DISAGGREGATED INCOME COMPONENTS AND WELFARE ANALYSIS AMONG HOUSEHOLDS IN UGANDA

BY

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DECLARATION

Declaration by Candidate

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To my family especially my amazing wife, Brendah and children: Joseph, Jemimah, Jerusha and Jeyline who inspired me to keep going.

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ABSTRACT

Welfare is a long-time key goal for most economies in formulation and implementation of policies. Evidence reveals tremendous decline in welfare in Sub-Saharan Africa manifested by low consumption expenditure and high poverty levels. This study's general objective was to analyze the effect of household income on welfare among households across districts in Uganda. Specifically, the study sought to establish the effect of farm income, non-farm income, remittance income and diversified income on household welfare in Uganda. The study was grounded on Pareto Optimality theory to test hypothesized relationship between household income and welfare. A positivistic research orientation was used. The study adopted an explanatory research design. Panel data of Uganda National Panel Survey for the period 2013 to 2020 was used. Secondary data obtained from Uganda Bureau of Statistics for 128 districts was analyzed using static panel, Logit and Probit models. Household consumption expenditure and household poverty status were used as proxies for household welfare in analysis. The study employed the instrumental variables fixed effects and random effects as well as instrumental variables probit estimation techniques in addressing endogeneity bias. The study tested for unit roots (Fisher type test), normality (Jaque Bera test), multicollinearity (VIF), FE-RE choice (Hausman test) and Endogeneity (Wald test). Results from the study confirmed that household income could assist to explain household welfare. Using consumption expenditure as a measure of household welfare, results indicated that coefficient estimates of farm income ($\beta = 0.014527, p = 0.082$) was not significant at 5% level while non-farm income ($\beta = 0.262181, p = 0.000$); remittance income ($\beta = 0.011652, p = 0.000$) and diversified income ($\beta = 0.071074, p = 0.000$) had a significant and positive effect at 5% level on household welfare in Uganda. Utilizing poverty status as a measure of household welfare, results indicated that coefficient estimates of farm income($\beta = -0.021325, p = 0.076$) was not significant at 5% level while non-farm income($\beta = -0.246568, p = 0.000$), remittance income ($\beta = -0.016760, p = 0.000$) and diversified income ($\beta = -0.200253, p = 0.000$) had significant and positive effect at 5% level on household welfare in Uganda. The study concluded that non-farm income, remittance income and diversified income are key determinants influencing household welfare. In addition, the study came to the conclusion that, of all the different types of income of the household, non-farm income had the most significant marginal influence on household welfare. In order to improve the welfare of households, it is necessary for both households and the government to develop methods that increase non-farm, remittance, and diversified income. Income from non-farm sources, income from remittances, and income from diverse sources should be the primary focus of households, governments, policymakers, and other stakeholders who are interested in alleviating poverty. The current study concentrated on measuring the welfare impact over a relatively short period of time, whereas future studies should focus on estimating the welfare effects over longer periods of time using more advanced models such as ARDL and GMM.

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ABBREVIATION AND ACRONYMS

ADB:	African Development Bank
AIH:	Absolute Income Hypothesis
APC:	Average Propensity to Consume
ARDL:	Auto Regressive Distributive Lag
COVID 19:	Corona Virus Disease 2019
FAO:	Food and Agriculture Organization
FE:	Fixed Effects
GCIS:	Global Consumer Insight Survey
GDP:	Gross Domestic Product
GSO:	Global Surveillance Organization
ICT:	Information Communications Technology
IV	Instrumental Variable
IV-FE	Instrumental Variable Fixed Effects
IV-RE	Instrumental Variable Random Effects
KCF:	Keynesian Consumption Function
LGA:	Local Government Authority
LOGCONSEXP:	Logarithm of Consumption Expenditure
LOGIT	Logistic Regression
MDGs:	Millennium Development Goals
MoFPED:	Ministry of Finance, Planning and Economic Development
MPC:	Marginal Propensity to Consume
MPS:	Marginal Propensity to Save
OLS:	Ordinary Least Squares
PIH:	Permanent Income Hypothesis

PSR:	Poverty Status Report
RE:	Random Effects
RNFE:	Rural Non-Farm Enterprise
UBOS:	Uganda Bureau of Statistics
Ug. Shs.:	Uganda Shillings
UK:	United Kingdom
UNHS:	Uganda National Household Survey
UNPS:	Uganda National Panel Survey

OPERATIONAL DEFINITION OF TERMS

Diversified Income: Is defined as a household's income from other sources other than farm and non-farm income sources ((Mathebula *et al.,* 2016; UBOS, 2021).

Farm income: This refers to income that proceeds from farm activities, more specifically the household wage from employment in farm activities as well as farm production for sale (UBOS, 2021).

Household income: Refers to aggregate of income reported from all sources of adult household members that includes Wages and salaries, net income from farms and businesses, income from property and pension (Azam, 2019; Guzman, 2019).

Household Welfare: Refers to the level of well-being of households measured by the benefits it receives from the purchase of products and services that serve as an indicator of that household's level of poverty (Anderson, 2020; Menna-tullah, 2020).

Non – farm income: Is income to the household apart from that from the farm which includes all household members' incomes from wages, and pensions, earning from rent and capital, remittances, and any nonagricultural firms' net profit (Kinge, 2019).

Remittance income: This refers to financial flows that accrue to households which do not require a quid pro quo in terms of economic value (Kangmennaang *et al*., 2017).

CHAPTER ONE

INTRODUCTION

1.1 Overview

In this chapter, background of the study, the statement of the problem, the general objective, the specific objectives, the hypotheses of the study, as well as the significance and the scope of the study are presented.

1.2 Background

It is fascinating to have an understanding of the manner in which people in modern societies think about economic issues. If the method of economic theory is centered on the improvement of the welfare of individuals or households, then it will be able to accomplish this goal. It is crucial to note, despite the fact that most analyses of welfare focus on the individual, that the wellbeing of the household is an important component for many individuals, given that these persons live in households. In spite of the fact that, most analyses of welfare focus on the individual (Kennedy, 2018; Nguyen & Nguyen, 2019; Rememberance, 2015). Consumers are important players in the supply chain, without which production of goods and services would be rendered useless. Thus, household welfare is important to businesses and economic authorities (Sirgy & Lee, 2006). Understanding household welfare would assist producers, marketing related professionals and government agencies (Sirgy & Lee, 2006). Kennedy (2018) noted that household welfare is important for the maximization of overall economic growth. Interestingly in most economies, consumption generates over two-thirds of Growth Domestic Product (GDP) and is the most important determinant of household welfare (Khan *et al.,* 2015). The counterpart of consumption, that is; the saving attitude of consumers based on purchase decisions is critical for capital accumulation, growth

and development of the economy making income and consumption of key concerns in economics.

In today's extremely dynamic economic systems, household wellbeing is a blistering topic (Kulikov *et al.,* 2007). This is because household welfare improves citizens' well-being, which encourages general economic growth (Kennedy, 2018; Nguyen & Nguyen, 2019). Welfare in economics refers to an individual's subjective perception of their quality of life (Glick, 2018). According to a lot of scholars, the concept of household welfare is hazy. Household welfare is defined as benefits received by a household as a result of the consumption of goods and services that may be indicative of the household's poverty status (Anderson, 2020). The individual advantages depend on how satisfied they feel about themselves after taking into account factors like price against income. The term "household welfare" refers to a household's overall wellbeing, namely the advantages that a household derives from using the good or service (Menna-tullah, 2020).

Money metric household welfare indicators give accurate information for tracking changes in the welfare status of households in an economy and Uganda, like any other country, utilizes this approach to assess household welfare (UBOS, 2018). The justification for the money-metric method is that households above a specific monetary line are assumed to have sufficient purchasing power to obtain the quantities required in a bundle to achieve a satisfactory household welfare level. Nevertheless, the purpose of this study was to measure household welfare by looking at proxies such as household consumption spending and poverty status. The overall demand for all types of consumer products and services is referred as consumption. According to Anyanwu (1995), "consumption expenditure" refers to the total amount that households spend on products and services such clothing, food, entertainment, medical care, and asset purchases.

According to Balisacan *et al.* (2003), household spending is a great indicator to employ as a welfare proxy since it closely resembles long-term average well-being. Another proxy measure of home welfare is a household's poverty status due to the fact that the poverty status of a household substantially represents the quality of living enjoyed by that household (Nguyen & Tran, 2018). Sumner *et al.*, (2020) pointed out that this component of measuring household welfare has gotten relatively less attention than the others. According to Xu *et al.* (2021), the term "poverty status" describes the categorization of households according to either or not the income per capita reaches the poverty level as a whole.

According to Newman *et al.* (2008), one of the most crucial aspects that goes into defining the level of well-being that a household enjoys is its income. The term "household income" refers to all financial and in-kind (goods and services) receipts that are gathered on an annual basis or more frequently by the household or any individual member of the household. However, shock earnings and other irregular and frequently one-time receipts are not included in the definition of household income. In addition, according to Wilkins (2015), household income is the aggregate income of all members of the household after taking into account the receipt of governmental pensions and benefits as well as the voluntary payment of income taxes for a specified amount of time. This income includes income from employment, government transfers, investment and any other business owned by the household (Wilkins, 2015). Moreover, this income for most households, men provide a bigger share of the income in the households (Grow & Bavel, 2020). Therefore, it is crucial for policy since the quantity of household income can be readily regulated by the government via the employment of the tax and benefit systems (Cooper & Stewart, 2020). Farm income, non-farm income, remittance income, and diversified income are the different categories for this

income. Understanding the relationship between the various income components and the wellbeing of the household requires breaking down household income (Scharf & Rahut, 2014).

According to Rashidin *et al.* (2020), farm income is the total amount made from crops, livestock, and any other products or services that are directly related to farming. Additionally, Severini & Tantari (2013) define farm income as the payment for the labor, capital, and land provided by family members as well as the payment for the risk assumed by business owners. The two main components of farm income are direct payments and market income, with the former being calculated by subtracting direct payments from farm income. Due to a significant increase in market income, which in turn causes incomes to decline, this farm income has steadily climbed greatly (Severini & Tantari, 2013). Additionally, although the cost of hired labor has significantly increased, net revenue from some farming crops still shows a notable increase (Tran & Goto, 2018). After deducting the costs of their supplies and the wages they pay to hired labor, Chand *et al.*'s research from 2015 shows that over the course of the past three decades, farmers' profits from farm activities have witnessed growth swings at different points in time.

The total income also includes non-farm income, which is made up of a number of different industries such trading, manufacturing, agro-processing, commercial, and service activities. Their operations range in size from substantial storage facilities to a part-time independence in household-based businesses. For many people, non-farm income is a sizable source of income (Rahman & Mishra, 2020). Additionally, (Nagler & Naudé, 2014) highlighted these to include income from activities that make up the larger domain of rural non-farm economy, such as agricultural enterprises, service industries, commercial and retail commerce, tourism, industrialization of rural areas,

building, and mines. This idea of income has generated a ton of study interest in an effort to understand how and why households, both in urban and rural settings, diversify their sources of income in order to improve their welfare (Egyei & Adzovor, 2013).

There is growing evidence that remittance income which forms part of income from non–farm sources results into higher household food consumption expenditure (Rahman and Mishra, 2020). According to Kangmennaang *et al.* (2017), remittances are monetary flows or receipts into households that do not necessitate a trade-off in economic value. Remittances are frequently referred to simply as "remittances." Remittances, in a similar vein, relate to the transfer of money or other products by migrant workers back to the nation of origin (Thapa & Acharya, 2017). Remittances, a type of financial inflow, are described as funds that citizens of a nation send home after taking an international trip. While Jimenez & Brown (2012) defined remittances as any sort of foreign transfers that a household has received, including cash and goods. Additionally, according to Javed *et al.* (2015), remittances are the portion of a foreign worker's salary that is returned back to their country of origin. A migrant worker who works abroad performs this. Additionally, these remittances are used to cover costs in the nations origin, including those for clothing, food, medical care, and other necessities (Javed *et al.,* 2015). Remittance income has been shown in the literature to increase household food consumption (Rahman & Mishra, 2020). Therefore, it is expected that remittances will raise households' income as well as their expenditure, which will in turn cause a change in households' consumption as well as their labor and output (Cuong & Linh, 2018).

According to the International Labour Organization report (2021), migrant workers make up 4.9% of the total workforce in the world. Because of the significant role that they play in determining how much money a household spends on necessities like food,

healthcare, and education, remittances have experienced phenomenal increase in recent years. According to World Bank Report (2022), the amount of money sent back to countries with low and moderate incomes climbed by 7.3 percentage points in 2021 after falling by 1.7 percent the previous year. In Sub-Saharan Africa (SSA), remittance flows to reached a peak of $ 550 billion in 2019, surpassing both FDI (foreign direct investment) and development aid (Ratha, 2021). Uganda has made significant strides toward expanding its labor export industry, which has resulted in increased levels of remittances. Every year, 4.3% of Ugandans look for jobs outside of their own country, according to (Bakunda & Mpanga, 2011). In particular, people who have been moving to the Middle East over the past few years have seen an increase in this number (GTZ, 2020). Uganda is one of the top ten SSA countries in terms of remittance receipts, according to Odhiambo & Handoo (2021).

It is noted that in accordance with the generally accepted standards of national accounting and the development of macro input/output tables in order to distinguish between the sectoral, functional, and locational categories of diversity. According to Agyeman *et al.* (2014), diversified income refers to "a situation in which farm households rely on income from multiple sources; both farm and non-farm." The importance of household income per capita, the regularity of extension visits, the possession of productive assets, and the kind of road are the main antecedents of income diversification for farm households, according to Agyeman *et al.* (2014). It is evident that more households rely on sources of income other than farming. The significance of these antecedents is the cause of this. Diversification, according to Salifu (2019), refers to activities that are carried out separately from those of the main or dominant household. However, due to capital limits, weak connections to political influence institutions, and conflicts that negatively impact these households, poor rural

households have not fully benefited from the advantages of diversified income (Salifu, 2019).

The national poverty rate increased from 19.7 percent in 2013 to 21.4 percent in 2017 (UBOS, 2018), indicating a welfare decline. During the same time frame, the proportion of households engaged in non-agricultural activities increased by 10%, from 24% to 34% (UBOS, 2018). Similarly, the share of households reporting non-farm activities as their primary source of income increased from 44.4 percent in 2012 to 53.3 percent in 2016 (UBOS, 2016). The developing trend of high poverty levels coexisting with increased diversification of household incomes from non-farm activities justifies the need for rigorous empirical research on the effects of non-farm revenues on household welfare.

The role of farm and non-farm household activities in boosting household income, employment, and poverty reduction is of particular relevance to developing nations like Uganda, which has experienced rapid economic growth and substantial poverty reduction over the past two decades. For instance, the annual Gross Domestic Product (GDP) growth rate averaged 6% between 2010 and 2020, with the services sector accounting for 52.3% of GDP, followed by agriculture (24.5%) and industry (23.2%) (UBOS, 2021) (See fig 1). Income poverty decreased from 24.5 percent in 2009/10 to 19.7 percent in 2012/13, allowing the nation to meet the first Millennium Development Goals (MDGs) early.

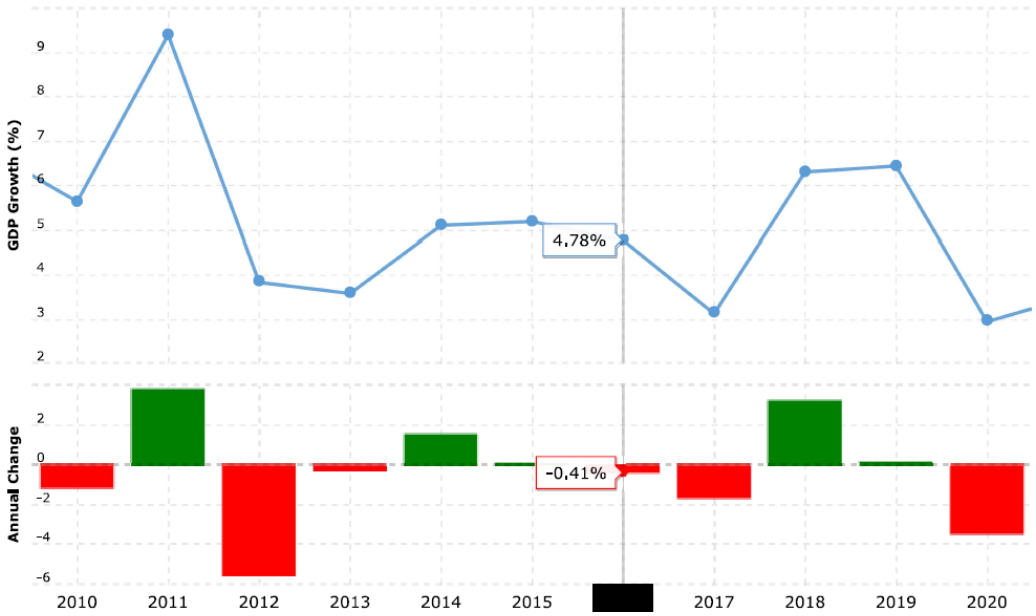

Figure 1: Uganda GDP per capita from 2010 – 2020
Source: World Bank (2020)

However, world over household welfare has seen tremendous decline in recent times (PWC-GCIS, 2020). For instance the welfare of households in terms of consumption has relatively seen a downward trend according to a World Bank report (World Bank, 2020a). In addition, the poverty rate, which has remained persistently high around the globe at 8.6% (656 million people) in 2022 (Aguilar *et al.*, 2022) demonstrates the deteriorating welfare of households. The Middle East and North Africa experienced the greatest increase in this incidence. As a result of global and local restrictions imposed on the movement of people, goods, and services to manage the Corona Virus Disease, 2019 (COVID 19) pandemic, household consumption has decreased, resulting in a decline in household welfare (World Bank, 2020a). The report further revealed that sluggish growth in the economy in the time following COVID 19 would continue to put a damper on household welfare and the demand for commodities. Relatedly, 40 percent of global households have experienced a drop in income due to job loss (PWC-GCIS, 2020) with Spain recording 56 percent decline, UK 43 percent, Italy 42 percent,

France 39 percent while China recorded 43 percent decline. As a result, households spend less in most nonfood categories for example clothing and footwear recorded a 51 percent drop, sports equipment and outdoor 46 percent, office equipment 36 percent while health and beauty products recorded 35 percent drop (PWC-GCIS, 2020). Reduction in household welfare has continuously been reported on the world scene as revealed by Nguyen & Nguyen (2019) who found that the welfare of households was declining as evidenced by low living standards across the entire Vietnam. According to the PWC-GCIS (2020), an estimated 13.8 percent and 9.1 percent of the Vietnamese people live in poverty in the North West and Central High Land Regions, respectively.

Household welfare in Sub-Saharan Africa was also found to be declining, according to World Bank (2018), as evidenced by low consumption expenditure. The quality of commodities consumed in Sub-Saharan Africa reflects a fall in household welfare. For example, the quantity of goods and services consumed in West Africa has consistently worsened (Bau, 2018). In addition to this, the number of people living in poverty in Sub-Saharan Africa rose from 420 million in 2018 to 424 million in 2019, resulting in a substantially higher poverty rate of 40 percent in the year 2021 (Aguilar *et al.*, 2022). Furthermore, consumption in most African countries has remained low, with only four economies accounting for 56 percent of total African consumption expenditure. The remaining 44 percent being shared by the rest of the countries (African Development Bank (ADB), 2012).

Despite having some of the world's fastest economic growth rates over the last decade, Africa's income levels have not caught up and household welfare has remained relatively low (Signé, 2018). The low welfare is reflected in the declining food consumption in Sub-Saharan Africa that has recently plummeted by 30 percent (Chauvin *et al.*, 2012). Between 1960 and 2010, per capita food consumption in Kenya,

Cote D'lvoire, and the Democratic Republic of the Congo decreased by 3 percent, 1 percent, and 9 percent, respectively, each decade (Chauvin, *et al.*, 2012). In the East African community, the existence of regulations has not offered a barricade against poor and unsafe goods, which continue to find their way onto the shelves of various establishments (Zeija, 2018). Adult equivalent household consumption increased at rates typically below 2 percent per year for the wealthiest (in terms of consumption) quintile of households from 2000 to 2003 while consumption declined by 1-2 percent per year for households below the 80th percentile, and for most urban households except the very rich (Appleton, 2001; Kappel *et al.*, 2005).

In a developing country like Uganda that faces huge unemployment and poverty levels, the high standard of living of households is just a dream (Ali *et al.*, 2020). According to Ali *et al.*'s research from 2020, frequent changes in the level of prices as well as significant inflation have had a negative impact on the consumer demand, purchasing power, and welfare of households. This is especially true for households with low and middle incomes. The situation was made even worse by the COVID 19 pandemic, a worldwide outbreak that occurred in the country, which led to the implementation of a statewide lockdown as well as other preventative measures to stop the virus from spreading. The lockdown resulted into loss of income by households as some of them lost jobs which made them to adjust their consumption patterns. There is also emerging evidence of widespread economic hardship as a result of lockdown policies. The foregone consumption during the lockdown in Uganda resulted into larger households welfare loss affecting their optimal choices (Carnap *et al.*, 2020). Even before the lock down consumption expenditure was declining in Uganda; for instance, residents' actual consumption expenditure fell between 2000 and 2003, and poverty levels increased, while real consumption expenditure fell for all households (UBOS, 2016).

Mahmud & Riley (2021) reported that Ugandan households from rural samples had seen their incomes decrease by 60 percent, reduced their food expenditure by 40 percent. In addition, spending on consumer goods fell by thirty percent as a result of the fact that sixty-six percent of the households in Uganda were hit by income shocks in the year 2020 (Kansiime *et al.*, 2021). Household welfare has remained stagnant in the recent past with 19 percent of total household food consumption in west Nile region as a greater percentage survive on gifts (UBOS, 2016). The report further noted that only 11 percent of Ugandan households had three meals per day with the remaining percentage having less than three meals. This has made Uganda to remain a relatively poor country (World Bank, 2018) and poverty is growing. According to the 2016/17 UNHS report, poverty rose to 21.4 percent in 2016/17, implying approximately eight million Ugandans were living in absolute poverty (PwC, 2020; UBOS, 2018). In addition to this, a survey by UBOS indicated that there was a decrease of 5.5 percent in the amount of money spent on consumption by Ugandan households in a survey conducted in 2019/2020 (UBOS, 2021).

Theoretically, there exists a link between household welfare and income. This link is cemented by the Pareto optimality theory that asserts that changes in the economic pattern (which also embodies household income changes) increase the welfare of consumers through gain and loss compensation (Backhaus, 1980). The Pareto optimality theory proposes that changes in the economy increase welfare of households objectively when those who gain compensate those who loose but still retain some gain. This means that any situation is optimal if all possible moves from it results in some individual being made worse off but can fully be compensated by the gainers (Buchanan, 2017). Ugandan households are increasingly involved in different farm and non-farm activities to yield income and hence source their income from a diversified

range of activities to enhance wellbeing. The percentage of households having non-farm activity raised significantly from 24 percent in 2012/13 to 31 percent in 2016/17, showing that roughly 3.1 million people use non-farm activities as a supplemental income source, with only a tiny minority abandoning agriculture totally (UBOS, 2018).

In a research by Zhang *et al.* (2017), it was noted that a rise in household income enhances household consumption of goods and services and hence on consumers' welfare. Similarly, Stratford & Cowling (2016) study revealed that increasing income for poor households would boost aggregate consumption and in effect, consumer welfare. Wambua *et al.* (2020) in their study showed that farming participants had higher overall crop and livestock productivity, increased household income and access to bio fortified foods than non-participants. Additionally, Kinuthia *et al.* (2018) indicated that non–farm significantly influences household welfare. Remittance income was also found as an important household welfare enhancing factors by Evans & Kelikume (2018). Moreover, (Amfo *et al.*, 2021a) revealed that rice farmers' income diversification affects crop and income diversification as well as rice-producing households' consumption expenditure.

In their study of how income enhances welfare of households in Eastern Uganda, Kakungulu *et al.* (2021) found that diversification and non-farm income increase household income, which in turn lowers vulnerability and poverty. This was noted in the research on the influence of rural income portfolios on wellbeing. Boakye *et al.* (2021) evaluated the effect of on-farm approaches on the welfare and livelihood of rural smallholder farmers. During their research, they revealed that these strategies had a beneficial impact on increased and alternative sources of income, improved diet, and sources of employment. Additionally, these tactics were found to have enhanced the overall quality of the farmers' lives. Similar to this, Al-Amin & Hossain (2019)

established the role of non-farm income on household asset ownership. They conducted their study to explore the impact of non-farm income on the ownership of assets in rural Bangladeshi households. This is true to the extent that non-farm income is taken into account, which also lowers the risk of poverty in addition to lowering poverty level, depth and severity. In addition, Cuadros-Menaca *et al.* (2020) studied the impact that overseas remittances have on children in Colombia between the ages of 12 and 18 in terms of whether or not they participate in child labor and whether or not they attend school. They reached the conclusion that income through remittances improves the welfare of children left behind, hence reducing the likelihood that the children will have to work in the market.

In Uganda, some researches have revealed the antecedent role of activities of farm and non-farm and reduction of poverty. For example, the 2014 Poverty Status Report (PSR) indicated that livelihood diversification portfolios toward non-farm household enterprises was closely connected with the alleviation of poverty in rural areas. Diversification away from agriculture enhances household welfare by increasing and stabilizing household earnings (MoFPED, 2014). Several studies were studied to date to determine the impact of farm and non-farm enterprises on the welfare of households (Wambua, 2020; Nagler and Naude, 2017; Kinuthia, *et al,* 2018; World Bank, 2016; Du-Pont *et al.*, 2020; Seneerattanaprayul & Gan, 2021)). For example, Akaakohol & Aye (2014) explored household welfare diversification in Nigeria. While Du-Pont *et al.* (2020) investigated the effects of pastoral income and household welfare on communities in South Africa that are located near to the Great Fish River Nature Reserve. Moreover, most of the studies have been done in developed countries, which have different economic activities, such as markets, infrastructure, and climate, than developing ones like Uganda, which necessitates the current research. Related studies

carried out in Uganda have not directly addressed the research area (Mahmud & Riley, 2021; Hill & Mejia-Mantilla, 2019; Kazungu & Guuroh, 2014). For instance, Mahmud & Riley (2021) investigated how households react to a severe shock by looking at information on the direct impact of the COVID 19 shutdown on the economy and welfare in rural Uganda. While Kazungu & Guuroh (2014) investigated the possibility of non-farm and off-firm firms in fostering rural development in Uganda, our focus was on the potential of non-farm enterprises. And Hill & Mejia-Mantilla (2019) explored welfare, growth and shocks in Uganda. Therefore, it is worthy efforts studying the relative role of disaggregated household income components on welfare in a developing country perspective since there is no research that has documented this existing gap.

1.3 Statement of the Problem

Household welfare has for long been an important goal for most economies and integrations in the policy formulation and implementation. Economic and social policies are necessary for ensuring citizens welfare through promoting consumption of commodities that meet the demands of consumers, ensuring reduced poverty levels and increasing the country's total economic growth. As such, welfare improvement remains on the agenda of governments and key to policy making bodies, academicians and development partners (Sirgy & Lee, 2006).

However, the poverty rate, which consistently remained high at 8.6 percent in 2022 (Aguilar *et al.*, 2022), is one indicator of deteriorating welfare of households globally. According to (Egger *et al.,* 2020), household welfare declined in some countries where 68 percent of households had a decline in consumption expenditure in 2020. Additionally, 1.2 billion children were living in multidimensional poverty without access to education, health, housing, nutrition and sanitation by the end of 2020 (Xinhua, 2022). Further still, the poverty-stricken households in Sub-Saharan Africa

(SSA) increased from 420 million in 2018 to 424 million in 2019 (Aguilar *et al.*, 2022), with a poverty rate of 40.0 percent in 2021.

