

## Gender Determinant on Multidimensional Poverty Index: Evidence from Indonesia

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### Abstract

Poverty measurement from a non-monetary aspect is needed as low-income individuals are not always multidimensionally poor, and vice versa. The focus should also be on the gender determinant potentially related to the inequality in wage, labour market, and the return of education, which can influence the household's ability to achieve a higher standard of living and alleviate poverty. This paper discovers the contribution of gender determinants to multidimensional poverty conditions in Indonesia. This paper used logit estimation using National Socioeconomics Survey (Susenas) 2018. The data show that approximately 10% of the Indonesian population is considered vulnerably poor, and severely poor is 3%. The vulnerably and severely poor individuals are mostly measured from years of schooling, health insurance ownership, and assets ownership. Moreover, we find that variables of household size, dependency ratio, and household head age are the better explanators of poverty's vulnerability. However, those variables cannot explain severe poverty among female- and male-headed households, even though female-headed households are more prone to falling into poverty situations. Then, the decomposition results show that our selected variables explain the probability of being vulnerably poor. However, the probability of being severely poor is largely determined by unobservable behaviour domination not included in the study.

### Keywords:

Indonesia, multidimensional poverty, gender determinant, logit estimation.

JEL Codes: C31, I24, I32

### Introduction

Indonesia has achieved satisfactory results in the poverty alleviation programme in the last five decades, indicated by the reduction of the percentage of the population who live below the poverty line, from 60% in the 1970s to 15.10% in 1990 and reached 10.12% in 2017 (Badan Pusat Statistik, 2021). Moreover, by using international comparison, i.e., measuring poor people as those who live below USD1.90 per day, the data shows that 57.27% of the population earned less than USD1.90 per day in 1990 and declined to 39.30% in 2000 and to 5.70% in 2017 (Badan Pusat Statistik, 2020).

However, since the estimations are monetary, biases can occur since they do not cover self-employment, barter, irregular-received income, or home-produced goods and services. Hence, the calculation of poverty status should be expanded into the non-monetary dimension, e.g., health, education, nutrition. Thus, we will have a more comprehensive analysis as low-income people are not always multidimensionally poor, and vice versa.

The deprived condition is one indicator of an individual's inability to participate in a market environment and can be a pitfall in development (Jordan, 1996). The deprivation is

also reflected in the unachievable individual's freedom, where freedom is the primary objective of development and the principal means of development (Sen, 1999). Therefore, estimation of an individuals' inability to achieve a certain standard of well-being should also be counted from monetary and non-monetary dimensions (Kakwani & Silber, 2008).

Investigation of the deprivation that considering gender inequality is important because throughout history, even though many women have been credited for their roles in revolutionary struggles, appreciation for women is lacking, especially in less- and developed countries (Ndinda & Ndhlovu, 2018). Further, as found by Espinoza-Delgado and Klasen (2018), some previous studies suggest that both the gender of the household head and their marital status have a strong impact on the probability of being multidimensionally poor, which contrast with other recent empirical evidence that the households headed by women are, on average, better off than those headed by men. This condition challenges that female-headed households are worse off than those led by males in terms of poverty. Since the deprived condition can differ from one country to another—especially related to the data availability—studies of poverty from multidimensional poverty estimation can bring different results among researchers. Some recent studies show that the poverty rate in Indonesia, measured from the multidimensional poverty approach, is approximately 10-12%, e.g., as found by Sumarto and De Silva (2014), Sumarto and Widyanti (deceased) (2008), and Wardhana (2010). Other studies show that the relationship between poverty and gender differences is important as it may relate to wage inequality (Taniguchi & Tuwo, 2014), motherhood penalty (Budig & Hodges, 2010; Killewald & Bearak, 2014), and inequality in the return of education (Soseco, 2021; UN Women Indonesia, 2020). These influence the household's ability to earn a higher income, accumulate assets, and achieve

better well-being. Despite its essential role, studies of the relationship between poverty and gender are still limited in Indonesia.

This paper investigates the gender differences in the probability of being poor in Indonesia, measured from multidimensional poverty. To achieve this objective, this paper tries to collect data as close as possible to the Alkire and Foster (2007) guidance that selects indicators of interest related to the multidimensional poverty indicators across three dimensions: health, education, and standard of living. The logit estimation is used to find the link between poverty measurement and gender determinants, especially to predict the influence of household size, dependency ratio, and household head age.

This paper contributes to the studies on how gender differences relate to multidimensional poverty in Indonesia. It provides more recommendations and information for national development, specifically focusing on gender equality and its contribution to economic growth, living standards, savings rates, consumption, and investment. Moreover, this paper is a valuable contribution to the Indonesian government to achieving gender equality as one of the Sustainable Development Goals (United Nations, 2021). The paper is organised: Section 1 will introduce the study, and section 2 presents a review of the literature. Section 3 covers data and methodology. Then, section 4 contains results and discussions. Last, section 5 concludes with policy recommendations and suggestions for future research.

### **Literature Review**

Alkire and Foster (2007) proposed a methodology summarising a plurality of imperfectly overlapping deprivation domains into a consistent parametric class of multidimensional poverty indices. These indices can be used in various policy-relevant applications, such as creating measures of well-

being, monitoring and evaluating antipoverty programs, and improving the targeting of in-kind and cash benefits (Pacifico & Poege, 2017).

