Exploring the Drivers of Poverty in Ugandan Peasant Families

Paper Submitted to ……

ABSTRACT

This study aimed to model the drivers of poverty in peasant agricultural households in Uganda. The specific objectives of the study were to examine the effect of individual predictors of poverty, and analyze the contribution of community predictors of poverty in peasant agricultural households in Uganda. The study utilized data from the Uganda National Household survey (UNHS 2019/20) obtained from Uganda Bureau of Statistics. A logit model was used in the analysis and estimates were provided using multilevel and interaction methods. Key findings suggest that poverty in peasant agricultural households was positively and significantly influenced by gender of the household head, marital status of the household head, income stability of the household, age of the household head and livestock ownership. Additionally, regional differences accounted for 17.9 % of the variations in poverty levels in Uganda and understanding such regional differences and their influence on poverty levels can assist policymakers and organizations in designing targeted interventions and policies to reduce poverty levels in peasant families. Such measures can address the specific challenges faced by different regions and promote more equitable development across Uganda. However, poverty in peasant agricultural households was negatively and significantly influenced by residence status, saving accounts ownership and household size. Based on the study's findings, the key policy recommendations were; government should continue implementing gender-focused interventions to address gender disparities among women empowerment programs that involve access to resources including land, equal access to employment opportunities and equal access to education so as to reduce poverty among women. Regarding income instabilities in agricultural households due to price fluctuations, government should empower famers to form farmer groups where they can collectively increase their bargaining power to avoid price fluctuations.

1. Introduction

Poverty is a global issue that requires significant attention from both local and international community. There is a strong commitment to eradicating poverty by 2030, as outlined in one of the 17 Sustainable Development Goals (SDGs) (United Nations, 2019). Moreover poverty is number one on the global agenda and all the nations including Uganda aim at ending extreme poverty in its all forms. Poverty encompasses various dimensions, including social, economic, and political aspects, but it is commonly understood in its socioeconomic context. It refers to the inability of households to access basic necessities such as food, clothing, education, health and shelter, thus hindering their ability to lead a decent life within society (Ngestrini, 2019). Evaluating poverty involves measuring whether individuals or households possess the means to meet these essential needs and is characterized by the lack of resources and capabilities required for a decent standard of living.(Ngestrini, 2019).

According to World Bank Poverty and Shared Prosperity (2022) report, it states that extreme poverty had been cut by at least half in 2015 globally, and poverty increased with low rate of economic growth since then. The global agenda of eliminating extreme poverty by 2030 may not be smooth as it was expected. Given most recent trends, by 2030 there is a possibility that approximately 574 million citizens which is about seven percent of the global population will continue surviving below 2.15 dollars a day, and a big percentage will be in Africa. In 2020 alone, the number of people who were extremely poor rose beyond 70 million, it was the largest one-year increase since global poverty monitoring began in 1990. Analyzing poverty in broader terms, almost half the world population which is over 3 billion persons live on less than 6.85 dollars daily.

About 9 percent of the world population are extremely poor and surviving on less than 1.9 dollars, this is about 698 millions of citizens of the total world population who are in the state of extreme poverty. The proportion of people who are extremely poor increased approximately by 50 million because of the outbreak of the pandemic that came along with world economic crisis in a space of 2019 to 2020 (Elena Suckling & Zach Christensen, 2021a). The proportion of the extremely poor reduced in 2021 when the world economy began to recover, but currently still

there are more who are in the state of poverty than those who lived in poverty in 2019, approximately 8 million more citizens (Elena Suckling, Zach Christensen, 2021b).

According to 2018 global Multidimensional Poverty Index (MPI) from 105 countries, 1.3bn citizens are multidimensional poor which a representation of 23%. This is almost quarter of the number of people of the one hundred five states for which the index was estimated. The multidimensional poor keep increasing in low income countries, but Sub Saharan Africa and Southern Asia has more people of this category than any other region around the globe (83%) of the total population of the dimensional poor (Alkire, 2015). Rural areas have more people who are multidimensional poor compared to urban areas, and rural areas accounts for 1.1bn people who are poor while urban areas account for only 0.2bn people and the differences between rural and urban multidimensional poverty continues to exist in Sub- Saharan African countries (Alkire, 2015).

According to EPRC report (2016), there was rising differences in poverty due to regional differences since 1990, the report further indicated that national poverty reduced since 1990's but the reduction rate was different across regions. There was a rise in poverty in Eastern Uganda from 24.3% in 2000 to 35.7% in 2017 though there was a reduction in poverty in Northern and Western Uganda in 1990. The Eastern region overtook and became poorer compared to the northern region than it had been before, yet the north used to be the poorest. Furthermore, the rate of poverty shoot to 12.7% 2017 from 10.7% in 2000. The report further found out that though there was reduction in the proportion of people who are extremely poor on average since 1990, there existed differences in reduction due to regional differences. There was a reduction in poverty rates in Northern Uganda to 32.5% in 2017 from 43.7% in 2013, but poverty rates remained high in other regions between the same periods.

In the last 30 years, the Ugandan government has achieved significant strides in its efforts to reduce poverty. Specifically, between 1992 and 2017, there was a substantial decline in the percentage of the population living in monetary poverty, dropping from 56% to 21%. However, although the current approach to measuring monetary poverty accurately reflects households' financial capabilities, it fails to fully capture the scope and severity of deprivations faced by both children and adult. According to Development Initiatives (2020), the national poverty line

suggests that there is a decline in general poverty trend although levels were found to be higher. The report also indicated a rise by 1.7 % in proportion of citizens who were poor from 2012 to 2016 and the rate was even higher where the portion of the population who were extremely poor was at approximately 41.7% by 2016 when 1.90 US dollars is considered as an international poverty line measure. The report further suggested that poverty had reduced over the period but the number of Ugandans who were at risk of being poor again had risen.