Trends in Uganda have also shown a tremendous decrease in the welfare of households. The World Bank's 2020 estimates revealed an increase in poverty rate to 21.4 percent from 19.7 percent in 2016. Furthermore, according to empirical data by Mahmud & Riley (2021), household welfare in Uganda had declined, as reflected by decrease in household food expenditure. In addition, a 30 percent drop in consumption expenditure in 2020, when over half of Ugandan households experienced economic shocks, was indicative of decline in household welfare in Uganda (Kansiime *et al.,* 2021). In addition to this, UBOS (2021) reported that there was a decrease of 5.5 percent in consumption expenditure by Ugandan households.

Uganda greatly suffered the effect of COVID-19 Pandemic causing households in Kampala and other areas across Uganda to lose between 68 and 72 percent of their revenues comprising of salaries, remittances, property rents, and other household production incomes (Younger *et al.,* 2020). Furthermore, between 2012/13 and 2016/17, the Uganda Bureau of Statistics (UBOS) reported a drop in public welfare due to wage (42 – 37 percent) and non-wage employment (14 – 9 percent) declines. Similarly, according to the UBOS Report (2018), household monthly expenditure on consumption reduced by, leading to 89 percent of households in Uganda having less than three meals.

Despite the burgeoning literature that has established the influence of income on welfare of households (Chirwa *et al.*, 2017; Ma & Abdulai, 2016; Stifel, 2010), there is still a dearth of knowledge regarding the heterogeneous impact of household income on consumption expenditure and poverty status as welfare measures (Deaton & Zaidi,

2002; Moratti & Natali, 2012). Moreover, poverty status is a welfare measure that has received less attention in literature (Sumner, *et al.,* 2020). Furthermore, most empirical studies on income and welfare have been directed to developed and industrialized economies and less attention has been paid to developing economies like Uganda (Mat *et al.,* 2012; Du-pont *et al.,* 2020) and yet the influence of household income on welfare varies across countries (Asfaw *et al.,* 2012), there is need to establish the external validity of income and welfare theories using evidence from Uganda. Moreso, previous studies on income and or its components on how they influence welfare have reported mixed results (Khan & Morrissey, 2020a; Kinuthia *et al.,* 2018; Obasi *et al.*, 2020).

Unlike previous research that revealed the influence of income on welfare of households (Kakungulu *et al.,* 2021; Obasi, 2020), the current research addressed endogeneity that arises from badly measured income components. In addition, most of the studies adopted cross sectional design which does not portray a true picture of changes in income and welfare across different periods (Ma, *et al.,* 2019; Adepoju & Ogundunmade, 2019) but this study employed nationally representative panel data. That withstanding, majority of these studies have not exhaustively studied the area since they only looked at certain types of income (Akaakohol & Aye, 2014; Seneerattanaprayul & Gan, 2021). Thus, it is worth the efforts to examine the existing research gap in the literature by establishing the relative contribution of the disaggregated income components on household welfare in Uganda.

1.4 Objectives of the Study

The study was anchored on the following general objective and specific research objectives.

1.4.1 General Objective

The study sought to analyze the influence of the disaggregated income components on welfare among households across districts in Uganda.

1.4.2 Specific Objectives

1. To determine the effect of farm income on household welfare in Uganda.
2. To analyze the effect of non-farm income on household welfare in Uganda.
3. To evaluate the effect of remittance income on household welfare in Uganda.
4. To assess the effect of diversified income on household welfare in Uganda.

1.5 Hypothesis of the Study

This study tested the following Research Hypotheses in line with the specific objectives;

H_{01}: Farm income has no significant influence on household welfare.

H_{02}: Non-farm income has no significant influence on household welfare.

H_{03}: Remittance income has no significant influence on household welfare.

H_{04}: Income diversification has no significant effect on household welfare.

1.6 Significance of the Study

The research findings could be of immense benefit to various stakeholders including government and other policy makers, academicians and researchers as well as households.

To the Government of Uganda, the findings of the study could help in financial planning by allocating the National budget financial resources to the activities that generate high sources of income to the citizens so as to boost such activities which in turn influences the welfare of the citizens. The recommendations of this study could also help in developing relevant policies that aim at protecting household welfare in the economy.

The findings could also empower government and other policy makers informatively and objectively by examining the effect of income on household welfare. The study findings could specifically inform policy on the paradigm shift necessary to spur the welfare of individuals and households positively.

To academicians and researchers; the study findings could help or pause grounds for further research by replicating the findings. The outcomes of this study could also serve as a template for future researchers to use as a solid and reliable reference point for their research. More specifically, the findings could be helpful to scholars especially to those who could be focusing on household welfare in enriching their skills and knowledge in teaching, research, publication and career growth. Theoretically, the research findings could enrich the extant knowledge on how consumption theories link the impact of income on household welfare. The study findings could help in testing and verifying existing theory about household welfare. In addition, the study findings could help in testing the existing theories as well as formulation for new ones.

To households; the study findings could contribute to enhancing their welfare as the relevant authority take it up to design appropriate policy to improve their welfare. The study could assist households in designing strategies for enhancing their welfare. To other stakeholders, the study could increase public understanding and awareness on issues of household income and household welfare. Households could specifically benefit from the findings of the Sunday by appreciating the need to shift from primarily agricultural activities to secondary activities that have higher job security and productivity.

1.7 Scope of the Study

The study was delineated to the influence of the disaggregated household income components on household welfare. The disaggregated household income components included farm income, non-farm income, remittance income and diversified income. Whereas, consumption expenditure and poverty status were used as proxies measures of household welfare. This was a single – country study where all the districts in Uganda were studied. The study was based on the most recent four waves of Uganda national panel survey data from 2013 to 2020. The study period was selected because it gives most recent (current) panel data but also gives sufficient data to constitute a panel. For the period gave four waves of data collected over eight years which period according to Sakyi *et al.* (2018) is sufficient for panel analysis.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter presents a review of related empirical studies on income and household welfare, but first, the key concepts of each construct are defined and a theoretical overview along with the dimensions of each study variable are provided. In this chapter, the gaps that the study seeks to address are articulated. The last subsection of this chapter presents the conceptual framework.

2.2 The Concept of Household Welfare

Household welfare means different things to different people as described by Daskalova (2015) and Menna-tullah (2020) who noted that household welfare has remained a vague term that generates more questions than answers. The questions in that light include; what does the term welfare entail? What is to be considered as harm to household consumption? Household welfare refers to the person advantages that can be received from an individual's purchase of goods and services. (Anderson, 2020). The individual benefits are dependent on the individual's self-assessment of satisfaction given considerations such as price relative to income. The term household welfare means the household's wellbeing: the benefits a household member who buys goods derives from the consumption of the good (Menna-tullah, 2020). From a theoretical view point, an individual's welfare is determined by the individual's own evaluation of his or her level of contentment, taking into account both income and cost.

Money metric household welfare indicators give accurate information for tracking changes in the welfare status of households in an economy, and Uganda, like any other country, utilizes this approach to assess household welfare (UBOS, 2018). The justification for the money metric method is that households above a specific monetary

line are assumed to have sufficient purchasing power to obtain the bundle of quantities required to achieve a satisfactory level of household welfare. However, this study examines household consumption expenditure as well as poverty status as proxies to household welfare since there is no direct link between household money holding and satisfaction. The overall demand for all consumer products and services can be simply stated as consumption. According to Anyanwu (1995), the term "consumption expenditure" refers to the sum of money spent by households on goods and services like clothes, food, entertainment, and medical care, among other things.

Researchers have argued the merits and drawbacks of several welfare indices that emphasize consumption expenditure over income, particularly in developing country context (Moratti & Natali, 2012). It is important to emphasize that individuals draw their material well-being from real consumption of goods and services rather than from earnings parse (Citro & Michael, 1995); as a result, consumption spending seems to better represent the concept of welfare. According to Deaton & Zaidi (2002), spending on consumption more accurately reflect long-term income due to the fact that they are more stable and less volatile than income and are not directly linked to fluctuations in short-term revenue.

It is more likely that cyclical patterns will have an effect on income, which may either lead to an underestimate or an overestimate of real income. Expenditures on consumption are more predictable, particularly in agricultural civilizations, because they are averaged out throughout the course of the year. As a result, they more accurately represent (or approximate) the actual level of living. In addition, although it takes a lot of effort to collect data on expenditures related to consumption, understanding the concept of consumption is typically much simpler than understanding the concept of income. As a result, precisely measuring household

income, particularly for self-employed households and those working in the informal sector, is extremely challenging. In the context of this research, the term "household consumption expenditure" refers to the total market value of every good and service bought by households, including long-lasting commodities (such as automobiles, washing machines, and personal computers for the home). The purchase of a home is not deductible, but the "imputed rent" on a dwelling that is owned and occupied by the taxpayer is. Also accounted for are payments made to governments in the form of fees and taxes for licenses (World Bank, 2018).

In empirical literature, three measurement metrics of the dependent variable are commonly adopted as proxy variables to welfare, namely: household consumption expenditure, household assets value and poverty status. According to Balasacan *et al.* (2003), consumption by households is an outstanding variable to employ as a proxy for welfare since it closely matches long term average wellbeing. Per capita consumption expenditure is normally calculated by dividing the total value of all food and nonfood items and services consumed in a household by the number of people living there.

Assets value is yet another measure for household welfare because assets value reflects household's affluence so that households with higher assets value are considered to live better welfare than their counterparts. Household income is allocated either to consumption or accumulation of assets (Grzelak, 2019). However, household assets are frequently left out of study measures of welfare because there is a dearth of reliable evidence (Huang *et al.,* 2015). Household assets are another key determinant of household wellbeing. However, the majority of households invest a sizeable portion of their income in household assets. Because of this, it is essential to investigate the contribution of this portion of household income to the wellbeing of the household. As a result, including the assets of the household in the analysis of the social welfare system

provides a more comprehensive understanding of the connection between household income and well-being (Huang, *et al.,* 2015). According to Fomum & Jesse (2016), the accumulation of assets not only protects but also acts as a cushion against such economic shocks as serious illness, the loss of a job, and the dissolution of a marriage. This is accomplished by providing back-up resources that may be used to level out consumption. In addition, assets can be passed down from one generation to the next, so improving the standard of living of offspring. This reduces the amount of stress offspring experience in their lives when they inherit some degree of assets and increases the opportunities available to them in life (Fomum & Jesse, 2016). According to Grzelak (2019), the accumulation of assets can take place either as a direct result of a growth in the prices of lands or through the process of investing. According to Ahmed *et al.* (2016), a rise in household income through any form of income, whether farm income or non-farm income, is likely to have a beneficial impact on household asset preservation and asset accumulation. This is the case regardless of whether the revenue comes from farming or another source.

Just as Grzelak (2019) contended that the amount of accumulated assets increases with the growth in household economic size. Assets include land, housing, livestock, agricultural equipment and structures, fishing equipment as well other durables like cars, furniture, household electronic appliances minus debt (Magalhaes & Sentaeulalia-Llopis, 2015). The most common channel for increasing such own assets within investment activities is through agricultural incomes (Grzelak, 2019).

According to Huang *et al.* (2015), some examples of accumulated assets include the equity in a home, savings, stocks, bonds, money that has been loaned out, investment in company, housing funds, insurance for businesses, and long-lasting consumer products such as automobiles, radios, motorcycles, and refrigerators. On the other hand,

(Celerier, 2019) defines household's accumulated assets to comprise all of the household's total assets, which is the sum of cars, liquid assets, and other assets less secured loans. This definition considers all assets owned by the household to be part of the household's total assets. In a related context, the term "assets accumulation" refers to the process of accumulating funds and productive assets such as an education, the ownership of a home or livestock, investments, or pensions (Fomum & Jesse, 2016). According to Ahmed *et al.* (2016), these assets can be broken down into four categories: durable items, housing, financial assets, and productive assets. In addition, the term "assets accumulation" refers to the gradual increase of tangible assets like a person's home and vehicle (Mckernan *et al.,* 2013). According to Neudert *et al.* (2015), the primary indicator of wealth accumulation in a home is the number of animals kept as pets or as livestock.

Another possible proxy for measuring welfare is poverty incidence. This is due to the fact that the poverty status of a household significantly represents the quality of life of that household (Nguyen & Tran, 2018). As noted by Ozughalu & Ogwumike (2019), a key dimension of welfare that has emerged in recent times in literature is poverty incidence. This dimension of measuring household welfare has received relatively less attention to date (Sumner, *et al.,* 2020). One of the measures used to evaluate social welfare is known as the poverty incidence rate, and it refers to the percentage of the total population whose income per capita falls within the poverty threshold for the entire population (Xu, *et al.,* 2021). Kristjanson *et al.* (2010) posit that the incidence of poverty is a dynamic component of the problem. This is because the group of people who are poor is itself continually changing as households and individuals either climb out of poverty or fall further into it. While *Ren et al.* (2017) define the incidence of poverty as the proportion of a population that is living in poverty relative to the entire

population of the country. The incidence of poverty is typically expressed as a ratio of the number of people who reside below the poverty threshold to the overall number of people in a given population (Danaan, 2018). This ratio is derived from a poverty line that is based on the cost of a minimal basket of necessary items that are required for basic human survival. The cost of this basket is defined by the cost of the products that are required for basic human survival. The statistics on income, consumption, and expenditures from households that do not fall into the category of "poor" are used to calculate these expenses.

According to Kwadzo (2015), having less than an objectively specified (absolute minimum) quantity of resources in society is considered to be in a state of monetary poverty. According to Kanayo (2014), persons who earn less than a certain level of income, which is acknowledged as the minimal amount required to pay for one's life's essential requirements, are frequently deemed to be poor. In addition, there is an argument that the prosperity of people and their households is not only a consequence of wealth and consumption, as well as health and educational capacities, but also of the amount of time they have available to them. According to Hirway (2010), one essential component of happiness is leisure, which can be defined as "the time spent on rest and relaxation. Households that earn higher income experience lower poverty incidence compared to their counterparts with low income and as such these households experience higher levels of welfare (Paqueo *et al.*, 2016). In addition to this, Ozughalu & Ogwumike (2018) found that poverty is linked to a decline in overall societal wellbeing as well as a loss in production and output. In addition, the incidence of poverty has a substantial link with income, despite the fact that the use of income as a measurement of poverty has been the subject of significant debate (Bak & Larsen, 2015). According to the UBOS, a household is regarded to be poor if its total monthly

spending per adult equivalent is lower than the minimal amount of money sufficient to satisfy its basic needs (both food and non-foods) (UBOS, 2018). This applies to both food and non-food purchases. This classification method is utilized in order to differentiate between homes that are not considered to be poor and those who are considered to be poor. UBOS's methodology for calculating the poverty index was expanded in order to take into account the newly introduced welfare indicators. Ownership of a home or other dwelling, the type of walls and floors in the home, the availability of clean drinking water, the number of distinct rooms in the home, the type of roof, and the household's access to better sanitation amenities like toilets and supplies for hand washing are some of these factors. Additional metrics of welfare were incorporated as well.

2.3 The Concept of Household Income

Household income is the aggregate of income from all reported of adult household members (Guzman, 2019; Kornrich & Roberts, 2017; Lansford *et al.*, 2018; Main, 2019; Nolan *et al.*, 2018; Strohschein, 2005). Relatedly, Azam (2019); Booker *et al.* (2020); Cynamon & Fazzari (2015); Kinge (2019) defined household income to include net farm income, family business net income, wages and salaries, and property and pension income. In addition, the total income of all members of a household, less any government pensions or benefits received and any income taxes paid for a specific amount of time is referred to as the household income. This income includes income from employment, government transfers, investment and any other business owned by the household (Wilkins, 2015). Household income depends on the number and ages of household members (Laß & Wooden, 2019). In a given period, household income refers to the total earnings of all members of a farmer homestead (Waridhani *et al.*, 2021). Posey (2016) further viewed household income to comprise of earnings of all household

members 18 years and older, whether or not they are related to the household head. Moreover, this income for most households, men provide a bigger share of the income in the households (Grow & Bavel, 2020). Accordingly, household income is of central importance to policy since its level can be influenced easily by government through the tax-benefit system (Cooper & Stewart, 2020).

Household is a term used to describe a group of people living in one homestead. According to UBOS (2018), family units in Uganda are made up of a number of individual, nuclear households that collaborate to fulfill the responsibilities of the family. These households are supervised by the extended household head. A part of the farm's earnings and assets, as well as food cultivated on community fields, are shared among several nuclear households, according to the research, which states that these houses have formed an alliance with one another and function as a single entity in farming activities. On the other hand, these smaller households are only partially autonomous in the sense that they and their members are able to pursue their own activities that generate revenue and consumption strategies outside of the larger farm (UBOS, 2018). The majority of economists are of the opinion that when defining income, household income in developing nations should include both monetary cash income as well as non-monetary revenue in the form of goods and services. Because household output is often meant for domestic use and never enters the market, nonmonetary revenue should be included (Ellis, 2003).

This study takes into account all types of income and takes into account both cash and non-cash forms of income. The latter type of income takes into account crop, livestock, and non-agricultural production used by the household, in addition to changes in animal stocks. The value of any unsold production was estimated by first deducting the cost of production from total crop sales and then adding the worth of any not sold production

(valued at the mean selling price acquired by the household for traded production or the mean price of sale at the level of the village if the household did not sell the crop – including both in-kind and cash inputs but excluding family labor costs). This allowed for an estimate of the household's net crop income. The total sales of livestock and livestock products as well as the value of stock changes were added together to determine the net household income for livestock revenue. This income can be attributed to animal consumption as well as births, deaths, and gifts among other things, and it was computed using the village or zone livestock pricing. Farm and non-farm income are combined to form household income. Farm revenue comes from farmers' agricultural activities, but non-farm income comes from sources other than agriculture (Van den Broeck & Kilic, 2019). Household income is the sum of farm, non-farm and passive earnings over a 12-month period.

According to a recent examination of labor market dynamics, pay employment growth has not kept pace with overall economic development. In the 2009/10 and 2010/11 rounds of the UNPS, Kavuma *et al.* (2015) found that less than 20% of workers were employed on wage basis. The great majority of workers are either employed by their families (particularly in agriculture) or work in the informal sector as self-employed people. Wage employment accounts for 25% of male workers in SSA as a whole, but just 10% of female workers; thus, growing the wage sector is a major policy concern for the area (World Development Report, 2013). A major source of concern is that SSA may be urbanizing without industrialization (Andersson, 2014), resulting in lack of possibilities in manufacturing or high wage services, which might lead to greater earnings in urban regions (Loison, 2019).

2.3.1 The Concept of Farm Income

A study by Rashidin *et al.* in the year 2020 define term "farm income" refer to the entire income that is made from crops, livestock, and various other farm-related goods and services. In addition, Severini & Tantari (2013) describe farm revenue as the compensation to the factors of production contributed by family members (labor, land, and capital), as well as the compensation to the entrepreneur's risks. In other words, farm income is the pay to family members for their contributions to the production of the farm. Market income and direct payments are the two primary components that make up this remuneration. The amount of market income is determined by first deducting the amount of direct payments from farm income. Farm income is defined by Severini & Tantari (2013) as the compensation paid to the factors of production provided by family members. These factors include labor, land, and capital. In a similar vein, earnings from crop sales and the value of products produced on the farm that are consumed on the farm itself both contribute to the overall farm income (Fisher & Economics, 2004). On the other hand, net farm income is the quantity of production's worth, and it reflects the farm operator's portion of the net worth generated by the national economy over the course of a certain amount of time. This share is determined over the course of a specific length of time. This holds true regardless of the form that the revenue is received in, be it cash or some other kind of payment. As a consequence of this, the quantity used for domestic consumption, changes in inventory, capital replacement, and implicit rent and expenditures connected to the farm operator's housing that are not reflected in cash transactions are all included in the calculation of net farm income (Schnepf, 2016). This is because the quantity used for domestic consumption accounts for a portion of the farm's total sales. According to Beckman & Schimmelpfennig (2015), net farm income is the amount that farm owners provide to

the overall economy. This amount is calculated as a component for estimations of GDP and includes payments from the government.

Farm income is positively impacted by adoption of efficient agricultural technology and consequently the welfare of the adopters was better than that of non-adopters (Hailu *et al.,* 2014). According to Chand *et al*.'s research from 2015, during the course of the past three decades, farmers' incomes from farm activities, after deducting the expenses of their inputs and the wages they pay to hired labor, have experienced growth swings at various points in time. This high degree of volatility in farm income has been observed throughout the course of time, and it can be attributed to the variability in farm income market revenue (Bojnec & Fertő, 2019). Though farm income has seen fluctuations that require the attention of policy makers to understand for appropriate action to be taken (Beckman & Schimmelpfennig, 2015), it has tremendously increased consistently due to a robust increase of the market income component which in effect results into declining negative incomes (Severini & Tantari, 2013). Moreover, the hired labor costs have increased intensely but net income from some farming crops still exhibits a momentous increase (Tran & Goto, 2018).

2.3.2 The Concept of Non–farm Income

The notion of non-farm income has bred mammoth research interest, aiming to appreciate how and why households in rural as well as urban areas diversify their income (Egyei & Adzovor, 2013). Non-farm activities entail a diversity of income from activities like trading, manufacturing, commercial and service activities, agro-processing, as well as capital gains and accumulated (inherited) wealth (Rahman & Mishra, 2020). Nagler & Naudé (2014) also defined non-farm income to include income from such activities as agribusiness, construction, trade and retail, services, industrialization, tourism, rural, and mining that constitute the greater domain of the

non-farm economy. In the same vain, Pandi (2015) articulated that the non-farm sector encompasses wide range of activities that are directly or indirectly related to and supporting various agricultural and nonagricultural activities, with the exception of activities associated with agricultural production.

2.3.3 The Concept of Remittance income

According to Bahadir *et al.* (2018), remittances are major channel via which wealth is transferred all over the globe as a result of the practice of migrant workers and immigrants sending a portion of their earnings back to the nations to which they originally came. It is anticipated that this pattern will carry on for the foreseeable future. According to research done by Munyegera & Matsumoto (2016), close friends and family members frequently send remittances to one another as a kind of financial assistance. This is especially widespread in rural communities, which typically have restricted access, if any at all, to legitimate financial institutions like banks. Rural households receive the majority of their remittances from within the country, but urban households are more likely to receive remittances from outside the country, as stated by Cuong & Linh (2018). The effects of foreign remittances can reportedly be felt on both the micro and macro levels of an economy, as stated by Kumar (2019). According to Kumar (2019), remittances directly boost the income of remittance recipient households and alleviate the financial strains that come with budgetary restrictions. Literature has demonstrated that remittance income results into higher household food consumption (Rahman & Mishra, 2020).

Remittance income is defined as money flows or receipts into homes that do not require a quid pro quo in economic value, as stated by Kangmennaang *et al.* (2017). In a similar vein, remittances are defined as the transfer of money and other items that are sent back to the nation of origin by migrant workers (Thapa & Acharya, 2017). A remittance is a

financial inflow defined as money sent back to a country by its citizens after they have traveled outside of the country. While Jimenez & Brown (2012) conceived remittances as meaning overseas transfers received by households in any form (cash or in-kind). In addition, remittances are defined as the portion of a foreign worker's wages that is sent back to his or her home country (Javed *et al.,* 2015). This is done by a migrant worker who is employed overseas. In addition, these remittances are used to pay for things like food, healthcare, clothes, and other expenses in the countries from which they were sent (Javed *et al.,* 2015). Therefore, it is anticipated that remittances will boost not only the income of households but also their level of consumption, which will consequently lead to a shift in not only the level of consumption but also the level of labor and production carried out by home households (Cuong & Linh, 2018).

2.3.4 The Concept of Diversified Income

The distinction between the sectoral, functional, and locational categorizations of diversification is made in accordance with the usual practice of national accounting and the development of macro input/output tables (Agyeman *et al.,* 2014). Diversified income is defined as "a situation where households on farms rely on earnings from multiple sources in addition to the household's main sources of income; farm and non-farm" (Agyeman, *et al.,* 2014). Accordingly, Weltin *et al.* (2017) delineates diversity to represent an urgent adaptation technique to cope with market demands and altering political framework conditions and facilitates drop in economic risk. This is due to the fact that diversification facilitates decline in economic risk. In a related vein, the term "diversified income" refers to the process by which rural families develop increasingly different livelihood portfolios by utilizing increasingly diverse combination of resources and assets in order to satisfy their basic needs, improve their wellbeing, and manage risk (Wan *et al.,* 2016). This allows rural households to better fulfill their basic

needs, improve their welfare, and manage risk. In this study, income diversification means a household having more than one source of income.

In banking, income is diversified into interest income and non–interest income which diversification means the relative proportions of interest income and non–interest income (Gürbüz *et al.,* 2013; Zhou, 2014). Diversification therefore implies activities undertaken outside agricultural-related enterprises (Salifu, 2019). It is clear that a bigger percentage of households participate in non-farm revenue sources due to the significance of household income per capita, the number of extension visits, productive assets held, and kind of road, which are essential antecedent of income diversification of farm households. These factors all contribute to the fact that a greater percentage of households participate in non-farm income sources (Agyeman, *et al.*, 2014). Yet the poor rural households have not fully realized the benefits of income diversification essentially as a result of capital restraints, political power weak link structures, and conflicts that negatively affect the households (Salifu, 2019).

2.4 Theoretical Literature Review

Several economists have developed theories to explain welfare. These theories date back to the works of Borda, Carroll & Black in 1730s. Three theories are presented in this study which are; Pareto Optimality theory by Vilfredo Pareto, the Social Choice theory by Amartya Sen and the Livelihood Portfolio theory by Neubourg.

2.4.1 Pareto Optimality Theory

The theory was advanced by an Italian economist, Vilfredo Pareto in the early twentieth century. The theory is premised on wellbeing for all such that the changes in the economic pattern induce the welfare of consumers to benefit at least one person while harming no one (Schumpeter, 1949). According to the Pareto optimality theory, any

change in the economic pattern (which also includes household income changes) increases the household members' welfare through gain and loss compensation (Backhaus, 1980). The Pareto optimality theory proposes that changes in the economy increase welfare of households objectively when those who gain compensate those who loose but still retain some gain (Schumpeter, 1949). This means that any situation is optimal if all possible moves from it results in some individual being made worse off but can fully be compensated by the gainers (Buchanan, 2017). To increase household welfare, a social interaction must benefit at least one person while harming no one (Hummel, 2008). According to the Pareto optimality theory, the concept of welfare is geared to protect households (individuals) in form of gains/benefits to these groups (Gormsen, 2007).

In other words, an increase in household income is desirable when it results in either everyone being better off or someone being better off and no one being worse off than before change. It is argued that the state that occurs after interaction is "Pareto superior" to the condition that occurs before engagement. When none of the Pareto superior adjustments can be made, optimality according to Pareto has been reached. Household income enhancement strategies are some of the economic components that make up a social system that has universal consensus (Hummel, 2008). The only social system that can provide the maximum benefit for society is one that has that consensus. Pareto intimated that household welfare increases as the disaggregated incomes are enhanced for the benefits of the majority (Schumpeter, 1949). When households maximize utility, they purchase each pair of goods so that their marginal rate of substitution (MRS) is equal to the corresponding ratio of prices of commodities consumed by the household.

From the consumption perspective, increasing income of the household leads to higher purchasing power of the household, better choices and access to quality alternatives

(Kontesa *et al.*, 2020). In fact, an increase in household income (whether via the farm, non–farm, remittance or diversified channel) positively correlates with an increase in the consumption of goods and services consumed by households that ultimately translates into improved household welfare (Zhang *et al.*, 2017). The Pareto optimality theory links welfare to the disaggregated household income components by revealing that when income of the households increases, households acquire more goods and services from the market to the benefit of the household members as well as suppliers who earn higher income in return which in turn leads to reduced poverty and thus increase welfare for all. Most economists maintain that Pareto optimality economic outcomes are the best to be pursued to promote wellbeing (Pressman & Summerfield, 2000). And as such, income from the different sources of farm, non-farm, remittance and diversified sources increase lead to lower poverty, increased consumption expenditure as well as better human wellbeing. Overall welfare can be increased by redistributing income from one person to another since utility of any two individuals can be compared (Pressman & Summerfield, 2000).

However, the Pareto optimality theory is limited in its welfare applications because it has a number of shortfalls (Sen, 1985, 1987). According to Sen (1987), an outcome might be Pareto optimal while yet being catastrophic. For instance, a scenario in which a few number of people have a great deal of wealth while the rest of the population goes hungry would be considered Pareto optimal due to the fact that the situation cannot be remedied without taking income from those with great wealth and lowering their utility. Even if some assets have to be taken from the really wealthy, whose utilities are not directly comparable, the total wellbeing can be improved by making additional assets available to persons who would otherwise starve. This serves to improve the general quality of life.