The selection of dimensions of interest is related to the Millennium Development Goals (MDGs) across three dimensions: health, education, and standard of living. Each dimension is equally weighted, and each indicator within each dimension is equally weighted. A person is identified as multidimensionally poor if they achieve a poverty cut-off: one-third of the weighted indicators for vulnerable poor and two-thirds of the weighted indicators for severely poor (Alkire & Foster, 2011) (Table 1).

Alkire and Foster (2007) explained the state of poverty by providing measurements based on the incidence, depth and severity

of multidimensional poverty by giving an adjusted headcount ratio (M0) calculated from two indices: H and A. The H is the multidimensional headcount ratio, i.e. the percentage of people identified as poor using the dual cut-off approach and shows the incidence of multidimensional poverty. Then, A is the average proportion of weighted deprivations, which people suffer simultaneously and shows the intensity of people's poverty—the joint distribution of their deprivations (Alkire & Foster, 2007).

The M0 is calculated by multiplying the incidence of poverty by the average intensity of poverty across the poor ( $M0 = H \times A$ ); as a result, it reflects the share of people in poverty and how much they are deprived. If a person is deprived in 20-33.3% of the weighted

**Table 1.**  
**The Dimensions, Indicators, Deprivation Thresholds and Weights of the MPI**

Dimension of poverty	Indicators	Deprived if...	Weight
Education	Years of schooling	No household member aged ten years or older has completed five years of schooling	1/6
	School attendance	Any school-aged child is not attending school up to the age at which he/she would complete class 8.	1/6
Health	Child mortality	Any child has died in the family in the five years preceding the survey	1/6
	Nutrition	Any adult under 70 or any child for whom there is nutritional information is undernourished in terms of weight for age*.	1/6
Living Standard	Electricity	The household has no electricity.	1/18
	Sanitation	The household's sanitation facility is not improved (according to MDG guidelines), or it is improved but shared with other households**	1/18
	Drinking water	The household does not have access to improved drinking water (according to MDG guidelines), or safe drinking water is at least a 30-minute walk from home, roundtrip***.	1/18
	Flooring	The household has a dirt, sand, dung, or 'other' (unspecified) type of floor.	1/18
	Cooking fuel	The household cooks with dung, wood, or charcoal	1/18
	Assets	The household does not own more than one radio, TV, telephone, bike, motorbike, or refrigerator and does not own a car or truck	1/18

Source: Oxford Poverty and Human Development Initiative (2017) and Alkire and Santos (2014)

\* Adults are considered malnourished if their BMI is below 18.5 m/kg<sup>2</sup>. Children are malnourished if their z-score of weight-for-age is below minus two standard deviations from the median of the reference population.

\*\* A household is considered to have access to improved sanitation if it has some flush toilet or latrine or ventilated improved pit or composting toilet, provided that they are not shared.

\*\*\*A household has access to clean drinking water if the water source is any of the following types: piped water, public tap, borehole, or pump, protected well, protected spring or rainwater, and within 30 minutes' walk (roundtrip).

indicators, they are considered vulnerable to poverty, and if they are deprived in 50% or more (i.e.  $k=50\%$ ), they are identified as in severe poverty (Oxford Poverty and Human Development Initiative, 2017)

For some reason, the M0 measure provides more strength to measure poverty than other indices. First, the measure is robust when using ordinal or cardinal variables as it divides the individuals' conditions into deprived and non-deprived. Second, to adjust the incidence of multidimensional poverty by the intensity of poverty across the poor, M0 satisfies dimensional monotonicity: if a poor person becomes deprived in an additional indicator, M0 will increase. Third, the measure is decomposable by population subgroups, meaning that the M0 of the overall society can be obtained as the population-weighted sum of subgroup poverty levels, enabling poverty comparisons across subgroups. Fourth, after identification, M0 can be grouped by indicators. The overall M0 can be expressed as the weighted sum of the total population's proportion identified as poor and deprived in each indicator. These proportions are the so-called censored headcount ratios, as opposed to the raw (or uncensored) headcount ratios, which are the deprivation rates in each indicator (including the deprivations of the non-poor). Analogous to the population subgroup decomposability, the break-down by censored headcounts enables analysis of the contribution of deprivations in each indicator to overall poverty (Alkire & Santos, 2014).

## Methods

This paper uses data from *Survey Sosial Ekonomi Nasional* (Susenas) 2018, which collects information on the socio-economic condition of 295,155 households that live in 34 provinces in Indonesia. The Susenas questionnaire can be split into core and module questionnaires. The core questionnaire consists of individual-level questions regarding their education,

health, economy, labour, housing, clean water, crime, leisure, and mass media exposure. Moreover, the module questionnaire consists of household-level questions regarding their demographic characteristics, health and nutritional status, educational attainment, effects of habits, crime, travel pattern, social-culture circumstances, household welfare, housing conditions, and consumption and expenditure (Surbakti, 1995).

The dependent variable is the multidimensional poverty index, partially based on Alkire and Foster (2007) methodology of multidimensional poverty. This index measures individual's deprivation in the ten indicators grouped into health, education and living standard dimensions and selected following Oxford Poverty and Human Development Initiative (2017) with some adjustments with Susenas data-set. For each indicator, the weight is proportionally given to reflect its significance in measuring poverty. Individuals are then considered vulnerably poor if they are deprived of one-third of the weighted indicators and they will be considered severely poor if they are deprived of two-third of the weighted indicators (Table 2).

