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Understanding poverty dimensions and transitions in Malawi: A panel data approach

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ABSTRACT

Poverty alleviation remains one of the ancient goals of Malawi as the country has since 1994 adopted a poverty alleviation strategy throughout its developmental programs. Through the support of the World Bank, a poverty monitoring system was put in place whose data are collected through the Living Standards Measurement Surveys (LSMS). However, since the establishment of the LSMS, findings of different assessments and eras have revealed instabilities in the country's poverty levels overtime. What remains unclear is whether households have been able to move out of poverty or not. The current study employed a two wave LSMS panel of 2016 and 2019 and assessed poverty dimensions including poverty incidence, depth and severity. The study further assessed the determinants of poverty transitions in order to understand movements in and out of poverty. Household size, gender of household head, education level of the household head, agricultural land holding sizes, access to credit, residence (urban or rural) and expected shocks significantly influenced the poverty dimensions and poverty transition. It is hence imperative that proper strategies that embrace robust and sustainable credit systems, improvement in literacy levels of the Malawian population, and further improving agricultural land productivity can help reduce poverty and further move households out of poverty. Such initiatives should take into consideration the gender divide and the rapid population growth faced by the country.

Introduction

The Government of Malawi has since 1994 adopted a poverty alleviation approach in its programs as seen through its development of a Poverty Monitoring System (Benson et al., 2004). The goal since the dawn of the multiparty era has been to improve people's standards of living or welfare. To that extent, most government and non-governmental initiatives have been streamlined towards improving the welfare of Malawians, particularly those unable to meet their basic standards of living (Poulton et al., 2014). Through the 1994 Poverty Alleviation Program to the Malawi Growth and Development Strategy (MGDS), the country has emphasized on eradicating poverty especially amongst the rural poor people. Nonetheless, a starting point for such initiatives has been the establishment of a system that can monitor people's standards of living, the Integrated Household Surveys (IHS) supported through the World Bank Living Standards Measurement Surveys (LSMS).

Since the establishment of the IHS, different scholars have assessed

the poverty levels of Malawi and the preceding determinants (Benson et al., 2004; Mussa and Pauw, 2011; Asiamah et al., 2021; and Birhanu et al. 2021). However, findings of different assessments and eras have revealed instabilities in the country's poverty levels overtime. For instance, the period between 2004 and 2010 has been praised by many scholars as an era of Malawi's success story (Mussa and Pauw, 2011). In this era, the Gross Domestic Product (GDP) grew at an astonishing rate of 6.8 percent, which resulted in poverty levels reducing from 52 percent to 39 percent (Mussa, 2010). The drastic change in poverty levels was however attributed to the re-establishment of the Farm Input Subsidy Program (FISP) which more than doubled yields from 0.8 to 2.0 metric tons per hectare between 2004/05 and 2009/10 agricultural seasons (GoM, 2016). Most importantly is the fact that the Agricultural GDP growth stood at 7.5 percent per annum in the period between 2004 and 2010, echoing the effect of the re-establishment of FISP.

A decade further, poverty levels escalated back to over half of the population assessed to be below the poverty line. The World Bank Poverty Assessment report of 2022 noted that 50.7 percent of the

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population in Malawi lives below the poverty line, with the estimate being consistently above half since 2012 (World Bank, 2022). In that period, GDP growth drastically dropped as well to an average of 1.5 percent per capita, with scholars arguing about low agricultural productivity and heavy reliance on rain-fed agriculture as the main causes (Chirwa, 2016; GoM, 2016; World Bank, 2022). World Bank (2022), International Monetary Fund [IMF] (2020) and scholars like Mgomozulu et al., (2023) all argued that climate shocks in that decade drove a lot of households into poverty due to their over-reliance on rain-fed agriculture.

Different social safety net programs have been implemented over the past years as the government adopted a *National Social Support Policy (NSSP) in 2012* which operationalized the *Malawi National Social Support Programme (MNSSP)* from 2013 through 2023 (GoM, 2018). The program involves income and consumption transfers to the poor through Social Cash Transfers (SCTs), Public Works Programmes (PWPs) and Livelihoods and Skill Development (LSD) which are funded by the World Bank Group (WBG). The original financing of these social safety nets was \$32.8 million, but further received a top up of \$74.2 million before getting another fund worth \$70 million (World Bank, 2020). The other big social safety net program ever implemented by the Malawian government remains the Farm Input Subsidy Program (FISP) which was later in 2022 named the Affordable Input Subsidy Program (AIP). The FISP was re-introduced in 2005/2006 with an aim of providing farmers with fertilizer and hybrid seeds at less than one-third of the market cost. The cost of FISP ranged from US\$36 million to US\$127 million between 2005/06 and 2009/2010 (AGRA, 2017). However, the AIP increased its number of beneficiaries to include all smallholder farming households in Malawi and hence pushed the budget to over US\$200 million (GoM, 2021). Despite such huge investments, poverty and hunger still persist in Malawi.

