

Determinants of Multidimensional Poverty in Rural Tanzania

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Abstract

The primary aim of the research was to examine the factors that contribute to poverty from a multidimensional standpoint among households in rural Tanzania, utilizing a logistic regression model. The study used Alkire and Foster methodology to examine multidimensional poverty index (dependent variable of the study). The research utilized data that were already collected by the Tanzania Demographic and Health Survey in 2017. Based on the findings, the factors being studied were proven to be key determinants that have a significant impact on multidimensional poverty in rural Tanzania. Additionally, households led by women experienced a higher incidence of multidimensional poverty compared to those led by men, underscoring the necessity for gender-specific measures to combat gender-based poverty. The study found that older households were less susceptible to experiencing multidimensional poverty compared to younger households. These results indicate the necessity for focused assistance and support for younger households. Furthermore, the research found that the likelihood of experiencing multidimensional poverty was lower for widowed and married individuals in comparison to those who had never been married. Finally, the use of family planning methods was associated with a decreased likelihood of experiencing multidimensional poverty. The study recommends that, poverty reduction interventions in rural Tanzania should take into consideration these significant factors to effectively address the issue of multidimensional poverty.

Keywords: Multidimensional Poverty Index, Multidimensional approach, Monetary approach

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1. Introduction

Various scholars and institutions, including Sen (2004), Alkire et al. (2020), and the World Bank Group (2020) have contributed to the understanding that poverty extends beyond just the lack of financial resources. Poverty is also characterized

by a lack of access to other essential goods and services. This perspective has been influenced by Sen's capability theoretical framework, which highlights the multidimensional nature of poverty. The United Nations Development Programme (UNDP) was one of the first organizations to adopt this multidimensional approach to poverty, which led to the creation of the Human Development Index (HDI) in 1990. The HDI combines factors such as life expectancy, education, and income to measure a country's progress. In 2010, Alkire and Foster constructed the global Multidimensional Poverty Index (MPI), which uses the dimensions of HDI (health, education, standard of living) as recommended by the Sarkozy Commission in 2008. The Commission recognized poverty as a complex and multifaceted phenomenon.

As stated in a report by the World Bank Group (2020), 1.45 billion people from 103 countries are currently experiencing multidimensional poverty, with 72% of them residing in middle-income countries, such as Tanzania. In Africa, an estimated 481 million individuals were living in extreme poverty in 2019, with this figure projected to increase to 490 million in 2021, which accounts for roughly 36% of the entire population, thus making it challenging to achieve Sustainable Development Goal 1 of eradicating poverty by 2030 (UNDP, 2019). In response, the African Union launched the 2063 Agenda. However, according to Alkire et al. (2020), while global numbers of extremely impoverished people have decreased, this progress has been regionally uneven and has even increased in sub-Saharan Africa, including Tanzania. These findings motivated the researcher to investigate the determinants of multidimensional poverty in Tanzania.

Despite the rapid and wide growing need to adopt a multidimensional approach, many sub-Saharan African countries rely on the monetary approach to estimate poverty and its determinants, which poses a risk of misidentifying a person as poor or not (UNDP, 2019). Therefore, the study's main object was to investigate the determinants of poverty in rural Tanzania using a multidimensional approach. With this, the study applied Alkire and Foster methodology to construct a multidimensional poverty index of Tanzania that was used as the dependent variable in a logistic regression model to investigate its driving factors.

The acknowledgment of poverty as a complicated and multi-faceted phenomenon has resulted in the adoption of a multidimensional approach to measure it. Although monetary approaches to poverty estimation are prevalent in many sub-Saharan African nations, there is an increasing need to adopt a multidimensional

approach that captures the various poverty dimensions beyond income or financial resources (Bannister & Venkatapuram, 2020). Relying solely on monetary approaches for poverty estimation can lead to misidentification of individuals as poor or non-poor (World Bank, 2018). To address this gap, this study aimed to investigate the determinants of multidimensional poverty in rural Tanzania by utilizing the Alkire and Foster multidimensional poverty index methodology and logistic regression to identify the determinants of multidimensional poverty. By doing so, the study intended to contribute to the growing literature on multidimensional poverty and offer policymakers a better understanding of poverty drivers in Tanzania.