The independent variables consist of age of household head, household size and dependency ratio. The dependency ratio is explained as the number of non-productive household members (aged 0-14 and more than 65 years) that must be supported by productive household members (aged 15-64). Those variables are distinguished between female-headed and male-headed households to allow more detailed observation based on gender differences.

To estimate the poverty status of individuals, Pacifico and Poege (2017) used "mpi" command (a command to analyse multidimensional poverty index) in Stata. By using this method, individuals are considered vulnerably poor if they are deprived in at least 3 indicators. Hence, the Pacifico and Poege

**Table 2.**  
**Dimension of Poverty, Modified to Susenas Dataset**

Dimension of poverty	Indicators	Deprived if...	Weight
Education	Years of schooling	Any household member aged 5 years or older has not completed six years of schooling.	1/6
	School attendance	Any household members aged 5 years or older that are not attending school.	1/6
Health	Food security	The household cannot get healthy food due to a lack of financial resources.	1/6
	Health insurance	The household has no health insurance.	1/6
Living Standard	Electricity	The household has no electricity.	1/18
	Sanitation	The household has no access to improved sanitation, i.e., some type of flush toilet or latrine, or ventilated improved pit or composting toilet, provided that they are not shared.	1/18
	Drinking water	The household has no access to clean drinking water if the water source is any of the following types: piped water, public tap, borehole, or pump, protected well, protected spring or rainwater.	1/18
	Flooring	The household has a dirt, sand, dung or 'other' (unspecified) type of floor.	1/18
	Cooking fuel	The household cooks with dung, wood, or charcoal	1/18
	Assets	The household does not own more than one radio, TV, telephone, bike, motorbike, or refrigerator and does not own a car or motorboat.	1/18

Source: Analysed by authors (2021)

(2017) estimator requires a cut-off value of 0.333. In contrast, a cut-off of 0.666 that reflects deprivation in at least 6 indicators is used if individuals are considered severely poor.

The logit model is used to find the correlation between a household's attributes and the risk of being poor. For binary outcome data, the dependent variable  $y$  takes one of two values,

$$y = \begin{cases} 1 & \text{with probability } p \\ 0 & \text{with probability } 1 - p \end{cases}$$

The logit model is the mathematical form (Cameron & Trivedi, 2005):

$$p_i = Pr[y_i = 1|x_i] = \frac{\exp(\beta_1 + \beta_2 x_i)}{1 + \exp(\beta_1 + \beta_2 x_i)}$$

with  $\beta$  is the parameter and ensures that  $0 < p_i < 1$ . For robustness check, a Blinder–Oaxaca-type decomposition (Sinning, Hahn, and Bauer (2008) in Stata using command: "nldecompose". This approach allows the decomposition of outcome variables between two groups into a part explained by differences in observed characteristics and a part attributable to

differences in the estimated coefficients (Sinning et al., 2008). To make sure that our method is the fittest model of all, we use the likelihood criteria, and the Akaike Information Criteria (AIC) and the Bayesian Information Criteria (BIC) are used, following Cameron and Trivedi (2005) and Hardin and Hilbe (2007).

## Results

### Multidimensional Poverty Estimation

In Indonesia, female-headed households have a smaller household size, higher dependency ratio, and older age of household head than male-headed households. As common norms place male as household heads, female-headed household occurs because of non-existing male due to death or separation. Therefore, smaller household size is explained by fewer family members (husband leave or die) or grown-up family members already leaving the house. A separation in the early marriage cycle means that a female-headed household has more young household members to be supported. Some female-headed households have a higher reluctance to remarry, which

might be due to the burden of raising children, or focusing on a career, but also due to social norms resulting in a social stigma that makes it more difficult for widows to remarry (Table 3).

Estimation across provinces shows that provinces in Eastern Indonesia—consisting

of West Nusa Tenggara, East Nusa Tenggara, Sulawesi Island, and Maluku and Papua—have a larger household size and dependency ratio than the provinces in Western Indonesia. For instance, provinces in Java Island have the smallest household size compared to other