Ideally, Malawi's poverty levels remain stubbornly high (World Bank, 2022). However, research on household specific assessments of determinants of dimensions of poverty and the factors that explain households escaping and becoming poor remain scanty. It is through understanding household specific determinants of poverty and poverty transitions that the country can formulate strategies that target the transition of poor households to non-poor, and hence achieve the Sustainable Development Goal (SDG) one of zero poverty by 2030. It is hence for this reason that a research of this thrust and dimension is imperative amidst Malawian household's over-reliance on rain-fed agriculture.

There remains a need to catalyze a robust community based agricultural transformation coupled with extensive rural community empowerment in order for communities to effectively reduce their poverty levels, more especially for vulnerable rural poor households (Brüntrup, 2011; Union, 2003; Kolavalli, Flaherty, Al-Hassan, & Baah, 2010). In addition, the country lacks in depth research on how past agricultural investments have affected transient poverty among the rural farmers, as little research has been adequately explored to establish the most impactful determinants amidst comprehensive investments aimed using agriculture as a conduit of rural poverty alleviation. For instance, extant literature, which worked at aid, agriculture and poverty in developing countries concentrated at, the effect of aid in improving quality of lives of the farmers.

However, these studies did not emphasize and articulate the poverty transitions among the smallholder farmers, more especially in an un-adjusted rural agricultural space not influenced by AID (Mosley, Suleiman, & Chiripanhura, 2006). Additionally, despite Christiaensen et al., (2011) anticipating the role of agriculture in poverty reduction at household level, issues of poverty shift among the farmers in a rural setting was inadequately addressed. The study hence sets to test the null hypothesis that socioeconomic and institutional factors do not significantly influence household welfare status and the probability of remaining poor and moving out of poverty. Therefore, the current study adds to the precious literature on poverty assessment in three different

ways: (i) it adds to the growing literature on poverty assessment by not only understanding cross-sectional poverty but also examining poverty transitions over time to understand movements of households in and out poverty; (ii) it provides a robust diverse assessment of livelihoods through not only measuring household wealth status through a livelihood welfare index but also providing assessments of poverty incidence, depth and severity as provided by the Foster Greer Thorbecke indices; and (iii) it provides an evidence base for poverty alleviation policies through providing information on the factors policy designers should focus on in moving households out of people in line with the Malawi Vision 2063 and the Sustainable Development Goals.

Materials and methods

Data and method

The study used 2 waves of Living Standards and Measurement Survey (LSMS) data called "*The Integrated Household Panel Survey Data (IHPS)*" for 2015/2016 to 2016/2019. The two-round panel data was collected by Malawi National Statistical Office (NSO), facilitated by the World Bank-LSMS division. The data covers socio-economic, coping strategies and community characteristics of rural and urban farming and non-farming households and is nationally represented. The IHPS data uses a stratified two-stage sample design where Primary Sampling Units (PSUs) which are Enumeration Areas (EAs) are selected first then later the identification of households. Data is available at <https://microdata.worldbank.org/index.php/catalog/2939>.

Indicator's derivation

The study derived poverty indicators which were used to measure the transient poverty among smallholder farmers in Malawi. To that extent, the study follows Haughton and Khandker (2009), and used (1) the head count index, (2) the poverty gap index, and (3) the squared poverty gap index as stipulated by Foster-Greer-Thorbecke (FGT) and derivation is presented as follows;

$$FGT_{\alpha} = \frac{1}{N} \sum_{i=1}^H \left(\frac{Z - y_i}{Z} \right)^{\alpha} \quad (1)$$

Where z denotes the poverty line set at MK 165,879 (US\$1 = MK1024), N represents Malawian households sampled in the IHS data, H denotes the number of poor households whose incomes are below the set poverty line z , y is the income (expenditure) of the sampled households and α is the degree of concern of the depth of poverty. Thus, when $\alpha = 0$, the FGT index presents the headcount index and measures incidence of poverty; when $\alpha = 1$, the FGT index measures poverty depth; and when $\alpha = 2$, the FGT index measures poverty severity. The FGT is the best indicator for poverty in this case as it goes beyond measuring absolute poverty, and further puts more weight and emphasis on the poor in measuring how deep they are into poverty and the severity through measuring poverty inequality (Haughton and Khandker, 2009).

The second outcome variable that the study used was the welfare statuses of the rural households. In order to define this welfare index, the study defined welfare as a multidimensional quartile indicator that was derived from aggregating both monetary and non-monetary household variables that describes the household's wealth position. For instance, in terms of the non-monetary indicators, households' attributes, not limited to ability to have durable assets, state of the household and facilities at the households such as access to clean water, sanitation and toilet facility among others were incorporated to define the index (Brüntrup, 2011; Union, 2003; Kolavalli, Flaherty, Al-Hassan, & Baah, 2010). The variables included were disaggregated in dimensions; Social, economic and governance.

Under social dimension, the study incorporated variables such as access to electricity, health facility, social security, clean water, and access to sanitation, while under economic dimension, variables like

home ownership, access to assets, distance to market and agricultural output were incorporated. As for governance, only one variable was added and that is access to information. Then, the Principal Component Analysis (PCA) was used to compute the quartile welfare index. It is imperative to emphasize that the use of both monetary and non-monetary metrics in determining the welfare index is validating due to complementarity nature of the monetary and non-monetary variables in the rural setting and feasible to derive a robust welfare index.