2. Methodology

2.1 Study Area

The study primarily focused on the rural region of the United Republic of Tanzania, a country situated in Eastern Africa between longitudes 29° and 42° East and latitudes 1° and 12° South. The decision to concentrate on this area was informed by the Tanzania Demographic and Health Survey 2017 report, which surveyed 64,880 households, of which 48,104 were from rural areas and 16,776 were from urban areas. As a result, the study population was predominantly represented by the rural population. Additionally, the study centred on rural Tanzania due to the high levels of poverty indicated in the TDHS report, as well as the HBS 2019 report, which revealed that poverty incidence in rural areas was 31.3%, compared to 15.8% in urban areas.

2.2 Research Design

The study employed a cross-sectional research design to examine the determinants of multidimensional poverty in rural Tanzania. Secondary data from the Tanzania Demographic and Health Survey (TDHS) 2015/16, collected by the National Bureau of Statistics in 2017, were used.

2.3 Data Analysis

2.3.1 Chi-square Test

A chi-square test at 5% level of significance was used to examine the association between multidimensional poverty index (dependent variable) and each independent variable.

2.3.2 Alkire and Foster (AF) Approach to Examine Multidimensional Poverty Index

The study employed the Alkire and Foster (AF) approach to examine the dependent variable (multidimensional poverty index (MPI)) of a binary logit regression model. The approach began with identifying the poor and non-poor using a dual cut-off threshold. Next, the multidimensional poverty index for each household was determined by aggregating the multiple deprivation scores (derived from ten non-monetary indicators across three poverty dimensions: education, health, and standard of living).

2.3.3 Dimension, Indicators and Deprived Condition

The study used three dimensions to construct multidimensional poverty index that was used as the dependent variable of the study as adopted and modified from Alkire and foster (2011)) as follows. Living standard was one of three dimensions used to measure poverty in households. It encompasses various aspects related to basic needs such as access to cooking fuel, safe drinking water, sanitation, electricity, and flooring. Within the living standard dimension, cooking Fuel has a weight of 1/18. This indicator considers a household deprived if they rely on solid fuels like wood, charcoal, crop residues, or dung for cooking. The sanitation indicator, also with a weight of 1/18, considers a household deprived if their sanitation facility is either unimproved or shared with another household. The safe drinking water indicator, with a weight of 1/18, identifies a household as deprived if they lack access to safe drinking water within a 30-minute round trip from their home. The electricity indicator, also with a weight of 1/18, indicates a household is deprived if they do not have access to electricity. Lastly, the flooring indicator, also with a weight of 1/18, considers a household deprived if they have a dirt, sand, or dung floor. These indicators, with their respective weights, are used to determine the level of deprivation within the living standard dimension for a household.

The second dimension included in this study was education. In this dimension, education is considered as an important factor to determine the level of deprivation of a household. The weight assigned to this dimension is 1/3, which implies that it holds significant importance in the overall measurement of deprivation. The first indicator is years of schooling, which has a weight of 1/6. This means that it accounts for half of the total weight of the education dimension. The indicator focuses on the education level of household members and considers the household as deprived if no member has completed five years of schooling. The second indicator is school attendance, which also has a weight of 1/6. This indicator focuses on the enrolment of school-aged children and considers the household as deprived if any child is not attending school up to

class 8. Overall, the education dimension aims to measure the level of education attained by household members, which is an important factor in improving the socio-economic status of households.

The third dimension was health. The health dimension has a weight of 1/3 and consists of two indicators with their respective weights and deprived conditions. The first indicator is nutrition, which has a weight of 1/6. Members of the household are considered deprived if any adult or child for whom there is nutritional information is malnourished in the household. The second indicator is child mortality, which also has a weight of 1/6. The household is considered deprived if any under-five child has died in the family.