2.4.2 Social Choice Theory

The theory is attributed to the works of an Indian economists, Amartya Sen in 1986 who improved the propositions of Arrow's impossibility theorem. According to Pressman & Summerfield (2000), human wellbeing among other things encompasses additional consumption such that an increase in consumption reflects higher welfare. Thus, policies that enhance household income, indirectly result into increased welfare of the household (Pressman & Summerfield, 2000). To Sen (1991), welfare analysis means ascertaining the empirical relationship of how income affects wellbeing. Sen postulated a connection between income and welfare in his social choice theory. Specifically, the theory proposes that an increase in income for families and individuals improves the utility and wellbeing of those individuals and households (Arrow, 1999; Atkinson, 1999).

According to Sen's observations, people consciously organize themself into households and families, and as a result, their well-being is influenced by the family's overall income (Pressman & Summerfield, 2000). Sen also stated that families and homes are a reflection of the individuals living in them. Therefore, welfare increases with an increase in the income of the household but, the manner in which this revenue is distributed among the members of the household will influence the welfare that can be achieved by each individual member of the household. According to Sen (1990), the result of the distribution may not be ideal anytime a single family member controls the majority of the resources and/or controls how the resources are divided among the family members. In addition to this, the welfare of the household is strongly impacted by any change in the income level. In addition to this, without money, households are unable to purchase consumable goods, which has a negative impact on their overall welfare (Sen, 1981).

Families are forced to make judgments on a consistent basis regarding how to make the most of the limited income at their disposal. One of the most significant choices to make is how to distribute the money among the members of the household. Such choices aren't usually that important for wealthy families, but for low-income families, they might literally mean the difference between life and death. Members of the family who did not receive a suitable amount of food would perish, just as members of the family who did not receive an adequate amount of medical attention when they become ill may perish. According to Sen's assessment, a significant number of individuals lost their lives in Bengal in 1943 as a direct result of a decrease in their earnings, which left them unable to purchase food. In a similar manner, during the Irish famine that occurred in the 1840s and the Ethiopian famine that occurred in 1973, food flowed out of the famine zones since income and demand were too low there, which ultimately led to a decline in the standard of living for families (Dreze & Sen, 1989). Sen theorized that wage income enhances the household welfare to the extent that this income is used to acquire more commodities from the market while remittance income in form of charity were meant to keep the poor from starving to death and by default improve their welfare (Pressman & Summerfield, 2000).

Welfare rises when individuals have the ability to eat and read. In this respect, eating is valued because food is necessity to health and life while literacy is important because of the kind of individual (household) that one becomes when they are able to read (Pressman & Summerfield, 2000). The theory emphasized the creation of human potential to enhance greater wellbeing in households and society (Pressman & Summerfield, 2000). The theory was based on ethics and philosophical foundations of economic theory (Pressman & Summerfield, 2000) and focused on resource allocation as well as policy. An alternative that is selected from any given feasible set is the option

that is valued the most in terms of boosting welfare, according to the social choice theory, which may be described by an ordering of preferences among alternatives. (Arrow, 1999).

2.4.3 Livelihood Portfolio Theory

Neubourg presented the Livelihood Portfolio theory in 2009. This theory states that because all families run the possibility of going broke at some time in the future, individuals and households maximize welfare when faced with restrictions. In other words, it is considered that families run the risk of not (any longer) being able to meet the demands of their members both now and in the future. According to the theory, households are rational, risk-averse, and utility maximizers, hence income diversification could be done to improve household welfare. Because resources are invested in several activities that aim to improve welfare, the theory's concepts also apply to households (Fraser *et al.*, 2005). According to Neubourg (2009), households should smooth their spending over time and lay aside some of their resources to pay for future consumption in order to avoid this risk materializing. According to the theory, households with a variety of income sources are better able to withstand shocks than those with fewer sources (Poshiwa *et al.*, 2013). Diversity in household income is crucial for welfare.

Additionally, households might look for alternate funding for the expenses if it becomes evident that their income is insufficient. When such efforts are successful, households can continue to live comfortably even when their income is insufficient (Neubourg, 2009). According to Chambers & Conway (1992), welfare consists of the skills, resources, and activities needed for a comfortable lifestyle. The capability of people to meet their requirements "tomorrow," despite risks and shocks, is reflected in their ability to smooth consumption, which is another crucial aspect of welfare. These

models take into account the household's various sources of income, particularly the on- and off-farm activities that are essential for maintaining household welfare (Maxwell & Devereux, 2001; Devereux *et al.,* 2004). The theory emphasizes how different coping and adaptation processes can help a household deal with stress and recover from shocks. As a result, a significant factor influencing the assets households have access to and the livelihood methods they are likely to adopt is the context in which they pursue their livelihood activities.

These methods place people's requirements for food within a broader range of needs that influence their behaviour as well as within a set of influences, opportunities, and limitations that go beyond a food first mentality. Such methods include farming operations, non-farming activities, passive income, and remittances. The activities play a significant role in the environment that determines the welfare of the households (Scoones, 1998). Beyond just income levels, the livelihood method offers a more solid framework for the investigation of households' consumer spending and poverty status (Chambers & Conway, 1992). Thus, it is thought that the potential for a livelihood-based analytical framework to produce better approaches to poverty and consumption expenditure is quite promising (Devereux et al., 2004).

Multiple asset combinations in rural household livelihood portfolios may indicate concerns for wellbeing (Fraser *et al.,* 2005). The theory demonstrates that households can generate more income by looking into a variety of other sources of income rather than relying solely on one activity (Poshiwa *et al.,* 2013). According to Iloh & Olewe (2018), households utilize their welfare pentagon to increase income, combat poverty, and manage their consumption. Additionally, in line with the theory (Hagen-Zanker *et al.,* 2009), receiving transfers, engaging in passive income activities, as well as farm income and non-farm activities, all increase household welfare.

2.5 Empirical Literature Review

This section entails findings of previous studies about the study variables; farm income, non-farm income, remittance income and diversified income in how they link to the dependent variable.

2.5.1 Farm Income and Household Welfare

The topic of agricultural income and the general wellbeing of households has been the subject of concern for numerous empirical studies. For example, a study on the impact of agricultural cooperative services on household wellbeing in Thailand was conducted by Seneerattanaprayul & Gan (2021) and used the Endogenous Switching Regression and Endogenous Switching Probit models. The survey administered to households in 2017 was used to acquire the data. The findings indicate that services provided by agricultural cooperatives play key roles in enhancing the well-being of households. Credit from agricultural cooperatives and marketing services provided by cooperatives had large, beneficial effects on the welfare of households and the income of farms.

Ma & Abdulai (2016) investigated the effect that off-farm income has on the amount of money spent by rural households on energy, giving particular attention to the costs of clean energies like electricity and gas as well as dirty energies like coal. The study investigated household survey data obtained from rural areas of the Chinese provinces of Gansu, Henan, and Shandong. Instrumental variable approaches were utilized to address endogeneity issues related to off-farm income, and the study employed data acquired from rural areas. The findings of the study indicate that revenue from sources other than farming is beneficial to the move toward renewable energy in rural areas. To be more specific, income from sources other than farming not only greatly raises the amount spent on electricity and gas, but it also lowers the amount spent on coal by rural households. Additionally, the study discovers that families in Shandong, whose

economy is far more developed than those in Henan and Gansu, are more affected by the energy transition impacts brought on by off-farm income. This is true since there are more middle- and upper-class citizens in Shandong.

Chang *et al.* (2012) demonstrates that the poor substitutability between family work and paid labor is not a fundamental factor in the divergence of home output and consumption by contrasting two distinct settings—one with and one without limits on off-farm employment. According to the findings of the study, the correctness of the separation hypothesis is demonstrated to be critically dependent on whether or not there are a restricted number of alternatives for employment away from the farm.

Mishra & Sandretto, who carried out a study in 2002, also looked at the stability of farm revenue and the function of non-farm income in American agriculture. Despite the fact that the percentage of agricultural families whose income is totally derived from farming represents a very small portion of all farm families, not all farmers with bad farm earnings had low household incomes. Nevertheless, there is a link between poor farm incomes and low household incomes.

In their 2017 study, Euler *et al.* examined the adoption of oil palm, household wellbeing, and dietary practices among Indonesian smallholder farmers. They found that introducing oil palms raised household standards of living and nutrition, and that the average effects on food and non-food expenditures, calorie consumption, and dietary quality were all substantial and beneficial. They also discovered that the average impacts on oil palm adoption increased the caloric intake and quality of diet. The absolute improvements in total spending and non-food spending, however, were greater for the wealthier households, suggesting that oil palm production may be a factor in rising inequality, which in turn affects household well-being.

The age of the household head has been taken into account in empirical welfare research, and the results show that, if age is not taken into account, it can have a significant impact on model outcomes. Nguyen *et al.* (2013) conducted one study that looked into rural to urban migration, household vulnerability, and welfare in Vietnam. During the study, panel data from 2200 rural Vietnamese families were used to cover the years 2007 through 2010, and a tracking survey with 299 migrants started in 2010. A probit model was used to analyze the effects of migration. The household head's age is substantially correlated with an increase in the likelihood of relocating for job, according to the results of applying difference-in-difference specifications with propensity score matching approaches.

Mohammed *et al.* (2018) looked at the circumstances in the urban region of Sokoto to study the connection between social capital and household welfare. 230 homes dispersed over 23 wards were given a structured questionnaire to complete in order to collect data for a cross-sectional study. The dataset was assessed using a robust logistic regression and a robust ordinary least squares regression. The results of this study showed that the members of a family's marital status did not significantly affect the welfare of the household in six of the seven models that included the variable, and it was only marginally significant. The study's conclusions indicate that a household's major breadwinner's marital status has no bearing on the standard of living in the Sokoto metropolitan area. By leveraging the enormous panel data from the Vietnam Access to Resources Household Surveys and the Matched Difference-in-Difference method, Thanh *et al.* (2019) accounted for household and other socio-economic characteristics in their analysis. They came to the conclusion that a number of variables, including marital status, education level, gender, and ethnicity, poverty status, land, household size, number of wage and self-employed workers, social capital, community

characteristics, and a few regional dummies, were statistically insignificant when it came to determining household welfare and accessibility to microcredit.

The consumption patterns of rural farming households in Isuikwuato, which is located in Abia State, Nigeria, were the focus of research conducted by (Obasi *et al.,* 2020). One hundred agricultural households were interviewed in order to acquire primary data. When selecting the respondents, a method involving many stages of random sampling was utilized. Following the collection of certain cross-sectional data on the socioeconomic features and other factors of farming households in the study region using standardized questionnaires, these households were visited every two weeks for the purpose of gathering additional data. The purpose of the visits every two weeks was to compile data on a set of variables concerning the households' total spending on consuming goods and services. Using frequency distributions and multiple regression analysis, the data were evaluated. The findings revealed that non-farm employment in the form of petty trading and services contributed significantly more income, both monetary and in-kind, to the households. The age of the farmers, their major occupation, their years of schooling, the size of their household, and the size of their farm were the characteristics that significantly impacted the income of the farming household. Credit availability was also a significant factor. In addition, the age of the head of the household, the educational level of the head of the household, the size of the household, and the net farm income were significant drivers of household consumption spending.

Additionally, Ikudayisi *et al.* (2019) explored the distributional impact of income among rural farm families in Nigeria by using a quantile regression technique to examine cross-sectional data. The study employed the ordinary least squares approach. The study's conclusions showed that, although to varying degrees, the number of people

residing in a household, asset ownership, farm size, access to extension services, and credit availability were the most important factors in determining income distribution among quintiles. Additionally, the study found that the variables that affect how farm households distribute their income are changeable, indicating that covariates are not consistent across quintiles.

Anang *et al.* (2020) study on the impact of participation in off-farm activities on income included a cross-section of maize farmers from Ghana's Tolon District as case study. In order to determine the characteristics that influence off-farm employment participation and to pinpoint the factors that influence farm income, the Heckman selection model was used in the study. Additionally, the propensity score matching method was used to assess how off-farm work affected farm earnings. The results show that a respondent's participation in off-farm work is influenced by their gender, age, number of years of formal education, farm size, and the number of dependents they have. On the other hand, a respondent's age, farm size, and access to financing all have an effect on their farm revenue. The data also revealed that individuals who worked outside of the farm were able to increase their yearly farm revenue by at least 1,702 Ghana cedis as a result of income diversification.

Asfaw *et al.* (2012) used propensity score matching techniques as part of their research on the factors that determine output and input market involvement. Their study sought to analyze the influence that market participation has on diversity as well as the welfare of households. Data from 333 households in Kenya were collected in a cross-sectional study. The empirical data demonstrated that judgments regarding involvement in input and output markets are significantly separate from one another. According to the findings of the study, household demographics, the size of farms, and ownership of radios all have a role in determining involvement in output markets, but participation

in input markets is determined by farm size, bicycle ownership, and access to salaried income. According to the findings of their research, the participation in the output market had a significant and beneficial impact on the diversity of pigeonpea, whereas the participation in the input market had a big and negative impact on diversity. The findings also show that those who participate in the output market had a much higher food security status than those who do not participate in the output market, while there was no significant impact identified between indices of household welfare and membership in the input market.

Kikulwe *et al*. (2014) conducted an investigation on the effects that mobile money technology has had on the economic well-being of smallholder agricultural households in Kenya via the remittances received pathway. This investigation made use of panel survey data and regression models. According to the findings of the study, remittances not only directly contribute to revenue but also assist decrease risk and liquidity limitations, which in turn promotes the commercialization of agriculture. The findings further show that mobile money may be able to assist in overcoming some of the significant smallholder market access barriers that impede rural development and contribute to reducing of poverty levels.

In order to evaluate the impact of the Integrated Household Extension Program (IHEP) on the wellbeing of participant households, Gebrehiwot & van der Veen (2015) performed a study. The researcher analyzed data from 730 agricultural households in Ethiopia's Tigray region from a household survey to determine the impact. Additionally, propensity score matching was a part of the research techniques. The extension program significantly improved household welfare, the study's data show, resulting in an increase in household income while having little impact on the income diversity. The study also found that household characteristics, such as the age of the

household head, gender, the availability of adult labor in the household, asset holdings, and social capital variables, were found to have an impact on income, investment, and the diversification of income in addition to the primary variable of interest (extension). This fact was found to be true. In a related study, *Boakye et al.* (2021) looked at how on-farm practices affect the welfare and way of life of rural smallholder farmers who live in poverty. Focus groups were used to conduct interviews with the study's participants. The study's conclusions state that the program's main advantages include an increased and alternative source of money, a better diet, and a source of employment. According to these findings, on-farm livelihood diversification initiatives are useful and appear to have the potential to help poor rural smallholder farmers achieve socioeconomic empowerment.

Verkaart *et al.* (2017) used three waves of panel data to investigate how consuming more chickpeas might affect living conditions in Ethiopia. This research employed a novel distance-weighted measure of a household's neighbors' access to improved seed and technology transfer activities, as well as a control function approach with correlated random effects to account for potential endogeneity resulting from access to improved seed and technology transfer activities. Each method was paired with a unique distance-weighted measure of how easily households in the area around had access to given superior seeds and technology transfer activities. The research concluded that increased chickpea consumption leads to substantial gains in household income and a reduction in poverty. According to the results of the study, everyone benefited from adopting the new technology except the largest landowners.

The results of a study on the factors influencing farm and non-farm income among farm households in Nigeria by Ibekwe *et al.* (2010) revealed that farm income accounted for greater percentage of the total income of farm households. This showed that the primary

source of income for farm households was farm income. Farm households with specialized businesses, including poultry and egg producers and growers of vegetables and melons, typically had higher average farm incomes and a higher proportion of their overall household income from farming.

In a research on farmer-led innovations and rural household welfare done by Tambo & Wünscher (2017): Evidence from Ghana: Using data from a household survey they had collected in northern Ghana, they performed endogenous switching regression and the maximum simulation likelihood technique. The information was gathered from residents of rural areas. The study's conclusions indicate that farmer-led innovations significantly improve household wellbeing through better household income and higher consumer spending per adult equivalent in the families. The results also showed that farmer-led innovation significantly reduces household food insecurity by increasing food consumption expenditures, reducing the severity of hunger, and reducing the duration of food shortages. With the exception of (Tambo & Wunscher, 2017), the existing body of research has not paid much attention to the standpoint of adding farm revenue. Despite the fact that they integrated company income with innovation, these authors only briefly mentioned it. As a result, their findings do not clearly depict the connection between farm income and household wellbeing.

In addition, Khan & Morrissey, (2020b) investigated household welfare and income diversification in Tanzania. They found that although many households prefer agricultural pay (income), it is not linked to rising household spending, which serves as a proxy for household welfare. This discovery justifies conducting more research on the subject. Asfaw *et al.* (2019) used household panel survey data from small households in Niger, Zambia, and Malawi as some of the three sub-Saharan African countries to conduct a study on the heterogeneous effect of livelihood diversification

on household welfare across-country evidence from sub-Saharan Africa. The results of the quantile treatment effects analysis of the data showed that the impact of crop The findings, however, indicated that the impact of crop and income diversification on household welfare, and even more so on household income, varies among nations and diversification tactics. However, there are still many unanswered questions regarding the situation in Uganda, which is also one of the nations in sub-Saharan Africa that uses farm income diversification to improve household welfare. In addition, Akaakohol & Aye (2014) looked into the welfare of farm households and the topic of diversification in Nigeria using survey data that was examined using conventional least square techniques. Their findings suggested that farm activity diversification is positively correlated with household welfare, indicating that farmers who raise multiple crops have multiple income streams and are better able to meet the consumption needs of their households (both food and non-food needs).

Wambua *et al.* (2020) conducted a study that analyzed data from 1,160 smallholder farmers. These farmers were either participants or non-participants in 23 regional initiatives that were spread throughout five East African nations: Burundi, Kenya, Rwanda, Tanzania, and Uganda. Wambua's study found that the majority of participants were from Kenya, while the non-participants were primarily from Uganda. The analysis of propensity score matching was used to figure out how much difference there is between the net benefits received by farm participants and those received by non-participants. According to the propensity ratings, participants had greater overall crop and livestock productivity, improved household income, and access to biofortified foods than non-participants did.

Using panel data from 1,160 smallholder farmers in Burundi, Kenya, Rwanda, Tanzania, and Uganda, Nyikahadzoi *et al.* (2019) investigated whether or not study

participants on the farms reaped more advantages than those who did not take part in the study. Participants benefited from increased availability of biofortified foods, higher family incomes, better soil and water management, and enhanced agricultural and animal output as a whole, according to the results. These advantages were unavailable to those who did not take part in the study.

Tesfaye & Tirivayi (2020), utilizing panel survey data from rural Uganda and the instrumental variables technique to control the heterogeneity and reserve causality, have examined diversification, farm household wellbeing, and consumption smoothening. Data from a panel survey conducted in rural Uganda was used for this. The results show that crop diversity is a way for improving wellbeing that changes the pattern of consumption and raises the average diet of households. A better diet overall is a result of this tactic. In a similar vein, the results of the quintile regression model showed that crop diversification gives poor families in the bottom quintile of the consumption distribution a significant consumption advantage over wealthy households with more evenly distributed consumption. Contrastingly, wealthy households have relatively spread consumption. The research continues by asserting that diversifying crops on farms encourages consumption smoothing by reducing a family's reliance on inadequate risk-coping strategies like forced dietary changes. One of the primary points the study raises is this. The results of the study indicate that adopting a more diverse cropping system will fundamentally transform agricultural practices and be one of the most significant strategies to improve the nutritional status of rural households' meals.

Tesfaye & Tirivayi's paper (Tesfaye & Tirivayi, 2020) raises some interesting questions concerning crop diversification and household welfare, but it neglects to mention the revenue generated from crop sales, which is an important factor in promoting transactions through regulating household spending patterns. This study also does not

include the revenue from agricultural sales, which is crucial for facilitating transactions by regulating household consumption patterns. Additionally, the study withholds information about the percentage of money that was saved from the total amount of money made through the sale of crops (farm earnings). The spending habits of homes are often disrupted by this omission, which has an effect on the welfare of households.

Additionally, Lekobane & Seleka (2016) used regression analysis to investigate the variables that affect household welfare and poverty in Botswana. To gather the relevant information, the 2009/2010 Botswana Core Welfare Indicator Survey as well as the 2002/2003 Household Income and Expenditure Survey were consulted. They discovered that among the most crucial elements in determining whether a household was wealthy or poor were the level of education and employment of the head of the home. According to the calculated coefficients for household head age, welfare rises at a decreasing rate as head age rises, reaches a maximum, and then declines as head age grows. This tendency persists till the household head is getting older.

Furthermore, Awotide *et al.* (2016) evaluated the variables of adoption intensity of improved rice varieties (IRVs) and the impact of market participation on farmers' welfare in Nigeria using the Tobit and Heckman two-stage models. Each of these two models consists of four steps. Six hundred rice farmers from the three rice-producing states in Nigeria were included in the cross-sectional survey. The farmers were selected at random. The study found that the chance of a farmer participating in the market increased with the gender of the household head, access to superior seed, years of formal education, and average rice yield. The study also revealed that farmers' prospects for participating in the rice production markets are directly related to the degree to which their economic conditions improve. This was further supported by the findings. The study found that the adoption rate of improved rice varieties was lower among

households headed by people aged 60 and up. This was due to the negative association between the age of the household head and market involvement, which rose with the age of the household head.

2.5.2 Non-Farm Income and Household Welfare

Several empirical research have been conducted in the domains of non-farm income activities and household welfare, and many of these studies have demonstrated a positive link between the two variables. For example, in a study that was conducted in Croatia by Möllers & Buchenrieder (2011) on rural non-farm work based on data collected from farm households, they discovered that it improved income diversity while reduced inequality among family farms that were undergoing transition. The authors discovered that agricultural revenue tended to serve as a lever when compared to other indicators of rural welfare such as total household income. This meant that even the smallest and poorest farms were dependent on farm income yet were still able to maintain their livelihoods. Also, prosperous farms are just approximately half the size of average farms, but they provide a greater income per hectare. Rural Non-Farm Enterprise (RNFE) is important for rural economic development in three distinct ways, according to an analysis: it is the primary source of income for farms in the middle class; it lifts households out of poverty; and research indicates that it plays a vital role in curbing income inequality in rural regions. All of these factors contribute to the fact that RNFE is important for rural economic development. The impact of non-farm income on poverty and income disparity among farmers was examined by Mat *et al.* (2012). They obtained their data from surveys conducted in rural Kedah. Based on the research, it was concluded that non-farm income households might either make poverty levels worse or better.

Tran (2015) utilized logistic regression and propensity score matching analysis to investigate the factors that motivate ethnic minorities in Vietnam's Northwest Mountains to seek nonfarm employment and the impact of this labor on household income. Non-farm employment's effect on family finances was also studied. The findings indicated that paved roads greatly enhance the likelihood of households engaging in non-farm self-employment, whereas education and the proximity to enterprises or trade villages significantly increase the likelihood of households engaging in wage work. Income per person in homes where at least one member works outside the home was also shown to be greater in the study. It didn't matter if the non-farm activity was for pay or not, the result was the same.

In addition, Hwang & Lee (2015) conducted an ex-post review of the results of the Rural Traditional Theme Village Program (RTTVP), which had been run by the Rural Development Administration (RDA), a central government entity in South Korea. The study used an ex-post metric to evaluate the program's effect on the non-farm income of agricultural households. This metric was used throughout the course of the study's analysis. Cross-sectionally and longitudinally, the results demonstrate that the Program was well-liked and appreciated by its participants. Non-farm revenue generation would have been challenging for the farms without the program, the study concluded, due to a lack of internal competition and a drain on human resources.

In a study to examine the welfare consequences of non-farm entrepreneurship in rural Vietnam, Hoang *et al.* (2019) employed a quasi-experimental technique utilizing a propensity score matching function. The farming villages in Vietnam were the study's main area of interest. The study's conclusions indicated that nonfarm entrepreneurial activity is advantageous to a community's welfare, at least in terms of how much money is spent and made per person. Furthermore, empirical statistics showed that the impact

on per-capita food spending ranged from 13.6% to 16.2% in nominal terms and from 14% to 17% in real terms. The survey also found that real per-capita income ranged from 19.4 percent to 26.5 percent, whereas nominal per-capita income ranged from 21 to 28 percent. Contrarily, non-farm entrepreneurship had a very small impact on wellbeing in terms of per-capita spending and per-capita durable assets.

Holden & Shiferaw's (2004) study examined how greater access to non-farm income affected household welfare, agricultural output, conservation investments, and the rate of soil erosion, which is a type of land degradation. The simulation's findings showed that lack of employment opportunities limits access to low-wage off-farm income. Households would have taken on more off-farm wage work than what was observed if there were more employment options available. The statistics also show that improving access to unrestricted low-wage non-farm income has a considerable and positive effect on household income. The overall agricultural productivity, including crop and livestock production, as well as the amount of farm inputs needed, decreases when employment opportunities in industries other than agriculture were more widely available. As a result, the need for food imports into the region increases. Even though the intensity of output is reduced, the incentives for farm households to invest in conservation were diminished when they had access to money from sources other than farming. As a result, overall soil erosion and the rate of land degradation increase.

Al-Amin & Hossain (2019) explored the effects of non-farm income on asset ownership of rural Bangladeshi households, which were primarily dependent on farming for their income. They achieved this by utilizing a multilevel mixed-effects linear regression model as the foundation of a two-stage econometric framework. They based their findings on information from the nationally representative Household Income Expenditure Survey (HIES), which was carried out in 2010. The results show that

household asset ownership was significantly and favorably impacted by income from sources other than farming. The results also demonstrate a decrease in the degree, depth, and severity of poverty as well as the risk of poverty at the division level and in rural Bangladesh when non-farm income was taken into account. The income gap between rural households also widened as a result of income from non-farm sources. Reardon *et al.* (2007) evaluated the evidence regarding the nature, importance, drivers, and effects of rural non-farm activity on farm households in developing countries. They illustrated the growing importance of rural non-agricultural enterprises, which generated up to 40% of the income in rural Latin American regions but only employed 25% of the people.

In rural Vietnam, Vu (2020) investigated the link between household income and education. Data from the 2018 Vietnam Household Living Standard Survey were used in the study. Mean and quantile regression analyses were both used in the study to examine the effect of education. The researchers found that education had a favorable effect on household income after tweaking the models to take into account a variety of parameters. They continued by stating that their quantile regression analysis showed that the effect of schooling years increased with quantiles, suggesting that education had a greater financial benefit for households with higher incomes. They also found that households with heads who had higher levels of education or occupational training tended to have higher income levels overall. This study was released in the same way that Dhanaraj *et al.* (2017) study, "from Income to Household Welfare: Lessons from Refrigerator Ownership in India," was conducted. They found that the main obstacles to enhancing family wellbeing in India were the government's failure to guarantee reliable public amenities like a continuous energy supply and higher levels of female education. Additionally, they came to the conclusion that households with females who

had received more schooling had better welfare levels and were more likely to purchase refrigerators.

In a study conducted in South Africa, the authors of the article that was published in 2017 used data from the first four waves of the National Income Dynamic Study (NIDS) to identify the factors that influence poverty and household welfare in South Africa. This was accomplished by analyzing the data utilizing a robust alternative estimating method that takes into consideration unobserved individual heterogeneity and endogeneity in addition to fixed effects. This is in contrast to other studies that use probit/logit models and ordinary least squares to analyze cross-sectional data. When males are employed, when women are heads of homes, when both men and women are heads of households, in regions with low dependency ratios, when both men and women are heads of households in mixed households, their incomes are greater. In addition, the study indicated that rural areas, which were used as a reference group, have a lower probability of being poor. This suggests that the focus of efforts to alleviate poverty in South Africa should continue to be on rural areas, specifically the traditional rural areas.