In order to examine the extent to which the livelihood diversity transient among the households had influenced the welfare of the smallholder farmers in Malawi, the welfare of the households was measured as a function of the welfare factors as demonstrated in the equation (2).

$$windex_{it} = \gamma'_{it}\beta + \sigma\varphi_i + \zeta_i + \mu_{it} \quad i = 1, \dots, P; t = 1, \dots, T \quad (2)$$

Where i is the index for the household and t is the corresponding time period; **windex** is a continuous household welfare indicator and γ is the vector of the covariates with the constant not been suppressed; β is the corresponding coefficient determined by the elements defined in a vector γ and φ is the transient livelihood status, which is defined earlier as binary; ζ defined under mean independence of assumption in which explanatory variables are uncorrelated, and u is the stochastic error term.

Poverty transition matrices

Poverty transition matrices (Table 1) were used to assess movements of households into and out of poverty (Haughton and Khandker, 2009). A poverty matrix shows the number of households who have been poor and non-poor along with those who have escaped or entered into poverty in a particular period. Poverty analysis requires estimation of a poverty line. A poverty line is a threshold of the basic resources or abilities required to meet a household's current needs. World Bank (2020) defines a poverty line for a household, Z_i , as the minimum spending/consumption (or income, or other measure) needed to achieve at least the minimum utility level u_x , given the level of prices (p) and the demographic characteristics of the household (x).

If a household is above the poverty line, it is considered to be non-poor while if it falls below the poverty line, it is observed to be poor. Whenever a household's income crosses the line, that household makes a poverty transition. An increase in income that moves the household's income above the poverty line is defined as an exit out of poverty while a fall that takes the household's income below the poverty line is a movement into poverty.

Z_{11} captures the proportion of households that were non-poor in 2016 and have maintained their status in 2019 while Z_{12} shows the proportion of households that were non-poor in 2016 but had fallen into poverty by 2019. Furthermore, Z_{21} is the proportion of the sampled households that were poor in 2016 but have moved out of poverty, Z_{22} gives the proportion of households who have remained poor. Z_{23} and Z_{32} are the total proportions of households observed to be poor in 2016 and in 2019, respectively. Z_{31} and Z_{32} are the total non-poor and poor households respectively after the transitions.

Table 1
Movements into and out of poverty (cell percentage).

Status in 2016	Status in 2019		Total
	Non-Poor	Poor	
Non-Poor	$\leftrightarrow Z_{11}$	$\downarrow Z_{12}$	Z_{13}
Poor	$\uparrow Z_{21}$	$\leftrightarrow Z_{22}$	Z_{23}
Total	Z_{31}	Z_{32}	100

Analytical procedure

The multinomial logit model

The study assessed three key aspects through the use of the Panel Data Multinomial Logit Model: (1) determinants of household welfare status i.e. ultra-poor, poor and better-off; (2) the determinants of poverty incidence, depth and severity; and (3) the determinants of poverty transition.

As such, the study employed a multinomial logit model that assumes independence in the choices as it was not possible for a single household to be reported in a number of categories in each of the three estimated equations. To that extent, the study hypothesized that heterogeneities exist in the poverty dimensions recorded for the households. The control variables in the three regression models are kept uniform to ensure comparability among results from the different models.

A discrete choice model was estimated using a multinomial logit model as follows:

$$Y_{ijt}^* = \beta' X_{it} + \varepsilon_{it} \quad (3)$$

where Y_{ijt} is the poverty dimension category j by household i in time period t ; j takes the values 1, 2 and 3 for either poor, ultra-poor and better off in the first equation; or became poor, moved out of poverty and remained non-poor for the transition equation; X_i is the vector of socioeconomic characteristics of the households i.e. age, household size, and institutional factors; β is a vector of parameters to be estimated. Lastly, ε_i is the measurement error term.

The estimation of the multinomial logit model implied independence of irrelevant alternatives (IIA), an indication of the independence of the error terms for the models estimating the choice of mitigation strategies. However, the violation of the IIA assumption implies that there exists hidden correlation in the choices of the strategies whereby a household could be found in different poverty categories concurrently, violating the IIA assumption presented as follows;

$$E(\varepsilon_{ijt}, \varepsilon_{ikt} | x_{it}) = 0 \quad (4)$$

Nonetheless, in theory, it is not possible for a single household to be categorized in more than one category. The data also reveals that a household was only categorized in a single poverty dimension hence necessitating the use of the Multinomial Logit model. Following Greene (2012), the multinomial logit model presented in equation (3) can be estimated by the maximum likelihood estimator which is consistent asymptotically normal estimator of the parameters β . This can be presented as follows:

$$\ln L(\beta, |Y, X) = \sum_{i=1}^N \ln L_i(\beta, |Y_{ijt}, X_{it}) \quad (5)$$

Where L is the maximum likelihood estimator that is regarded as consistent and efficient for the estimated parameters in equation (3).