Therefore focusing on the agricultural sector is imperative to increase income of the households as well as facilitating transformation and rapid economic growth (International Monetary Fund, 2012). According to EPRC report (2016), poverty in Uganda showed regional disparities since 1990. While national poverty levels decreased overall, the reduction rate varied across regions. Eastern Uganda experienced an increase in poverty from 24.3% in 2000 to 35.7% in 2017, while Northern and Western Uganda saw a decrease in poverty since 1990. Additionally, the poverty rate rose from 10.7% in 2000 to 12.7% in 2017.

The agricultural sector in Uganda employs about 70% of the workforce and nearly 90% of the working poor. Therefore, focusing on the agricultural sector is crucial for increasing household income and facilitating economic growth (GoU, 2018). With this reason, it is therefore critical for policy makers to understand the major drivers of poverty in peasant agriculture households in Uganda and tackle them accordingly.

However, previous studies on poverty in Uganda have used conventional regression models that assume similar effects of poverty predictors across regions. This overlooks the regional variations in poverty caused by different drivers. Multilevel modeling, on the other hand, considers these variations and allows for the separation of regional-level effects from individual effects. Unfortunately, multilevel analysis has been rarely used in poverty analysis in Uganda. Therefore, this study aimed at exploring the hierarchical data structure and analyzes the data at different levels of analysis (individual and regional units) and examined the differences in agricultural poverty caused by regional characteristics.

2.0 Empirical Literature Review

According to the study on theories of Poverty in Ghana by Addae-korankye (2019) , individual incapacities account for their poverty status; distortions in cultural beliefs; economic, social and political setups, differences in geographical setups and cumulative and cyclical interdependencies. Furthermore this study provided details on the specific variables that contribute to poverty which includes discrimination in jobs, limited schooling, inequalities, and discrimination in accessing employment, housing benefits, banks, skills, and joining politics, lack of investment in infrastructure especially water and waste disposal. All such variables proposed by the study are grouped according to the theory of Individual incapacities, the theory of Cultural setups, distortions in Economic, Political, and social theory, Geographical differences theory and Cumulative and Cyclical Interdependencies theories (Addae-korankye, 2019).

The analysis of the economic theories of poverty by Davis & Sanchez-martinez (2014) highlighted the major drivers of poverty based on the review of the already existing economic theories that included the classical theory, theory of neo-classicals, theory of Keynesians, Marxists (radical theories) and social exclusion, social capital and eclectic theories of poverty. The study further described poverty to be associated by several factors including behavioral or decision factors, lack of access to assets, incentives and credit markets, limited human capital development, discrimination and demographics differences. The study also looks at macroeconomic and social factors as the drivers of poverty that include unemployment, low savings, low investment, low aggregate demand and consumption, high levels of inflation, social exclusion and lack of social capital.

Poverty theories using Comparative Analysis by Sameti M. et a.l (2012), stressed the major factors of poverty and grouped such theories into three categories; that is factors related to individuals, factors related to structures and factors related to neighborhood. They further suggest that poverty is related to individual's ability especially when they are provided with opportunities to help them achieve success, poverty is also on the other hand related to neighborhood factors in a sense that some people are motivated by what is happening in the environment they live. Furthermore, poverty differs by differences in behaviors, beliefs and values of the society.

Literature reviewed on poverty and urban development indicators by Hasan (2002) indicated that poverty is attributed to lack of provision of basic services especially water and sanitation, garbage removal systems, transport systems, lack of health care and hazardous living conditions, lack of education and vocational training and inadequate law enforcement on bribes and harassment. Hassan further urges lack of good and decent jobs in the labor markets, and this is attributed to education and skills gap all of which result into poverty.

Poverty is also promoted by conditions that come along with capitalism, social and economic structures (Sameti M. et al., 2012). The study asserts that if people cannot find employment, they are prone to poverty. On the other hand those who are excluded from employment are at risk of being poor because it makes it hard to have a decent standard of living. When such opportunities are denied, it limits citizens from having decent living.

2.1 Individual and or household drivers of poverty

Gender and poverty

According to the study carried out on the determinants of poverty at household level in Kenya by Studies (2001), male headed households have higher likelihood of being poor compared to female headed households. On the other hand, gender was found to be a significant driver of poverty where male headed households have less chances of being poor and the reason behind this finding is due to differences in access to land, credit, technology, and extension services which are not easily accessed by females (Campenhout et al., 2016)

Marital status and poverty

Katharina et al (2001) finds that marital status is a significant driver of poverty and the study highlights that consumer units where both adults are married are approximately 8% less likely to be poor than households headed by an individual who is single and has never been married. The study carried out on poverty and its dynamics in Uganda using a new set of poverty lines indicated by Campenhout et al (2016) indicated that marital status has a significant effect on poverty among households. The study further urgues that housedhods whose head has never married were less poorer compared to households headed by widows , the study also urgues that

divorced headed households are also more likely to be successful compared to the households headed by widows .

Education and poverty

Results from the study carried out on poverty and its dynamics in Uganda using a new set of poverty lines indicated by Campenhout et al (2016), recognises that there are differences in poverty levels of the households due to differences in education. It further suggest that households whose head completed primary and above are more likely to be non poor compared to those households headed by individuals whose education level do not exceed primary level. The most important and significant factor of poverty was education according to study carried out at household level analysis in Kenya by Alemayehu et al (2001). In terms of education status in USA, household heads with at least a bachelor's degree are at least 12% less likely to be poor than households heads who have not completed high school (Studies, 2001).