**Table 3.**  
**Household Head, Dependency Ratio, and Household Head Age in Indonesia, 2018**

	Female-headed Household			Male-headed Household		
	HH Size	Dep. Ratio	HH Head Age	HH Size	Dep. Ratio	HH Head Age
<b>Sumatera Island</b>						
Aceh	2.977	0.703	55.913	4.26	0.686	46.519
North Sumatera	2.913	0.813	57.391	4.34	0.796	46.789
West Sumatera	2.787	0.733	55.901	4.212	0.723	48.172
Riau	2.937	0.697	55.191	4.09	0.676	45.222
Jambi	2.892	0.61	55.49	3.872	0.588	46.387
Bengkulu	2.466	0.636	55.058	3.866	0.611	46.015
South Sumatera	2.837	0.646	56.378	3.969	0.629	46.476
Lampung	2.68	0.647	56.921	3.793	0.626	46.947
Kepulauan Riau	2.769	0.667	52.171	3.877	0.631	45.314
Kep. Bangka Belitung	2.613	0.633	56.185	3.823	0.612	45.739
<b>Java Island</b>						
DKI Jakarta	2.876	0.54	53.669	3.778	0.511	47.358
West Java	2.479	0.598	56.563	3.702	0.579	47.445
Central Java	2.524	0.607	57.94	3.738	0.579	50.075
D.I. Yogyakarta	2.21	0.588	55.07	3.532	0.557	50.588
East Java	2.545	0.574	57.184	3.679	0.547	50.026
Banten	3.116	0.573	54.518	4.116	0.565	47.025
<b>Bali and Nusa Tenggara</b>						
Bali	2.187	0.635	51.601	3.92	0.6	48.099
West Nusa Tenggara	2.61	0.683	48.887	3.785	0.665	45.622
East Nusa Tenggara	3.242	0.923	52.958	4.728	0.904	48.383
<b>Kalimantan Island</b>						
West Kalimantan	3.09	0.683	55.145	4.127	0.651	46.907
Central Kalimantan	2.757	0.631	53.442	3.853	0.599	44.874
South Kalimantan	2.433	0.595	54.346	3.698	0.576	45.382
East Kalimantan	3.079	0.655	52.972	4.058	0.642	46.055
North Kalimantan	3.329	0.723	50.044	4.332	0.692	45.491
<b>Sulawesi Island</b>						
North Sulawesi	2.838	0.623	56.223	3.934	0.597	48.904
Central Sulawesi	2.979	0.686	54.548	4.118	0.663	45.912
South Sulawesi	3.005	0.724	57.073	4.286	0.705	48.686
South-East Sulawesi	3.152	0.784	53.039	4.332	0.764	45.722
West Sulawesi	3.113	0.785	55.177	4.374	0.761	45.251
Gorontalo	2.966	0.62	53.108	4.158	0.606	45.711
<b>Maluku and Papua</b>						
Maluku	3.716	0.843	54.707	4.937	0.84	47.459
North Maluku	3.327	0.751	52.427	4.662	0.739	45.786
West Papua	3.522	0.861	51.245	4.638	0.83	44.387
Papua	3.155	0.878	47.247	4.285	0.861	41.318
<b>Indonesia</b>	<b>2.803</b>	<b>0.685</b>	<b>55.401</b>	<b>4.023</b>	<b>0.664</b>	<b>47.247</b>

Source: Calculated by authors (2021)

provinces—both for male- and female-headed households. The data also shows that provinces in Eastern Indonesia have a relatively lower age of household heads than in Western Indonesia. These conditions reflect the large disparity and varied household characteristics between Indonesia’s regions.

Estimation of the multidimensional poverty index shows which individuals whose mostly deprived based on years of schooling, lack of health insurance, and asset ownership (Table 4). The deprivation in the education sector (domain 1) reflects that educational infrastructure development in Indonesia could not reach the population widely and equally. It is indicated by the lack of opportunity for households to access education. For some reason, parents prefer not to send their children to school, e.g., due to lack of financial capability, distance to school, or parents’ intention for children to help them in economic activities.

**Table 4.**  
**Percentage of individuals whose indicator values are below the threshold**

	Female-headed household (%)	Male-headed household (%)	Total (%)
<b>Domain 1</b>			
Years of schooling	38.675	36.281	37.472
School attendance	7.188	5.026	6.102
<b>Domain 2</b>			
Food security	12.081	12.279	12.18
Health insurance	35.532	36.269	35.902
<b>Domain 3</b>			
Electricity	1.461	1.563	1.512
Sanitation	11.248	11.711	11.481
Drinking water	11.348	11.669	11.509
Flooring	4.691	4.72	4.705
Cooking fuel	15.997	16.032	16.015
Assets	23.155	29.882	26.535

Source: Calculated by authors (2021)

Note: Households are categorised as vulnerably poor if they are deprived in 3 out of 10 indicators and severely poor if they are deprived in 6 out of 10 indicators.

Lack of educational access due to financial aspects will lead to difficulties on providing sufficient health conditions, reflected in the ability to access health insurance. In fact, the Indonesian universal health insurance (BPJS), which was launched in 2014 to allow the poorest households to access healthcare facilities, only covered 77% of the Indonesian population in 2018 (Kontan, 2021).

Asset ownership is defined as individuals/households with a low level of earning, high expenditure, and households’ inability to find a suitable instrument to preserve their wealth. Households with less educational access will have difficulties finding decent and well-paid job opportunities and push them to live in sub-standard housing that, unfortunately, bring high costs in sanitation, drinking water, or cooking fuel. The high living expenditure will push the households to allocate less budget for savings or investment. Moreover, lack of information or access to knowledge makes them difficult to enhance financial management knowledge, including selecting suitable investment tools.

Estimation of the multidimensional poverty index (MPI) shows that over 10% of the Indonesian population are considered vulnerably poor, with a higher proportion found in the female-headed household than male-headed households. Moreover, more than 3% of the population are severely poor, with a similar percentage between female- and male-headed households (Table 5).

The results in Table 5 are considered lower than the BPS calculation that uses the expenditure approach. In BPS’ calculation, approximately 20% of the Indonesian population is considered vulnerable, i.e., they have expenditures up to 1.5 times the poverty line. Approximately 10% of the Indonesian population are considered poor, i.e., those who live below the poverty line (Badan Pusat Statistik, 2018; Tempo, 2018). Those different findings are considered acceptable as the



**Table 5.**  
**Multidimensional Headcount**

		Female-headed household		Male-headed household		Total	
		Coefficient	Std.Error	Coefficient	Std.Error	Coefficient	Std.Error
<b>Vulnerably Poor</b>							
Incidence	H	0.257	0.001	0.246	0.001	0.252	0.001
	$M_0$	0.102	0.000	0.099	0.000	0.101	0.000
Intensity	A	0.398	0.000	0.402	0.000	0.4	0.000
<b>Severely Poor</b>							
Incidence	H	0.004	0.001	0.004	0.001	0.004	0.000
	$M_0$	0.003	0.000	0.003	0.000	0.003	0.000
Intensity	A	0.688	0.000	0.689	0.000	0.689	0.001

Note:  $M_0 = H \cdot A$

Source: Calculated by authors (2021)

multidimensional poverty index measures poverty from both the monetary and the non-monetary aspects. Thus, it is potentially biased due to intergenerational transfers, inheritance, or non-market economic sectors not captured in the expenditure reports.