Asmah (2011) examined how different indicators of Ghana's agricultural sector has changed over time and assessed their relative importance in influencing the diversification of rural livelihoods and household well-being. Data from the Ghana Living Standards Surveys conducted in 1991–1992 and 2005–2006 were combined using the endogenous switching regression approach. The findings revealed that households with greater diversity and those with less diversity differed significantly in terms of variables linked to household assets, markets, and institutions. The majority of household assets, including good health, education, and the age distribution of the household, have an impact on both judgments for rural non-farm diversification and household wellbeing.

In order to better understand the connection between the availability of food nutrients in families and the various forms of nonfarm labor, Tsiboe *et al.* (2016) performed research in northern Ghana. 5770 people in all, representing 3488 farming households, participated in the study, which used the linear regression with endogenous treatment effects model. The empirical results of the study revealed that the availability of food nutrients was positively influenced by non-farm labor and that farming households with non-farm companies had better nutrient availability and a higher degree of food security. The study's conclusions indicated that households that participated in the labor market in an effort to increase their income did not appear to have a higher level of food security than those that just engaged in farming activities. The study's results also revealed that women who worked in non-farm jobs made the biggest contribution to households' total access to food and nutrients. Additionally, in Ghana's Upper East and Upper West Regions, Osarfo *et al.* (2016) assessed the impact that engagement in non-agricultural activities had on household income and food security among agricultural households. Both the Recommended Daily Calorie Required (RDCR) approach and the Propensity score Matching (PSM) function were used throughout the investigation. A significant percentage of households in each of the two regions, according to the study's findings, were at risk of being hungry. The results showed that non-farm work appeared to have a significant and positive impact on household income as well as their level of food security.

Kowalski *et al.* (2016) looked into how non-farm enterprises (NFE) contribute to the emergence of seasonal income, the averaging out of consumption, and the risk reduction. The Ethiopia Socioeconomic Survey (ESS)'s initial wave provided the data for this study. The study's conclusions indicated that natural food businesses cycle with agriculture. The study found that the harvest season and agricultural sales correspond

with the most profitable months for operating a natural food business. The study's findings show that households that take part in NFEs are not more adept at reducing the frequency or duration of food insecurity in the face of shocks. This shows that NFEs do not offer risk mitigation to households that are time-sensitive. Anang (2017) investigated the determinants influencing engagement in non-farm labor and the impact of participation on farmers' productivity using survey data from 300 smallholder farm households in northern Ghana. Anang (2017) looked at the elements that affect non-farm work involvement and how it affects farmers' production in a related study. Models for treatment effects and endogenous switching regression were both used in the study. According to the study's findings, the location of the farm, whether or not cattle are owned, the head of household's gender, the number of years spent in formal education, and the dependence ratio were the most crucial variables in influencing participation in off-farm activities. Gender, the number of years spent in formal education, farm size, location, access to credit, and the level of specialization in rice cultivation were all factors that affected productivity. The results also showed a positive and statistically significant impact of non-farm employment on agricultural output.

Using the propensity score matching (PSM) method, Ampaw *et al.* (2017) assessed the impact of farm-nonfarm diversification (FND) on household income and food expenditure in urban Ghana. The empirical data showed that, in terms of the characteristics of the households, diversified homes presented statistically distinct differences from undiversified homes. Age, gender, the family head's educational attainment, household size, the possession of livestock and agricultural land, and the receipt of miscellaneous and rent income were all positive and significant factors that affected FND in urban Ghana. Participation in both agricultural and non-agricultural activities was found to have a positive and significant impact on household income and

food spending. Additionally, Neglo *et al.* (2021) looked into what characteristics influence engagement in non-farm activities and how this affects the household's income. In the study, 3866 distinct homes contributed a three-wave survey data set, which was then evaluated using the Heckman two-step approach. Crop failures, inadequate food intake, household consumption expenditures, gender, family size, literacy, health status, ownership of farm animals, access to credit, total hired labor, cooperative membership, and agricultural extension services were among the factors that affect household participation in non-farm work, according to the study's findings. Services for agricultural extension were discovered to be important. Additional research revealed a decline in the likelihood of older households, who frequently depended on subsistence farming, engaging in alternative non-agrarian activities.

Biyase & Zwane (2018) conducted research on the causes of poverty and household well-being in South Africa using data from the first four waves of the national income dynamic research. The authors of this study choose to use a robust alternative estimating strategy that accounts for fixed effects as well as unobserved individual variability and endogeneity. This is in contrast to other research that analyze cross-sectional data using probit/logit models and ordinary least squares. The income was shown to be higher when males were employed, when women were the heads of homes, when both men and women were heads of households, and in mixed households. This was true in areas with low dependence ratios, when men and women both headed homes, when males were employed, when women headed households, and when households were made up of both men and women. The study also found that the likelihood of poverty was lower in rural areas, which were utilized as the reference group. This means that attempts to reduce poverty in South Africa should keep a particular focus on traditional rural communities in the country's rural districts.

In rural Malawi, Adjognon *et al.* (2017) investigated the relationship between wage and self-employment in rural areas and household welfare. They achieved this by using analytical techniques for panel data. The study's findings regarding the average treatment effects as well as the distributional impacts were examined in relation to indicators of participants' well-being, such as households' per capita consumption expenditures. The study's main objective was to assess how non-farm activities affected the utilization of agricultural inputs. This was done because one way that non-farm employment could boost the welfare of rural households was through the usage of agricultural inputs. The computations were performed using the linked random effects estimate approach as well as the fixed effects estimate approach. The study's conclusions indicated that non-farm wage job and non-farm self-employment were both advantageous to social welfare and decreased levels of poverty. However, compared to the wealthiest households, households at the lower end of the wealth distribution benefited from participation much less.

Researchers have made an effort to take into account the impact of the primary breadwinner's educational attainment in many welfare-related studies. For instance, Wossen *et al.* (2017) examined how access to extension services and membership in a cooperative influenced the rate of technological adoption, asset ownership, and poverty levels in rural Nigeria using data collected at the household level. They discovered that having access to extension services and belonging to a cooperative both had a favorable and statistically significant impact on the adoption of new technologies and on household welfare through the use of a variety of matching strategies and an endogenous switching regression approach. Furthermore, they found that education had a favorable and statistically significant correlation, demonstrating that educated

households were more likely to join cooperatives and improve their welfare. This result raises the possibility that cooperatives and education may be related in some way.

Using information from the first four waves of the National Income Dynamic Study and an appropriate poverty level, Biyase & Zwane (2018) investigated the determinants that predict poverty and household welfare in South Africa. The Social Indicators Research journal published their research. In the study, endogeneity and unobserved individual heterogeneity were taken into account using the probit and logit models on cross-sectional data. Both a fixed effect and a reliable alternative based on random effect probit estimation were utilized with these models. The results of both fixed effect and random effect probit showed that the head of the household's race, gender, education level, dependency ratio, employment status, and marital status were statistically significant predictors of household welfare. Other factors that were significant included the head of the household's race and some province dummies. The study also found that the risk of a household being impoverished is decreased the more education the head of the home has.

There have been a lot of studies on the regulation of wellbeing for marital status to avoid fitted model results being skewed. For instance, Aelst & Holvoet (2016) looked into how Tanzanian farmers' marital status and gender affect the adaptive strategies they use. The study compared how single, married, divorced, and widowed men and women adopted various adaptive methods. Focus group discussions were used in the study, and the results of the questionnaire were examined using logistic regression. They came to the conclusion that a man's marriage status was a less relevant factor in this regard, whereas a woman's marital status was a crucial aspect in determining the adaptive methods open to her. The study's findings also suggested that widows and female divorcees are less competitive than other women in the field of agricultural

water management, and that divorced women take on proportionately more jobs that earn money outside of agriculture, which has an effect on their welfare. In a similar line, Dogra & Gorbachev (2015) looked into household wellbeing, liquidity constraints, and consumption volatility. They made sure to take into account any changes in a person's marital status as well as any adjustments to the total number of adults and children residing in the household. The study's findings showed that changes in marital status had a significant impact on how unpredictable a household's spending and income were, both positively and negatively.

Additionally, it was discovered that there was a notable decrease in poverty in a study that examined the welfare impact of farm households adopting improved cassava varieties in Southwest (SW) Nigeria using poverty as an indicator. The study made use of information gathered at the farm household level from a cross-sectional sample of 312 cassava-producing families that were chosen at random. The study used both descriptive and inferential statistical methods, including the Foster, Greer, and Thorbecke (FGT) poverty measure and the Logit regression model. The study's conclusions indicate that a number of socioeconomic factors played a significant role in the farmers' choice to plant enhanced cassava varieties. The farmers' marital status, the length of time they had been farming, the availability of improved cassava cuttings in the hamlet, and their access to the radio were among these variables. Additionally, the data showed that the participants' marital status had a positive coefficient that significantly influenced their choice to adopt superior cassava varieties in the study location. Afolami *et al.* (2015) concluded that married farmers were more likely to adopt children than were unmarried farmers since the estimated coefficient of marital status had a positive sign and was significant.

Relatedly, Kinuthia *et al.* (2018) analyzed non-farm activities in Uganda and Tanzania and their effects on both agricultural production and farmers' well-being. The Living Standards Measurement Study–Integrated Surveys datasets were used for the two countries for the period 2008 – 2012, combining household and agricultural datasets. The results showed that factors such as gender, education levels, marital status, and the price of inputs influence non-farm activities in each country. In light of this, it was concluded that even when gender is controlled for, non-farm activities have no effect on agriculture production in both countries. Matsumoto *et al.* (2006) investigated the role of non-farm employment in reducing poverty using panel data from 894 rural Ugandan families in 2003 and 2005. Utilizing the rare non-farm labor supply and income data, they investigated how households respond to adverse agricultural shocks, particularly through off-farm labor supply and income to minimize crop revenue loss. They discovered that the flexibility of labor time allocation varied among non-farm occupations and that only low-skilled, low-paying positions were generally employed to counteract negative shocks, particularly for those with few assets.

There was a strong positive correlation between non-farm income share and total household income when Barrett reviewed the available data in Africa. Non-farm income levels appear to be more closely linked to total income than previously understood Matsumoto *et al.* (2006). The welfare of the households seems to be directly connected to nonfarm incomes in Uganda. Khan & Morrissey (2020a) studied income diversification among Ugandan households over a two-decade period of continuous economic growth and poverty reduction by examining the six waves of national household surveys in Uganda, beginning in 1992/3 and ending in 2012/13. Most of the income that is derived from these sources came from farming, farm work, self-employment, wage employment, and remittances. They discovered that households

with more diverse income sources tend to have lower consumption welfare, indicating the majority of their diversification was caused by the need for income.

Additionally, it was found that adult equivalent expenditure on welfare was greater for those families whose members were in the non-agricultural wage sector, but only a very small increase in wage employment was observed. Although technological change and profound changes in the nature of agricultural production were largely to thank for the recent growth in agricultural income, several other factors contributed to that growth as well, such as good fortune, peace, and an improvement in food market efficiency (Hill & Mejia-Mantilla, 2019). The authors also studied the causes of this change using data from a nationally representative sample of 2,356 Ugandan households who had visited the site four times over a five-year period between 2005/6 and 2011/12. In their research, Hill & Mejia-Mantilla (2019) found that increased agricultural incomes were especially prevalent among the poor. Progress in reducing poverty were to be slow and increasing spatial inequality were to persist in Uganda without fundamental changes in agricultural production.

Kazungu & Guuroh (2014) conducted a desk review that looked at several government policies and the national development strategy. They looked at related case studies, books, and previous publications. They found that non-farm rural activities, like owning a small farm or running a store, support farm families that would otherwise experience significant income inequality and rural-urban migration. A growing rural labour force would be absorbed by the rural non-farm sector, which would have a positive impact on national income growth, and increasing equity in the distribution of income would be promoted. According to studies, a greater percentage of Uganda's workforce is employed in sectors other than agriculture, and this non-farm industry can help the agriculture sector.

By using panel data on 894 rural Ugandan families from 2003 to 2005, researchers Kijima *et al.* (2008) studied the influence of non-farm work in the decrease of poverty. The findings revealed that job flexibility varies by job type and that, particularly for those who are financially insecure, only the lowest-skilled and lowest-paying positions have a tendency to be used to deal with setbacks. The study examined how households react to adverse agricultural shocks, specifically by determining how households supplement their incomes with outside work and non-farm labour supply to lessen the financial effects of agriculture sector challenges. It did this by using unique non-farm labor supply and income data. In order to mobilize the resources required for profitable investment and to reduce the unpredictability of consumption, access to financial services is essential for economic development. Sekabira & Qaim (2017) found that non-farm activities raised household welfare in another study. In Uganda, they looked at off-farm revenue, agricultural marketing, and mobile money. The research was based on panel data from smallholder coffee growers in Uganda. Off-farm income gains were suggested as a crucial source of revenue in addition to remittances. Small businesses engaged in trade, transportation, and handicrafts were typical non-farm sources of income, and mobile money offered them special options for savings and money transfers.

In order to provide evidence on the various welfare effects of rural income portfolios in eastern Uganda, Kakungulu *et al.* (2021) undertook a study. The study's secondary data sources included two rounds of the quantitative Uganda National Household Survey. The study used quantile regressions, fixed effects, and random effects to estimate average and heterogeneous effects. By diversifying sources of income and making money from sources other than farming, the study's findings suggest that household income can be increased. The study's conclusions also showed that income

diversification works best to reduce risk when there is a high degree of diversification and a low amount of income. However, the production of non-farm income increases risk at greater levels of non-farm income while decreasing it at lower ones.

2.5.3 Remittance Income and Household Welfare

There have been many investigations carried out in the field of remittance income and household welfare, and the results of many of these investigations point to the existence of a positive connection between the two factors. For instance, Cuong & Linh (2018) examined the pattern and impacts of migration and remittances on household wellbeing in Vietnam using panel data from the Vietnam Household Living Standard Surveys (VHLSS) in 2010 and 2012. They discovered that household wellbeing is positively impacted by migration and remittances. They came to the conclusion that there was little difference in the employment of family members who stayed behind due to emigration and money sent home. They also discovered that people who lived in houses with remittances and migration tended to work less hours per week than those who lived in other households. It should be noted that remittances account for the majority of the impact of migration on household wellbeing. Therefore, when migrants do not remit money to their households, there are no effects of migration on the welfare of such households.

In the study done by Javed *et al.* (2015), they employed a household survey to assess migrant characteristics, transaction costs, and funding sources. They wanted to know how the benefits accrued at the household level were influenced by the costs incurred financially and the time spent relocating. In their study, information on 400 houses' demographic characteristics, the migration process, and the amount of remittances received and distributed was gathered via questionnaires and interviews. In addition, a qualitative element was added to the research questionnaire for this study. This was

achieved via conversing with respondents and getting their opinions on themes including migrating, receiving remittances, benefits, and other issues that fall under the same broad heading. The researchers discovered that migration is connected to several advantageous outcomes using a technique called Propensity Score Matching (PSM). These results were assessed in terms of total spending, food spending, non-food spending, clothing spending, pots and pans spending, automotive spending, and saving percentages. Another study looked at the short- and long-term implications of an increase in remittances on salary levels, employment rates, and welfare levels in metropolitan areas, as well as the economic impact of migrant workers' remittances on the locations in which they found laborers to work. According to Li & Wang (2015) research, an increase in remittances results in a short-term decline in the informal sector's output and a rise in urban residents' welfare, but over the long run, the informal sector's output rises and urban residents' welfare rises.

Abbas *et al.* (2014) examined the impact that remittances have on both the welfare of households and the severity of their poverty in their study carried out in Tehsil Hazari, Pakistan. The level of household welfare was assessed using the expenditures of households as a proxy variable. The main sources of the information gathered were the nine union councils that make up Tehsil 18 Hazari. There were 280 households in the sample as a whole, 140 of which had moved while the other 140 remained put. They used OLS and the logit model and found that factors including the household head's education, the total number of animals, monthly income, and foreign remittances all contributed to the family's welfare. On the other side, the number of dependents per person, marital status, and house size all had a detrimental effect on the welfare of the family. Bahadir *et al.* (2018) compared the dynamic absorption of remittances at the macroeconomic level and found that the remittances' impacts on economic activity vary

depending on whether they go to cash-strapped wage workers or credit-constrained businesses. That is to say, the effect on economic activity varies with the recipient organization. Data from the FIES (Family Income and Expenditure Survey) was used for the analysis. Using a model of an open economy with diverse families, they determined that remittances had a contractionary effect if they go to the first group but an expansionary effect if they go to the second. They reasoned that if remittances are skewed in favor of businesses, then everyone benefits.

Jimenez & Brown (2012) evaluated the extent to which migrants' commitments to provide social safety for their family in their home countries inspire them to send money back home in the form of remittances. The research utilized data from a customized household survey conducted in Fiji. They incorporated household-specific subjective welfare evaluations into the model of private transfers they used, which was a mixed motives model. They discovered further data to support the idea that remittances were an important kind of social protection for the most vulnerable people. They also discovered a positive, but smaller, association for those who were above the poverty line. This indicated that there was a switching of motivations whenever the household's welfare reached a level that is judged adequate. They came to the conclusion that improvements in welfare in countries that are sending migrants could either boost or decrease remittance flows depending on the levels of welfare that existed prior to the transfer and other intervening circumstances.

Thapa & Acharya (2017) examined how remittances affect household spending patterns by employing propensity score matching approaches. By using these measures, not only is selection bias mitigated, but also observational data may be generated and analyzed. The 2010–2011 Nepal Living Standards Survey (NLSS) data served as the basis for their conclusions. They discovered that families that get remittances spend more money

on consumption, healthcare, and education than those who do not. In contrast to those who did not receive remittances, those who did spent more money on non-food investment categories such durable goods, health, and education. This suggests that families that receive remittances may benefit from them in the long run. In addition, Cuadros-Menaca *et al.* (2020) looked into how youth in the Santiago de Cali metropolitan area of Colombia, aged 12 to 18, were affected by abroad remittances on their work and school participation. The participants in this study were from Colombia. They used a method called Propensity Score Matching (PSM), which led them to the conclusion that children living in households that receive remittances had a lower likelihood of engaging in market labour. On the other hand, there was no evidence to support the idea that foreign remittances have an effect on school attendance. They came to the conclusion that income from remittances improved the welfare of children who were left behind, hence reducing the amount of time those youngsters spent working in the market.

Kumar (2019) used primary data obtained from 360 houses in the Cumilla district of Bangladesh to assess the effect of foreign remittances on poverty and welfare. One-way analysis of variance was used to examine the impact of remittances on household welfare using the Foster-Greer-Thorbecke (FGT) index. The results of the study indicate that households that received remittances experienced significantly less severe poverty than those that did not. The study found that the percentage of households in poverty was 48% lower among those who received remittances compared to those who did not. The survey also found that families who receive remittances spent an average of three times more per person than non-remitting families on consumer goods and services. As a result, homes who get remittances have better welfare, and the researchers came to the conclusion that remittances significantly affect household

welfare. In Toba Tek Singh, Pakistan, Awan *et al.* (2015) examined the advantages and disadvantages of international migration from the perspective of the household level. To assess the transaction costs associated with remittance transfers and the funding sources for international migration, they combined a household survey with a propensity score matching exercise. This was done in order to find out more information. According to the findings of the study, policy options such as establishing technical training institutions to assist workers in upgrading their skills, information campaigns on the migration process and opportunities available, setting up institutions to provide loans for potential migrants, reducing the costs of money transfer through formal channels, and building awareness of the Pakistan remittance initiative are all necessary in order to facilitate migration and the transfer of remittances, which was found to be one of the most important factors in determining whether or not migrants will leave their home countries.

Additionally, Ahmad & Sadaqat (2016) used data from Pakistan to look into the connection between social capital and household welfare. A logit model was used to examine the relationship between social capital and the chance of poverty. The study that looked at the connection between social capital and household wellbeing used a social capital measure and a heterogeneity index. The study made use of data collected from 1,050 distinct families in and around the cities of Quetta, Lahore, and Karachi. The study's findings revealed, among other things, that the characteristics of the head of the household and the demography of the family had a big impact on the wellbeing of the family. The wellbeing of the home was consistently seen to be significantly and favorably impacted by the head of the household's higher degree of education.

The influence of demographic variables on the utilization of official and informal credit among rural families in China's Fujian Province was investigated by Lin & Zhu (2019).

The goal of this research was to ascertain if rural farmers in the study area are harmed economically due to a lack of access to financing. The authors utilize a probit regression and an endogenous switching regression model to examine data collected from 960 farm families in 2017. The study concluded that access to formal finance is influenced by demographic variables such as age, income level, family composition, and farm size. The study also found that the level of education had a substantial impact on rural household borrowing from informal sources, which in turn affected the standard of living and consumption of rural farmers in Fujian.

Evans & Kelikume (2018) looked into how terrorism and militancy impact trade, aid, remittances, tourism, and foreign direct investment (FDI). Between 1980 and 2016, they did research on Nigeria utilizing the Cobb-Douglas production function and the autoregressive distributed lag (ARDL) bounds testing method. Their case study covered the years 1980 through 2016. They arrived to the conclusion that, despite the prevalence of terrorism and militancy, foreign direct investment (FDI), business, aid, remittances, and tourism all had sizable positive effects on wellbeing in the short term. Their analysis found that only foreign aid and remittances had a significant long-term influence, while foreign commerce, tourism, and direct investment had little to no effect. They also found that acts of terrorism and militantism, whether short-term and long-term, have a significant negative impact on people's level of living.

Additionally, (Akanle & Adesina, 2017) used primary and secondary sources of data to assess the effect that remittances have on the financial security of Nigerian households. Several research methodologies were used to perform the study in 2015 and 2016. Due to the respect that is gained from the community before receiving remittances, the researchers came to the conclusion that remittances have a positive impact on household wellbeing that extends beyond the impact of consumer expenditures.

Similarly, Kangmennaang *et al.* (2017) used data from a sample of 1,000 rural families in Northern and Central Malawi acquired using face-to-face structured questionnaires to investigate the effect of migration and remittances on food security and asset wealth. The research set out to learn if and how food security and wealth in rural areas are impacted by migration and remittances. The Home Food Insecurity Access Scale (HFIAS) was used to determine each household's level of food insecurity. The results showed that households with migrants were less likely to be food insecure and that their average treatment impact was positive, indicating that migrants had a positive effect on the growth of their households' assets. These findings point to a beneficial effect on the growth of family wealth. They also discovered that the impacts of migration and receiving remittances were equal on household wellbeing, while the former was more important for food security than the latter. Ajaero *et al.* (2017) looked at the connections between international migration, remittances, and household wellbeing in Nigeria utilizing consumer and durable assets as welfare indicators. The purpose of this was to examine the possible relationship between the three factors. Descriptive statistics, ordinary least square, and probit regressions were analyzed using data from the World Bank Migration Survey in 2009. The bulk of migrants, per the study's findings, were male students who had finished their elementary school and were, on average, 30 years old when they left their home countries. In addition, the vast majority of migrants were single. They also found that the main determinants of whether or not households got remittances were the head of household's age, the head of household's residency region, the place of residence, and the head of household's employment status. The researchers also discovered that the percentage of households in the fourth welfare quintile that received remittances was higher than the percentage of those in the same quintile who did not. The percentage of non-migrant households in the same quintile, on the other

hand, was higher than the percentage of migrant homes. The results of this study also demonstrated that getting remittances and having an immigrant from abroad both considerably improve household welfare in Nigeria. The study also discovered that other factors, such as the head of family's age, the size of the household, the area in which they lived, their level of education, and whether or not they lived in an urban or rural area, had a substantial impact on household welfare.

Using panel data from 846 rural households, Munyegera & Matsumoto (2016) did a similar analysis of the effect of mobile money remittances on household wellbeing. Using a combination of household fixed effects, instrumental variable, and propensity score matching methods, they discovered that access to mobile money had a positive and statistically significant influence on household well-being, as assessed by real per capita spending.

Frempong & Stadelmann (2017) examined the question of whether or not an educated female had a direct bargaining effect on the wellbeing of her home using data collected at the individual level in Ghana and Uganda. According to the results of this research, a crucial factor in determining the standard of living within a home is the amount of education attained by both the wife and her husband. On the other hand, the education level of the wife did not have an impact that was greater than that of her husband, and the relative bargaining position of the wife had, at most, a minimal impact on the welfare of the family. Additional robustness analysis was carried out, the results of which essentially confirmed the findings of the study.

The fourth round of the Ethiopian Rural Household Survey was done in 2009, and Bocher *et al.* (2017) used this information to shed light on the ways in which different household variables impact the decision to take out credit and the efficiency with which

it is utilized. This was done to better understand the factors that influence a family's decision to utilize credit as well as the impact that credit has on the family's financial situation. Endogeneity in loan availability and self-selection bias in credit utilization were modeled using an endogenous Regime Switching framework in this study. In doing so, were able to more precisely evaluate the results. They came to the conclusion that households that had access to credit spent more money on their consumption than those households that did not have access to credit. Access to credit led to an increase in total spending, even after self-selection bias was taken into account in the regression analysis using ordinary least squares. According to the findings of this study, participation in non-farm activities led to an increase in the demand for loans. The size of the household, the amount of land that is owned, and involvement in saving associations each raise the likelihood of obtaining credit which results in an improvement in the welfare of the household.

In addition to this, Mekonnen (2017) evaluated the impact of technology adoption on productivity and household welfare by using evidence collected at the micro-level in rural Ethiopia. Data acquired at the household level as part of the Ethiopian Rural Household Survey by IFPRI between the years 1989 and 2009 were utilized. The survey included responses from around 1500 rural families, distributed throughout four regions and 15 rural communities. In order to account for the selection bias that may have been present in households' decisions about the adoption of new technologies, an endogenous treatment effect model was utilized, and both single and multi-level treatment effect techniques were utilized. The findings of the study indicated that there was a beneficial and statistically significant effect of increased technological adoption on the crop yield and welfare of rural families in Ethiopia. The number of people living in a home, their level of education, the size of their farm, the availability of financing, the amount of

labor that is utilized, an extension program, the amount of money spent on modern inputs, and the possession of assets are the most important elements for agricultural productivity and the welfare of rural farm households.

2.5.4 Diversified Income and Household Welfare

According to Asfaw *et al.* (2019) and Van den Broeck & Kilic (2019), income diversity is an essential component of household welfare in low-income countries. This is due to the fact that income diversification assists in strengthening people's livelihood by raising total income and dispersing risk. There are several research that link income diversification with household welfare (Xu, 2017). These studies can be found across the existing academic literature. For instance, Xu (2017) used province level panel data from 1998-2015 to investigate the correlation between income diversity and peasants' consumption in rural China. He found that income diversity leads to higher consumption among Chinese peasants. The study indicated that income diversification had a greater impact on farmers' consumption in high- and low-income provincial subsamples than on farmers' consumption in middle-income provinces. With data from the 2012 Bhutan Living Standard Survey (BLSS), Rahut *et al.* (2017) studied the impact of rural households' efforts to diversify their income streams on their economic security. As a means of parameter estimation, they utilized a matching strategy predicated on propensity scores. They discovered that factors such as education, asset endowment, labor availability, and the gender of the person in charge of the home all play a crucial role in the decision to diversify income sources beyond agriculture. Furthermore, they discovered that rural households who pursued several livelihoods had higher earnings and lower poverty rates than those who pursued farming as their primary source of income. In addition, they discovered that moving rural households' incomes away from agriculture might help reduce poverty.

Hong *et al.* (2018) analyzed the connection between income diversification and household welfare using original survey data from 3099 forestry farm families across seven regions in China. Variables such as family size, labor force participation, farmland and forestland, access to the forestland property certificate, human capital of the household head, and regional heterogeneity are found to be related to the availability of income diversification strategies. They also discovered that farm households who practice income diversification have greater levels of forestry revenue, agricultural income, off-farm income, consumption, and savings, and a reduced chance of relative poverty, compared to those who do not. This was found when contrasting agricultural households that diversified their income with those that did not.

Gautam & Andersen (2016) created a composite household well-being index using information gathered from household surveys. As part of their research on the contribution that diversified livelihoods make to household well-being in Nepal, they were able to use this measure to analyze the effect that diversified livelihoods had on a household's level of wellbeing. The results showed that there was a regular pattern of diversification in terms of the variety of activities undertaken as means of sustenance, but there was a significant degree of diversity in the resulting well-being between families. Additionally, they found that diversity had no impact on people's levels of satisfaction. Additionally, it was shown that the diversification of livelihoods had a very uneven impact on income and wellbeing disparity.