A study on regional determinants of poverty in Uganda by Okurut et al (2002) found out that education was a significant driver of poverty and the odds of being poor for those with no education, completed primary and secondary were higher compared to those with tertiary education. The relationship between poverty and education according to the literature takes a center stage and has been studied comprehensively by different scholars. Another study that sought to expose the reasoning behind why people are poor across the world by Janjua and Kamal (2011) found out that it's not only the direct sense to focusing on the effects of education on poverty but also in a more indirect manner. They highlighted that poverty can be reduced by greater incomes which are as a result of greater yields which come from better farming methods that exists as a results of skills from education.

Investment in education is fundamental to economic growth and its process, it helps in reducing poverty and upgrading individual's welfare by getting them out of poverty including the community in terms of both the social and economic status (Pervez, 2014). Raja (2005) finds that countries cannot develop properly without education and it is the first step in the process of development path. He further suggested that it is a process of two steps where education leads to the growth of the economy and minimizes poverty and rises productivity. Education plays a very fundamental role in capital accumulation and leads to the growth of the economy through

acquiring knowledge and skills and investors are more interested in the nation, where there exists sufficient human capital stock (Raja, 2005). Income inequalities also significantly reduce because of differences in education (Dănăcică et al., 2010). Education is important and has got a potential as it lowers crimes, terrorism, and child labour due to the role it plays, it makes people able to afford basic needs of life and therefore reduce their participation in crimes and other illegal activities (Chevrier, 2017)

Education is related to poverty in an inverse manner, and people with higher education levels have got low risk of being poor due to direct increase in wages earned as a result of more knowledge and skills through schooling. The other indirect way education reduces poverty is through improving income which enables the population to afford basic needs in easier ways that improve their standards of living (Pervez, 2014). Education also enables the population in accessing the basic needs of life such as food, shelter, water and sanitation, health facilities utilization. It further facilitates family planning and impacts the behavior in making decisions regarding repruduction among women (Awan et al., 2011)

Household size and poverty

According to the study by Katharina et al (2001), family size has a significant effect on poverty levels. The study highlights that households with more children are at risk of being poor compared to households with less children especially among African American families. Results from the analysis on regional determinants of poverty in Uganda by Okurut et al (2002) highlighted family size to be a significant driver of poverty levels and the study showed that large households have higher risks of being poor.

A study by Fusco & Islam (2017) finds that poverty of a household may be affected differently due to varying age groups from the number of children. The age of children in family has a significant effect on poverty status. They further argue that a parent might stop work as a result of taking care of young children and this affects the professional life in cases government support is not enough to take care of the children. Furthermore, having children positively affects poverty levels in case there are no social transfers to facilitate the additional costs as a result of having extra children. Lanjouw and Ravallion (1995) found out that household size has an effect on poverty especially where family size is large, people are at the risk of falling into poverty

relative to small sized families. The study highlights the link between having children and poverty which indicates that having extra children is associated with extra levels of poverty. Findings by Garza-Rodriguez et al. (2021) also shows that family size is a significant predictor of poverty and highlights that poverty is higher in families of above five members compared to the families with one member.

According to Orbeta (2005), the extent to which family size is related to poverty can be demonstrated through family size and incidence of poverty. The study also highlighted that the incidence of poverty increases with the increase in family size. He further found out that in the year 1985, poverty incidence for a household of size of four is 36.4 and the poverty incidence for the household of 9 is 59.9. He made the analysis 25 years later and still found out that, poverty incidence for a household of size of four was 23.8 and the poverty incidence for the household of 9 was 57.3, and the correlation between poverty and family size had not changed much (Orbeta, 2005). Demographic characteristics indicate that larger families, which had a higher dependency ratio as a result of big number of aging member and a big number of children who are not productive had high likelihood of being poor in terms of income compared to small families with less aging members and children(Northeast China, 2022).

Age of the household head

Literature shows that age has a significant relationship with poverty and studies by Junfeng & Bin (2017) indicate that it has a significant impact on rural poverty arguing that the elderly and middle aged people had low probability to be poor. According to the study on determinants of poverty in Mexico using quantile regression analysis by Garza-Rodriguez et al. (2021), age was found to be significant factor of poverty and poverty is higher at young age since at this stage, there is no productive activities being done, poverty reduces in the middle age and again increases at an old age. The study further highlights that experience is very minimal and poverty reduces with the increase in the experience of working.

2.2 Community and environmental drivers of poverty

Region and poverty

According to Alemayehu et al (2001), there is a significant difference in poverty due to regional differences in United States and households that are in the Midwest have high risks of falling into poverty. There is a significant difference in poverty due to regional differences and people from Central region, Eastern region and western region have less chances of being poor as compared to those from northern region (Okurut, 2002). The study further highlights that those from Central region were about 3.5 better off than those of northern region , those of eastern being 3.5 times better off than those of Northern region, those of western being 3.1 times better off than those of northern region. Literature on poverty and region shows a significant relationship between the two, for instance a study by Campenhout et al (2016) on poverty and its dynamics in Uganda, the study highlights a clear relationship between region and poverty levels and futher states that nothern region has a big number who are chronically poor compared to other regions like western and central regions. In another study on the determinants of poverty in Mexico using quantile regression analysis by Garza-Rodriguez et al. (2021), the region where people live have a significant impact on poverty levels.