The probit model

The study first estimated the determinants of poverty incidence and employed a Probit model. Considering that poverty incidence is measured through absolute poverty as whether a household is above or below a poverty line, a Probit model was specified following Greene (2018) as follows:

$$P_{it}^* = \alpha + \beta_i X_{it} + \varepsilon_{it} \quad (6)$$

$$P_{it} = 1 \text{ if } P_{it}^* > 0 \quad (7)$$

$$P_{it} = 0 \text{ if } P_{it}^* \leq 0 \quad (8)$$

Where P_{it}^* is the probability that a rural household is below the poverty line or not (poverty incidence; $P_{it} = 1$ for a rural household that has its expenditure below the consumption poverty line of MK 165,879

(US\$1 = MK1024); and $P_{it} = 0$ for a rural household that has its expenditure above the poverty line. β is a vector of parameters to be estimated; and ε_{it} is the stochastic error term. X_{it} is vector of socioeconomic and institutional factors to be estimated.

The tobit model

To measure the severity of poverty which denotes the extent to which a household falls below the poverty line, the study employed the Tobit model. The Tobit model is an econometric model used to analyze censored or limited variables, in our case, we refer to poverty gap. Poverty gap measures the poverty severity and depth which are continuous variables and take non-negative values.

The basic Tobit model assumes that the dependent variable Y_j for the observation $j = 1, \dots, n$ satisfy (Woodlridge, 2015; Green, 2018)

$$Y_j = \max(Y_j^*, 0) \quad (9)$$

which means that Y is observed for the values greater than 0 but not values of 0 or less. Considering these values, the best model for estimating poverty severity and depth which takes the values of 1 and 0 would be a tobit model (Tobin, 1958). The specification of the Tobit regression model for the poverty gap can be defined as follows (Woodlridge, 2015; Green, 2018):

$$Pov_seve_{it}^* = x_{it}\beta + \varepsilon_{it}\varepsilon_{it} N(0, \sigma^2) \quad (10)$$

$$Pov_seve_{it} = \begin{cases} Pov_seve_{it}^* & \text{if } Pov_seve_{it}^* > 0 \\ 0 & \text{if } Pov_seve_{it}^* \leq 0 \end{cases} \quad (11)$$

Where $Pov_seve_{it}^*$ is the poverty gap (severity) by household i in time period t ;

where Y_{ijt} is the poverty dimension category j by household i in time period t ; X_i is the vector of socioeconomic characteristics of the households i.e. age, household size, and institutional factors; β is a vector of parameters to be estimated. Lastly, ε_i is the measurement error term.

Following Woodlridge (2015) and Green (2018), the Tobit model can be estimated using the log-likelihood function. Thus, the function to maximized to estimate β and σ is presented as follows:

$$\max_{\beta, \sigma} \ln L = \sum_{Pov_seve_{it} > 0} \ln \left[\frac{1}{\sigma} \phi \left(\frac{Pov_seve_{it} - x_{it}\beta}{\sigma} \right) \right] + \sum_{Pov_seve_{it} = 0} \ln \left[1 - \phi \left(\frac{x_{it}\beta}{\sigma} \right) \right] \quad (12)$$

Where ϕ is the cumulative distribution function of standard normal distribution and φ is the matching density function. Following Woodlridge (2015) and Green (2018), the marginal effects for the independent variable β_i on the expected value (E) for poverty severity can be estimated as presented below:

$$\frac{\partial E[Pov_seve_{it}]}{\partial x_{it}} = \beta_i \phi \left(\frac{x_{it}\beta}{\sigma} \right) \quad (13)$$

Results

Descriptive statistics

Table 2 presents the summary of the variables used in the analysis.

Table 2
Summary statistics of continuous variables by wave.

Variable	2016 (n = 1217)		2019 (n = 1217)	
	Mean	SD	Mean	SD
Age of the HH Head	42.592	15.855	44.887	15.376
Household size	4.899	2.125	5.321	2.225
Household Dependency	3.897	0.373	3.928	0.399
Education of HH Head	5.859	4.579	5.622	4.099

The variables chosen include the combination of household demographic characteristics, household socio-economic characteristics, community characteristics and exogenous shocks. Specifically, the variables include age of the household head, gender of the household as being male-headed (=1), the number of dependents (those household members younger than 15 or older than 65), education of the household head, ownership of the house (owned and purchased measured as self, those from work or government as institutional, rented deemed as contracted houses), drought (=1 if the household experienced drought), resident, institutional characteristics (measured as access or if anyone received agricultural extension services), shock (drought), and credit access.

The heads of the household were on average 43 years in wave 1 and 46 years in wave 2. On the other hand, the mean household size for the households was 4.9 and 5.3 in wave 1 and wave 2 respectively. On average, the dependency ratio is almost equal in both waves (4). The results further show that many households completed some levels of education as indicated in Table 2. In additional, the study results show that maize lost per kg in most households dropped by four in wave 2.

Table 3 further presents the summary of categorical variables in both waves. The results show that majority of the households were male dominated both in wave 1 (76 %) and wave 2 (72 %). This is mostly the ideal situation in Malawi where a majority of the households are male headed. The results show that many households experienced drought in wave 2 (44 %) as compared to wave 1 (31 %). It is apparent that majority of people live in rural areas (84 %) in wave 1 and (88 %) in wave. This concurs with NSO report which indicate more than 70 % of people live in rural areas. Results further show that credit access is still a big challenge as majority of people (79 %) in wave 1 and (76 %) in wave 2 did not had access to credit.

