non-single mother, working	0.7944		0.7989		0.7859	
Single mother, not working	0.6926		0.7657		0.8221	
Single mother, working	0.7102		0.7414		0.7731	

Note. The dependent variable is the basic household living condition index, which ranges from 0 to 3. *** p<0.01, ** p<0.05, * p<0.10

Maternal employment shows a less consistent pattern across the age cohorts. It is not statistically significant among young mothers (0.0061; p = 0.936) or older mothers (-0.1178; p = 0.175), but is negatively significant among prime-age mothers (-0.0948; p = 0.028). The interaction between single motherhood and maternal employment is also not significant for young and prime-age mothers. Among older mothers, the interaction was negative and marginally significant (-0.2060; p = 0.090). Therefore, the results do not provide strong evidence that employment offsets the disadvantages associated with single motherhood. This interpretation is important because the predicted probabilities show some differences between working and non-working single mothers, but the interaction coefficients are generally not significant.

The predicted probabilities in Panel B provide additional insights. Among young mothers, the probability of achieving the highest basic household living condition score was lower for single mothers than for non-single mothers. For example, the predicted probability for young single mothers who are not working is 0.6926, while that for young non-single mothers who are not working is 0.7935. Among prime-age mothers, single mothers also show lower predicted probabilities than do non-single mothers. In the older age group, the differences are less straightforward, and the coefficient for single motherhood is not statistically significant. Therefore, the predicted probabilities should be read together with the coefficient estimates rather than being interpreted as evidence of a significant advantage among older single mothers.

Several control variables were consistently associated with basic household living conditions across age cohorts. Mother's education, internet access, and formal work were positively associated with better basic household living conditions in all age groups, whereas household size and rural residence were negatively associated with the outcome. The positive association of Internet access remains particularly strong, although its coefficient declines across age cohorts. Overall, the age-based heterogeneity analysis indicates that the association between single motherhood and basic household living conditions is most pronounced among young and prime-age mothers, whereas the role of maternal employment and its interaction with single motherhood are less consistent.

Heterogeneity Analysis by Maternal Education

The heterogeneity analysis by maternal education in Table 6 indicates that single motherhood is negatively associated with basic household living conditions in both the education groups. Among low-educated mothers, single motherhood had a negative and statistically significant coefficient (-0.2810; $p < 0.001$). A similar negative association was also found among highly educated mothers (-0.3386; $p = 0.012$). These results indicate that the negative association between single motherhood and basic household living conditions is not limited to mothers with low educational attainment. However, the predicted probabilities show that highly educated mothers generally have higher probabilities of achieving the highest basic household living condition score than low-educated mothers across all single-mother and working-status combinations.

Maternal employment shows a more limited and inconsistent pattern. Among low-educated mothers, the working status coefficient is negative and only marginally significant (-0.1251; $p = 0.070$), while among high-educated mothers, it is not statistically significant (0.0251; $p = 0.646$). The interaction between single motherhood and maternal employment was not statistically significant in either group. Therefore, the results do not provide evidence that maternal employment modifies the association between single motherhood and basic household living conditions across educational groups. This interpretation is consistent with the main model and robustness check, where the interaction term is also not statistically significant.

Within the low-education group, employed single mothers had the lowest probability of achieving good basic household living conditions (0.6825), while non-single mothers had a higher probability (0.7307). Meanwhile, in the group of mothers with higher education, all groups showed higher probabilities than those with lower education. This finding suggests that education is associated with better household living conditions. However, education has not completely eliminated the disparities faced by single mothers.

Several control variables showed consistent patterns across both education groups. Age tended to be positively associated with basic household living conditions, while larger household size and rural residence were negatively associated. Conversely, internet access and formal employment were positively associated with better basic household living conditions. Furthermore, single motherhood remained negatively associated across both education groups, while maternal employment and its interaction with single motherhood status did not show a significant association.

Table 6. Results of heterogeneity analysis by maternal education

Variable	Low Educated Mothers		High Educated Mothers	
	Coef.	p-value	Coef.	p-value
Single mother (*reference*: non-single)	-0.2810***	0.000	-0.3386**	0.012
Working mother (*reference*: not working)	-0.1251*	0.070	0.0251	0.646
Single mother × Working mother	0.0354	0.726	-0.1512	0.283
Age	0.0211***	0.000	0.0239***	0.000
Age^2	0.0010***	0.000	-0.0001	0.670
Household size	-0.1177***	0.000	-0.0837***	0.000
Internet access	0.7872***	0.000	1.0422***	0.000
Formal work	0.8939***	0.000	0.7118***	0.001
Rural	-0.6022***	0.000	-0.9030***	0.000
Observations	35.156		36.164	
LR chi^2	193.96		266.49	
Prob > chi^2	0.0000		0.0000	
Panel B. Predicted probability of achieving the highest basic household living condition score				
Non-single mother, not working	0.7534		0.8542	
Non-single mother, working	0.7307		0.8571	
Single mother, not working	0.7006		0.8095	
Single mother, working	0.6825		0.7906	

Note. The dependent variable is the basic household living condition index, which ranges from 0 to 3. *** p<0.01, ** p<0.05, * p<0.10

Discussion

The findings indicate that single motherhood is associated with lower basic household living conditions. Descriptive results and regression analyses consistently indicate that single mothers are less likely to achieve better household living conditions. This finding aligns with previous research showing that single mothers are more vulnerable due to their limited access to the resources and support needed to meet household needs (Eyasu, 2020; Santoso et al., 2020; Kim et al., 2020). Therefore, single motherhood cannot be viewed as a direct cause of low well-being, but rather as a condition associated with household vulnerability.