In this study, the household’s multidimensional poverty is decomposed into subgroups, i.e., the female- and male headed-households. The results show that poor female-headed households are slightly higher than male-headed households (10.2% versus 9.9%). This difference might be caused by female-headed households that have more limited types of job opportunities, and at the same time, the absence of males in the family creates only a single income earner in the family (Table 6).

**Table 6.**  
**Indices by Subgroups**

	Female-headed Household	Male-headed Household	Total
<i>Absolute</i>			
H	0.257	0.246	0.252
$M_0$	0.102	0.099	0.101
pop	0.498	0.502	1.000
<i>Percentage</i>			
H	0.508	0.492	1.000
$M_0$	0.505	0.495	1.000

Source: Calculated by authors (2021)

Findings from the adjusted headcount,  $M_0$ , and the decomposition of subgroups,

i.e., the female- and male-headed households show domain 2 or health aspect is the biggest contributor to the condition of household poverty, then followed by years of schooling and food security (Table 7). In the MPI, since the health condition is expressed by health insurance access, the male-headed household has the advantage over the female-headed household because government recognise social norms that the male should be the household head. Hence, female-headed households are often marginalised/ side-stepped in the development process or government projects. Further, many female-headed households are not in formal jobs, making obtaining health insurance more difficult.

Further, we will identify the spread of the poor households by province. Figures 1 and 2 show that provinces outside Java Island have a higher percentage of poverty, either severely or vulnerably poor, than provinces on Java Island, which might be correlated with the unequal infrastructure development between Java and outside Java Islands. This condition results from the trickle-down-effect economic strategy during the 1970s-1990s that concentrated economic activities in certain areas, especially on Java Island and largely neglected other areas (Drake, 1981; Nazara, Hewings, & Sonis, 2006; Withington, 1983).

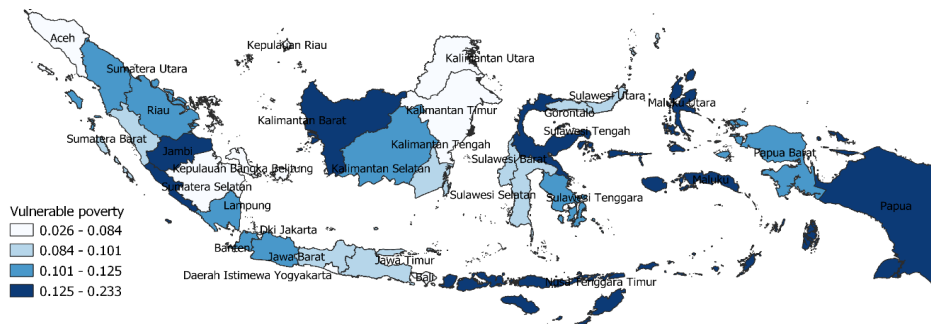


**Table 7.**  
**Contribution of each indicator (%)**

	Female-headed Household	Male-headed Household	Total
$M_0$			
<b>Domain 1</b>			
Years of schooling	0.304	0.308	0.306
School attendance	0.067	0.049	0.058
Contribution of domain 1	0.371	0.356	
<b>Domain 2</b>			
Food security	0.151	0.154	0.153
Health insurance	0.319	0.315	0.317
Contribution of domain 2	0.470	0.470	
<b>Domain 3</b>			
Electricity	0.007	0.007	0.007
Sanitation	0.031	0.033	0.032
Drinking water	0.03	0.031	0.031
Flooring	0.013	0.014	0.013
Cooking fuel	0.045	0.046	0.046
Assets	0.033	0.043	0.038
Contribution of domain 3	0.159	0.174	
<b>Total</b>	<b>1.000</b>	<b>1.000</b>	<b>1.000</b>

Source: Calculated by authors (2021)

**Figure 1.**  
**Incidence of Vulnerable Poverty in Indonesia, 2018**



Source: Analysed by authors (2021)

**Figure 2.**  
**Incidence of Severe Poverty in Indonesia, 2018**



Source: Analysed by authors (2021)

**Discussion**

**Poverty Determinants: Gender Probability of Being Poor**

As the previous section presents the condition of poverty in Indonesia, measured from the multidimensional poverty index, further investigation is needed to discover the probability of being poor, either vulnerably or severely poor, based on the gender differences of the household head. The analysis is started with the model selection to choose the best model that fits with the data, either logarithm or non-logarithm models. The best model is selected from four proposed models explained as follows: First, model 1 represents the status of vulnerable poverty as a function of log based on household size, dependency ratio, household head age and model 2 is the status of severe poverty as a function of log based on household size, dependency ratio, household head age. While model 3 is the status of vulnerable poverty based on household size, dependency ratio, and household head age. Last, model 4 presents the status of severe poverty based on household size, dependency ratio, and household head age.