The household was considered multidimensionally poor if the weighted sum of its deprivations exceeded a defined poverty cut-off. The study used the multidimensional poverty cut-off of $k = 0.33$, adopted from the Global MPI (Alkire and Foster, 2011). The household is considered to be multidimensionally poor with deprivation if multidimensional poverty index C_i 0.33 or higher and multidimensionally non-poor if C_i less than 0.33

The deprivation score of each household (C_i) is mathematically expressed by

$$C_i = w_1I_1 + w_2I_2 + w_3I_3 + \dots + w_dI_d$$

where, $I_i = 1$ if the household is deprived in indicator i and 0 otherwise, and

$$w_i \text{ is the weight attached to indicator } i \text{ with } \sum_{i=1}^d w_i = 1$$

The head count ratio (MPI) was mathematically expressed as product of Multidimensional Poverty Incidence (H) and Multidimensional Poverty Intensity (A)

$$MPI = H * A = \frac{q}{n} \times \frac{\sum_{i=1}^q C_i(k)}{q} = \frac{\sum_{i=1}^q C_i(k)}{n}$$

$$A = \frac{\sum_{i=1}^q C_i(k)}{q} \quad \text{and} \quad H = \frac{q}{n}$$

Where, H = head count ratio /percentage of poor households/ incidence of multidimensional poverty,

A = Multidimensional poverty intensity

q = Number of multidimensionally poor people

n = Total population

C_i = The deprivation score of each poor person

2.3.4 Logit Regression Model

The logistic function was used because the outcome variable (Y) was a binary one with two categories “multidimensionally poverty poor and not multidimensionally poverty poor”. The study employed binary logistic regression to model determinants of multidimensional poverty of households in Tanzania.

Specification of the Binary Logistic Model

$$\text{Logit}(Y_i) = \beta_0 + \sum_{j=1}^n \beta_j X_j + \mu_i$$

Where, Y_i = Multidimensional Poverty Index (MPI);

μ_i = stochastic error term,

β_i = vector of regression coefficients, and

X_i = Vector of explanatory variables.

2.3.5 Diagnostics for the Logistic Regression

The study used two tests namely Link test and Hosmer-Lemeshow goodness-of-fit test to examine the accuracy of the binary logit regression model that was used.

3. Findings and Discussions

3.1 Findings

3.1.1 Descriptive Statistics

The findings in Table 1 show that 48,104 households were included in the sample, which had varying characteristics. Among the heads of household who responded, the majority were male (79%) while the rest were female (21%). The findings indicated that most of the heads of household who responded did not use family planning (74%). Furthermore, about 90% of the respondents had low levels of education, with primary education (49%) being the most common, and 41% had no formal education, while a small proportion had attained higher education. Regarding marital status, the majority of the household heads were married (61%), followed by those who had never been married (26%), divorced (7%), and widowed (6%).

According to the results, this implied that, the sample size was sufficiently large with 48,104 households, and the characteristics of the sample were diverse. The majority of the household heads who responded were male, indicating a gender imbalance in the sample. Additionally, the study revealed a high rate of non-use of family planning methods among the respondents, highlighting the need for effective family planning education and services. The study also found that a large proportion of the respondents had low levels of education, indicating a need for interventions that address the education gap. The majority of the respondents were married, highlighting the importance of targeting married couples in interventions aimed at reducing poverty.

Table 1: Characteristics of the Respondents THDS, 2017 participants included in the study

Variable	Response	Total	Per cent (%)
Head of household's age	Scale	48,104	100
Head of household sex	Male	38,454	79
	Female	9,650	21
Awareness of head of household on family planning	No	35,983	74
	Yes	12,121	26
Head of household education attainment	No education	19,786	41
	Primary education	23,620	49
	Secondary education	4,552	9
	Higher educ.	128	0.7
	Don't know	15	0.3
Head of household marital status	Never married	6,457	26
	Widow	1,622	6
	Divorced	1,708	7
	Married	15,260	61

3.1.2 Association between Multidimensional Poverty Index (MPI) and other Variables

According to the results presented in Table 2, there was a significant statistical association between the MPI and each of the independent variables examined in the study. This was evidenced by the fact that the p-values for the Pearson chi-square test statistics for all variables were less than 5 per cent, indicating that the explanatory variables were significantly associated with multidimensional poverty among rural households in Tanzania in 2017.