The research that was conducted by Zhao & Barry (2014) looked at the various types of farm-level diversification in China and how they affect the amounts of income that rural households have. In order to estimate the parameters, they made use of secondary data obtained from a survey of households and carried out quantile regression analysis. The findings demonstrated that the benefits of diversification vary significantly

according to rural income strata as well as a variety of structural features. They came to the conclusion that families living in rural areas with low incomes benefit economically from diversification more than families living in rural areas with high incomes. Omotesho *et al.* (2020) evaluated the numbers of revenue sources of rural households and examined the contribution of the various income sources to overall income and wellbeing using primary data obtained from 160 rural respondents. This research was carried out with the intention of determining the number of income sources utilized by rural households. Descriptive statistics and Pearson product moment correlation were utilized in the data analysis process. The findings showed an average number of income sources and farming contributed the majority of the income to the household despite the fact that the number of income sources was inversely related to the livelihood status of the household, and the study came to the conclusion that the more diverse the income of the household, the lower the livelihood status.

Primary data from Bangladesh were analyzed by Salam *et al.* (2019) as part of their study on the impact that income diversification techniques have on the well-being of rural households. The Two Stage Least Square (2SLS) method with instrumental variable was used for their research. The outcomes of the study showed that participating in any kind of non-farm activities simultaneously with farming had a considerably favorable effect on the wellbeing of the household. They also discovered that engagement in wage work and migration in addition to agricultural activities ensured significantly greater household expenditures, whereas participation in agricultural activities alone had no significant impact on household expenditures. This was found in contrast to the fact that participation in agricultural activities alone had no significant influence on household expenditures. In addition, the size of the farm, the

number of people with higher education, and the number of facilities for infrastructure all played significant roles in boosting the welfare of households.

Mendoza (2018) conducted a panel study in which they estimated a two-stage pooling and fixed effects model in order to investigate the behavior of income diversification among Filipino households. According to the findings of the study, the primary reasons for income diversification are the avoidance of risk and the acquisition of wealth. The study went on to come to the conclusion that diversity is beneficial to wealthy families in that it helps them minimize future income and consumption volatility. However, the study found no evidence to suggest that diversification had any effect on rural households, whose strategy for diversification is essentially subsistence-driven.

Khan & Morrissey (2020b) conducted research on the relationship between income diversification and household welfare in Tanzania. They did this by using three waves of the Tanzanian National Panel Survey between the years 2008 and 2013. Their findings indicated that income diversification, in particular, labor income and farming income, is associated with high levels of household welfare by influencing food consumption; however, there are variations according to the nature of activities and gender. According to another finding of the research (Khan & Morrissey, 2020b), wage employment in industries other than agriculture is extremely important for boosting the welfare of households.

In Ghana, Amfo *et al.* (2021) conducted another study on rice farm income diversification and household consumer expenditure. This study looked at the effects of crop and income diversification on rice-producing households' consumer spending or welfare. The results of this study showed that rice farmers' income diversification affects crop and income diversification as well as rice-producing households'

consumption expenditure. Despite Khan & Morrissey (2020b) and Amfo *et al.* (2021) supporting the correlation between income diversification and household welfare, Khan & Morrissey (2020b) have contended that even though agricultural wage employment is preferred by many households as an important mechanism for diversifying income, it is not associated with increasing household consumption. This is despite the fact that both of these researchers support the idea that there is a correlation between income diversification and household welfare. This gives rise to the question of whether or not diversifying household's income through agricultural wage employment could possibly correspond with household consumption as a proxy for household welfare in other circumstances.

In addition, Amfo *et al.* (2021) conducted research in Ghana on the topic of rice farm income diversification and household consumer expenditure. This study investigated how households that produce rice respond to changes in their consumption expenditure and welfare when crop and income diversification are introduced. In addition to this, it compares and contrasts three distinct methods of cultivating rice: one-season rain-fed rice culture, two-season irrigated rice cultivation, and two-season rain-fed rice farming. The basic data came from 225 different rice farmers. The findings of the research showed that crop and income diversification, in addition to rice-producing households' consumption expenditures, are all affected when rice producers diversify their incomes. Within the context of this study, crop diversification and income diversification served as examples of continuous response variables. Another study, this one carried out in Nigeria by Akaakohol & Aye (2014), investigated the relationship between diversified farm income and the wellbeing of households. Questionnaires of a predetermined format were used to facilitate the collection of the data. While the ordinary least square (OLS) model was utilized in the investigation of the utility effect of diversity, the logit

model was utilized in the investigation of the factors that determine diversification. According to the findings of the Logit model, the likelihood of diversification is increased by having a household led by a male, having a higher level of education, and having access to loans, but decreased by having previous agricultural experience and having access to markets. According to the findings of the OLS analysis, a good and substantial impact on the wellbeing of a household is had by diversification, age, education, and credit; however, a negative and significant impact was had by household size.

Awoniyi & Salman (2011) investigated the amount of non-farm income diversification, its impact on the wellbeing of farming households, and the factors that drive non-farm income diversification. They used fuzzy set analysis and Logit regression analysis to conduct their research. The age of the family head, whether or not he is a man, whether or not he has a formal education, the poverty level of the household, and the size of the farm are all factors that influence participation in activities other than farming, according to the research. According to the findings of the study on poverty, a higher percentage of farming households with non-farming household heads live in poverty than farming households with non-farming household heads. According to the findings, farming households that do not participate in any income-generating activities other than farming are more likely to fall into poverty than farming households that do participate in income-generating activities other than farming.

Zakaria *et al.* (2019) studied the effects of income diversification on farm households' well-being using a multistage sample method, a probit model, and a propensity score matching strategy. They looked at a total of 284 farm households from 62 communities in northern and eastern Ghana. The study found that farmers who were older, farmers who had access to extension services, farmers who were male, and farmers who felt

that rainfall was erratic and temperatures were high were the most likely to diversify their operations. They also found that families with many sources of income did better financially than those with a single source of revenue on the farm. Stifel (2010) investigated the link between non-farm employment in rural areas and household welfare using data from Madagascar that were believed to be nationally representative. The research concluded, using multinomial logit models, that high-return non-farm activities provide a substantial route out of poverty.

Using information from the 2014 General Household Survey of South Africa, researchers Ebenezer & Abbyssinia (2018) analyzed the effects of occupational diversity on living standards. Using a multi-step random selection approach, researchers randomly selected 3033 households from around the province to participate in the study. The data was analyzed using the Tobit regression model, descriptive statistics, and a modified Multidimensional Poverty Index. The results of the survey showed that there was little diversity in the demographics of province's households. The findings revealed that a household's level of diversification in its means of subsistence did not significantly affect whether or not it was poor in the province. It was determined whether or not a household was poor by other socioeconomic characteristics, including gender, level of education and employment, access to electricity, degree of engagement in agricultural activities, total income, asset score, and geography.

Using a unique dataset that combines harmonized national representative household surveys with geo-referenced climatic data collected in Malawi, Niger, and Zambia, Asfaw *et al*. (2019) looked into the connections between crop and livelihood diversification strategies, severe weather, and household welfare. This research was done to find out if there is a relationship between these variables. The results showed that crop or livelihood diversification was positively correlated with either exposure to

extreme rainfall events or with extreme rainfall events themselves in every nation that was studied. Additionally, they found that the impact of variety on household income varied greatly among nations and the different diversification strategies employed. They also discovered that in all three countries, the effect of crop and income diversity on household wellbeing was highest for the poorest and diminished or even reversed itself as one moved toward the higher end of the income distribution. This held true for all three nations.

Farmers in Ghana's upper east area provided primary data for Danso-abbeam *et al.* (2020) study on the effects of non-farm income diversification on rural family prosperity and the uptake of Zai-technology. This research was conducted to determine if and how non-farm income diversification in rural areas affects family adoption of Zai-technology. Non-farm income diversification's impact on social welfare and Zai-technology was evaluated through the use of Propensity Score Matching (PSM) and Inverse Probability weighted Regression Adjustment (IPWRA) in the research project. Findings reveal that a rise in non-farming income greatly improves household well-being and, in turn, the chance that Zai technology will be used. Mohammed (2018) employed a survey methodology to investigate the relationship between income diversification and wellbeing among Kaduna State University teachers. They issued 180 questionnaires, and 108 of them were returned. They used the regression model to evaluate the data. The survey's results show that Kaduna State University's academics staff view giving consulting services, exchanging commodities, creating handcrafted goods, and offering transportation services as potential supplemental sources of income. The results of the regression analysis revealed a significant relationship between trading and consultation services and the wellbeing of the study area's workforce.

Oyimbo & Olaleye (2016) carried out research in the Giwa Local Government Area in Kaduna state, Nigeria, to determine how the diversification of people's sources of income helped alleviate poverty in that region. The research utilized primary sources of information, and the findings were examined through the application of straightforward descriptive statistics, the FGT poverty model, and the Tobit regression model. The findings showed that thirty percent of the households in the agricultural sector were living below the poverty line. The study also indicated that livelihood diversification had a considerable impact, both positively and adversely, on the amount of poverty experienced by the households of farmers. According to the findings of the study, increasing the amount of livelihood activities available to farmers would result in an increase in their income, which would in turn boost their purchasing power and wellbeing.

Kidane (2019) used primary data from a two-round plot-level survey panel data of 900 families that were selected using multistage sampling processes in a study to investigate the influence of income diversification on the welfare of households. According to the findings, majority of household income was derived from agricultural activities, with an observed increase in diversification in 2013. The findings of an econometric study showed that households led by women and households with members who had completed higher levels of education were more likely to practice income diversification. The findings also suggested that the presence of multiple sources of income had a beneficial effect on total income and decreased the likelihood of living in poverty. In addition, the study came to the conclusion that characteristics such as farming experience, gender dependency ratio, quantity of farmed land, livestock, crop diversity, and agroecology were major factors in affecting degrees of vulnerability and poverty.

Adepoju & Obayelu (2013) analyzed the impact of occupational diversity on the financial security of rural households in Ondo State using primary data collected from 143 respondents chosen using a multistage sampling approach. The setting for this study was the state of Ondo. Several methods were used to analyze the data, including descriptive statistics, multinomial logit models, and logit regression models. They discovered that the predominant elements that influenced the choice of livelihood strategies that were utilized were the size of the household, the total income of the household, and the level of elementary education held by the household head. They also discovered that revenue from non-farm activities and income from a mix farming and non-farm activities positively increased welfare in comparison to income from farming activities. This was the case even when income from farming activities was the primary source of income.

Panel data from the Living Standards Measurement Study - Integrated Surveys on Agriculture (LSMS-ISA) were utilized by Dedehouanou & Mcpeak (2019) in their research on the diversification of rural livelihoods in Nigeria. The U.S. Department of Agriculture was responsible for these polls. Unlike previous research, which found a U-shaped or inverted U-shaped relationship between wealth and income diversification in rural Nigeria, this study found that the relationship is better characterized as upward sloping with declining marginal benefits. These results go counter to previous research that found a U form or an inverted U shape. The study's findings suggest that having several income streams might improve people's capacity to buy, store, and eat healthy food. Furthermore, the study found that income diversification did not mitigate the effects of shocks, and that shock experiences still had an adverse effect on food security.

The three-stage least-squares method and primary data from 225 rice farmers were utilized by Mensah *et al*. (2021) to conduct their research on the effects of crop and

income diversifications on the wellbeing of households in Ghana that produce rice. This study was done to examine the effects of crop and income diversifications on the wellbeing of Ghanaian households that produce rice in terms of consumption. They found that the vast majority of households in Ghana that produce rice do some kind of economic diversification. Nevertheless, the level of economic diversification practiced by these households differed according to whether or not they produced two-season rain-fed, two-season irrigated, or one-season rain-fed rice. The study's findings indicate that a variety of variables, including credit, distance to district capitals, production goal, and the number of agricultural seasons, affect how much rice-producing households diversify their income and how much they spend on consumption. According to the findings of the second part of the study, increasing income diversity leads to higher levels of consumption expenditure, while crop diversification leads to lower levels. In addition, the data demonstrated that crop diversification and income diversification had a mutually beneficial effect on one another, and that increased consumption expenditures decreased crop diversification while simultaneously increasing income diversification.

Asfaw & Maggio (2018) used panel data that was linked with climatic records in order to investigate the gender-differentiated effects of weather shocks on the economic well-being of households in the country of Malawi. They discovered that sudden changes in temperature have a significant negative impact on the welfare of households, leading to a reduction in consumption, food consumption, and daily calorie intake. In addition, they suggested that the adverse effects on welfare were significantly worse for households in which women handled the land by themselves, which shed light on the gender disparate impact that temperature shocks have. They came to the conclusion that

women's vulnerability to temperature shocks was linked to women's security of land tenure because temperature shocks had a major impact on the wellbeing of women.

Ibukun & Adebayo (2020) used the COVID19 National Longitudinal Phone Survey (COVID19 NLPS) to study the factors that determined the food security status of households throughout the pandemic. For the purpose of the study, descriptive statistics, bivariate analysis, and multivariate analysis were all utilized for data examination. To account for variations in the sociodemographic features of families, the study included variables such as the gender, age, educational level, and marital status of the household head; the dependence ratio of the household; and the size of the home. On the other hand, social factors like income and wealth status were thought to be crucial in explaining variations in households' economic susceptibility. Only twelve percent of the households were considered to be food secure, five percent were considered to be only slightly food insecure, twenty-four and a half percent were considered to be only moderately food insecure, and fifty-eight and a half percent were considered to be severely food insecure. The outcome of the ordered probit regression indicated that socioeconomic factors (level of education, income, and wealth status) were the primary factors that determined whether or not people had access to sufficient food during the epidemic. In addition, the data suggested that homes led by women were more likely to be vulnerable to food insecurity, which posed a risk to the welfare of the household. Mendola & Simtowe (2015) assessed how the project's heterogeneity affected the gender of household heads and how it differed greatly depending on the variable's outcome. They achieved this by combining a quasi-experimental program with household panel data. The findings of this study suggest that female household heads in patrilineal families appear to benefit from the project more than male counterparts in terms of asset value, food security, and ownership of agricultural land;

however, they appear to benefit less in terms of total land ownership and agricultural productivity.

The size of the household, the age of the household head, the level of education held by the household head, the gender of the household head, the size of the farm, the number of contacts with extension agents, and the characteristics of the location, for example, are the factors that are likely to affect the adoption and impact of natural resource management technologies. In their investigation of the effects of alternative livelihood initiatives on household welfare, these elements were discovered. Additionally, Gadisi *et al.* (2020) made adjustments for socioeconomic factors like the size of the family, the ages of the household members, the gender of the household members, and the level of education when examining the impact of government support programs on household welfare in the Limpopo region of South Africa. They found that socioeconomic factors, such as household size and lack of formal education, had a stronger negative effect on wellbeing for those with lower incomes than for people with higher incomes. The significantly negative findings for the number of individuals residing in a home and the lack of any formal education, confirmed these findings. According to the study's findings, a rise in household size had a negative impact on low-income households, suggesting that a household's wellbeing declined proportionately.

Tambo & Wünscher (2017) looked into the connection between farmer-led innovations and rural household well-being. They employed techniques like endogenous switching regression and maximum simulated likelihood on household survey data from northern Ghana. The size of a household, the value of assets, the length of time spent working off the farm, and the number of animals possessed all had a significant impact on the income and welfare of both innovators and non-innovators, according to Tambo & Wunscher's (2017) findings. Additionally, this conclusion implied that a greater

household size resulted in a decrease in the members' wellbeing and income. They also found that household size dramatically lowers the amount of money spent on consumption by both innovators and non-innovators, with the effect being noticeably more for innovators. According to the results of a study conducted to look into the variables that affect household wellbeing in that region, the non-poor in Vietnam's Central Highlands were found to have a smaller household size and a lower dependency ratio than the poor. Vietnam was the location of the study.

Through the use of six waves of national household surveys that were carried out between 1992/93 and 2012/13, Khan & Morrissey (2020a) explored the phenomenon of income diversification in Uganda. The study took into account a variety of economic factors, including agriculture (farming), agricultural wages, informal self-employment, wage employment, and remittances. Their conclusions were drawn from the results of individual surveys and were computed with the help of a pseudo-panel. According to the findings of their study, households with several income streams tend to have lower consumption welfare. According to their findings, income diversification is the product of push factors that compel people into low-wage professions. The majority of income diversification happened in agriculture among the poorest households, who have seen their remittances decline. This finding suggests that income diversification is a result of push factors that force people into low-wage professions. According to the findings of their study, pay employment growth has been rather sluggish, despite the fact that households in the non-agricultural wage sector had better welfare (in terms of adult equivalent consumption).

Tesfaye & Tirivayi (2020) used information from a panel survey carried out in rural Uganda along with historical weather data to examine the effects of crop diversity on household well-being and consumption smoothing. For unobserved variability and

probable causality reversals, they employed strategies that included instrumental variables. The study's findings indicate that increasing crop diversity can increase social welfare since it increases household consumption and dietary diversification. They found that crop diversity offers lower-income families in the lower quantile of the consumption distribution more benefits than it does for substantially wealthier households using quantile regression with instrumental variables. Additionally, they came to the conclusion that crop diversity boosts consumption smoothing by reducing households' reliance on ineffective risk-coping strategies like unintentional insurance and dietary adjustments.

2.5.5 Literature Review Gaps

Empirical studies have looked at farm and non-farm incomes as determinants of household welfare. But most of the studies on non-farm income and household welfare have only considered income equity consequences (Deininger & Okidi, 2000) and there exists very limited research on income and consumption and these few studies have looked at correlation rather than causal effects (Chang & Mishra, 2008; Deininger & Okidi, 2000; Holden & Shiferaw, 2004). More so, most studies have estimated income and consumption in developed countries and little knowledge is available on the relationship between income and welfare using evidence from developing economies context. Even then, most of the studies have been biased to rural or urban settings and either farm or non-farm. Still, most of the studies on income and welfare have been conducted in industrialized economies yet according to Asfaw *et al.* (2012), the influence of household income on welfare varies across countries which requires to establish the external validity of income and welfare theories using evidence from Uganda. There are relatively few studies on whether the results of these income and welfare studies in industrialized nations are relevant in helping to enhance welfare in

Uganda. More so, the extant literature has given mixed results with some suggesting positive influence of income components on welfare *(*Mat *et al., 2012;* Obasi *et al.,* 2020), others suggesting no influence at all (Cuong & Linh, 2018; Kinuthia *et al.,* 2018) while the others have given inverse influence on welfare (Khan & Morrissey, 2019; Kumar, 2019; Awoniyi & Salman, 2011).

Previous studies that have established a link between income and household welfare (Kakungulu *et al.,* 2021; Kinuthia *et al.,* 2018; Kumar, 2019; Obasi *et al.,* 2020) have not addressed the endogeneity problem arising from badly measured income components to households due to the nature of data collection which was self – reporting and the bi – causality of variables in the study. Moreover, most of these studies adopted cross sectional design which does not portray a true picture of changes in the income and welfare across different periods (Ma, *et al.,* 2019; Adepoju & Ogundunmade, 2019; Akaakohol & Aye 2014). Furthermore, past studies have used small samples and shorter time periods that can affect the variability in household income and welfare measures (Khan & Morrissey, 2020a; Obasi *et al.,* 2020).

According to the current literature, there is either a dearth of or complete lack of study on the disaggregated income components and household wellbeing in Uganda and much less regarding the heterogeneous impact of household income on consumption expenditure and poverty status as welfare measures (Citro & Michael, 1995; Deaton & Zaidi, 2002; Moratti & Natali, 2012) yet poverty status is a welfare measure that has received little attention in literature (Sumner, *et al.,* 2020). Few studies have focused on the impact of Uganda's non-farm and farm components on household wellbeing (Kazungu & Guuroh, 2014; Kijima *et al.,* 2008; Nagler & Naudé, 2014). Furthermore, contrary to the conclusions of most reviewed studies such as Kinuthia *et al.,* (2018); Hill & Mejia-Mantilla (2019) discovered that non-farm activities, such as commercial

activities, have no beneficial and significant impact on household welfare in Uganda and Tanzania (2018). While Khan & Morrissey (2020a) used Uganda National Household Surveys for 1999/00, 2002/03, 2005/06, 2009/10, and 2012/13 to analyze income diversification and household welfare, this study came to identical conclusions. That withstanding, majority of these studies have not exhaustively studied the area since they only looked at certain types of income (Akaakohol & Aye, 2014; Du-Pont *et al.*, 2020; Seneerattanaprayul & Gan, 2021).

More specifically, most farm and non-farm income literature is focused on poverty reduction (Barrett *et al.*, 2002) and little study has been done on how income enhances welfare. According to Van de Walle & Cratty (2003), focusing on sources of income (rather than patterns of expenditure) may better represent how a household is influenced by changes in the economic environment by identifying opportunities (in their example, a growing nonfarm industry) that allow for more spending. This suggests that it would be worthwhile to look into how income diversification has evolved for different sorts of households through long period of time.

2.6 Conceptual Framework

A conceptual framework is a model presentation in which the researcher diagrammatically displays the relationship between the independent factors of the investigation and the dependent variables of the study. The reader should be able to gain a clearer understanding of the hypothesized connections between the variables with the assistance of the conceptual frame work. The relationship between a household's income and its welfare is seen in Figure 2.

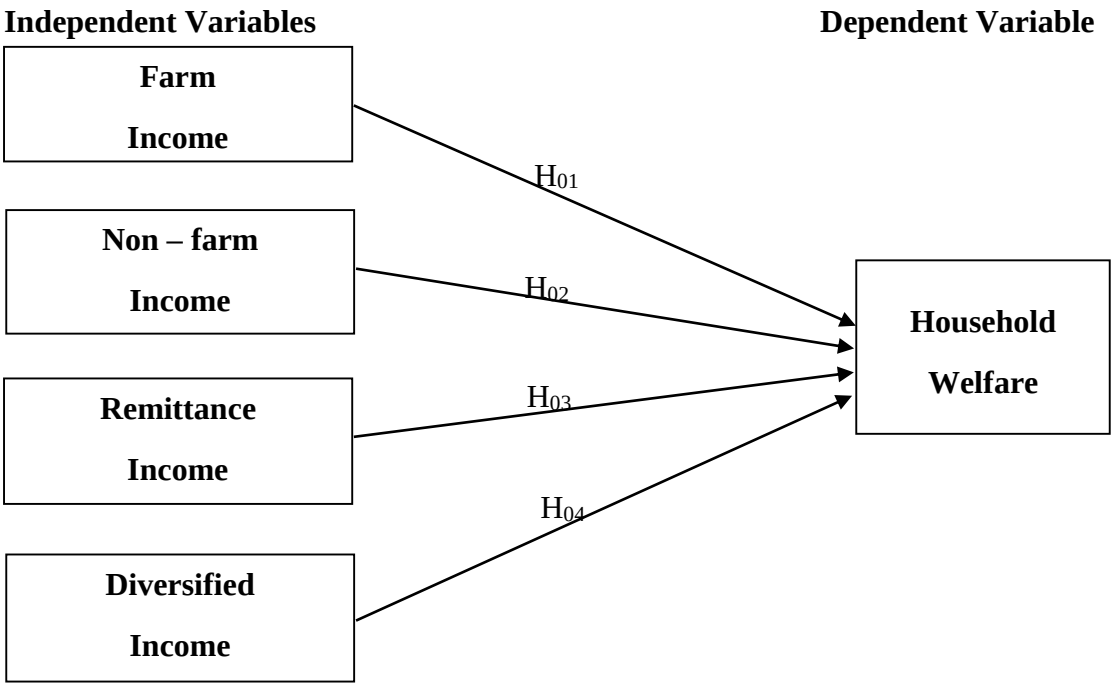

Figure 2: Conceptual Framework
Source: Author (2023)

The source of the conceptual framework was obtained from Canberra group handbook on Household income Statistics (2011), Anderson (2020) and Menna-tullah (2020) and modified by the researcher (2023). Thereafter, the author modified to suit the current study. The conceptual framework consists of household income as independent variable with constructs of farm income, non-farm income, remittance income as well as income diversification and welfare as the dependent variable with constructs of consumption expenditure, assets value and poverty incidence. Farm income leads to household welfare. Non-farm income leads to household welfare. Remittance income leads to household welfare. Income diversification leads to household welfare.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

This chapter presents the research methodology as follows; study area, philosophy underpinning the study, the design that the study followed, the theoretical model, specification of the empirical model, definition of model variables, target population, data source and type, data collection instrument and procedure, diagnostic tests, model estimation techniques and ethical considerations.

3.2 Study Area

The study was conducted in all the districts of Uganda. Uganda is found in east of Africa bordered by Kenya, Tanzania, Rwanda, Democratic Republic of Congo (DRC) and Southern Sudan in the east, south, south west, west and north respectively as shown by the map below.

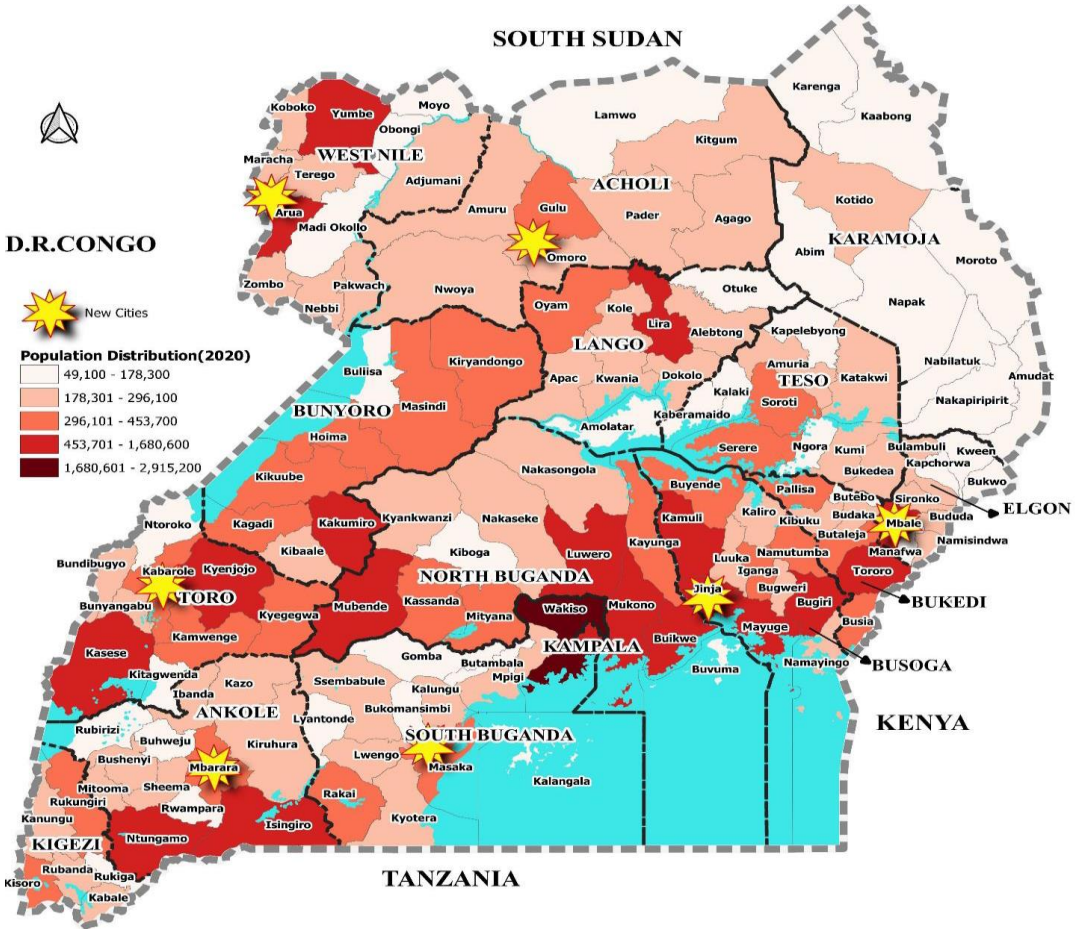

Figure 3: A Map of Uganda Showing Neighboring Countries and the Fifteen Sub Regions

The administrative structure of Uganda is composed of districts, constituencies, counties, municipalities, sub-counties, town councils, parishes, and LCIs at the macro level. At the micro level, there is a household which is defined as a collection of people who typically eat and live together, with one responsible person being considered as the head. There were 7.3 million households counted at the National Population and Housing Census in 2014. According to the table below, these have since increased to 9 million households.