**Table 9.**  
**Model Selection**

Model	Log-likelihood	AIC	BIC
Model 1	-121511.90	241836.50	241877.40
Model 2	-21758.54	42826.39	42867.32
Model 3	-166658.00	331736.00	331778.20
Model 4	-30785.76	61145.32	61187.54

*Source: Calculated by authors (2021)*

Estimation of log-likelihood shows the best models are the logarithm models as they maximise the log-likelihood value. But estimation of Akaike Information Criteria (AIC) and Bayesian Information Criteria (BIC) show logarithm models are suitable to represent the data as they have smaller AIC and BIC values than non-logarithm models. Thus, from the above three criteria, the models that include logarithm models are the best to explain the data (Table 9).

Investigations to find the influence of the gender differences of household heads on the probability of being poor in Indonesia are achieved through three logit models, combining a model that includes the relationship between poverty status and household size only (as seen in model 1 in Table 10), a model that contains the relationship between poverty status, household size, and dependency ratio (model 2), and a model that has the link between poverty status, household size, dependency ratio, and household head age (model 3). Since model 3 has the highest likelihood compared to other models, it is best to explain the relationship between household heads' gender differences and the possibility of being poor in Indonesia (Table 10).

Model 3 in Table 10, which estimates the relationship between the poverty status, household size, dependency ratio, and household head's age, is then re-estimated by using estimation with robust standard error to find its robustness (as seen in Table 11). Findings show that female-headed-households have a higher probability of being vulnerably poor than male-headed households due to the increase of the coefficient from dependency ratio and household head's age. Therefore, a larger household size will significantly reduce the probability of being vulnerably poor among female-headed households than in male-headed households (coefficients of -0.258 vs. -0.094). After that, a higher coefficient of dependency ratio significantly increases the probability of being vulnerably poor, with a higher tendency in female-headed households than male-headed households (coefficients of 0.185 vs. 0.173). But the older household head brings a significant probability of being vulnerably poor, with a higher tendency found in female-headed households (coefficients of 0.482 vs. 0.467).

Female-headed households have a lower tendency to be severely poor due to the increase in dependency ratio. A higher dependency

**Table 10.**  
**Model Comparisons**

	Model 1		Model 2		Model 3	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
<i>Vulnerably poor status</i>						
<b>Female-headed Household</b>						
Household size	-0.412***	0.023	-0.245***	0.054	-0.258***	0.053
Dependency ratio			0.169***	0.033	0.185***	0.033
Household head age					0.482***	0.072
Constant	-0.672***	0.023	-0.747***	0.069	-2.645***	0.289
Log pseudolikelihood	-6120802.6		-2863864.2		-2854313.8	
Pseudo R2	0.0111		0.0049		0.0082	
<b>Male-headed Household</b>						
Household size	-0.160***	0.015	-0.037	0.026	-0.094***	0.025
Dependency ratio			0.155***	0.013	0.173***	0.013
Household head age					0.467***	0.030
Constant	-1.037	0.020	-1.132***	0.038	-2.808***	0.115
Log pseudolikelihood	-31625633		-22723148		-22661117	
Pseudo R2	0.0008		0.0014		0.0042	
<i>Severely Poor</i>						
<b>Female-headed Household</b>						
Household size	-0.557***	0.070	-0.210	0.163	-0.192	0.166
Dependency ratio			0.435***	0.099	0.410	0.099
Household head age					-0.412***	0.210
Constant	-3.747***	0.063	-4.017***	0.210	-2.420**	0.844
Log pseudolikelihood	-839346.64		-339400.3		-338859.43***	
Pseudo R2	0.0112		0.0093		0.0109	
<b>Male-headed Household</b>						
Household size	-0.337***	0.048	0.119	0.090	0.185*	0.099
Dependency ratio			0.458***	0.040	0.444***	0.042
Household head age					-0.506***	0.104
Constant	-4.011***	0.063	-4.472***	0.137	-2.675***	0.375
Log pseudolikelihood	-3786024.7		-2615700		-2611096.4	
Pseudo R2	0.0020		0.0070		0.0087	

Note: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Source: Calculated by authors (2021)

**Table 11.**  
**Poverty Determinants in Indonesia with Robust Standard Error**

	Female-headed Household		Male-headed Household	
	Coef.	Std. Err.	Coef.	Std. Err.
<b>Vulnerably Poor</b>				
Household size	-0.258***	0.053	-0.094***	0.025
Dependency ratio	0.185***	0.033	0.173***	0.013
Household head age	0.482***	0.072	0.467***	0.030
Constant	-2.645***	0.289	-2.808***	0.115
<b>Severely Poor</b>				
Household size	-0.192	0.166	0.185*	0.099
Dependency ratio	0.410***	0.099	0.444***	0.042
Household head age	-0.412**	0.210	-0.506***	0.104
Constant	-2.420***	0.844	-2.675***	0.375

Note: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Source: Calculated by authors (2021)

ratio will significantly increase the probability of being severely poor with a lower coefficient than in male-headed households (0.410 vs. 0.444). While in the increase of household head's age, female-headed households will get a higher probability of being severely poor due to a negative coefficient lower than male-headed households (-0.412 vs -0.506). Last, the change in household size variables brings no significant impact on the probability of being severely poor among female-headed households.

Similar findings are found when clusters' effect is considered, shown in the logit estimation with clustered standard error (Table 12). Estimation using a clustered standard error shows less significant variables occur than estimation without considering the clustering interaction and with standard error values that are higher than estimation when the clustering interaction is excluded in the analysis, as found in Table 11.