Place of residence, location, distance to the market and poverty

Alemayehu et al (2001) carried out a study in Kenya and found out that the likelihood of being poor is lower in urban places of Kenya than in rural places areas. The study on the drivers of poverty in rural households by Eyasu (2020) in North-Western Ethiopia indicated that how long one takes to get to the market has a positive relationship with household poverty. The average spending for each person and how long one takes to get to the market can change poverty levels of rural households and this is expected to change rural households' living standards. Poverty is higher in rural areas of Uganda than it is in urban areas where poverty levels are low. Location has an effect on access to social services especially safe water , where poor people were found to be spending more time fetching water compared to the non-poor who spent less time fetching water (Campenhout et al., 2016).

The study on the analysis of spatial determinants of poverty in rural Uganda by Muhumuza (2007) showed a significant negative correlation between population density and poverty. The study further highlights those whose distance to the nearest towns had low probability of being poor as compared to those whose distance to the nearest town was higher which implied that those in locations far from town were at higher risk of being poor.

3.1 Methodology of the study

3.2 Data Source

Uganda National Household Survey dataset (UNHS 2020) was used in this study and was obtained from Uganda Bureau of Statistics. The analysis was based on those households whose major economic activity was agriculture. An extract of the data for only those households who were involved in agriculture was used for the purpose of this study.

3.3 Study Population and Sample

This study based on the households whose household representatives were available in the households at the time UNHS 2020 data was collected and only those households whose major activity is agriculture were included in this study.

3.4 Diagnostic tests

3.4.1 Skewness / Kurtosis tests for Normality

The kurtosis and skewness test for normality for residuals was established to choose the best model between logit and probit model.

3.4.2 Heteroscedasticity test

To provide estimates that are free from heteroscedasticity, robust command was added to regression command in Stata; vce (robust). The analysis provided estimates with robust standard errors which were free from heteroscedasticity.

3.5 Model Specification

In this study, multilevel and interaction model approaches were used at multivariate analysis in which the response category was a binary outcome. This was dummy variable where 1 represented those that fall into category of Poor and 0 for Non-poor. Therefore in the

reclassification of variables poverty status had two categories *ie* Poor and Non-poor. In understanding the drivers of poverty, a logistic model was applied since the outcome variable (poverty status) was binary.

In Logistic Regression Model *P* is the probability of success / probability of one being poor.

1 – P is the probability of not being poor.

The odd of poverty is given by,

Odds = $\frac{P}{1-P}$ ……...…(1)

Let us take $P = \frac{e^M}{1+e^M}$……...(2)

And M = linear predictor that includes all independent variables

Then $P(1 + e^M) = e^M$

$P + Pe^M = e^M$

$P = e^M - Pe^M$

$P = (1 - P)e^M$

$\frac{P}{1-P} = e^M$

$\text{In}\left(\frac{P_{ij}}{1-P_{ij}}\right) = M$……(3)

$$M = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ - - - + \beta_k X_{2k}$$

For a level 1 model then;

$\text{In}\left(\frac{P_{ij}}{1-P_{ij}}\right) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ - - - + \beta_k X_{ki}$…….....(4)

$$\beta_0 = Constant$$

$$\beta_1, \beta_2 \ up \ to \ \beta_k \ are \ the \ coefficients \ of \ the \ fixed \ effects \ model$$

With interaction terms, the level 1 effect model becomes

$$\text{In}\left(\frac{P_{ij}}{1-P_{ij}}\right) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{ij} X_{2i} + --- + \beta_k X_{ki} + \beta_j X_{ki} X_{kj} \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

$$X_{1i}X_{2i} --- X_{ki}X_{kj} \textit{ are the interaction terms of the model.}$$

The Random (level II) effect model.

The random effects model provides estimates and takes into account regional differences. This is also called level II estimates.

$$\text{In}\left(\frac{P_{ij}}{1-P_{ij}}\right) = X_{ij}\,\beta + Vj \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

With interaction then

$$\text{In}\left(\frac{P_{ij}}{1-P_{ij}}\right) = X_{ij}X_{ik}\,\beta + Vj \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

Where $X_{ij} = Matrix\ of\ Covariates$

$X_{ij}X_{ik}$ = interaction terms

$\beta =$ matrix of the Unknown regression coefficients

Vj is Random effect due to regional differences.

This measures the difference in poverty and it gives the total variations of poverty as a result of regional differences. It assumed there are many households from the same regions so it is important to understand the variations in poverty levels that can be accounted by regional differences. Additionally, according to study on testing for Interaction in multiple regressions by Allison (1977) it is suggested that in response to recent challenges, the practice of including product terms in multiple regression models to investigate the outcome variable is important. The study further suggested that while some statistical measures may be affected, the limitations in testing certain hypotheses unless variables are measured on ratio scales, the inclusion of product terms remains a legitimate approach for probing interaction effects in sociological theories,

where variables are often believed to interact in influencing dependent variable. Moreover, other literature suggests the same on interacting variables through non-additive methods to assess their joint impact on the outcome variable of interest (Rogers, 2002), and Balli & Sørensen, (2013).