Table 3.1: Distribution of households in Uganda across the four UNPS waves

Wave	Year	Total Number of Households	Households Sampled	Enumeration Areas
4th	2013/2014	7,300,000	3,118	322
5th	2015/2016	7,700,000	3,300	322
6th	2017/2018	8,300,000	3,119	322
7th	2019/2020	9,000,000	3,100	322

Source: UBOS (2021)

As of 2020, Uganda had a total of 128 districts which were grouped in fifteen (15) sub – regions (see appendix IV and V – UBOS, 2020). Before data collection, it was imperative to delimit unit of analysis to clarify the unit from where data came from. Unit of analysis according to Kothari (2004) is the component from which information is to be obtained. Since the study aimed to clarify on the factors that enhance welfare of households in Uganda, the unit of analysis were the households across districts in Uganda. The justification for considering Uganda is that the country has experienced increasing cases of decline in household welfare across (FAO, 2017).

3.3 Philosophical Paradigm

The philosophical paradigm is the foundation upon which scientific research is built (Krauss, 2005). There are four philosophical approaches to social science research which are positivism, interpretivism, pragmatism and social constructivism (Saunders *et al.,* 2009). Positivism is concerned with observable facts and stresses objectivism, which focuses on presenting explanations; interpretivism is concerned with subjectivism and is more concerned with understanding rather than explaining phenomenon; social constructivism is concerned with seeking understanding of the reality in the world and views the individual as a sense maker who makes sense of the environment around them as they see and experience it; pragmatism on the other hand is concerned with actions, situations and consequences rather than antecedent conditions and calls for use of all approaches available to understand the problem while

making inquiry by more practical minded researchers (Chapman & McNeill, 2005; Creswell, 2009; Darlaston-jones, 2007; Saunders *et al.,* 2009). The study follows a positivist paradigm because it aims at emphasizing objectivism while looking into the hypothesized causal explanations. In this case therefore the researcher in this study is viewed as an objective, value-free observer who establishes a causal relationship in order to find links between the diverse household incomes and household welfare. In addition, the positivist paradigm has been preferred for this study because this kind of research paradigm bases its ideology on cause and effect (Creswell, 2009). Positivistic studies are easily repeatable in real life unlike interpretivism studies.

In terms of ontology and epistemology, this research addressed the structural assumptions of reality. Epistemology refers to how a researcher learns about the reality (ontology) that exists in the world out there, whereas ontology refers to what reality exists out there and in what knowledge structure (Krauss, 2005). Household welfare is a reality that exists out there in both structured and unstructured manner. Epistemology is concerned with the production of knowledge, or how knowledge is generated. The researcher is seen as objective and value-free observer who establishes causal linkages in a positivist epistemology (Chapman & McNeill, 2005). In this study, the objective approach looked at household welfare as real, hard, countable, and concrete which was independent of the researchers. By focusing on the operationalization and measurement of the concepts, the ontological perspective that grounds this study is based on the belief that the conceptions of disaggregated income components and household welfare represent phenomena in the empirical world as they actually exist.

3.4 Research Design

Research design is a logical model of evidence that enables researchers to assess and draw conclusions about the causal relationships between the variables under study

(Creswell, 2009; Fraenkel *et al.,* 2011). It is a detailed road plan or blue print for the research study. Several research designs have been proposed by scholars (Cresswell, 2008; Saunders *et al.,* 2009) that can be adopted by researchers and these include but not limited to explanatory design, exploratory design and mixed methods design. In terms of period, cross-sectional design and longitudinal designs have been advanced. This study adopted an explanatory research design which seeks to determine whether a cause-effect relationship exists between the study variables (Ellis & Levy, 2009), namely disaggregated income components and household welfare. The research design is consistent with this study in which the researcher examined how the independent variable (household income: farm income, non-farm income, remittance income and diversified income) directly affect the dependent variable (household welfare) in a cause-effect relationship between the variables. Also, this study adopted panel study model since it adopted the use of panel data collection to carry out the research. A panel study is a type of research that provides information regarding the same cases at two or more different times. According to Blossfeld *et al.* (2009), panel studies are a specific sort of longitudinal study in which the unit of analysis is tracked at preset timeframes in a lifetime. These timeframes might occur at any point in a person's life. Panel study was utilized due to the fact that it provides historical information that reveals back and forth shifting behavior and is effective in coping with the dangers posed by unit heterogeneity.

3.5 Theoretical Model

To examine the effects of non-farm and farm income on household welfare in Uganda, this study used a theoretical model proposed by Huffman (1997) and adopted by Owusu *et al.* (2011). According to the model, individual activities including farm and non-farm activities, are believed to be allocated to households. A household is supposed to

maximize a utility function defined by goods C and leisure L in consumption (Equation 3.1). The utility function of the household is maximized under budget, time, and non-negativity restrictions and it is given by:

$U = (C, L)$……3.1

The households total time endowment (T) is the sum of the time used in the farm (N_F) and time used in the non-farm activities (N_N) as well as time to use in leisure (L) and is given by:

$T = N_F + N_N + L$……3.2

Where

$$N_N = N_N(W_N P_F)$$

$$N_F = N_F(W_F P_N)$$

Key

The household is faced with a budget constraint characterized by four sources of income (farm income, non-farm income, diversified income and non-labor income or endowment) and expenditure on consumption goods. Letting I_F be farm income, I_N be non-farm income, and R be endowment, P be price of consumer goods, and C be quantity of goods purchased, the budget constraint is given by:

$I_F + I_N + R \geq PC$……3.3

Where

$I_N = W_N.N_N$ *and* $I_F = W_F.N_F$…… 3.4

$I_F = W_N.N_N$ *and* $I_N = WN.N_N$ …… 3.5

From equations 3.1, 3.2, and 3.3, the household's optimization problem can be solved using the langrage equation given below;

$L = U(C, L) + \pi(T - N_F - L) + \mu(I_F + I_N + R - PC)$……3.6

From equation 3.6, the first order condition of utility maximization between farm and non-farm can be shown in equation 3.7 and 3.8

$\frac{\partial L}{\partial I_N} = MU_{IN} = \mu$……(3.7)

$\frac{\partial L}{\partial I_F} = MU_{IF} = \mu$…… ……(3.8)

Solving equations (3.7) and (3.8) simultaneously yields the equilibrium position given as

$\frac{MU_{IN}}{MU_{IF}} = 1$……(3.9)

Equation 3.9 implies that in equilibrium, the marginal utility from farm income should be equal to the marginal utility from non-farm income. In such a situation, households with more farm income would have the same welfare as households with more non-farm income. However, if $\frac{MU_{IN}}{MU_{IF}} > \mathbf{1}$, households with non-farm income would have higher welfare compared to their counter parts with farm income; and if $\frac{MU_{IN}}{MU_{IF}} < \mathbf{1}$, households with farm income would have higher welfare compared to their counterparts with non-farm income.

The ratio of marginal utilities in equation 3.9 is a tangency condition and it defines the marginal rate of substitution between non-farm and farm income from utility maximization function, which in essence is the household's utility function; U = f(farm, non-farm and other income components). Due to market imperfections, it is rare that equation 3.9 would hold. The ratio of the marginal utilities would either be less than one or greater than one.

3.6 Model Specification

Empirical models were specified in frame work of panel models. Four kinds of empirical panel model specifications were adopted to examine the causal linkage

between the disaggregated household income components and household welfare: the fixed effects panel model (FE), the random effects (RE) panel model, the logistic regression (LOGIT) panel model and the PROBIT panel model. The first two model specifications are static panel model specifications in which the response variable is quantitative (household consumption expenditure) while the last two model specifications are panel model specification in which the response variable is qualitative (household poverty status). In this study, the first model specification (i.e. the FE model) was designated as model 1, the second model specification (i.e. the RE model) was designated as model 2, the third model specification (i.e. the PROBIT panel model) was designated as model 3 while the fourth model specification (i.e. the LOGIT panel model) was designated as model 4. The empirical panel model specifications have been adopted in line with Newman *et al.* (2008), who stated that the relationship between household welfare and household income could be explored using the standard panel model. Panel data frame work was used because the study controlled for household level of heterogeneity at district level.

Based on theoretical considerations, the empirical model linking household welfare to its potential determinants was specified as follows:

$W_{it} = f\ (MINCS, u)_{it}$…….. 3.10

W_{it} is some measure of the household's welfare in the i^{th} district at time t, $MINCS_{it}$ is the household's main income source in the i^{th} district at time t and u_{it} captures the unknown factors that may have a causal effect on the household's welfare in the i^{th} district at time t.

Household consumption expenditure (CONSEXP) and poverty status (POV) are two measuring metrics of the dependent variable that were adopted as proxy variables to W_{it}. According to Balisacan *et al.* (2003), one reason why household consumption

expenditure was selected as a desirable variable to use as a proxy for W_{it} was because it provides a fair approximation of long-term average wellbeing. The poverty status of a household has also been chosen as the variable of interest (Nguyen & Tran, 2018). This is due to the fact that the poverty status of a household significantly represents the quality of living of that household.

The effect that the disaggregated household income components have on the welfare of households is the primary focus of this study. Farm income (FINC), non-farm income (NFINC), remittances (REMIT), and diversified income (DIVINC) were the four components that were extracted as disaggregated components of household income. As a consequence of this, the econometric forms of the empirical panel models used in this research were determined by the method that was utilized to estimate the proxy variables of household welfare. For example, household consumption expenditures (CONSEXP) were measured as continuous variables; as a result, two static panel models; the Fixed Effects (FE) and the Random Effects (RE) models, respectively; were specified. These models were chosen because of the fact that CONSEXP was measured as continuous variable. To be more specific, the Fixed Effect empirical model (model 1) was stated as follows where consumption expenditure (CONSEXP) is employed as a proxy measure for household welfare:

$$Log(CONSEXP)_{it} = \beta_{0i} + \beta_1 Log(FINC)_{it} + \beta_2 Log(NFINC)_{it} + \beta_3 Log(REMIT)_{it} + \beta_4 Log(DIVINC)_{it} + \mu_{it} \quad \text{.....3.11}$$

Where: the $\beta_{0i}{}'s$ are individual intercepts fixed per district but unknown; the i in the FE model means that no overall intercept is included. In fact, the i notation defines the unknown intercept for each district. $Log(CONSEXP)_{it}$ is the logarithm of consumption expenditure of households in district i at time t; $Log(FINC)_{it}$ is the logarithm of farm income of the household in district i at time t; $Log(NFINC)_{it}$ is the logarithm of non-

farm income of the household in district i at time t; $Log(DIVINC)_{it}$ is the logarithm of diversified income and $Log(REMIT)_{it}$ is the logarithm of total annual remittances received by the household in district i at time t. The unobserved variables that are distinctive to each district do not undergo any kind of change according to the FE model. According to Stock & Watson (2003), this indicates that any changes that occur in the dependent variable must be the result of factors that are distinct from these fixed traits. Because the fixed effects model accounts for any time-invariant variations that exist between the various districts, the estimated coefficients of the fixed effects models are not subject to the possibility of being skewed by the absence of time-invariant characteristics. In order for the FE model to be consistent, it is not necessary for the individual intercepts (which are denoted by β_{0i}) and the explanatory variables to be uncorrelated. Rather, in order for the FE model to be consistent, it is sufficient for the explanatory variables and the error terms to be uncorrelated.

On the other hand, when the consumption expenditure (CONSEXP) is employed as a proxy to measure for welfare, the Random Effects (RE) empirical panel model (model 2) is stated as follows:

$$Log(CONSEXP)_{it} = \beta_0 + \beta_1 Log(FINC)_{it} + \beta_2 Log(NFINC)_{it} + \beta_3 Log(REMIT)_{it} + \beta_4 Log(DIVINC)_{it} + \alpha_i + \mu_{it} \quad \text{3.12}$$

Where β_0 is a random intercept; $(\alpha_i + u_{it})$ is a composite error consisting of two components: (i) an individual district specific component that does not vary over the period of the panel surveys, represented by α_i , and (ii) the remainder of the error, which is uncorrelated with the explanatory variables, represented by u_{it}. Where β_0 is a random intercept. According to the RE model, the two components of the composite error α_i and u_{it} are thought to be completely independent of one another. When discussing the specific words, the between error is referred to as the component α_i, and

the within error is referred to as the component u_{it}. The term "within" refers to the variance that occurred over the course of the panel survey periods inside a single district, whereas "between" measures the variation that occurred between each of the various districts.

It is not appropriate to estimate 3.12 by the OLS procedure. This is because the OLS does not take this special error structure of 3.12 into account and so it produces biased estimates. Instead, a form of GLS RE estimator was used to estimate the model.

Table 3.2: Summary of Hypothesis Testing

Symbol	Hypothesis	Parameter	Decision
H_{01}	Farm income has a significant influence on household welfare	β – test	Accept or reject
H_{02}	Non – farm income has a significant influence on household welfare	β – test	Accept or reject
H_{03}	Remittance income has a significant influence on household welfare	β – test	Accept or reject
H_{04}	Diversified income has a significant influence on household welfare	β – test	Accept or reject

Source: Author (2023)

3.7 Measurement of Variables

The definition of the variables included in the empirical model have been predominantly derived from reports of the source of the data used in the empirical analysis, that is, from the UNPS reports. Variable notations are author's elucidation, and the expected signs are predominantly based on economic theory. Table 3.3 below indicates the variable names, variable notations, variable definitions and the expected signs of the coefficients that multiply the independent variables.

Table 3.3: Definition of Variables

Variable	Variable notation	Variable Definition	Expected sign
Dependent variable (s)			
1. Log of consumption expenditure	Log(CONSEXP)	The common logarithm of the amount of money spent on consumption by each household, expressed in Ugandan shillings. (Balasacan *et al.,* 2003; UBOS, 2021)	N/A
2. Poverty status	POV	The ability of the household to generate enough money to meet its fundamental requirements is being referred to here as poverty status. Because it is a binary variable, it is measured in such a way that: POV=1 If the annual income of a household is greater than the federal poverty threshold and POV is zero otherwise (Nguyen and Tran, 2018, UBOS, 2021).	N/A
Independent variables			
1. Logarithm of Farm income	Log(FINC)	Refers to the common logarithm of the component of income that proceeds from the farm activities, more specifically the Household wage from employment in farm activities measured in Uganda shillings (UBOS, 2021).	+
2. Logarithm of Non-farm income	Log(NFINC)	This term refers to the common logarithm of the component of income from non-farm activities, which is the household wage from employment in non-farm activities, such as incomes from employment in the public sector non-farm investments in businesses, real estates, stock dividends, interest returns, and all other than agriculture wages measured in Uganda	+

		shillings (Kinge, 2019; UBOS, 2021).	
3. Logarithm of remittance income	Log(REMIT)	Defines the common logarithm of the total annual transfers received by the household measured in Uganda shillings (Kangmennaang *et al.*, 2017; UBOS, 2021).	+
4. Logarithm of diversified income	Log(DIVINC)	A household's revenue from sources other than farming and non-farming jobs is referred to as "other sources of income." Additional revenue that is not derived from farming or other non-agricultural activities; hence, it represents passive income sources assessed in Ugandan shillings which are other examples of passive income (Mathebula, *et al.*, 2016; UBOS, 2021).	+

Source: Author's Elucidation (2023)

3.8 Target Population

As defined by Neuman (2000), a population is a collection of people or organizations that the researcher is interested in researching. This definition of a population may be used to both individuals and groups. Koonce & Kelly (2014) describe it as a whole group of people, events, or objects that have comparable characteristics and comply to a set of standards. Saunders *et al.* (2009) define it as a whole group that enables data to be sourced and studied. Saunders *et al.* (2009) describe it as a complete group that permits data to be sourced and researched. The study population comprised of all the households in all the districts covered in the most recent four waves of the Uganda National Panel Survey (UNPS). As of 2020, Uganda had a total of 128 districts which were grouped in fifteen (15) sub – regions (see appendix I and II – UBOS, 2021). The unit of analysis were the households in a given district while the unit of inquiry was the

household head. The districts in Uganda formed the panel dimension of the panel data model which panel was constituted of 128 districts with a time dimension of four years giving an overall panel sample of 512.

3.9 Data Type and Source

This research makes use of secondary data taken from a panel consisting of the most recent four waves of the Uganda National Panel Survey (UNPS), which were collected from the Uganda Bureau of Statistics (UBOS). According to Kothari (2004), secondary data is data that is already accessible or that has been gathered and evaluated by someone else. On the other hand, Polit & Beck (2003) describe secondary data as the use of data acquired during prior investigations to test new hypotheses or study new connections. Kothari (2004) defines secondary data as data that is already available or that has been collected and studied by someone else. UBOS conducts routine nation – wide household and panel surveys and these have been done since 1989 to provide statistical data for monitoring outcome and impact indicators (UBOS, 2018). The surveys conform to the Uganda Standards (US) 942 (code of practice for official statistics) and the US 493 (guidelines for production of quality data) as well as conforming to relevant international standards (UBOS, 2018). The four UNPS waves used in the study were conducted in between 2013 and 2020 which cover a period of 8 years. This time frame for the study was selected not by chance but rather based on the quantity and quality of data that was readily available. These surveys are an essential source of socioeconomic data, which are then used to develop key indicators, with a special focus on the wellbeing of households. The UNPS seeks to provide a platform for experimenting with and evaluating national policies and programs, as well as produce yearly estimates in important policy areas. In addition, the UNPS produces estimates in those key policy areas.

The UNPS is an ongoing survey that covers the entire country. Its purpose is to collect data on a wide variety of factors, such as academic achievement, health status, household spending patterns, incomes of households, decisions about finances, savings and investment, credit and borrowing, conditions of housing and household characteristics, the ownership of household assets, and use of information and communication technology (ICT). The surveys give information about household structures, as well as the demographic features and the socioeconomic conditions of the households. In addition to that, details concerning one's income and the amount spent on consumption may also be obtained. In all waves, each district was considered a stratum and was divided into rural and urban sub – strata which stratification enables better spread and representation of sample, thereby increasing the efficiency of the estimates.

UNPS waves have similar designs and coverage but with varying number of modules administered. For example, some waves have separate modules for labour force and price while others did not include such modules but included labour and price related questions in the main socio – economic module. The four waves of UNPS have varying number of modules ranging from three modules (socio – economic, agriculture and community modules) to six modules (socio – economic, labour force, informal sector, community, price and qualitative modules). It is clear that all the four series have a socio – economic component/module with diverse characteristics that were necessary to answer the study objectives. Field data collection for all the series was spread over twelve month’s period to take care of seasonality factors and enable comparability.

3.10 Data Collection Instrument and Procedure

According to Burns & Grove (2003), the term "data collection" refers to the precise and effective gathering of information that is relevant to the study issues being investigated. The study used content/document analysis guide as a method of data collection. According to Oso & Onen (2008), document analysis is a tool for gathering secondary data. Because the data to be collected was secondary, document analysis was employed in this study. The researcher obtained research approval letters from Moi University to facilitate acquisition of the data from UBOS. The researcher then approached UBOS on notice seeking for permission as well as requesting for the required data sets that were used in this study. The bureau was also assured that the data was to be used purely for academic purposes and were to be treated with utmost confidentiality.

3.11 Diagnostic Tests

Diagnostic tests are useful in confirming an ideal predictive relationship between the dependent variable and the predictor variables. The study began by conducting the normality test and multicollinearity test. Thereafter, stationarity tests of the variables in the empirical panel model were conducted. This was accomplished by implementing the panel unit root tests that allow balanced panels but with time gaps. The rest of the diagnostic tests were conducted after model estimation and choice of these tests were dictated by the estimation method. The estimation methods were also dictated by the panel unit root tests results as well as the panel cointegration test results.

3.11.1 Normality Test

The normality test is one of the key requirements for linear regression. In this study, the normality test was conducted on model 1 and model 2 model specifications in which the dependent variable is continuous. The study adopted the Jarque – Bera normality test (Jarque & Bera, 1987) procedure which well accommodates large sample sizes,

unlike the Shapiro – Wilk and Kolmogorov – Smirnov normality tests which are quite sensitive in case of a relatively large sample sizes. The Jarque – Bera test calculates the Jarque – Bera asymptotic test for normality on the specified variable in level form and tests the null hypothesis that the variable is normally distributed. The Jarque – Bera statistic is calculated from the formular (Jarque & Bera, 1987);

$$JB = \frac{n}{6}\left[S^2 + \frac{1}{4}(K-3)^2\right] \quad \text{.....3.22}$$

Where

$$S = \frac{\frac{1}{n}\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^3}{\left[\frac{1}{n}\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^2\right]^{\frac{3}{2}}} \quad \text{.....3.23}$$

$$K = \frac{\frac{1}{n}\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^4}{\frac{1}{n}\left[\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^2\right]^2} \quad \text{.....3.24}$$

The Jarque – Bera statistic estimates a chi – square statistic under the null hypothesis;

H_0: there is no normality of residuals.

The hypothesis was tested at 5 percent level of significance and was rejected when the estimated chi – square statistic p – value was greater than 0.05 (p – value > 0.05, Jarque & Bera, 1987).

3.11.2 Multicollinearity Test

This test cuts across the various models that were estimated, whether FE, RE, logit or probit models. This test was conducted to find out if there were high linear relationships among the explanatory variables that would cause severe multicollinearity in the panel model. Existence of severe multicollinearity in a regression would render determination of the contribution of individual independent variables on the dependent variable difficult (Schofield *et al.,* 2015). Multicollinearity, in particular, causes an increase in

the standard errors of the coefficients, resulting in a reduction in the predictive influence of the covariates. According to Won *et al.* (2017), this is due to the fact that the variables cancel each other out. In this study, multicollinearity was investigated by estimating and examining the pairwise correlation coefficients between the independent variables in the panel regression. According to Gujarati (2003), a correlation coefficient between the independent variables that exceeds ± 0.8 is an indication of high multicollinearity in the regression. In addition, multicollinearity was also investigated using the variance inflation factors (VIFs) of the independent variables in the panel regression. The factor was calculated using the formula below (Gujarati, 2003);

$$\text{VIF} = \frac{1}{1 - R^2} \quad \text{3.32}$$

According to Gujarati (2003), VIF > 10 indicates presence of high multicollinearity of explanatory variables in the regression.

3.11.3 Unit Root Test

Like in time series, there is a risk of reporting spurious panel regression estimates if the variables in the panel model are nonstationary and non-cointegrated. It is therefore prudent to know the stationarity of variables in panel data settings. In addition, the adoption of a unit root test for a panel data can considerably lead to the enhancement in the power of the test (Levin *et al.,* 2002). As much as there are a variety of panel unit root testing procedures, the appropriateness of any method depends on the structure of the time and cross section dimensions of the panel as well as on whether there are time gaps or not.

Given that the empirical panel data was balanced panel but with time gaps, this study implemented the Fischer-type (Choi, 2001) panel unit root testing procedure which allows for both balanced and unbalanced panels and panels with time gaps. The Fischer-

type (Choi, 2001) panel unit root integrates the p-values from the panel-specific unit root tests by making use of the four approaches that were proposed by Choi (2001). The inverse Chi-square transformation, inverse normal transformation, and inverse logit transformation are the three ways that p-values are transformed when using one of these three approaches. The fourth is a variation of the inverse chi-square transformation that works well when N approaches infinity. It is suited for these situations. Regardless of whether N is finite or infinite, the inverse normal and inverse logit transformations could still be utilized. The Fisher – type statistics are given by the following set of formulae (Choi, 2001);

$$\bar{\pi} = -2\sum_{i=1}^{N} ln(\pi_i) \quad \text{.....3.25}$$

Where π_i is the p – value from the i[th] cross section and the statistic is chi square distributed with 2N degrees of freedom. The other three statistics are also given below.

$$L^* = \sqrt{KL} \quad \text{.....3.26}$$

$$K = \frac{3(5N+4)}{\pi^2 N(5N+2)} \quad \text{.....3.27}$$

$$L = \sum_{i=1}^{N} ln\left(\frac{P_i}{1-P_i}\right) \quad \text{.....3.28}$$

$$P_m = -\frac{1}{\sqrt{n}}\sum_{i=1}^{I}[lm(P_i)+1] \quad \text{.....3.29}$$

The null hypothesis was that all panels contained a unit root, and it was rejected if the majority (of the four statistics) were statistically significant, that is, the null hypothesis was rejected if the p-values of the majority of the four reported statistics were less than 0.05 (Choi, 2001).

3.11.4 Cointegration Test

Cointegration test establishes the existence or absence of long run equilibrium relationships among the variables in the empirical model. It enables the determination of long run relationships between variables in which the variables share a common stochastic trend. The cointegration tests are conducted for panel model specifications for which the dependent variable is measured quantitatively (Model 1 and Model 2). In addition, the cointegration tests are conducted on panel model specifications for which either all the panel variables are non-stationary in levels or when at least the depended variable is non-stationary in levels. This follows from the fact that cointegration should be conducted on I(d) variables where d ≠0. This is because non-stationary series tend to wander, and in fact cointegration says that non-stationary series wander together, meaning that there is a long-run equilibrium relationship among these series (Maddala & Wu, 1999).

The method of panel cointegration test adopted in this study would be based on the unit root test results on the panel variables of the empirical model (Maddala & Wu, 1999). For instance if the study found that the variables in the empirical panel model had mixed orders of integration; some were I (0) and others were I(1). Under such unit root test results, this study could have adopted the Kao panel test (Fisher, 1932; Maddala & Wu, 1999) panel cointegration test which accommodates a mix of orders of integration of panel model variables as long as the dependent variable was I (1). The Kao panel test could be calculated from the formula specified below (Maddala & Wu, 1999);

$$\hat{e_{it}} = \lambda\hat{e}_{it-1} + \sum_{j=1}^{p} \theta_j \Delta \hat{e_{it-j}} + V_{i+p} \quad \ldots\ldots 3.30$$

Under scenario four of unit root test results, the study would have adopted the Johansen Fisher (Fisher, 1932; Maddala & Wu, 1999) panel cointegration test which

accommodates a mix of orders of integration of panel model variables as long as the dependent variable is I (1) and is specified as follows;

$$P = -2\sum_{i=1}^{N} ln(P_i) \quad \text{.....3.31}$$

P is chi square distributed with 2N degrees of freedom.

3.11.5 Hausman Test

To distinguish between fixed effect and random effect models, the Hausman (1978) specification test was used. With the null hypothesis that the preferred model is the random effects against the alternative hypothesis that the preferred model is the fixed effect, the Hausman (1978) specification test commonly evaluates the appropriateness of the random effects estimator. The random effects specification was deemed suitable for individual-level effects in this study.

The Hausman (1978) specification test in this situation compares the random estimator, which is effective under the tested assumption, with the fixed effect estimate, which is known to be consistent. The null hypothesis, which states that the random estimator is the preferred model, suggests that random effects is, in fact, an effective (and reliable) estimator of the true parameters. The decision criteria for Hausman test is that the preferred model is the random effect model if the reported p – value is greater than 0.05. The Hausman statistic was calculated from the formula;

$$H = (\beta_{RE} - \beta_{FE})'[Var(\beta_{RE}) - Var(\beta_{FE})]^{-1}(\beta_{RE} - \beta_{FE}) \quad \text{.....3.33}$$

Where

$\beta_{RE}\ and\ \beta_{FE}$ are the vectors of coefficient estimates for the random and fixed effect model respectively.

At this stage, were not certain what the Huasman's specification test would choose between the RE and FE specifications (Hausman, 1978). Whatever the Hausman's specification test would favours, the study would proceed to conduct relevant diagnostic tests as presented in the subsequent sub-sections. When the Hausman test between FE and RE favored the RE specification, the study would apply the Breusch and Pagan Lagrangian multiplier test for random effects (Breusch & Pagan, 1979). This test examines the null hypothesis that there are random effects, which states that Var (u) = 0. When the Hausman test between FE and RE favored the RE specification, the study would implement the Breusch and Pagan Lagrangian multiplier test for random effects. According to Baltagi *et al.* (2008), the Breusch and Pagan Lagrangian multiplier test for random effects can also be used as a joint test to determine whether or not the RE model exhibits homoscedasticity and lack of first order serial correlation. When the p-value is lower than 0.05, it is reasonable to conclude that the null hypothesis should be rejected (Hausman, 1978).