Table 3 provides summary descriptive of the poverty variables used in the model. The study anticipated to find the distribution of poverty in its incidence, depth and severity in 2016 and 2019. Based on the results in Table 4, in 2016 poverty incidence rate was 13.23 %, indicating that 13.23 % of the population lived below the poverty line. In 2019, the poverty incidence rate decreased to 11.43 %, indicating an improvement in reducing poverty. In 2016, the poverty depth was 6 %, which measures the average shortfall in income or resources for those living below the poverty line. In 2019, the poverty depth decreased to 5 %, suggesting that, on average, the shortfall in income or resources for those living below the poverty line improved and lastly, the Table also shows that inequality among poor people did not change as poverty severity was 3 % in both 2016 and 2019.

Based on the provided data, it appears that there has been progress in reducing poverty between 2016 and 2019. The poverty incidence rate decreased, indicating a decrease in the proportion of the population living in poverty. Additionally, the poverty depth decreased, indicating an improvement in the average shortfall in income or resources for those living in poverty and lastly, inequality remained the same.

Table 5 presents the association between wealth status of households and socio-economic, demographic and environmental factors. Chi-

Table 3
Summary Statistics of categorical variables by wave.

Variables	Categories	2016		2019	
		n	Percent	n	Percent
Sex of HH head	Female	313	24.0	308	27.7
	Male	990	76.0	803	72.3
Drought	No	898	68.9	618	55.6
	Yes	405	31.1	493	44.4
Residence	Rural	1,093	83.9	980	88.2
	Urban	210	16.1	131	11.8
Experience Shock	No	47	3.6	49	4.4
	Yes	1,256	96.4	1,062	95.6
Credit Access	No	1,031	79.1	839	75.5
	Yes	272	20.9	272	24.5

Table 4
Poverty Incidence, Depth and Severity.

Poverty Measure	2016	2019
Poverty Incidence	13.23 %	11.43 %
Poverty Depth	6 %	5 %
Poverty Severity	3 %	3 %

square coefficient denoted the degree of association between each factor category in relation to the wealth status at household level. Therefore, based on the results, a higher proportion of the households with poor wealth status were male dominated households and resonates concurrently in both wave 1 (2016) and waves 2 (2019). Emphatically, the study noted an increase in wealth status among households dominated by men in wave 2 relative to their women counterpart whose status decreased in the subsequent wave. For instance, in wave 1, the study noted that the proportions of the household who were stuck in ultra-poverty and in poverty state were 33 % and 20 % respectively. Furthermore, in wave 2 the study noted that their wealth status dropped by 10 % and 14 %, respectively. Likewise, low wealth status was more pronounced among the households who reported to have own houses as compared to those who either were resident in institutional houses or those on contract.

Table 5 further show that in wave 2, low wealth status was pronounced among the households faced with drought as compared to wave 1. This implies that the drought prevalence negatively impacted households in wave 2, making them poorer as compared to households in wave 1. Apparently, low wealth status households were noted among the people in rural areas both in wave 1 and 2 as compared to those living in rural areas. Interestingly, it is noted from the results that there is an improvement in wealth status among the people who reside in urban areas from wave 1 to wave 2. For instance, 2.5 percent of the households in the urban areas were ultra-poor in wave 1 but the proportion reduced to 0.6 percent in wave 2. Similarly, 12.8 percent were poor in wave 1 and the proportion dropped to 7.1 percent in wave 2. In relation to regions, low wealth status households are prevalent among the people living in central and southern region as compared to those living in northern region. This scenario is the same for both waves. This indicates that more interventions have to be diverted towards central and southern region as these regions also constitute large percentage of people as compared to northern region.

Table 5
Bivariate Association between Socio-economic variables and Wealth Status.

Covariates	2016 Wealth Status			Chi test	2019 Wealth Status			Chi test
	Ultra-Poor	Poor	Better Off		Ultra-Poor	Poor	Better Off	
Sex								
Female	33.1	20.4	15.6	38.0982***	43.5	34.7	18.5	53.231***
Male	66.9	79.6	84.4		56.5	65.3	81.5	
House Ownership								
Self	90.0	85.6	65.1	168.1479***	90.7	86.7	79.5	57.193***
Institutional house	9.2	8.4	7.9		8.7	12.5	9.0	
Contract	0.8	6.0	27.0		0.6	0.8	11.5	
Drought								
No	66.9	66.7	75.6	8.5467**	48.5	53.3	59.3	7.259**
Yes	33.1	33.3	24.4		51.6	46.7	40.7	
Resident								
Rural	97.6	87.2	57.5	234.1938***	99.4	97.1	79.0	94.713***
Urban	2.5	12.8	42.5		0.6	2.9	21.0	
Region								
North	7.8	11.2	13.3	11.0519*	9.9	7.1	11.1	6.829
Central	37.4	38.1	41.9		39.8	41.5	43.9	
South	54.8	50.7	44.8		50.3	51.4	45.0	
Credit Access								
No	85.7	77.2	72.1	23.4235***	85.7	73.4	74.1	10.650**
Yes	14.3	22.9	27.9		14.3	26.6	25.9	