Table2: Associations between Multidimensional Poverty Index and independent factors

Covariates	Response	Non-Poor	Poor	Total	P	Cramer's (V)	χ^2
Head of household				48,104			
Age							
Sex	Male	11,544	26,910	38,454	0.000	0.0312	47.0287
	Female	2,554	7,096	9,650			
	TOTAL	14,098	34,006				
Household head's awareness on family planning	No	10,149	25,834	35,983	0.000	0.562	83.758
	Yes	3,949	8,172	12,121			
	Total	14,098	34,006	48104			
Head of household Education attainment	No formal education	4,130	15,656	19,786	0.000	0.2419	2.8e+03
	Primary educ.	7,160	16,460	23,620			
	Secondary educ.	2,706	1,846	4,552			
	Higher educ.	96	32	128			
	Don't know	4	9	13			
	TOTAL	14,096	34,003				
Head of household Marital status	Never married	2,411	4,046	6,457	0.000	0.0622	96.9488
	Widow	463	1,159	1,622			
	Divorced	478	1,230	1,708			
	Married	4,871	10,389	15,260			
	TOTAL	8,223	16,824				

Source: Calculation using STATA package based on data from TDHS 2015/16

3.1.3 Findings from Alkire and Foster Model

The results in **Table 3** indicate that the rural Tanzania's multidimension poverty incidence (H) and multi-dimensional poverty intensity (A) for the year 2015/16 at poverty cut-off of $k = 33.3\%$ was 74.43% and 52.15% respectively whose product give a national Multidimensional Poverty Index 0.388.

Table 3: Multi-dimensional Poverty Indices at National level.

Cut- off point (%)	Multidimensional Poverty Indices Estimates		
	Incidence poverty (H)	Intensity poverty (A)	Multidimensional Poverty Index (MPI)
k=33.3	74.43%	52.15%	0.388

Source: Calculation from STATA package based on data from TDHS 2015/16

3.1.4 Logistic Regression Model Findings

The findings in Table 4 reveal that each of explanatory variables of the study (Age, sex, marital status, education attainment and heard about family planning methods) were statistically significantly associated with multidimensional poverty of people living in rural Tanzania since each one had a p-value less than 0.05. This means that each of these variables has a significant impact on poverty levels in rural Tanzania, and should therefore be taken into consideration in any poverty reduction interventions.

The binary logit regression model results in Table 4 show that, if other variables are kept constant, households headed by women in rural Tanzania were 1.22 times more likely to experience multidimensional poverty compared to households headed by men at a 5% level of significance. The results indicated that women were more vulnerable to multidimensional poverty than men in rural Tanzania, and that gender-based interventions may be necessary to address this issue. This finding highlights the need for policies that promote gender equality and address the underlying causes of gender-based poverty in rural Tanzania.

In a case of education level, the findings in Table 4 show that households where the head had primary education were 0.46 times less likely to experience multidimensional poverty than those without formal education. Similarly, households where the head had secondary education were 0.13 times less likely to experience multidimensional poverty than those without formal education. Furthermore, households where the head had higher education were 0.06 times less likely to experience multidimensional poverty than those without formal education, with a significance level of 5%. The findings suggest that households where the head of household has higher level of education are less likely to experience multidimensional poverty than those with lower levels of education or no formal education. The odds ratios of 0.46 for primary education, 0.13 for secondary education, and 0.06 for higher education indicate that the odds of experiencing multidimensional poverty decrease as education level increases, after controlling for other factors such as age, gender, marital status, and awareness of family planning methods.

At the same time, the findings in Table 4 indicate that one unit change in household age decreased the likelihood of being multidimensionally poor by 0.99 times at 5% level of significance. Moreover, the odds ratio of head of household in Table 4, at 5% level of significance showed that widows was 0.61 times less likely to be multidimensionally poor compared to never married while the

married were 0.82 times less likely to be multidimensionally poor compared the never married. Similarly, for the case of family planning use, the odds ratio in Table 5 was 0.79 indicating that heads of household who used family planning methods were 0.79 times less likely to be multidimensionally poor compared to people who did not use family planning at 5% level of significance.