Maternal education and internet access are positively associated with improved basic household living conditions. This finding aligns with human capital theory, which states that education improves individuals' decision-making and household resource management skills (Hmimou et al., 2024). Previous research also shows that maternal education contributes to household well-being through improved health, nutrition, and resource management practices (Godah et al., 2021; Wu, 2022). Furthermore, internet access can help households access information, services, and economic opportunities, thus supporting better living conditions (Marshall et al., 2023; Wang et al., 2025).

The results showed that maternal employment status was not significantly associated with basic household living conditions. The interaction between employment status and single motherhood was also insignificant, indicating that maternal employment did not mitigate the negative impact of single motherhood on household living conditions. One possible reason for this is that this analysis only measured employment status without considering job quality. Previous research has shown that

low-wage, informal, or unstable employment does not necessarily improve household well-being (Ablaza & Perales, 2025; Sultana et al., 2022). In contrast, this study found that formal employment is associated with better household living conditions, suggesting that job quality appears to be more important than mere employment status (Wulan et al., 2025).

Heterogeneity analysis shows that the relationship between single motherhood and basic household living conditions varies by age and education level. By age, the negative association with single motherhood is more pronounced among young mothers and those of productive age, but is not significant among older mothers. By education, single motherhood remains negatively associated with both low- and high-educated mothers. However, mothers with higher education have a greater chance of achieving better household living conditions. These findings suggest that education can improve household living conditions but does not completely mitigate the negative impacts associated with single motherhood. These results align with the capability approach, which emphasizes that education can expand an individual's ability to utilize resources to improve well-being (Kim et al., 2020; Patrinos & Psacharopoulos, 2020).

The disadvantages associated with rural residence also deserve attention. Rural households are less likely to achieve higher basic household living conditions, even after controlling for maternal and household characteristics. This finding is consistent with studies showing that rural households often face structural disadvantages in accessing services, infrastructure, and economic opportunities (Ezeudu & Obimbua, 2024; Kosec & Wantchekon, 2020). The strong association of internet access further suggests that digital inclusion may be one pathway through which households improve access to information and opportunities, although digital access alone cannot substitute basic service provision. Overall, the findings support a multidimensional understanding of household welfare, in which family structure, human capital, digital access, work formality, and territorial context jointly shape vulnerability (Angraini et al., 2024). However, the results do not support broad claims regarding gender equality or family interaction beyond the variables measured in this study.

Despite these contributions, this study has several limitations. First, the cross-sectional design does not allow for causal interpretation, and the estimated relationships may still be affected by unobserved heterogeneity or reverse causality. Second, the outcome measures basic household living conditions through food adequacy, improved sanitation, and safe drinking water; it does not capture the full breadth of family well-being, such as psychosocial well-being, parenting quality, family functioning, and child development. Third, the employment variable captures working status but does not measure job quality, working hours, earnings, or employment stability, which may explain why working status and formal work show different patterns. Finally, single motherhood was identified based on marital status, which may not fully capture caregiving arrangements, co-residence, or support from extended family networks. Future research could address these limitations by using longitudinal data, richer measures of family well-being, and more detailed employment indicators.

Conclusion and Recommendation

Conclusion

This study shows that single motherhood is associated with lower baseline household living conditions compared to mothers living with a partner, even after accounting for various socioeconomic and demographic characteristics. However, because the study used a cross-sectional design, these findings represent a statistical association, not a causal relationship.

The results also show that maternal employment is not consistently associated with better household living conditions or mitigates the negative impact of single motherhood. Conversely, maternal education is associated with better household living conditions, although it does not completely eliminate the vulnerabilities experienced by single mothers. Furthermore, the negative association between single motherhood and household living conditions is more pronounced among young mothers and mothers of productive age, and remains present across both low- and high-educated groups.

Recommendation

The results of this study indicate that support for single mothers needs to be strengthened, particularly through social assistance, childcare services, and improved access to food, sanitation, and safe drinking water. Childcare support is also crucial to enable mothers, especially young working single mothers, to more easily fulfill their roles as breadwinners and caregivers. In addition to increasing women's labor force participation, policies also need to encourage access to more stable and high-quality formal employment. Research findings indicate that formal employment is more closely associated with better household living conditions than employment status alone.

Improved education, internet access, and digital services also need to be continuously promoted, as all three can help families access information, public services, and economic opportunities. Given that rural households tend to have lower living conditions, welfare programs should also be more focused on these areas. Future research is recommended to use longitudinal data and include more detailed information on employment quality, income, and caregiving arrangements to better understand the relationships found in this study.

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