3.6 Study Variables

The outcome variable of this study was Poverty Status; this is a binary option variable that took on *1* to be a poor household and *0* to be non-poor household. The independent variables included household head sex, household head age, household head level of education, marital status, household size, status of income, ownership of livestock and ownership of bank saving account as individual level factors; place of residence and region of birth as environmental or demographic factors (see table 3.1)

Table 3.1 Description of the study variables.

variable	**Definition**
Household head Sex	
Female headed	Dummy variable (1 for female headed household, 0 otherwise
Household head Marital status	
Married	Dummy variable (1 for married, 0 otherwise)
Divorced/widow/separated	Dummy variable (1 for divorced/widow/separated, 0 otherwise
Single	Reference category
Household head Education level	
Primary education	Dummy variable (1 for primary education, 0 otherwise
Secondary education	Dummy variable (1 for secondary education, 0 otherwise
Post-secondary education	Dummy variable (1 for post-secondary education , 0 otherwise
No formal education	Reference category
Region	
Eastern	Dummy variable (1 for eastern , 0 otherwise
Northern	Dummy variable (1 for northern , 0 otherwise
Western	Dummy variable(1 for western , 0 otherwise
Central	Reference category
Residence status	

Rural	Dummy variable (1 for rural household , 0 otherwise
Income stability	
Unstable income	Dummy variable (1 for unstable incomes , 0 otherwise
Bank saving accounts	
Own bank saving accounts	Dummy variable (1 for bank saving accounts ownership, 0 otherwise
Livestock ownership	
Own livestock	Dummy variable (1 for livestock ownership , 0 otherwise
Household size	
Household size	Continuous variable
Household head age group	
Age	Continuous variable
Education and region	
Primary education Central	Dummy variable (1 for primary education from central , 0 otherwise
Secondary education Central	Dummy variable (1 for secondary education from central , 0 otherwise
Post-secondary central	Dummy variable (1 for post-secondary education from central , 0 otherwise
No education East	Dummy variable (1 for no formal education from east , 0 otherwise
Primary education East	Dummy variable (1 for primary education from east , 0 otherwise
Secondary education East	Dummy variable (1 for secondary education from east , 0 otherwise
Post-Secondary East	Dummy variable (1 for post-secondary education from east , 0 otherwise
No education North	Dummy variable (1 for no formal education from north , 0 otherwise
Primary education North	Dummy variable (1 for primary education from north , 0 otherwise
Secondary education North	Dummy variable (1 for secondary education from north , 0 otherwise
Post-Secondary North	Dummy variable (1 for post-secondary education from north , 0 otherwise
No education west	Dummy variable (1 for no formal education from west , 0 otherwise
No education central	Reference category
Education and Residence Status	
No education & Rural	Dummy variable (1 for no formal education from rural , 0 otherwise
Primary education & Rural	Dummy variable (1 for primary education from rural , 0 otherwise
Secondary Education & Rural	Dummy variable (1 for secondary education from rural , 0 otherwise
Post-Secondary & Rural	Dummy variable (1 for post-secondary education from

	rural , 0 otherwise
No education & central	Reference category

3.7 Re-classification of variables

Poverty status was classified into five categories according the UNHS 2020 dataset: very poor, poor, neither poor nor rich, rich and very rich. However, poverty status was re-categorized into two groups for the purposes of this study and for understanding the problem. Therefore, this study considered poverty status as the dependent variable and was coded 1 for Poor Households (poor and very poor categories) and 0 for Non-Poor Households (neither poor nor rich, rich, and very rich). It's however important to note that some other variables were re-classified along with data processing and analysis for better understanding of poverty and its drivers.

4.1 Empirical Results and Discussion

The results are presented at various levels of analysis. The analysis was based only on the individuals who were available in the households at the time UNHS 2020 data was collected and for only agricultural households or individuals whose major activity is agriculture. For national representative results, the data was weighted using survey sampling weights.

4.2 Diagnostic tests

Skewness and Kurtosis tests for Normality

The kurtosis and skewness test for normality for residuals was established to choose the best between the logit and probit model.

Table 4.11 Skewness / Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj_chi2(2)	Prob>chi2
Residuals	18,326	0.000	0.000	0.000	0.000

Table 5.1 shows that both the skewness and the kurtosis are not asymptotically normally distributed with respective probability values (0.000 and 0.000), the joint probability value is also 0.000 which indicates that the residuals are not normal. For this reason, the binary outcome variable, poverty status is a logistical distribution and logistic regression model was used in the analysis as was proposed in the methodology section.

Heteroscedasticity test

To provide estimates that are free from heteroscedasticity, robust commend was added to regression command in Stata; vce (robust). The analysis provides estimates with robust standard errors which are homoscedastic.

4.3 Drivers of poverty among agricultural households

In order to establish the effect of each independent variable (factor) on poverty status in Uganda, both fixed (level I estimates) and random effects (level II estimates) regression models were fitted with interaction of some selected variables (See table 4.31 and table 4.32). In the analysis using logistic regression model, the use of robust standard errors was very important in order to provide estimates that are free from heteroscedasticity problem. The marginal effects of the

logistic model were presented and the reported significance level of estimated parameters was 5% (0.05)

Table 4.31 Predictors of poverty: Level I estimates

Variable	dy/dx	Robust Standard Error.	z-statistic	P-value
Farmer group				
In farmer group	0.022	0.007	2.92	0.004
Household head sex				
Female headed	0.041	0.009	4.39	0.000
Household head Marital status				
Married	0.093	0.008	11.28	0.000
Divorced/widow/separated	0.098	0.012	7.83	0.000
Household head Education level				
Primary education	-0.001	0.020	-0.05	0.960
Secondary education	-0.045	0.026	-1.71	0.087
Post-secondary education	-0.045	0.031	-1.42	0.155
Region				
Eastern	-0.010	0.016	-0.58	0.565
Northern	0.015	0.017	0.92	0.357
Western	-0.015	0.016	-1.02	0.307
Residence status				
Rural	-0.030	0.013	-2.28	0.022
Income stability				
Unstable income	0.246	0.003	80.07	0.000
Bank saving accounts				
Own bank saving accounts	-0.101	0.020	-4.98	0.000
Livestock ownership				
Own livestock	0.111	0.006	20.20	0.000
Household size				
Household size	-0.063	0.005	11.73	0.000
Household head age group				
Age	0.017	0.006	2.73	0.006
Education and region				
Primary education Central	-0.023	0.021	-1.13	0.259
Secondary education Central	-0.020	0.027	-0.75	0.454
Post-secondary central	0.047	0.030	1.56	0.118
No education East	0.023	0.025	0.92	0.357
Primary education East	-0.005	0.016	-0.27	0.786
Secondary education East	-0.004	0.022	-0.16	0.857
Post-Secondary East	0.011	0.027	0.43	0.669
No education North	0.048	0.025	1.89	0.059
Primary education North	-0.020	0.017	-1.17	0.241
Secondary education North	0.027	0.023	1.15	0.250
Post-Secondary North	0.061	0.026	2.39	0.017
No education west	0.041	0.025	1.59	0.112