Determinants of household's welfare in Malawi

Table 6 examines factors influencing the welfare of the communities in Malawi over the wave 1 and wave 2. As it is illustrated in Table 6, a multinomial regression with a base of the households defined as better-off is presented below. The overall model was significant at 1 percent and a Durbin-Wu Hausman test was insignificant implying that we fail to reject the null hypothesis that the repressors are exogenous. Based on the results, the study found that household size remained the consistently negative predictor which affected the welfare stability of the ultra-poor and poor households in both waves of the study relative to their counterpart households with better off welfare status. In a Malawian setting, most rural households live in an extended family which implies that one household head has to provide for quite a large number of dependents. This further deteriorates the welfare of the households. This finding is backed by the positive significance of household dependency which was found to increase the probability of a household being poor and ultra-poor in both waves. For instance, an increase in household dependency increased the probability of a household being ultra-poor and poor in the first wave by 63.8 and 60.5 percent respectively; whilst increased the probability of being poor aggregately by 32.4 percent.

Worth noting, the current study found that the household with heads that have had attained education, their levels of ultra-poor and poor state consistently and significantly reduced. For instance, in the first wave, a year increase in education of the household head reduced the probability of a household being ultra-poor and poor by 18.1 and 8.2 percent respectively. In the second wave, education reduced the probability of a household being poor by 6.4 percent. On aggregate, the probability of a household ultra-poor significantly reduced by 14.9 percent with a year increase in education. In a Malawian rural setting, educated farmers easily understand agricultural technologies and hence are able to fetch higher returns, a prerequisite for moving out of poverty traps.

Likewise, it was found that household ownership had a consistent and significant influence to reduce the degree of ultra-poverty and poverty condition of households at both wave 1, wave 2 and aggregately. For instance, owning a house reduced the probability of being ultra-poor and poor in the first wave by 77.1 and 43.9 percent respectively; whilst it reduced the probability of being ultra-poor and poor by 122.8 and 43.8 percent respectively. Most importantly, aggregately, ownership of a house increased the probability of a household being

Table 6
Determinants of Welfare.

	(Ultra-Poor)	(Poor)	(Better Off)	(Ultra-Poor)	(Poor)	(Better Off)	(Ultra-Poor)	(Poor)	(Better Off)
	2016			2019		Aggregate			
Age	−0.0130 (0.00986)	−0.0107 (0.00784)	0.0101* (0.00553)	0.0232** (0.0104)	0.0166*** (0.00612)	0.000940 (0.00563)	0.00238 (0.00656)	0.00370 (0.00456)	0.00449 (0.00397)
Sex (Male = 1)	−0.690* (0.359)	−0.104 (0.278)	−0.167 (0.186)	−0.583 (0.363)	−0.532*** (0.195)	0.377** (0.171)	−0.552** (0.230)	−0.256* (0.151)	0.393*** (0.126)
Household Size	−0.230*** (0.0732)	−0.134** (0.0551)	−0.102** (0.0443)	−0.255*** (0.0807)	−0.219*** (0.0453)	0.154*** (0.0350)	−0.260*** (0.0504)	−0.189*** (0.0333)	0.151*** (0.0249)
Household Dependency	0.638** (0.314)	0.605*** (0.223)	0.00653 (0.00412)	0.207 (0.345)	0.241 (0.180)	0.0152 (0.02376)	0.343 (0.216)	0.324* (0.131)	0.00998 (0.0123)
Education of HH Head	−0.181*** (0.0371)	−0.0822*** (0.0260)	0.132** (0.0668)	−0.134** (0.0523)	−0.0641*** (0.0240)	0.116*** (0.0404)	−0.149*** (0.0279)	0.0569*** (0.0165)	0.123*** (0.0271)
House ownership	−0.771** (0.309)	−0.439*** (0.164)	−0.0306 (0.105)	−1.228*** (0.431)	−0.438** (0.201)	0.437*** (0.106)	−0.899*** (0.242)	−0.375*** (0.121)	0.484*** (0.0761)
Drought	0.410 (0.301)	0.154 (0.227)	0.121 (0.177)	0.666** (0.322)	0.162 (0.173)	−0.400** (0.160)	0.282 (0.201)	0.0474 (0.130)	−0.274*** (0.106)
Residence	1.385** (0.559)	−0.464 (0.306)	0.981** (0.388)	4.575*** (1.349)	2.096*** (0.549)	1.537*** (0.186)	1.861*** (0.479)	0.696*** (0.229)	−1.407*** (0.127)
TLU	−0.215 (0.200)	−0.126 (0.115)	0.0486 (0.62)	−0.390 (0.302)	−0.141 (0.119)	−0.111 (−1.12)	−0.236 (0.158)	−0.107 (0.0785)	0.0380* (2.05)
Credit access (Yes = 1)	−0.822** (0.327)	−0.298 (0.232)	−0.221 (0.192)	0.230 (0.407)	0.579*** (0.196)	−0.303* (0.162)	−0.305 (0.238)	0.139 (0.142)	−0.157 (0.112)

Durbin-Wu-Test: $\chi^2 > p$ -value = 0.223.

better off by 43.7 percent.