3.11.6 Cross-Sectional Correlation Test

When the Hausman's specification test favoured the FE specification, it would be prudent to first test for Cross-sectional correlation in the fixed effects panel model. This is because the FE regression assumes independence of the errors across units (Baum, 2001). A deviation from this assumption could however arise from contemporaneous correlation of errors across units such that $E(e_{it}e_{jt}) \neq 0$ for all $i \neq j$. Due to the presence of this condition, there was going to be a cross-sectional dependency in the error terms across the units. In this study, the Breusch-Pagan LM test was performed on the assumption that cross-section error was independent of one another. According to Baum (2001), the null hypothesis suggests that the residual matrix of correlation is an identity matrix of order N, which indicates that the error terms were not linked with

one another across entities. When the p-value was less than 0.05, the researchers concluded that the null hypothesis could not be supported (Baum, 2001).

3.11.7 Heteroscedasticity Test

If the Hausman's specification test favours the FE specification and that there were cross-sectional dependence in the residuals of the FE regression, the study would go ahead to test for heteroscedasticity in the FE model by implementing the Modified Wald test for groupwise heteroskedasticity in the residuals of the FE regression, following Greene (2000). The statistic is given by the formula below;

$$W = \sum_{i=1}^{Ng} \frac{(\hat{\sigma_i^2} - \hat{\sigma^2})^2}{V_i} \quad \text{.....3.34}$$

The null hypothesis was that the variance of the errors was the same for all individuals in a group (for a given district in our case). The term "groupwise heteroskedasticity" refers to the possibility that the error process could be homoscedastic within cross-sectional units, but that the variance of the process could vary from unit to unit. For this particular reason, the "xttest3" stata command was executed. "xttest3" examines the validity of the hypothesis that "sigma2(i) = sigma" holds true for the case in which "i" equals "1, N_g," where "N_g" refers to the total number of cross-sectional units. Under the assumption that there was homoscedasticity in the data, the resulting test statistic was the distributed Chi-squared (N_g) value. When the p-value was less than 0.05, it was decided that the null hypothesis be rejected (Greene, 2000).

3.11.8 Autocorrelation Test

Again when the Hausman's specification test favours the FE specification and that there was cross-sectional dependence in the residuals of the FE regression, this study would further go on to test for autocorrelation in the FE model. In this respect, the study could implement the Inoue & Solon (2006) Lagrangian Multiplier test, the IS-test. The IS test

is a Portmanteau test for serially correlated errors in fixed effects. The IS-test tests for serial correlation of any order in the FE regression but can be restricted to consider only autocorrelation up to a certain lag. The IS-test calculates the Portmanteau test for panel serial correlation in FE regressions described in Inoue & Solon (2006) for *varlist* of e-residuals. The null hypothesis tested is of no serial correlation in the FE model. The null hypothesis was to be rejected when the p-value was less than 0.05 (Inoue & Solon, 2006).

When the study detects heteroscedastcity or serial correlation or both in FE and RE regressions, this would imply that the RE and FE estimators would not be appropriate and the study would fix the problem by estimating the empirical panel model using feasible generalized least squares (FGLS).

3.11.9 Endogeneity Test

Endogeneity is a condition in which an explanatory variable is correlated with the error term as a result of measurement mistakes, having omitted factors in the defined model, or bi-causality of explanatory and dependent variables. There can also be endogeneity as a result of having omitted variables in the model. The research utilized two estimators in the panel regression in which the dependent variable was quantitative. These estimators were the two-stage least-squares within estimator for fixed effects and the two-stage least-squares random effects estimator for random effects. This was done to address the endogeneity concerns of some independent variables, specifically farm income, non-farm income, remittance income and diversified income, which are linked to potential measurement errors in these variables. These two estimators were examples of instrumental variable (IV) estimators. The study also estimated the models with robust standard errors to cater for probable heteroscedasticity as well as the within-panel serial correlation in the idiosyncratic error term. This was done in addition

to estimating the models with traditional standard errors. The research used a panel logit model and a panel probit model for the panel model that included a binary outcome variable as the dependent variable. The logit model was estimated using the traditional panel logistic model, whereas the probit model was calculated using an instrumental variable model to address endogeniety of farm income, non-farm income, remittance income, and diversified income explanatory variables. As a result, the endogeneity problems caused by some regressors in the empirical model were not adequately addressed by the panel logistic model.

The study employed the instrumental variable estimation for the FE, RE and probit models in order to address endogeneity of the regressors: farm income, non-farm income, remittance income and diversified income. To test whether these regressors were in fact endogenous or not, the study implemented the Hausman's endogeneity test under the null hypotheses that the instrumented variables were in fact exogenous. The test works by testing whether or not there was need to use instruments in estimation. The null hypothesis was rejected if the estimated Hausman chi – square statistic was statistically significant at 5 percent level, and in this case the instrumented variables would in fact be endogenous which justifies use of instrumental variables. The study also employed the Wald test for exogeneity under the null hypothesis of no endogenous explanatory variables. In respect of the Wald exogeneity test, the null hypothesis was rejected when the estimated Wald chi – square statistic was statistically insignificant at 5 percent level.

3.11.10 Binary Models Specification Test

Hosmer-Lemeshow (Hosmer & Lemeshow, 1980) goodness-of-fit test was used to test how well the estimated model fits the observed sample in binary response panel models.

This study used this test to evaluate the goodness of fit of the estimated logit and probit models respectively. Unlike the coefficient of multiple determination which is used to indicate goodness of fit under least squares estimation, the Hosmer-Lemeshow goodness-of-fit test tests the null hypothesis that the model provides a good fit. The statistic is calculated using the formula below;

$$H = \sum_{g=1}^{G} \frac{(O_{1g} - E_{ig})^2}{N_g \prod_g (1 - \Pi_g)} \quad \ldots\ldots 3.35$$

Where,

O_{1g} – observed Y = 1 events

E_{ig} – expected Y = 1events

N_g – Total observations

π_g – predicted risk for the g^{th} risk decile group

G – number of groups.

The statistic asymptotically follows a chi square distribution with (G – 2) degrees of freedom. The Hosmer-Lemeshow goodness-of-fit output returns a chi-square value (a Hosmer-Lemeshow chi-squared) and a corresponding p-value. Small p-values ($p < 0.05$) mean rejection of the null hypothesis.

This study however utilized panel data, which makes the implementation of the Hosmer-Lemeshow goodness-of-fit test invalid. Instead, the study relied of the Wald Chi-square test on significance of the entire regression model, which tests the null hypothesis that the entire model is insignificant (or all the model coefficients are simultaneously equal to zero). The null hypothesis is rejected if the reported p-value is less than the significance level.

3.12 Estimation of Parameters

In this section, the statistical estimating approaches that were used in the data analysis to accomplish the goals that were established and to test the hypotheses are discussed. In order to organize the data and conduct the statistical analysis, the Stata statistical software, version 16, was utilized. In the first instance, any and all observations that were missing were disregarded until the sample size became stable in each wave, and duplicates were also taken out of the equation. Thereafter, all the waves of the UNPS datasets were merged to create a single panel data set. This study implements estimation procedures for panel regression models. The choice of estimation methods has particularly been determined by two main factors: (i) on whether the dependent variable was measured quantitatively or qualitatively and (ii) on whether endogenous regressors were suspected in the regression model being estimated or not. More specifically Model 1 and model 2, whose household welfare proxy dependent variables were measured quantitatively and where endogenous regressors were suspected, were estimated by the instrumental variable fixed effects and instrumental variable random effects estimator. Model 3 and model 4 whose household welfare proxy dependent variable were measured qualitatively were estimated by the instrumental variable probit model and the logistic regression. The effect of FINC, NFINC, REMIT and DIVINC on welfare were captured by β_1, β_2, β_3 and β_4 the coefficients of interest. The parameters of interest were estimated in this study using instrumental variable fixed effect, instrumental variable random effect two stage least squares (2SLS) regression models, instrumental variable probit and logit models as specified below;

When consumer expenditure (CONSEXP) is used as a proxy measure for family welfare, the empirical model known as the Fixed Effect (FE) model is model 1, and its specifications are as follows:

$$Log(CONSEXP)_{it} = \beta_{0i} + \beta_1 Log(FINC)_{it} + \beta_2 Log(NFINC)_{it} +$$

$$\beta_3 Log(REMIT)_{it} + \beta_4 Log(DIVINC)_{it} + \mu_{it} \text{.....3.36}$$

On the other hand, when the consumption expenditure (CONSEXP) is used as a proxy measure for a household's wellbeing, the study thus specify the Random Effects (RE) empirical panel model (model 2) as follows:

$$Log(CONSEXP)_{it} = \beta_0 + \beta_1 Log(FINC)_{it} + \beta_2 Log(NFINC)_{it} +$$

$$\beta_3 Log(REMIT)_{it} + \beta_4 Log(DIVINC)_{it} + \alpha_i + \mu_{it} \text{..... 3.37}$$

The third panel model that will be used for the empirical analysis in this study is designated as the LOGIT panel model. In this model, the dependent variable is evaluated qualitatively, and the estimates are derived using logistic regression. The proxy variable for household welfare is poverty status (POV). Let POV=1 if the household in the ith district lives above the poverty line. The study developed a cumulative logistic regression equation as:

$$P_i = E(POV = 1) = \frac{e^z}{(1+e^z)} \text{..... 3.38}$$

where $Z = X\beta$. X is a vector of all the observed explanatory variables that affect household welfare and β is a vector of model coefficients. P_i represents the probability that the household in the ith district lives above the poverty line and this household is considered to enjoy a better welfare. P_i is nonlinearly related to $Z = X\beta$ and β is a vector of all model parameters.

If P_i in 3.14 is the probability that the household in the ith district lives above the poverty line (and thus lives a better welfare), it follows that $(1 - P_i)$ is the probability that the household in the ith district lives below the poverty line (and thus lives a poor welfare) such that:

$$1 - P_i = E(POV = 0) = \frac{1}{1+e^z} \text{.....3.39}$$

Considering 3.37 and 3.38, it follow that:

$$\frac{P_i}{1-P_i} = \frac{1+e^{Z}}{1+e^{-Z}} = e^{Z} = e^{X\beta} \quad \text{.....3.17}$$

The left hand side of 3.17 is the odds ratio in favour of the household in the ith district that lives above the poverty line or the household in the ith district that lives a better welfare.

Note that in equation 3.17, P_i is nonlinearly related to both X and β. To make equation 3.17 linear in parameters, β and in explanatory variables, *X*, the natural logarithms is taken on both sides of 3.17 such that:

$$L_i = Ln\left(\frac{P_i}{1-P_i}\right) = Ln\left(e^{Z}\right) = Z = X\beta \quad \text{.....3.18}$$

Where *L* is the log of the odds ratio, or simply the logit model. Considering all the explanatory variables in the other forms of the empirical models earlier specified in equations 3.35 - 3.37, the Logistic regression form of the empirical model is specified as:

$$Log\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_1 Log(FINC)_{it} + \beta_2 Log(NFINC)_{it} + \beta_3 Log(REMIT)_{it} +$$

$$\beta_4 Log(DIVINC)_{it} + \mu_{it} \text{.....} \quad 3.42$$

Panel model 4 in this study is stated as PROBIT panel model, which is constructed and estimated to compare the estimates from the logistic regression. The study specified the empirical model as a probit regression by first developing a cumulative Gaussian normal distribution as follows:

$$P_i = E(POV = 1) = \phi(X\beta) \text{.....3.43}$$

φ is the cumulative standard distribution. Similar to the logistic distribution function, φ also transforms the regression into the interval (0, 1). Considering all the explanatory

variables in the other forms of the empirical models earlier specified in equations 3.35 – 3.37, the probit regression form of the empirical model was specified as:

$$P_i = E(POV = 1) = \phi(\beta_0 + \beta_1 Log(FINC)_{it} + \beta_2 Log(NFINC)_{it} + \beta_3 Log(REMIT)_{it} + \beta_4 Log(DIVINC)_{it} + \mu_{it} \quad \text{3.44}$$

3.13 Ethical Considerations

According to Yin (2011), one of the most important considerations in the planning stage of social research is ethics. According to Saunders *et al.* (2009), ethics pertain to the appropriateness of one's behavior in regard to the rights of others who become subjects of one's work or are influenced by it. Saunders *et al.* (2009) further added that research ethics relate to the way we formulate and clarify the study topic, design the research and gain access, collect data, process and store data, analyze data, and write up the research results. A researcher has a duty to disclose the findings in a complete and correct manner (Yin, 2011). These are some of the ethical factors that must be taken into account.

The study employed secondary data collected from UBOS which was stored in a manner compliant with the ethical standards of the university and used discretely for that purpose. A copy of introductory letter from Moi University, School of business and economics was availed to Uganda Bureau of Statistics (UBOS) for identification purposes on approaching the bureau to acquire the data. The body (UBOS) was assured that the study was purely for academic purposes with no intention of affecting their data, and or reputation of the organization in any negative way.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Overview

The findings of the statistical analysis that was conducted for this study are discussed in this chapter. The findings have been presented in the form of tables and figures for the purpose of facilitating a clearer comprehension of the relative importance of the various factors and the nature of their interrelationships. The chapter is organized into the following sections: It begins with presentation of descriptive statistics on key study variables. Next, the pre-model estimation diagnostic tests (such as normality test, multicollinearity test and panel unit root test) are conducted and summary results displayed and interpreted. Regression estimates are then presented together with relevant post-model estimation diagnostic test results.

4.2 Descriptive Statistics

The key study variables are household consumption expenditure (CONSEXP) and household poverty status (POV) which are the proxy variable for household welfare. Other key study variables are the farm income (FINC), non-farm income (NFINC), remittance income (REMIT) and diversified income (DIVINC). The descriptive statistics are displayed on these variables in their original units. The most important of these descriptive statics displayed are the mean values, minimum values, maximum values and standard deviation.

4.2.1 Household Consumption Expenditure and Household Poverty Status

In this study, household annual consumption expenditure (CONSEXP) and household poverty status (POV) were employed as two proxies to measure household welfare. The most recent four waves of the Uganda National Panel Surveys provide the key descriptive statistics on household annual consumption expenditure, which are given

in Table 4.1. The key descriptive statistics on household poverty, which are also shown by the most recent four waves of the Uganda National Panel Surveys, are presented in Table 4.2.

Table 4.1: Household Consumption Expenditure (CONSEXP - figures are in Ug. Shs)

Wave	Mean	Minimum	Maximum	Std.dev.
2013/2014	5,323,503	368,501	9.66e+07	5,162,845
2015/2016	351,725	22,786	1.03e+07	391,208
2017/2018	4,412,815	234,177	3.62e+08	9,137,697
2019/2020	5,290,936	492,775	6.87e+07	5,084,346
Overall	**3,775,661**	**22,786**	**3.62e+08**	**6,144,725**

Total number of observations: 9,943

Source: Author (2023)

According to the descriptive statistics on household annual consumption expenditure (CONSEXP) displayed in Table 4.1, the overall mean annual household consumption expenditure over the four waves for all households was approximately three million seven hundred and seventy-five thousand Ugandan Shillings (i.e. approximately 3,775,000/=). This figure was determined by taking the average of each wave's results. The analysis of raw data indicates that the minimum mean annual household consumption expenditure was recorded in wave 2015/2016 of UNPS. This minimum mean annual household consumption expenditure was approximately Ug.Shs. twenty-two thousand eight hundred (i.e. approximately 22,800/=), and it was found that this minimum mean annual household consumption expenditure was recorded over the waves that were studied. On the contrary hand, the highest mean annual household consumption expenditure over the waves studied was approximately Ug.Shs. three hundred and sixty-two million (i.e. approx. 362,000,000/=), and the analysis of raw data indicates that this maximum mean annual household consumption expenditure was recorded in wave 2017/2018 of UNPS. This maximum mean annual household

consumption expenditure was approximately equal to three hundred and sixty-two million Ugandan Shillings. The descriptive statistics in Table 4.1 further indicate that the largest standard deviation in the mean annual household consumption expenditure was approximately Ug.Shs nine million one hundred and thirty seven thousand (i.e. approx.. 9,137,000//=) and which was recorded in wave 2017/2018. This suggests that the highest disparities in annual consumption expenditures among household was in 2017/2018 wave of UNPS compared to the other waves studied. The descriptive statistics in Table 4.1 also show that smallest standard deviation in the mean annual household consumption expenditure was approximately Ug.Shs three hundred and ninety one thousand (i.e. approx. 391,000/=) and which was recorded in the wave 2015/2016, suggesting that the lowest disparities in annual consumption expenditures among household was in 2015/2016 wave of UNPS.

Table 4.2: Household Poverty Status (POV) (Figures indicated are counts, percentages

Wave	Non-Poor	Poor
2013/2014	1,898	551
	(19.09%)	(5.54%)
2015/2016	2,171	461
	(21.83%)	(4.64%)
2017/2018	1,974	470
	(19.85%)	(4.83%)
2019/2020	2,192	226
	(22.05%)	(2.27%)
Overall	**8,235**	**1,708**
	(82.82%)	**(17.18%)**
Pearson Chi-sq. = 160.4228* Pr. = 0.000**		
Total number of observations: 9,943		

*** indicates significance at 1 percent level.
Source: Author (2023)

The descriptive statistics on poverty status of households summarized in Table 4.2 show that across the four waves studied, a total of eighty thousand two hundred and thirty-five households (i.e. 8,235 households) were categorized as non-poor, and this formed the majority of the households at 82.82 percent. On the other hand, the

descriptive statistics in Table 4.2 indicate that across the four waves studied, a total of one thousand seven hundred and eight (i.e. 1,708 households) were categorized as poor, and this was the minority of the households at 17.18 percent. Thus, the descriptive statistics in Table 4.2 indicate that the average poverty rate among households across the four waves studied was approximately 17 percent. The descriptive statistics on household poverty status displayed in Table 4.2 further show that out of the total non-poor households across the four waves, the majority of these (i.e. approximately 22%) were recorded in wave 2019/2020 of the UNPS. On the other hand, the descriptive statistics in Table 4.2 show that of the total poor households across the four waves, the majority of the poor households were recorded in wave 2013/2014 of the UNPS at approximately 5.5 percent.

Household welfare formed the dependent variable and had two proxies: household consumption expenditure and household poverty status. The descriptive statistics indicate that the average annual household consumption expenditure was highest in the 2013/2014 wave of the UNPS and was lowest in the 2015/2016 wave. Comparing the mean annual household consumption expenditure between the most recent wave and earliest wave, the descriptive statistics indicate that mean annual consumption expenditure reduced from the earliest wave of 2013/2015 (mean HH CONSEXP was 5,323,503/=) to the latest wave of 2019/2020 (mean HH CONSEXP was 5,290,936/=), suggesting that on average, households in Uganda were on average better off in 2013/2014 compared to 2019/2020.

4.2.2 Farm Income, Non-Farm Income, Remittance Income and Diversified Income

There are four key independent variables which this study considered as the focus independent variables, namely: Farm income (FINC), non-farm income (NFINC),

remittance income (REMIT) and diversified income (DIVINC). All the four components of household income formed key independent variables and were measured quantitatively. Table 4.3 displays the key descriptive statistics on the four key independent variables.

Table 4.3: Farm Income, Non-Farm Income, Remittance Income and Diversified Income

Variable: Farm Income (FINC)				
Wave	**Mean**	**Minimum**	**Maximum**	**Std.dev.**
2013/2014	160,486	0	7,110,000	608,253
2015/2016	965,406	8,600	6,135,134	1,114,595
2017/2018	775,178	4,300	6,564,000	1,109,144
2019/2020	173,849	2,900	645,000	151,401
Sub-Total	**302,910**	**0**	**7,110,000**	**784,085**
Variable: Non-Farm Income (NFINC)				
Wave	**Mean**	**Minimum**	**Maximum**	**Std.dev.**
2013/2014	3,121,287	10,000	2.18e+07	2,849,344
2015/2016	2,594,479	9,700	2.55e+07	2,651,065
2017/2018	3,662,805	21,800	2.17e+07	3,558,202
2019/2020	211,619	4,900	602,000	154,988
Sub-Total	**3,015,507**	**4,900**	**2.55e+07**	**3,016,010**
Variable: Remittance income (REMIT)				
Wave	**Mean**	**Minimum**	**Maximum**	**Std.dev.**
2013/2014	168,347	0	7.24e+06	520,538
2015/2016	128,232	0	5.41e+06	
2017/2018	207,339	0	6.25e+06	540,589
2019/2020	217,339	0	6.35e+06	550,589
Sub-Total	**221,464**	**0**	**2.17e+06**	**549,083**
Variable: Diversified Income (DIVINC)				
Wave	**Mean**	**Minimum**	**Maximum**	**Std.dev.**
2013/2014	173,363	0	1.90e+07	1,034,524
2015/2016	137,261	0	1.61e+07	875,384
2017/2018	290,270	0	2.12e+07	1,324,084
2019/2020	1,730,068	0	1.81e+07	2,880,101
Sub-Total	**271,678**	**0**	**2.12e+07**	**1,278,128**

Source: Author (2023)

The descriptive statistics presented in Table 4.3 indicate that the mean annual household farm income across all four waves studied was approximately Ug. Shs. 320,900 (i.e. approx. 902,900/=), of which the highest mean annual household farm income was recorded in the 2015/2016 wave of the UNPS at an annual mean value of approximately 965,400 (i.e. approx. 965,400/=), and the lowest mean annual household

farm income was recorded in the 2011/2012 wave of the UNPS at In the 2013/2014 wave of the UNPS, the least mean annual household farm income reported was zero, while the greatest mean annual family farm income recorded was Ug. Shs seven million one hundred eleven thousand. Both of these figures were recorded in Uganda.

When it comes to income from non-farm sources, the descriptive data in Table 4.3 show that the average yearly income from non-farm sources for households over all four waves of research was around three million and fifteen thousand Ugandan shillings (that is, roughly 3,015,000/=). The highest mean annual household non-farm income was reported in the 2017/2018 wave of the UNPS as roughly Ug. Shs three million six hundred and sixty-two thousand (i.e. about 3,662,000/=). The 2019/2020 wave of the UNPS reported the lowest mean annual household non-farm income, which was about two hundred and eleven thousand six hundred Ugandan Shillings (i.e. roughly 211,600/=). This figure represents the lowest level ever recorded. This information was recorded in the 2019/2020 wave of the UNPS. The maximum mean annual household non-farm income was approximately Ug. Shs twenty-five million five hundred thousand (25,500,000/=), and this information was recorded in the 2015/2016 wave of the UNPS. The minimum mean annual household non-farm income was 4,900, and this was recorded in the 2019/2020 wave of the UNPS.

The descriptive statistics shown in Table 4.3 suggest that the mean annual household remittance income over all four waves investigated was about two hundred twenty-one thousand Ugandan Shillings (that is, around 221,000/=). This figure was derived from the analysis of remittance data. According to the results of the 2019/2020 wave of the UNPS, the highest mean annual family remittance income was about two hundred twenty-seven thousand Ugandan shillings (i.e. roughly 217,000/=). The

lowest mean annual family remittance income was around one hundred twenty-eight thousand Ugandan Shillings (i.e. roughly 128,000/=), and this was documented in the wave of the UNPS that occurred in 2015/2016. The minimum annual household remittance income was 0 and this zero-remittance income was recorded as the minimum value in every wave of the UNPS. This result suggests that in each wave, there was at least one household that was not receiving remittance income, that is, there were some households in each wave that were not earning any remittance income. The maximum annual household remittance income was approximately seven million two hundred and forty thousand (7,240,000/=).

Considering the household diversified incomes, the descriptive statistics in Table 4.3 show that the mean annual household diversified income across the four waves studied was approximately Ug. Shs two hundred and seventy-one thousand seven hundred (i.e. approx.271, 700/=) of which the largest mean annual household diversified income was registered in the 2019/2020 wave of the UNPS at approximately one million seven hundred and thirty thousand (i.e. approx. 1,730,000/=) and lowest mean annual household diversified income was registered in the 2015/2016 wave of the UNPS at only approximately one hundred and thirty-seven thousand (i.e. approx. 137,000/=). The descriptive data on diversified mean annual household income demonstrate that there are large discrepancies in the family's diversified incomes over the four waves of the UNPS. The total standard deviation in the household's diversified income across all four waves was 1,278,128 Ugandan Shillings. The descriptive statistics in Table 4.3 also indicate that the minimum household diversified income was zero and this zero diversified income was recorded as the minimum value in every wave of the UNPS. This result suggests that in each wave, there was at least one household that was not getting any

diversified income, that is, there were some households in each wave who were not earning any passive income which was over and above either farm income or non-farm income. Lastly, the descriptive statistics included in Table 4.3 show that the highest annual household diversified income was around twenty-one million two hundred thousand Ugandan shillings; this information was obtained from the UNPS wave 207/2018. This was reported in the year 2018.

Four independent variables were considered in this study for analysis, that is: the farm income, the non-farm income, remittance income and the diversified income. In the first place, the descriptive statistics indicated that the mean annual incomes from each of the four different components of household income differed quite substantially across the waves. For instance, the mean annual household income from non-farm activities was approximately ten-fold the mean annual household income from farm activities, suggesting that household on average derived much bigger incomes from non-farm activities than from farm activities. Secondly, the descriptive statistics indicated that households earned the lowest mean annual incomes from the diversified incomes activities which formed their residual income sources. This suggests that on average Ugandan households derive most of their incomes from the active income sources (farm and non-farm activities) compared to household incomes from passive or residual income generating activities.

4.3 Diagnostic Estimation Tests

In this study, a number of diagnostic tests were conducted that included; test for normality, multicollinearity test, unit root test, fixed effects – random effects test, (Hausman test), endogeneity test, instruments choice test and model goodness of fit test.

4.3.1 Normality Test

The study conducted the normality test on the transformed dependent variables which was quantitatively measured. Table 4.4 shows the normality test results on "LOGCONSEXP" variable from the Jarque-Bera normality (Jarque and Bera, 1987) testing procedure. The null hypothesis is that "LOGCONSEXP" is normally distributed. The Jarque-Bera normality test was augmented with the normal plot of "LOGCONSEXP" to further the analysis. Table 4.4 shows the normality test results from the Jarque-Bera test on the dependent variable which is log-transformed and Figure 3 shows the normal plot of the same variable.

Table 4.4: Normality test results on logarithm of consumption expenditure

Jarque-Bera test for normality	Estimated statistic value
p-value	0.6179
Chi-square statistic	0.7675
Null hypothesis: LOGCONSEXP is normally distributed.	

Source: Author (2023)

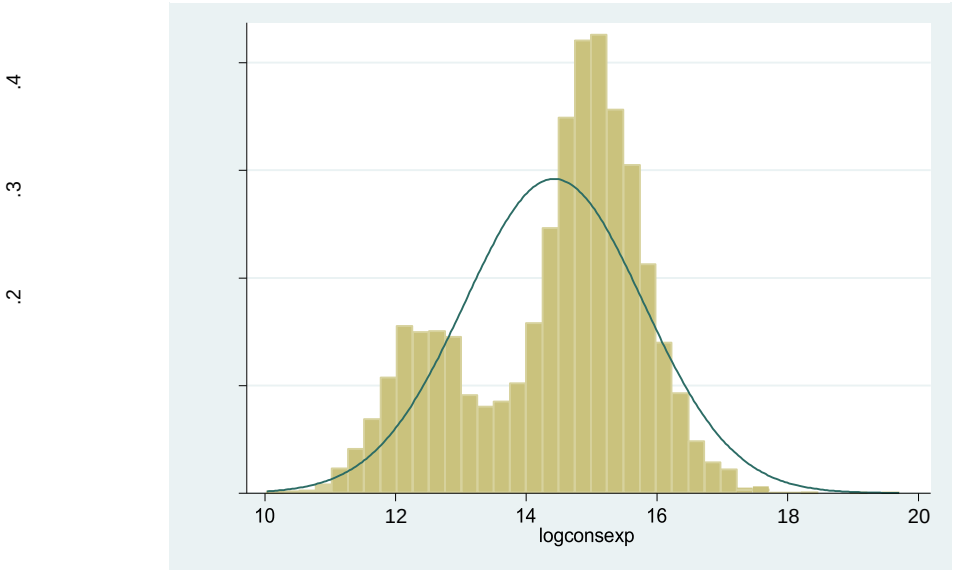

Figure 4: Normal Plot of logarithm of consumption expenditure
Source: Author (2023)

The results of the Jarque-Bera normality test are presented in Table 4.4. These findings imply that the chi-square statistic is statistically insignificant, with a corresponding p-value that is greater than 0.05. The findings of the test do not provide evidence to contradict the null hypothesis that "LOGCONSEXP" follows a normal distribution. In addition, the normal plot displayed in Figure 3 gives the impression that the LOGCONSEXP variable follows a distribution that is close to normal. As a result, the study arrived to the conclusion that the "LOGCONSEXP" dependent variable, which is used in both model 1 and model 2, follows a normal distribution. The findings of such a normality test are compatible with a good number of the parametric econometric estimate approaches for linear regression.