Education and Residence Status				
No education & Rural	0.042	0.020	2.08	0.038
Primary education & Rural	0.034	0.018	1.90	0.057
Secondary Education & Rural	0.054	0.023	2.31	0.021
Post-Secondary & Rural	0.017	0.032	0.54	0.589

Table 4.31 shows that the effect of gender of household head who is in agriculture is significant at 5% level of significance. The probability of falling into poverty increases by 0.04 for female headed households. Females have higher probabilities of falling into poverty, women are less employed in other sectors than men. Also, women have less control over the ownership of household assets and are more involved in unpaid domestic work compared to men and this explains why they are poor. The study is consistent with study by Campenhout et al (2016) which found out that gender is a significant predictor of poverty where male headed households have less chances of being poor compared to female headed households.

Marital status has a significant effect on poverty, the probability of falling into poverty increases by 0.09 (9%) for agricultural household heads who are married, those who divorced/widow or separate poverty increases by 0.1 (10%). Similar findings are from the study on poverty and its dynamics in Uganda using a new set of poverty lines indicated by Campenhout et al (2016) who found out that maritral status has a significant effect on poverty among households. The study further revealed that households whose head had never married were less poorer compared to households headed by widows and other groups. In both studies the probability of falling into poverty increases for those who are married and ever been married. With exception of statistical significance, this study disagrees with a study by Katharina et al (2001) which suggests that consumer units where both adults are married are approximately 8% less likely to be poor than households headed by an individuals who are singles and have never been married.

The information presented in Table 4.32 demonstrates that as the age of individuals in agricultural households in Uganda increases by one year, there is a corresponding increase in the likelihood of falling into poverty by 0.02 (2%). In other words, poverty levels rise as the age of the household head or members increases in agricultural households in Uganda. The research results regarding age align with the study conducted by Adeoti (2014), which revealed that as individuals get older, poverty tends to increase. However, this effect is particularly pronounced in the higher age group where the likelihood of experiencing poverty rises significantly after the

age of sixty. This can be attributed to factors such as being deemed unemployable and a decrease in physical energy, which hinders the ability to handle demanding agricultural tasks.

There is a positive effect between income instability and poverty status where the probability of falling into poverty increases by 0.25 (25%) for those individuals whose incomes are unstable. The implication is that poverty reduces as incomes of individuals become more stable and from this study it is statistically significant at 5% level. The findings of this study align with a study conducted by Reardon et al. (1992) which found a significant impact of income stability on poverty levels. The study further revealed that individuals with stable incomes have a lower risk of experiencing poverty, highlighting the importance of income stability in mitigating poverty risks.

Table 4.31 also shows that poverty reduces by 0.1 (10%) for those individuals who own saving accounts and save in commercial banks. This is because individuals with accounts in banks are at disposal of obtaining agricultural loans from the commercial banks and they have higher chances of increasing their productivity. This is the case because they have high capacity to purchase agricultural inputs to be used in their farms. These findings are in line with the findings from study on whether banks matter by Burgess & Pande (2005) that found out that having a bank account reduces the likelihood of falling into poverty since it's directly related to credit access in agricultural households.

The likelihood of experiencing poverty among individuals who own livestock was found to rise by 0.1 (10%), and this increase is considered statistically significant at a 5% level. This significance is indicated by the probability value being less than 0.05. Those engaged in livestock farming are more susceptible to poverty compared to those who do not practice it. This empirical evidence is supported by the livestock profile report from the Uganda Investment Authority (2009), which highlights the heavy reliance on livestock in the Karamoja region of Uganda. This region is also identified as one of the poorest areas in Uganda, as reported by the Uganda Bureau of Statistics (UNHS, 2020).

The size of agricultural households has an impact on the likelihood of experiencing poverty. Specifically, an increase in household size reduces the probability of being poor by 0.06 (6%) and this finding is statistically significant at a 5% level, indicated by a probability value less than

0.05. This suggests that larger households have a lower risk of falling into poverty compared to smaller households. However, there are differing views on this matter. Some studies argue that household size is not a significant driver of poverty. According to Muhumuza (2007), larger households tend to have higher levels of poverty incidence due to a higher dependency ratio, which strains available resources. Schultz (2006) also supports this view, as they found that families with many children have a greater likelihood of experiencing poverty due to a higher dependency ratio that depletes economic resources.

This is not the case especially in agricultural households of Uganda, larger households can benefit from economies of scale in agricultural production. When there are more people available to work on the farm, they can collectively engage in more efficient and productive farming practices. This can lead to increased agricultural output and, consequently, higher income for the household. In agricultural economies, labor is a crucial input for farming activities. With a larger household size, there is a greater availability of family labor. This means that more tasks are accomplished on the farm without the need to hire external labor, reducing labor costs and increasing the overall productivity of the household.