Considering that Malawian rural households are agricultural households, weather shocks like a drought has adverse effects on their livelihood further pushing them into poverty. The study notes that experiencing a drought in the second wave increased the probability of a household being poor by 66.6 percent and reduced the probability of a household being better off by 40 percent. Overall, experiencing a drought reduced the probability of a household being better off by 27.4 percent.

In as far as access to credit was concerned, the study noted that the household that indicated to have an access to credit, in wave 1, the credit impact reduced their ultra-poverty levels significantly. On the contrary, in wave 2, the study found that the households that were defined as poor, access to credit had little impact of reducing their poverty but increased the state of poverty significantly. This is mainly because interests paid over time further pushes households into poverty as most poor people in Malawi get informal loans in order to consume and not invest. Such loans push households into poverty over time.

Determinants of poverty incidence, depth and severity in Malawi

Table 7 present the determinants of poverty incidence, depth and severity among households in Malawi. Residence was one of the key factors that affected all the three poverty dimensions. Residing in the rural positively influenced the probability of being poor by 81.9 percent, falling deep in poverty by 10.1 percent and poverty severity by 7.04 percent. The findings concur with [Mussa \(2010\)](#) and [Mussa and Pauw \(2011\)](#) who found higher poverty levels among the rural population. This can further be explained by lack of proper facilities, structures and economic opportunities that can improve the welfare of the rural masses which end in increased levels of rural–urban migration.

Furthermore, expected shocks like droughts increased the probability of a household falling into poverty by 41.9 percent holding other factors constant. The findings concur with those of [Tol \(2009\)](#) and [Mussa and Pauw \(2011\)](#) who found that weather shocks move households below the poverty line as they lose their capability to make a living. Household size further increased the probability of a household being poor by 10.8 percent and poverty depth by 1.8 percent. Bigger household sizes imply more people to feed and provide other basic needs for.

Again, education level of the household head was another negative and significant determinant of poverty incidence, depth and severity.

Table 7
Determinants of poverty Incidence, Depth and Severity in Malawi.

Variables	Poverty Incidence (dy/dx)	Poverty Depth (dy/dx)	Poverty Severity (dy/dx)
Access to Credit	−0.0736** (0.012)	0.0159 (0.91)	0.0120 (0.89)
Sex	0.0974 (0.93)	0.0380* (0.05)	0.355* (0.48)
Residence (1 = rural)	0.819*** (3.44)	0.101** (3.13)	0.704** (0.84)
Age(years)	0.00963 (3.01)	0.00275 (4.94)	0.0025 (5.23)
Expected Shock	0.419*** (0.41)	−0.00147 (0.03)	−0.00883 (0.27)
Household size	0.108*** (0.068)	0.0180*** (0.070)	0.0109 (3.67)
Household Head Education level	−0.739*** (0.09)	−0.913*** (0.98)	−0.524** (0.96)
Asset Value	−0.0215 (2.50)	−0.381 (3.56)	−0.0003 (−0.53)
Free inputs	0.0356 (0.22)	0.0156 (0.58)	0.00368 (0.18)
Land size	−0.095** (0.052)	−0.0169** (0.067)	−0.0143** (0.084)

***significant at 1%, **Significant at 5%, *Significant at 10%.

Standard errors in parenthesis.

Thus educated household heads have a lower probability of being poor. [Mussa \(2010\)](#) further explains that education provides better opportunities and further provides people with investments insights including the understanding of agricultural technologies. Access to credit further reduced the probability of a household falling below the poverty line. Thus, accessing credit reduced the probability of the household being poor by 7.36 percent. Credit is important as it allows households to invest in businesses including farming and further earning a living. Lastly, land size was another significant determinant of poverty. For instance, an acre increase in land holding size of the household decreased the probability of the household falling below the poverty line by 9.5 percent, falling deeper into poverty by 1.69 percent and reduced poverty severity by 1.43 percent. Land is important in Malawi as it is a

very important resource necessarily for a household engaging in farming and hence earning income for their daily livelihoods.

Poverty transition status of households

Table 8 points out the environmental, social and economic determinants of poverty transitions among the households. The study found that a household which was accessing credit had reduced impacts of moving out of poverty. It is worth noting that some households which had access to credit remained poor and others became poor. Much as credit is important in providing households with resources to invest in their businesses including agriculture, credit repayment pushes households into poverty if loans are used for consumption. In-terms of gender of the household head, the study found that male headed households had lower chances of remaining poor and becoming poor, but it increased the chances of graduating out of poverty. This may be attributed to men's capability to organize, mobilize and facilitate some domestic resources to sustain a particular household at the very same time improving their welfare.

Considering the place of residence, the current study found that those who are staying in the rural areas had a higher chance of remaining poor in both waves, and also having a higher chance to become poor in the 2nd wave if they were non-poor in the first wave. This can be attributed to lack of social amenities aimed at improving the welfare of the rural communities. Furthermore, age of the household head was found to have a significant impact in making households to remain in poverty, to become poor and negatively enhanced households to move out of poverty.