For robustness check, we apply a Blinder–Oaxaca-type decomposition, which allows the decomposition of gender differences in the poverty status into a part caused by differences in observable characteristics and a part explained by differences in estimated coefficients (Bauer, Göhlmann, & Sinning, 2007). The estimation used is the Sinning et

al. (2008) estimator, and the decomposition is carried out separately for the binary value of vulnerably poor and the binary value of severely poor (Table 13).

In the following section, we will interpret the observable characteristics related to behavioural differences in the probability of being poor. Table 13 shows that for the male-headed household, over 90% of the gender differences in the probability of being vulnerably poor are due to differences in observable characteristics, and only 9% is due to differences in coefficient. Similar results show that the female-headed household has a higher probability of being poor explained by the differences in observable characteristics. This indicates that the demographic variables of household size, dependency ratio, and household head age are sufficient to explain the probability of being vulnerably poor among male-headed and female-headed households.

The interesting findings were found in the severe poverty section, where the probability of being severely poor is largely determined by unobservable behaviour domination not included in the study. It reflects that the variables of household size, dependency ratio, and household head age used cannot fully explain the severely poor condition in Indonesia. It seems the condition of the severely

**Table 12.**  
**Poverty Determinants in Indonesia with Clustered Standard Error**

	Female-headed Household		Male-headed Household	
	Coef.	Std. Err.	Coef.	Std. Err.
<b>Vulnerably Poor</b>				
Household size	-0.258***	0.090	-0.094	0.114
Dependency ratio	0.185***	0.048	0.173***	0.033
Household head age	0.482***	0.146	0.467***	0.100
Constant	-2.645***	0.598	-2.808***	0.364
<b>Severely Poor</b>				
Household size	-0.192	0.236	0.185	0.276
Dependency ratio	0.410***	0.125	0.444***	0.078
Household head age	-0.412	0.281	-0.506*	0.261
Constant	-2.420*	1.274	-2.675***	0.998

Note: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Source: Calculated by authors (2021)

**Table 13.**  
**Decomposition Results**

	Vulnerably Poor			Severe Poor		
	Coef.	Std. Err.	Percentage	Coef.	Std. Err.	Percentage
<b>Male-headed Household</b>						
Characteristics	-0.025***	0.000	90.39%	0.001*	0.000	-48.17%
Coefficient	-0.003	0.003	9.61%	-0.002**	0.001	148.17%
<b>Female-headed Household</b>						
Characteristics	-0.030***	0.002	112.49%	0.000	0.001	26.64%
Coefficient	0.003***	0.001	-12.49%	-0.001	0.001	73.36%
Raw	-0.027***	0.003	100%	-0.001	0.001	100%

Note: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Source: Calculated by authors (2021)

poor is also caused by other potential factors, such as low economic growth that brings a few opportunities for poor people to raise their income and accumulate assets, social exclusion and adverse incorporation.

Our findings show any drops in income will significantly influence female-headed households and make them more vulnerable to being poor than male-headed households. Therefore, efforts are needed to reduce the risk that puts women in a marginal position, i.e., reduce the risk of divorce—a formal declaration to end a marriage—or separation—to stop living together but without divorce. Some actions can be taken to prevent divorce, namely: the prevention of child marriage, better education access for women, and the creation of more job opportunities for women.

### Conclusion

This paper investigates the relationship of household heads' gender differences to the probability of being poor in Indonesia, measured from the multidimensional poverty approach.

While we differentiate poverty into two conditions, vulnerable and severe, we find that the three demographic variables—household size, dependency ratio, and household head age—are the better explainers of vulnerability to poverty but cannot explain severe poverty among female- and male-headed households

with the female-headed household are more prone to falling into poverty situation.

This paper is not free from limitations. While the use of Susenas provides in-depth analysis of socio-economic conditions in Indonesia, single-year observation cannot fully reflect the condition of poverty as the household's current condition will likely be influenced by past conditions. Therefore, multi-year observations on the poverty issue will provide interesting findings. A further issue that can be discussed in future research includes deeper analysis within subgroups and expanding the analysis into some variables, including labour market and geographical aspects.

### References

- Alkire, S., & Foster, J. (2007). *Counting and Multidimensional Poverty Measurement*. Retrieved from <https://ophi.org.uk/working-paper-number-07/>
- Alkire, S., & Foster, J. (2011). Counting and multidimensional poverty measurement. *Journal of Public Economics*, 95(7-8), 476-487.
- Alkire, S., & Santos, M. E. (2014). Measuring Acute Poverty in the Developing World: Robustness and Scope of the Multidimensional Poverty Index. *World Development*, 59, 251-274. <https://doi.org/10.1016/j.worlddev.2014.01.026>