Table4: Estimation for Binary Logistic Regression Model

Variable	Response	OR	P-Value	OR 95% CI	
				Lower	Upper
Age		0.9938	0.000	0.9919	0.9957
Sex	Male (Reference)				
	Female	1.2248	0.000	1.133	1.3239
Education level	No education (Reference)				
	Primary	0.4624	0.000	0.4270	0.5007
	Secondary	0.1253	0.000	0.1135	0.1383
	Higher	0.06401	0.000	0.0426	0.0962
	Don't know	0.4502	0.187	0.1377	1.4721
Marital status	Never married (Reference)				
	Widow	0.6141	0.000	0.5370	0.7023
	Divorced	0.8829	0.053	0.7781	1.0018
	Married	0.8186	0.000	0.7634	0.8778
family planning use	No (Reference)				
	Yes	0.7874	0.000	0.7401	0.8378
Constant		8.1343	0.000	7.0264	9.4169
	Number of obs = 25,044	LR chi2 = 2272.84			
	Prob > Chi2 = 0.000	Pseudo R2 = 0.0717			
	Log likelihood = -14714.958				

Source: Calculation from STATA package based on data from TDHS 2015/16

3.1.5 Diagnostics for the Logistic Regression

3.1.5.1 Goodness of Fit Test of Binary Logit Regression Model

According to findings in Table5, the goodness of fit test results shows that the p-value = 0.000, less than $\alpha = 0.05$, which implies that the model fitted well. The overall model was significant, and hence its covariates had a direct significant impact on multidimensional poverty (LR chi2 = 2272.84 and p-value is 0.0000 less than $\alpha=0.05$).

3.1.5.2 Model Specification Error Test results

The adequacy of the binary multiple logistic regression model was tested for specification error and assessed using a link test. Table 5 displays the outcomes

of the link test, which revealed that there were no misspecification errors in the model, as the linear predicted value squared (hatsq) was found to be insignificant at a 5% level (p-value = 0.893), while the predicted value (\hat{y}) was extremely significant at a 5% level (p-value=0.000). As a result, the model specification was deemed correct, indicating that the researcher had included the appropriate variables in the model and that they had been entered in the correct functional form.

Table 5: Link test results

	Z-statistics	P-value
HAT	6.73	0.000
HATSQR	-0.9	0.893

3.2 Discussion of Key Findings

According to the findings of this study, several factors including age, gender, marital status, education level, and awareness of family planning methods are significantly associated with multidimensional poverty in rural Tanzania. Similar findings have been reported in previous studies conducted in Oyo state Nigeria by Sulaimon (2022) and in Taiwan by Chen (2019). These results have important implications for policymakers in Tanzania and other countries with similar demographics to design and implement poverty reduction policies that target these significant factors. For example, policies aimed at educating rural communities on family planning methods and promoting education could effectively reduce poverty in rural areas.

Female-headed households are found to be more vulnerable to multidimensional poverty than men-headed households, and policies targeting female-headed households specifically could address gender-based poverty, as reported by Mohammed and Ab-Rahim (2021). The Government of Tanzania has implemented policies related to family planning, but more efforts are needed to promote family planning and reduce multidimensional poverty. Additionally, the findings suggest that higher levels of education are associated with a decreased likelihood of experiencing multidimensional poverty, as reported by Mohammed and Ab-Rahim (2021) and Eyasu A. M. (2020). Older households are less likely to be multidimensionally poor than younger households, indicating the need to provide targeted support to younger households who are at a higher risk of experiencing multidimensional poverty, as reported by Chen et al. (2019). Lastly, the study found that widows are less likely to be multidimensionally poor than those who have never been married, while married individuals are also less

likely to be multidimensionally poor than those who have never been married, similar to findings reported by Bersisa and Heshmat (2021). This highlights the importance of considering marital status in poverty reduction interventions in rural Tanzania and the need to provide targeted support to those who have never been married to reduce their risk of experiencing multidimensional poverty.