The results further show that household size significantly influenced a household whether to remain poor, move out of poverty and become poor. For instance, a member increase in household size increased the probability of a household remaining poor by 13.5 percent, reduced the probability of moving out of poverty by 24.2 percent and increased the probability of becoming poor by 10.7 percent. This is mainly because most households are extended families which increase the dependency burden on a single household head. In-terms of the education level of the household head, a higher education level increased the likelihood of inducing a household to move out of poverty, reduced the likelihood of a household becoming poor and also for a household to remain poor. Education remains important in Malawi as it aids households to easily understand and adopt agricultural technologies that are imperative in improving their welfare.

Based on the provided results, a higher land size decreased the chances of a household remaining poor by 42 percent and of becoming poor by 47.3 percent. Land is important in a Malawian setting as more

than 80 percent of the population depends on agriculture for their livelihood. Lastly, in as far as expected shocks like droughts was concerned, its impact on moving people out of poverty was significantly limited. Concurring with expected shocks' impact on moving people out of poverty, an increase in expected shocks significantly decreased the chances of a household remaining poor by 148.2 percent and becoming poor by 53.1 percent. Drought have an adverse impact in reducing yields and hence impacting the proceeds obtained from agriculture. This further translates to household poverty.

Conclusions and recommendations

This paper has assessed the determinants of poverty and poverty transitions in Malawi using the Living Standards Measurement Survey (LSMS) data of the World Bank. Indeed, the country policy priority area remains poverty eradication as the country has been implementing a poverty monitoring system since the multiparty democracy era (1994). What is evident however is that poverty levels have over time increased to above 52 percent, then lowered to 39 percent before moving back up to 50.1 percent in the period 1994 to 2020. This presents policy challenges in the achievement of the Sustainable Development Goal (SDG) one of achieving zero poverty by 2030. As such, policy designers and implementers need to be provided with information on key influencers of poverty and most importantly poverty transitions to sustainably move people out of poverty.

The current study has found that socioeconomic and institutional factors like age, gender, household size, education level and access to credit significantly influenced the poverty dimensions. Furthermore, experiencing weather shocks was a key determinant of poverty in Malawi considering that the country has been hit with a mixture of droughts and El Ninos in the past decade. Despite the fact that a number of policy conclusions can be drawn from the findings, the following key policy implications stand out:

First, education attainment of the household head is a key determinant of a household being non-poor and of course the probability of a household moving out of poverty. To that effect, it is imperative that government's long term strategies emphasize on promoting education with an aim of eradicating poverty. Second, access to credit stands out as a key determinant of poverty and poverty transition. Thus households with access to credit were found to be better as opposed to their counterparts, and easily moved out of poverty. However, in the long-run, loan repayments made it difficult for households to move out of poverty, especially when credit is used for household consumption. This further explains why most government initiatives like the National Economic Empowerment Fund (NEEF) have emphasized on improving access to credit to Malawian population. Nonetheless, such efforts still need to be intensified and extended to a larger scale in order to improve access to credit for a larger population. These programs need to provide conditions that refrain from trapping households into poverty by providing realistically lower interest rates and attaching loans to an investment portfolio. Lastly, occurrence of extreme weather shocks remains a key determinant of poverty and poverty transitions in Malawi. It is imperative that the nation implements robust climate change resilience structures as past occurrences of droughts and floods have moved a majority of the rural population into poverty. The country relies on agriculture, with over 80 percent of those employed in agriculture living in the rural areas. As such, future initiatives need to focus on implementing structures that improve rural household's resilience to such shocks that move households into poverty.

Based on these recommendations, there is a need that a robust poverty eradication should be designed that combines financial literacy trainings, provision of investment loans that are realistically cheaper whilst providing weather related insurance to those households whose livelihoods or investments are prone to weather shocks. Such a program would help reduce the probability of most households remaining poor or falling into poverty, at the same time helping a great deal of households

Table 8
Determinants of Poverty Transitions Among Households.

Variables	Remained poor	Moved out of poverty	Became Poor
Credit Access (Yes = 1)	13.76*** (1.657)	-16.14*** (2.667)	0.440 (4.363)
Sex (male = 1)	-0.216 (0.164)	0.426*** (0.133)	0.209 (1.51)
Residence (Urban = 1)	0.850 (0.600)	-1.179*** (0.380)	2.029*** (4.18)
Age	0.0147*** (0.00473)	-0.00602 (0.00394)	0.0208*** (5.13)
Household Size	0.135*** (0.0392)	-0.242*** (0.0321)	0.107*** (3.48)
Education	-0.00690 (0.0230)	0.0807*** (0.0179)	-0.0876*** (4.74)
Land size	-0.420*** (0.140)	0.0522 (0.0905)	-0.473*** (3.85)
Drought	-1.482*** (0.340)	-0.950*** (0.319)	-0.531** (2.59)
N	2536	2536	2536

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

to move out of poverty.

CRedit contribution statement

Kennedy Machira: Conceptualization, Writing – review & editing, Supervision, Validation. **Wisdom Richard Mgomozulu:** Conceptualization, Methodology, Writing – review & editing, Validation. **Mark Malata:** Formal analysis, Writing – original draft.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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