- Badan Pusat Statistik. (2018). Persentase penduduk miskin Maret 2018 turun menjadi 9,82 persen. Retrieved from <https://www.bps.go.id/pressrelease/2018/07/16/1483/persentase-penduduk-miskin-maret-2018-turun-menjadi-9-82-persen.html>
- Badan Pusat Statistik. (2020). Proporsi Penduduk Yang Hidup Di Bawah Garis Kemiskinan Internasional (1,90 USD Per Hari) Retrieved from <https://bps.go.id/indicator/23/1471/8/proporsi-penduduk-yang-hidup-di-bawah-garis-kemiskinan-internasional-1-90-usd-per-hari.html>
- Badan Pusat Statistik. (2021). Jumlah Penduduk Miskin, Persentase Penduduk Miskin dan Garis Kemiskinan, 1970-2017. Retrieved from <https://www.bps.go.id/statictable/2014/01/30/1494/jumlah-penduduk-miskin-persentase-penduduk-miskin-dan-garis-kemiskinan-1970-2017.html>
- Bauer, T., Göhlmann, S., & Sinning, M. (2007). Gender differences in smoking behavior. *Health Economics*, 16(9), 895-909. <https://doi.org/10.1002/hec.1259>
- Budig, M. J., & Hodges, M. J. (2010). Differences in disadvantage: Variation in the motherhood penalty across white women's earnings distribution. *American Sociological Review*, 75(5), 705-728.
- Cameron, A. C., & Trivedi, P. K. (2005). *Microeconometrics: Methods and Applications*. Cambridge: Cambridge University Press.
- Drake, C. (1981). The Spatial Pattern of National Integration in Indonesia. *Transactions of the Institute of British Geographers*, 6(4), 471-490. <https://doi.org/10.2307/621880>
- Espinoza-Delgado, J., & Klasen, S. (2018). Gender and multidimensional poverty in Nicaragua: An individual based approach. *World Development*, 110, 466-491.
- Hardin, J. W., & Hilbe, J. M. (2007). *Generalized linear models and extensions*. College Station, Texas: Stata Press.
- Jordan, B. (1996). *A theory of poverty and social exclusion*. Oxford: Polity Press.
- Kakwani, N., & Silber, J. (Eds.). (2008). *Quantitative approaches to multidimensional poverty measurement*. Hampshire: Palgrave Macmillan.
- Killewald, A., & Bearak, J. (2014). Is the motherhood penalty larger for low-wage women? A comment on quantile regression. *American Sociological Review*, 79(2), 350-357.
- Kontan. (2021). Menyimak strategi BPJS Kesehatan mengejar target kepesertaan 95% di 2019. Retrieved from <https://keuangan.kontan.co.id/news/menyimak-strategi-bpjs-kesehatan-mengejar-target-kepesertaan-95-di-2019>
- Nazara, S., Hewings, G. J. D., & Sonis, M. (2006). An exploratory analysis of hierarchical spatial interaction: the case of regional income shares in Indonesia. *Journal of Geographical Systems*, 8(3), 253-268. <https://doi.org/10.1007/s10109-005-0016-3>
- Ndinda, C., & Ndhlovu, T. P. (2018). Gender, poverty and inequality: exploration from a transformative perspective. *Journal of International Women's Studies*, 19(5), 1-12.
- Oxford Poverty and Human Development Initiative. (2017). Indonesia Country Briefing [Press release]. Retrieved from <http://www.ophi.org.uk/multidimensional-poverty-index/mpicountry-briefings/>
- Pacifico, D., & Poege, F. (2017). Estimating measures of multidimensional poverty with Stata. *The Stata Journal*, 17(3), 687-703.
- Sen, A. (1999). *Development as freedom*. New York: Oxford University Press.
- Sinning, M., Hahn, M., & Bauer, T. K. (2008). The Blinder–Oaxaca decomposition for nonlinear regression models. *The Stata Journal*, 8(4), 480-492.
- Soseco, T. (2021). Household Size, Education, and Household Wealth in Indonesia: Evidence from Quantile Regression. *Jurnal Ekonomi Indonesia*, 10(3), 281-297.

- Sumarto, S., & De Silva, I. (2014). Beyond the Headcount: Examining the Dynamics and Patterns of Multidimensional Poverty in Indonesia. *TNP2K Working Paper* Retrieved from <http://www.tnp2k.go.id/downloads/beyond-the-headcount-examining-the-dynamics-and-patterns-of-multidimensional-poverty-in-indonesia>
- Sumarto, S., & Widyanti (deceased), W. (2008). Multidimensional Poverty in Indonesia: Trends, Interventions and Lesson Learned. Retrieved from <https://ideas.repec.org/p/pramprapa/59468.html>
- Surbakti, P. (1995). *Indonesia's National Socio-Economic Survey: a continual data source for analysis on welfare development*. Jakarta: Central Bureau of Statistics.
- Taniguchi, K., & Tuwo, A. (2014). New Evidence on the Gender Wage Gap in Indonesia. *ADB Economics Working Paper Series*, (404). Retrieved from <https://www.adb.org/sites/default/files/publication/84120/ewp-404.pdf>
- Tempo. (2018). 2018, Warga Rentan Miskin 20,19 Persen dari Total Penduduk. Retrieved from <https://bisnis.tempo.co/read/1165738/2018-warga-rentan-miskin-2019-persen-dari-total-penduduk>
- UN Women Indonesia. (2020). Infographic: Gender Pay Gaps in Indonesia. Retrieved from <https://asiapacific.unwomen.org/en/digital-library/publications/2020/09/infographic-gender-pay-gaps-in-indonesia>
- United Nations. (2021). Sustainable Development Goals. Retrieved from <https://www.un.org/sustainabledevelopment/>
- Wardhana, D. (2010). Multidimensional poverty dynamics in Indonesia (1993-2007). *School of Economics and University of Nottingham*, 1-64.
- Withington, W. A. (1983). *Indonesia: Insular Contrasts of the Java Core with the Outer Islands*. Boulder, Colorado: Westview Press.