Residence status has a statistically significant effect on poverty at a 5% level. In rural areas, the likelihood of agricultural households experiencing poverty decreases by 0.03 (3%). These findings are in tandem with the study conducted by Campenhout et al. (2016), which revealed higher poverty rates in rural areas of Uganda compared to low poverty levels in urban areas. It is worth noting that although poverty may be more prevalent in rural areas than it is in urban areas, the probability of poverty risk reduction may be greater in rural areas compared to urban areas. This could be attributed to the recent urbanization in Uganda, which has limited the availability of farmland in urban areas. In contrast, rural people engaged in agriculture have ample land for farming, leading to a significant reduction in the risk of falling into poverty.

Table 4.31 shows that household heads engaged in agriculture, who have obtained post-secondary education and reside in northern Uganda, face a 6% higher likelihood of experiencing poverty. Several reasons account for such risk of falling into poverty; firstly, the agricultural sector in northern Uganda may have limited opportunities for higher-income or value-added activities. Despite their education, these household heads still rely on traditional farming

methods or have limited access to modern agricultural techniques, technologies, and markets. This can result in lower productivity and income levels, contributing to the increased probability of poverty.

Additionally, the northern region may face specific challenges related to agricultural development, such as inadequate infrastructure, poor access to credit, limited extension services, or vulnerability to climate change and natural disasters. These factors can impede the ability of educated household heads to leverage their knowledge and skills effectively, hindering their economic advancement and increasing the risk of poverty. Moreover, there are disparities in the distribution of resources and development initiatives between northern Uganda and other regions. The lack of investment in education, agricultural infrastructure, and rural development programs can limit the opportunities available to post-secondary educated household heads in the agricultural sector, leading to a higher probability of poverty. Considering these underlying drivers, it becomes evident why post-secondary educated agricultural household heads in northern Uganda face an increased risk of poverty despite their educational attainment.

The level of education has a notable impact on poverty within agricultural households residing in rural areas. This can be observed by examining the results presented in Table 4.31. Results indicate that the probability of rural household heads without any formal education falling into poverty increases by 0.04 (4%). Furthermore, residing in a rural area amplifies the probability of falling into poverty for individuals who have attended primary education and secondary education, by 0.03 (3%) and 0.05 (5%) respectively. These findings strongly support the assertion that education level plays a significant role in determining the likelihood of poverty within rural agricultural households (Alkaire, 2015). The evidence suggests that higher education levels in rural areas are associated with a decreased probability of falling into poverty, as education opens up opportunities for employment, income generation, entrepreneurship, and access to resources and this is statistically significant at 5% level.

Table 4.32 Predictors of poverty: Level II estimates.

Variable	dy/dx	Robust Standard Error.	z-statistic	P-value
Farmer group				
In farmer group	0.015	0.015	1.02	0.306
Household head sex				
Female headed	0.040	0.013	2.98	0.003
Household head Marital status				
Married	0.095	0.009	10.55	0.000
Divorced/widow/separated	0.097	0.012	8.10	0.000
Household head Education level				
Primary education	-0.002	0.011	-0.16	0.871
Secondary education	-0.018	0.012	-1.51	0.130
Post-secondary education	-0.042	0.030	-1.41	0.159
Residence status				
Rural	-0.031	0.015	-2.13	0.033
Income stability				
Unstable income	0.234	0.009	28.90	0.000
Bank account saving				
Own account and save	-0.085	0.025	-3.42	0.001
Livestock ownership				
Own livestock	0.121	0.011	10.90	0.000
Household size				
Household size	0.017	0.007	1.92	0.050
Household head age				
Age	-0.057	0.009	-7.73	0.000
Education and region				
Primary education Central	-0.034	0.020	-1.73	0.084
Secondary education Central	-0.042	0.012	-3.54	0.000
Post-secondary central	0.041	0.029	1.41	0.158
No education East	0.014	0.016	0.90	0.368
Primary education East	-0.010	0.012	-0.79	0.428
Secondary education East	-0.027	0.015	-1.72	0.085
Post-Secondary East	0.004	0.024	0.16	0.869
No education North	0.032	0.018	1.85	0.064
Primary education North	-0.009	0.009	-0.98	0.320
Secondary education North	0.022	0.013	-0.99	0.072
Post-Secondary North	0.042	0.025	1.80	0.087
No education west	0.032	0.017	1.86	0.063
Education and Residence Status				
No education & Rural	0.042	0.016	2.72	0.007
Primary education & Rural	0.041	0.014	2.96	0.003
Secondary Education & Rural	0.041	0.015	2.87	0.004
Post-Secondary & Rural	0.019	0.027	0.71	0.475
Sub region				
Var(_cons)				

	0 .179142	**0 .1061401**

According to the information provided in Table 4.32, it is worth noting that the level II estimates from the random model reveal that 17.9% of the variations in poverty levels in Uganda can be attributed to regional differences. Additionally, table 4.32 demonstrates a significant disparity between the level II estimates and level I estimates. This disparity can be attributed to clustering effects resulting from regional differences. As a result, certain socioeconomic and demographic variables lose their significance, as the differences in poverty are primarily influenced by regional disparities rather than population, socioeconomic, and demographic differences alone.

However, despite the impact of regional variations, other factors such as the sex of the household head, marital status, residence status, stability of household income, possession of bank savings accounts, ownership of livestock, household size, age of the household head, primary and secondary education from central, no education, primary education and secondary education attainment from rural areas are significant even after accounting for regional differences.

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5.0 Summary, Conclusion and Recommendations

5.1 Summary of the findings

The study examined the drivers of poverty in agricultural households in Uganda using multilevel regression and interaction methods. The study used Uganda National Household survey data (UNHS 2019/20) from Uganda Bureau of Statistics.