4. Conclusions and Recommendations

4.1 Conclusions

This study has highlighted the significant factors associated with multidimensional poverty in rural Tanzania, including age, gender, marital status, education level, and awareness of family planning methods. The findings suggest that poverty reduction interventions should take into consideration these factors to effectively address the issue of multidimensional poverty in rural Tanzania. Efforts should be made to promote gender equality, improve access to education, provide targeted support to younger households and those who have never been married, and promote the use of family planning methods as a means of reducing multidimensional poverty. By addressing these significant factors, poverty reduction interventions can help to improve the living conditions of those living in poverty in rural Tanzania

4.2 Recommendations

Based on these findings, this study recommends that poverty reduction interventions in rural Tanzania should prioritize gender-based interventions that promote gender equality and address the underlying causes of gender-based poverty. Additionally, the researcher recommends the following:

- Provide targeted financial support, access to education and skills training, and promote gender equality in the workforce to reduce poverty among female-headed households.
- Increase awareness and access to family planning methods through community-based education and outreach programmes to reduce multidimensional poverty among households that do not use family planning.
- Provide targeted support to younger households who are at higher risk of experiencing multidimensional poverty, taking into account their unique needs and challenges.
- Encourage young people, particularly girls, to pursue education as higher education levels are associated with a decreased likelihood of experiencing multidimensional poverty.

These recommendations could contribute to the design and implementation of more effective poverty reduction policies that address the multidimensional nature of poverty in rural Tanzania and similar contexts.

References

- Adepoju, A. O. & Akinluyi, O. I. (2017). Multidimensional poverty status of rural households in Nigeria: Does family planning have any effect? *International Journal of Social Economics*.
- Alkire, S., & Foster, J. (2011). Counting and multidimensional poverty measurement. *Journal of Public Economics*, 95 (7-8), pp. 476-487.
- Alkire, S., Kovesdi, F., Mitchell, C., Pinilla-Roncancio, M., & Scharlin-Pettee, S. (2020). Changes over time in the global Multidimensional Poverty Index. *OPHI MPI Methodological Notes*, 50
- Alkire, S., Nogales, R., Quinn, N. N., & Suppa, N. (2021). Global multidimensional poverty and COVID-19: A decade of progress at risk? *Social Science & Medicine*, 291, 114457.
- Bersisa, A., & Heshmati, A. (2021). Multidimensional poverty and its determinants: Evidence from rural Ethiopia. *Journal of African Development*, 23 (1), pp. 1-23. <https://doi.org/10.1007/s11205-021-02606-w>
- Bannister, E. W., & Venkatapuram, S. (2020). Grounding the right to live in the community (CRPD Article 19) in the capabilities approach to social justice. *International Journal of Law and Psychiatry*, 69(March), 101551. <https://doi.org/10.1016/j.ijlp.2020.101551>
- Chen, K. M., Leu, C. H., & Wang, T. M. (2019). Measurement and determinants of multidimensional poverty: Evidence from Taiwan. *Social Indicators Research*, 145(2), 459-478. <https://doi.org/10.1080/23311886.2022.2123084>
- Eyasu A. M. (2020) Determinants of poverty in rural households: Evidence from North-Western Ethiopia, *Cogent Food & Agriculture*, 6:1, 1823652 <https://doi.org/10.1080/23311932.2020.1823652>
- Mohammed, M. & Ab-Rahim, R. (2021). Determinants of Multidimensional Poverty Index of Niger State, Nigeria. *International Journal of Academic Research in Business and Social Sciences*, 11(14), 95-108. <http://dx.doi.org/10.6007/IJARBS/v11-i14/8532>
- Sulaimon, M. D. (2022). Determinants of multidimensional poverty in Nigeria: a state level analysis. *International Journal of Sustainable Economy*, 14 (2), pp. 151-166.

- United Nations. (2017). Department of Economic and Social Affairs. Population Division. World population prospects: the 2017 revision: key findings and advance tables. Working Paper No. ESA/P/WP/248.
- UNDP. (2019). Human Development Report 2019; beyond Income, beyond Averages, beyond Today: Inequalities in Human Development in the 21st Century. New York, NY: United Nations
- World Bank Group. (2019). Bhutan Development Report, January 2019: A Path to Inclusive and Sustainable Development. World Bank.
- World Bank. (2018). Poverty and shared prosperity 2018: Piecing together the poverty puzzle.