According to the findings presented at the bivariate level, females in agricultural households tend to experience higher poverty rates compared to males. The study also reveals that poverty levels in agricultural households decrease as family size increases, as a smaller percentage of people with larger families are considered poor. Additionally, poverty is more prevalent among individuals aged 55 years and above compared to other age groups.

The study aimed at finding out the individual related predictors of poverty in agricultural households in Uganda and results suggests that having a stable source of income in agricultural households is associated with lower poverty levels. With stable incomes, the likelihood of falling into poverty decreases. Moreover, poverty decreases with higher levels of education, as obtaining more education enables individuals to get away from poverty. Married individuals, on the other hand were found to have higher poverty rates compared to other groups. Owning livestock in conjunction with other agricultural activities increases the likelihood of experiencing poverty. The study highlights the benefits of owning a bank account and having access to bank borrowing is associated with a reduced likelihood of experiencing poverty.

At the multivariate level, the study finds that certain variables have statistically significant effects on poverty levels in agricultural households. These variables include income stability, residence status, ownership of livestock, having bank savings accounts, gender, household size age, residence status (specifically rural areas), and the interaction between education and region (specifically secondary education in the northern region).

Consequently, the null hypothesis stating that these variables have no significant effects on poverty status in agricultural households is rejected at a 5% level of significance. However, when controlling for regional factors, it is found that within-individual characteristics are highly

significant, as regional-level characteristics only account for 17.9% of the variations in poverty in Uganda. Furthermore, the hypothesis that the effect of education level on agricultural household poverty is not modified by region and residence status is rejected at a 5% level of significance. Therefore, it can be concluded that the effects of education level on poverty are indeed modified by region and residence status.

5.2 Conclusions

Level II estimates were so critical especially with observations that are nested within the regions (hierarchical data structure). The study showed that 17.9% of the variations in the poverty level is accounted for by regional differences implying that the differences between regions in Uganda have an impact on the poverty levels observed in the country.

When conducting a study on poverty levels, researchers often analyze various factors that contribute to poverty as social economic and demographic factors including regional disparities. In this case, the study has found that 17.9% of the variations in poverty levels can be attributed to regional differences. This means that nearly one-fifth of the differences in poverty rates across different areas in Uganda can be explained by the regional characteristics. These characteristics might include factors like economic development, infrastructure, availability of resources, social programs, or cultural and historical factors that vary from region to region.

By identifying and understanding these regional differences and their influence on poverty levels, policymakers and organizations can develop targeted interventions and policies to address the specific challenges faced by different regions. This information can help in designing effective strategies to alleviate poverty and promote more equitable development across Uganda.

On the other hand, the stability of an individual or household's income has been found to play a significant role in poverty levels. Fluctuations and lack of stability in income can contribute to a higher likelihood of experiencing poverty. Place of residence, whether rural or urban, has been identified as a significant factor influencing poverty levels. People living in rural areas may face different challenges and have fewer opportunities compared to those in urban areas, affecting their poverty status.

Owning bank savings accounts is identified as a factor related to poverty levels. Access to formal financial services, such as savings accounts, can provide individuals with a safety net and opportunities for economic advancement.

Gender is shown to have a statistically significant effect on poverty levels. Gender disparities and inequalities, such as limited access to resources, education, and employment opportunities, can contribute to higher poverty rates among certain gender groups especially women. Age has been identified as a variable with a statistically significant effect on poverty levels. Different age groups may have varying vulnerabilities and access to resources, impacting their poverty status.

The interaction between residence status (rural and urban) and education is statistically significant. This suggests that the effect of education on poverty levels differs based on whether an individual resides in a rural or urban area. The interaction between education, specifically secondary education, and region (particularly in the north) has a statistically significant effect on poverty levels. This indicates that the impact of secondary education on poverty varies across different regions, with specific attention to the northern region.

These deductions provide insights into the complex and multidimensional nature of poverty and highlight the importance of considering various factors when analyzing and addressing poverty levels. Policymakers, researchers, and organizations can utilize these findings to develop targeted interventions and strategies aimed at reducing poverty and promoting inclusive development.

5.3 Policy Recommendations

Based on the findings of the study on the drivers of poverty in agricultural households in Uganda, the following policy recommendations can be drawn.

Evidence suggests that being female headed household increases the probability of being poor. Government should invest heavily in women empowerment programs and provide access to resources including land, equal access to employment opportunities and equal access to education to reduce poverty.

Results from the study indicated that income instability in agricultural households increases the probability of being poor. Government should empower famers to form farmer groups where they can collectively increase their bargaining power to avoid price fluctuations. Additionally, Government should establish marketing platforms that enables farmers to get information on available prices in the market to reduce income instabilities due to locational price differences and fluctuations.

The study revealed that income stability has got potential in reducing poverty and government should implement programs that promote stable incomes for agricultural households. This may include providing support in terms of sourcing other income-generating activities to farmers.

Given that poverty in agricultural households is more common in rural areas, targeted rural development initiatives are necessary. These initiatives should focus on improving infrastructure, access to basic services, agricultural productivity, and market linkages in rural areas. Promoting diversification of income sources and providing training and support for rural entrepreneurs can also help reduce poverty in rural agricultural households.

5.4 Areas for Further Research

This study proposes conducting further research that specifically targets agricultural households in Uganda, using the National panel survey datasets provided by the Bureau of Statistics. By utilizing these datasets, it will be possible to examine poverty trends and dynamics over time and consider the specific poverty challenges faced by agricultural household's due to time differences.

References