4.3.2 Multicollinearity Test

This study investigated multicollinearity by estimating and examining the pairwise correlation coefficients between the independent variables in the panel regression. The estimated correlation coefficients between the independent variables that exceed ± 0.8 would be an indication of high multicollinearity in the regression. Table 4.5 shows the estimated pairwise correlation matrix for all the model variables.

Table 4.5: Pairwise Correlation Matrix for all Model Variables

	LOGCONSEXP	POV	LOGFINC	LOGNFINC	LOGDIVINC	LOGREMIT
LOGCONSEXP	1.0000					
POV	-0.3707**	1.0000				
	(0.0000)					
LOGFINC	-0.5149	0.1597	1.0000			
	(0.0000)	(0.0000)				
LOGNFINC	0.3654**	-0.2041**	-0.2376**	1.0000		
	(0.0000)	(0.0000)	(0.0000)			
LOGDIVINC	0.2125**	-0.0876**	-0.0086**	0.0058**	1.0000	
	(0.0000)	(0.0183)	(0.7177)	(0.8758)		
LOGREMIT	0.0495**	-0.1005**	0.0201**	-0.0444**	0.1207**	1.0000
	(0.1824)	(0.0068)	(0.5896)	(0.2325)	(0.0011)	

** Correlation is significant at 0.05 level (2 – tailed)

Source: Author (2023)

Results from table 4.5 indicate absence of multicollinearity since all of them are below the 0.8 threshold (Gujarati, 2003). In addition, the study augmented the correlation between independent variables with variance inflation factors (VIFs). A given independent variable with a VIF > 10 would cause high multicollinearity. Table 4.6 show the VIFs of each of the independent variables in the model.

Table 4.6: VIFs for Independent Variables

Variable	VIF	1/VIF
LOGFINC	1.05	0.947981
LOGNFINC	1.05	0.947981
LOGREMIT	1.00	0.999600
LOGDIVINC	1.00	0.999600

Source: Author (2023)

In agreement with the pairwise correlations between regressors, the VIF matrix indicates that none of the independent variables has a VIF > 10. This suggests that the included independent variables in the empirical model are not highly linearly correlated, and do not pose the multicollinearity problem. It is therefore obvious that multicollinearity is not a problem in the model specifications.

In line with Hair *et al.* (2014), the study utilized Pearson's correlation coefficient to test for any linear association between study variables. The study findings in table 4.5 indicated a negative and statistically insignificant relationship between farm income and consumption expenditure ($r = -0.51$, $p < 0.05$). The findings also revealed a positive and statistically insignificant relationship between farm income and poverty status of the household ($r = 0.16$, $p < 0.05$). This implies that there exists an insignificant relationship between farm income welfare of households.

Table 4.5 results also revealed that there exists a significant positive relationship between non-farm income and consumption expenditure of households ($r = 0.37$, $p < 0.05$). These results imply that there is a 0.37 likelihood of enhancing consumption

expenditure as non-farm income increases. The findings show that the relationship between non-farm income and poverty status of the household was negative and statistically significant ($r = -0.20$, $p < 0.05$). These findings imply that an increase in non-farm income would increase the possibility of a household escaping from poverty while a decline in household non – farm income would result into increase in the possibility of a household sliding back to the poverty cycle. Accordingly, non-farm income had a positive and statistically significant relationship with household welfare.

The findings in table 4.5 also revealed that there exists a positive and statistically significant relationship between remittance income and consumption expenditure of households ($r = 0.05$, $p < 0.05$). These results imply that there is a 0.05 likelihood of boosting consumption expenditure as remittance income increases. The findings in table 4.5 show that the relationship between remittance income and poverty status of the household was negative and statistically significant ($r = -0.10$, $p < 0.05$). These findings imply that an increase in remittance income would increase the possibility of a household escaping from poverty while a decline in household remittance income would result into increase in the possibility of a household sliding back to the poverty cycle. Consequently, remittance income had a positive and statistically significant relationship with household welfare.

Table 4.5's results also revealed that there exists a significant positive relationship between diversified income and consumption expenditure of households ($r = 0.21$, $p < 0.05$). These results imply that an increase in diversified income results into an increase in consumption expenditure while a decrease in diversified income would lead to reduced consumption expenditure. The findings further show that the relationship between diversified income and poverty status of the household was negative and statistically significant ($r = -0.09$, $p < 0.05$). These results imply that an increase in

diversified income would increase the possibility of a household escaping from poverty while a decline in household diversified income would result into increase in the possibility of a household sliding back to the poverty cycle. Thus, diversified income had a positive and statistically significant relationship with household welfare.

4.3.3 Unit root test

The study performed the unit roots on model variables that are measured quantitatively but not on model variables that are categorical in nature. This is because categorical variables do not have defined mean and variance, yet stationarity is concerned with whether the mean and variance of a given variable change over time. Consequently, all variables that are categorical in nature are known a priori to be stationary in levels.

This study adopted the Fisher-type (Choi, 2001) panel unit root test procedure because the test accommodates unbalanced panels and panel data sets with time gaps which suits the empirical panel data that this study set has for empirical analysis. This panel unit root testing procedure reports four statistics, and reject or do not reject the null hypothesis depending on the majority of the reported statistics which are statistically significant at 5 percent level of significance. Table 4.7 gives the summary of the stationarity results on all the model variables.

Table 4.7: Panel Unit Root Test Results

Variable	Statistic	Estimated Statistic	p-value	Order of integration
Logarithm of consumption expenditure (*LOGCONSEXP*)	Inverse chi-sq.	288.3492	0.0000	I (0)
	Inverse normal	-16.2518	0.0000	I (0)
	Inverse logit, t	-40.6370	0.0000	I (0)
	Modified inv. chi-sq.	70.0873	0.0000	I (0)
Logarithm of farm income (*LOGFINC*)	Inverse chi-sq.	88.0925	0.0000	I (0)
	Inverse normal	-6.1577	0.0000	I (0)
	Inverse logit, t	-13.9200	0.0000	I (0)
	Modified inv. chi-sq.	20.0231	0.0000	I (0)
Logarithm of non-farm income (*LOGNFINC*)	Inverse chi-sq.	120.7002	0.0000	I (0)
	Inverse normal	-9.6260	0.0000	I (0)
	Inverse logit, t	-19.7659	0.0000	I (0)
	Modified inv. chi-sq.	33.1111	0.0000	I (0)
Logarithm of Diversified income (*LOGDIVINC*)	Inverse chi-sq.	217.1982	0.0000	I (0)
	Inverse normal	-12.0280	0.0000	I (0)
	Inverse logit, t	-30.3324	0.0000	I (0)
	Modified inv. chi-sq.	52.2995	0.0000	I (0)
Logarithm of Remittance (*LOGREMIT*)	Inverse chi-sq.	262.2932	0.0000	I (0)
	Inverse normal	-15.3687	0.0000	I (0)
	Inverse logit, t	-36.9650	0.0000	I (0)
Categorical variable		-	-	I (0)
Poverty status of the household (*POV*)		-	-	

Source: Author (2023)

The findings of the unit root test are presented in Table 4.7. These results suggest that the null hypothesis, which states that all panels have a unit root for all non-categorical variables included in the empirical model, is not supported by any of the four estimated statistics of the Fisher-type (Choi, 2001). In the case of the categorical variables, it is known a priori that these variables do not change their level throughout time. The findings of the panel unit root test that are given in Table 4.7 imply, therefore, that all of the model variables are stationary in levels, and as a result, they are integrated of order zero, I (0).

4.3.4 Panel Cointegration Test

As a consequence of the findings of the unit root tests presented in Table 4.7, which showed that all of the model variables remained unchanged in their values, the prerequisites for a cointegration test cannot be satisfied. As a result, the cointegration

hypothesis will not be investigated further in this study. This is due to the fact that the cointegration test ought to be carried out on panel model specifications for which either all of the panel variables should be non-stationary in levels or when at least the dependent variable ought to be non-stationary in levels. Both of these conditions should be met. Due to the fact that all of the model variables were discovered to have I (0) values, the aforementioned criteria for the cointegration test were not satisfied in this study.

4.3.5 Fixed Effect – Random Effect Test

The study performed the fixed effects – random effects test to choose between the fixed effects model and the random effects model. This study adopted the Hausman test procedure to choose between fixed effect model and random effects model. The Hausman testing procedure reports the chi-square statistics under the null hypothesis the random effects model in appropriate which is tested at 5 percent level of significance. Table 4.8 gives the summary of the FE – RE test results.

Table 4.8: Fixed Effect – Random Effect Test

Hausman test for FE – RE	Estimated statistic value
p-value	0.0000
Chi-square statistic	856.48
Null hypothesis: Random effect is appropriate.	

Source: Author (2023)

The estimated Hausman chi-square statistic in Table 4.8 rejects the null hypothesis in favor of the alternative hypothesis at the 5 percent level of significance (Hausman chi-square = 856.48; p = 0.0000 0.05). This indicates that the alternative hypothesis is more plausible than the null hypothesis, which states that the preferred model is the random effects estimator. Based on the findings of the Hausman test, it appears that a model with fixed effects is able to appropriately represent the individual-level effects

investigated in this work. As a consequence of this, estimates derived from the fixed effects model are going to be the primary focus of the interpretation and discussion of the results.

4.3.6 Endogeneity Test

The study performed the endogeneity test to check if the explanatory variables are correlated with the error term. This study adopted the Wald test procedure for endogeneity. The Wald testing procedure reports the chi-square statistics under the null hypothesis that there is no endogeneity of the explanatory variables which is tested at 5 percent level of significance. Table 4.9 gives the summary of the endogeneity test results.

Table 4.9: Endogeneity Test Results

Wald test for endogeneity	Estimated statistic value
p-value	0.0000
Chi-square statistic	34.58
Null hypothesis: No endogeneity of explanatory variables.	

Source: Author (2023)

The findings in table 4.9 on the Wald exogeneity test (also known as the test for no endogeneity) show that the p-value of the chi-square statistic is less than the significance level of 5% (chi-square = 34.58; p-value = 0.0000 0.05). These findings indicate that there is no endogeneity in the data. As a consequence of this finding, the alternative hypothesis—the one that assumes there is endogeneity—has been shown to be incorrect at the 5% significance level. Therefore, the Wald exogeneity test implies that the instrumental variable probit should be used, which means that it was necessary to make use of instruments in estimation, which again shows that the instrumented regressors were in fact endogenous. This is because there was a need to utilize instruments in estimation.

4.3.7 Test for Exogeneity of Instrumented Variables

The study performed an exogeneity test of the instrumented variables (LOGFINC, LOGNFINC, LOGREMIT and LOGDIVINC). This study adopted the Hausman test procedure for exogeneity. The Hausman testing procedure reports the chi-square statistics under the null hypothesis that the instrumented variables are exogenous which is tested at 5 percent level of significance. Table 4.10 gives the summary of the exogeneity test results.

Table 4.10: Test for exogeneity of Instrumented Variables

Hausman test of exogeneity	
p–value	0.0005
Null hypothesis: Instrumented variables are exogenous.	

Source: Author (2023)

The instrumented variables are assumed to be exogenous in the absence of evidence to the contrary in the null hypothesis of Hausman's exogeneity test. The summary estimates of this test can be seen in Table 4.10, and they show that the related chi-square statistic has a lesser p value than the significance level of 5 percent (Prob > chi-square = 0.0005). This indicates that the null hypothesis was wrong, and it led to the rejection of the alternative hypothesis. The Hausman's test results thus suggest that the instrumented variables are in fact endogenous. The Hausman's test results therefore agree with the Wald exogeneity test results in the sense that they both support the use of instruments in the probit estimation, that is to say, there is indeed presence of endogenous regressors in the model being estimated.

4.4 Regression Results

In the study, the two-stage least-squares within estimate was used for determining the impacts of fixed variables, while the two-stage least-squares random-effects estimator was used to determine the effects of random variables. Both estimators were used in

the panel regression, which had a quantitative dependent variable. In order to adjust for any potential heteroscedasticity and the within-panel serial correlation in the idiosyncratic error component, the models were estimated with robust standard errors. Table 4.11 and Table 4.12 show the summary regression estimates for models 1 and 2, respectively, in which the logarithm of the household's consumption expenditure was used as a measure of household welfare. Table 4.12 also shows the summary regression estimates for models 3 and 4, respectively, in which the poverty status of the household head was used as a measure of household welfare. Table 4.11 and Table 4.12 are presented below.

Table 4.11: Regression Results for Static Panel Model

Independent Variables:	**Model 1** **2SLS Fixed-Effects IV regression (robust SEs in parentheses)**	**P-Value**	**Model 2** **2SLS Random-Effects IV regression (robust SEs in parentheses)**	**P-Value**
Logarithm of farm income	0.014527 (0.0047065)	0.082	0.061005 (0.0655708)	0.352
Logarithm of non-farm income	0.262181*** (0.0073943)	0.000	0.297840 *** (0.0476895)	0.000
Logarithm of diversified income	0.071074*** (0.0016337)	0.000	0.069383*** (0.0004570)	0.000
Logarithm of remittance	0.011652*** (0.0032786)	0.000	0.011797*** (0.0035849)	0.000
	Wald = 97097.11*** Wald prob. > chi-sq.= 0.0000 Within R^2 = 0.483; Between R^2 = 0.356; Overall R^2 = 0.42		Wald = 1710000*** Wald prob. > chi-sq.= 0.0000 Within R^2 = 0.490; Between R^2 = 0.209; Overall R^2 = 0.342	
Instrumented: logfinc lognfinclogremit logdivinc Instruments: agr_wge nonagr_wgonfarmincome nonfarmincome				

*, **, *** represent significance at 10%, 5% and 1% levels respectively.

Source: Author (2023)

On the effect of farm income on household welfare, regression estimates from the preferred fixed effects model, as shown in Table 4.11, indicate that the estimated partial slope coefficient on logarithm of farm income is positive and statistically insignificant at 5 percent level ($\beta = 0.014527, p = 0.082 > 0.05$). Estimates from the random effects model also indicate that the estimated partial slope coefficient on logarithm of

farm income is positive and statistically insignificant at 5 percent level of significance. The insignificance of the estimated coefficient on farm income suggests that farm income does not have a significant effect on household welfare. On the basis of the estimates of preferred fixed model, farm income does not help explain variations in household welfare when consumption expenditure is used as a measure of household welfare.

The regression estimates shown in Table 4.11 reveal, with regard to the influence of non-farm income on the well-being of households, that the estimated partial slope coefficient on the logarithm of non-farm income is positive and statistically significant at the 5% level of significance. This is the case in both model 1 and model 2, as can be seen in the table. Taking into account the estimates that come from the preferred fixed effect model, it has been found that when consumption expenditure is used as a proxy for household welfare, an increase of one percent in a household's non-farm income results in an increase of approximately 0.26 percent in the household's overall welfare. This is the case even when all other factors are held constant($\beta = 0.262181, p = 0.000 < 0.05$). This result means that non-farm income is an important predictor of household welfare. The estimates also mean that variations in households' non-farm income can help to explain variations in households' welfare.

On the effect of remittance income on household welfare, regression estimates in Table 4.11 show that, in both model 1 and model 2, the estimated partial slope coefficient on logarithm of remittance income is positive and statistically significant at 5 percent level of significance. Considering the estimates from the preferred fixed effect model, estimates indicate that when consumption expenditure is used as a proxy of household welfare, a one percent increase in household's remittance income enhances the household's welfare by approximately 0.012 percent holding other factors constant

($\beta = 0.011652, p = 0.000 < 0.05$). This result means that remittance income is an important predictor of household welfare. The estimates also mean that variations in households' remittance income can help to explain variations in households' welfare.

On the effect of diversified income on household welfare in both model 1 and model 2, the regression estimates in Table 4.11 indicate that the estimate on diversified income variable is positive and statistically significant at 5 percent level. Taking estimates from the preferred fixed effect model ($\beta = 0.071074, p = 0.000 < 0.05$), results indicate that when consumption expenditure is used as proxy of household welfare, a one percent increase in the diversified income of the household enhances the household's welfare by approximately 0.07 percent holding other factors constant.

In comparison with the estimates on non-farm income in terms of magnitude, the regression estimates indicate that the marginal effect of non-farm income on household welfare is much higher than the marginal effect of the diversified income on household welfare. This suggests that although non-farm income, remittance income and diversified income significantly influence household welfare, the non-farm income component plays a bigger role in enhancing household welfare than the remittance income and diversified income components.

Based on the preferred fixed effects model (model 1), the within coefficient of determination, R – square was 48.3% (R^2 = 0.483) which means that the specified model has an explanatory power of 48.3% within the individual districts while the between coefficient of determination, R – square was 35.6% (R^2 = 0.356) which means that the specified model has an explanatory power of 35.6% of welfare across districts. The overall coefficient of determination, R – square was 42% (R^2 = 0.42) which meant that the specified model could explain 42% of the variation in household welfare and

this was statistically significant at 5% level as indicated by the model Wald statistics (Wald = 97097.11, p – value = 0.0000 < 0.05).

The preceding presentation is for the estimates of the regression when the household welfare is measured qualitatively as poverty status of the household such that POV=1 if the household is categorized poor and POV=0 if the household is categorized as non-poor. The empirical model was estimated by the IV-probit and xtlogit and the estimates are summarized in Table 4.12 as indicated below:

Table 4.12: Regression Results for PROBIT and LOGIT Estimation

Independent Variables:	**Model 3 IV-Probit regression: Coefficient are predicted probabilities (robust SEs in parentheses)**	**P-Value**	**Model 4 xtlogit regression: Coefficient are log-odds (SEs in parentheses)**	**P-Value**
Logarithm of farm income	-0.021325 (0.012032)	0.076	-0.039322 (0.0203698)	0.054
Logarithm of non-farm income	-0.246568*** (0.0960069)	0.010	-0.518662*** (0.1091281)	0.000
Logarithm of diversified income	-0.200253*** (0.0257177)	0.001	-0.085392*** (0.0321268)	0.011
Logarithm of remittance income	-0.016760*** (0.0206585)	0.000	-0.068788 ** (0.0270464)	0.008
	Wald = 97097.11*** Wald prob. > chi-sq.= 0.0000		Wald = 1710000*** Wald prob. > chi-sq.= 0.0000	
Instrumented:	logfinc lognfilogremit logdivinc			
Instruments:	agr_wge offfar nonagriculture wage		Nonfarmincome	

*, **, *** represent significance at 10%, 5% and 1% levels respectively

Source: Author (2023)

Results from the two tests of exogeneity: The Wald exogeneity test and the Hausman's exogeneity test of the instrumented variables used in the instrumental variable regression indicated that indeed the explanatory variable were endogenous. This finding thus require use of instruments in the estimation of parameters. Whereas the probit panel model has been estimated by instrumental variables, the logit model has

only been estimated by "xtlogit". With suspicion of endogenous regressors in the empirical models, the "xtlogit" estimates could not be trusted as they could suffer endogeneity bias. Therefore, in the household welfare model estimates where poverty status of the household was used as a proxy for measuring household welfare, this study focused on interpretation and discussion of the IV-probit regression.

On the effect of farm income on household welfare when "poverty status" of a household is used as a proxy for measuring household welfare for POV = 1 if the household is poor implying that the included poverty status category is when the household is classified poor**,** the regression estimates after IV – probit, as shown in Table 4.12, indicate that the estimated partial slope coefficient on logarithm of farm income is positive and statistically insignificant at 5 percent level ($\beta = -0.021325, p = 0.076 > 0.05$). The insignificance of the estimate on farm income means the variable "farm income" is not an important factor that influence household's welfare.

On the effect of non-farm income on household welfare as seen from the summary estimates in Table 4.12, estimates from the IV-probit model indicate that the coefficient on non-farm income is negative and statistically significant at 5 percent level ($\beta = -0.246568, p = 0.010 < 0.05$). As a result, the estimates demonstrate that there is a reduction of around 0.25 percentage points in the predicted risk of a household being poor if there is a one percentage point rise in the household's non-farm income. Based on these findings, it appears that income from sources other than farming plays a significant part in lifting families out of poverty and allowing them to experience improved wellbeing. When poverty is used as a proxy for gauging household welfare, the estimates that arise from the IV-probit suggest that families with bigger non-farm incomes are likely to have better wellbeing than households with lower non-farm

incomes. This is because households with larger non-farm incomes are more likely to have access to resources that allow them to avoid or escape poverty.

On the effect of remittance income on household welfare as seen from the summary estimates in Table 4.12, estimates from the IV – probit model indicates that the coefficient on remittance income is negative and statistically significant at 5 percent level ($\beta = -0.016760, p = 0.001 < 0.05$). As a result, the estimates demonstrate that there is a reduction of around 0.02 percentage points in the estimated risk of a household being poor if there is a one percentage point rise in the household's remittance income. Based on these findings, it appears that cash received via remittances plays a significant part in lifting families out of poverty and providing them with improved wellbeing. When poverty is used as a proxy for gauging household wellbeing, the estimates from the IV-probit suggest that families with bigger remittance incomes are likely to have better welfare than households with smaller remittance incomes. This is because households with larger remittance incomes are more likely to have family members working outside the home, which brings in more cash.

On the effect of diversified income on household welfare, the summary estimates in Table 4.12 from the IV-probit model indicate that the coefficient on diversified income is negative and statistically significant at 5 percent level ($\beta = -0.200253, p = 0.000 < 0.05$) which suggests that diversified income is an important predictor of household welfare. Estimates suggest that the estimated chance of a household being poor drops by around 0.20 percent each time the household's diversified income improves by one percent. This is particularly true when looking at the likelihood of a household being poor. This result means that the observed differences in household welfare can be explained by differences in the diversified income among the households.

Among the key independent variables under study, the estimates from the IV-probit indicate that while variations in households' farm incomes does not explain variations in households' welfare, the variations in non-farm income, variations in remittance income and variations in the diversified incomes can help explain variations in household's welfare. However, further analysis of the estimates indicates that variations in non-farm incomes have a bigger marginal effect on households' welfare relative to variations in remittance income and variations in the diversified income. This study considers and discusses estimates from the IV-fixed effects and IV – probit models. This is because not only the conducted diagnostic tests selected these models but also the estimates from these models address the concern of endogeneity bias which could be associated with badly measured independent variables of farm income, non-farm income, remittance income and the diversified income.

An analysis of the estimates from both of the preferred estimation methods indicate that that household income is a key determinant of household welfare. Estimates from both IV – fixed effects and IV – probit show that household welfare can be enhanced through household income. More specifically, estimates show that non-farm income, remittance income and diversified (or passive) income have significant positive effect on household welfare. In addition, the estimates indicate that although most of the income components (non-farm income, remittance income and diversified income) are important predictors of household welfare, the marginal effect of non-farm income on household welfare is more pronounced than the marginal effect of the other components (remittance income and diversified income). The study results thus suggest that non-farm income plays the biggest role in enhancing household welfare relative to farm income, remittance income and diversified income (or passive income).

4.5 Discussion of Results

4.5.1 Consumption Expenditure and Poverty Status

Both household's level of consumption expenditure and their poverty status are considered to be closely connected markers of a household's level of welfare by the UBOS assessment metric. The term "consumption expenditure" refers to household spending and is defined as the amount of money (in Ugandan Shillings) spent by households on both food and non-food products, with the amounts being adjusted for inflation (UNPS 2019/2020). During the 2019/2020 UNPS, a 30-day recall term was utilized in the case of household consumption spending on non-food goods and regularly purchased services. However, a 7-day recall period was used for expenditures on food, drinks, and cigarettes. In Uganda, the cost of consumer goods is not measured in terms of per capita spending but rather in terms of per adult equivalent spending.

A household is deemed to be poor in accordance with the UBOS if its consumption expenditure per adult equivalent is less than the minimum income required to meet the basic necessities (including food and non-foods) (UNPS, 2019/2020). This system of classification is used to distinguish between households that are not poor and those that are impoverished. The recently revised poverty line in Uganda, which is used as a benchmark for identifying low-income households, is set at USD 1.25 per day spent on consumption. The UBOS has however added more welfare variables while calculating the poverty index. These indicators consist of home or dwelling ownership, the type of wall of the dwelling (mud, brick, or wattle), the type of floor of the dwelling (dirt or non-dirt), access to safe drinking water, the number of separate rooms in the dwelling of the household, and the type of roof of the dwelling (solid or non-solid roof). Indicators like these are in addition to daily consumption expenditures for adults.

The data from the UNPS conducted by UBOS used in this study take into account the additional welfare indicators highlighted above in the classification of households as poor and non-poor. For this reason, this study benchmarked the IV-probit model that has poverty status as an indicator of household welfare and discussed the IV-probit estimates alongside the IV-fixed effects estimates.

4.5.2 Influence of Farm Income on Household Welfare

According to the estimates derived from the IV-fixed effects and the IV-probit models, the estimated partial slope coefficient on the logarithm of farm income is positive but not statistically significant at the 5 percent level. Farm income depicts a positive influence on welfare but there is no causal effect of farm income on household welfare in terms of influencing consumption expenditure upwards and poverty down wards. The positive sign is consistent with theoretical expectation and therefore theoretically valid. However, the statistical insignificance suggested that there is no causal influence of farm income on household welfare, a result that supported the study's first hypothesis which stated that farm income has no significant influence on welfare among households in Uganda. The inability of farm income to indicate a causal influence on household welfare in Uganda could be attributed to the fact that households who thrive on farm income in Uganda are predominantly employed in the agricultural sector where there is low job productivity, low prices which imply low earnings, unpremeditated employment, unpredictable income flows which are in many times influenced by fluctuations in production due to weather vagaries and the informality that dominates the sector. According the UNHS 2019/2020, that majority of Uganda's population (68%) was working in the agricultural sector including crop production, livestock, agricultural wages, agricultural land renting, forestry and fishing (UNHS 2019/2020). The low incomes from farm activities are further supported by the descriptive statistics

earlier displayed in Table 4.3 where the average annual farm income accruing to households over the four UNPS studied was only Ug. Shs 302,910 compared to the average annual non-farm income accruing to households of Ug. Shs. 3,015,507 over the same period. In 2019 calendar year, statistics show that average annual farm income was Ug.Shs. 0.9 million for small producers and Ug. Shs. 2.6 million for large producers (Annual Agricultural Survey, 2019). Thus, argue that the meagre incomes from farm income to households, moreover which are unpredictable, are responsible for inability to influence and improve household welfare.

Few authors have found that farm income is an insignificant predictor of household welfare (Salam, *et al*., 2019). The findings of the study tally with the works of Salam *et al*. (2019) who examined the influence of income diversification strategies on rural household welfare and revealed that income from only agricultural activities has an insignificant influence on household expenditure and thus welfare. Intuitively, households that entirely deriving their welfare from the farm enjoy lower welfare as agricultural in Uganda sector which employs 76 percent of the population (Ggoobi, 2017) contribute a smaller portion of the Ugandan GDP. Dividing up the 24 percent GDP contribution of this sector amongst the 76 percent population indicatively reflects lower welfare experienced by those who derive their livelihood from this sector. Moreover, most of them are rural farmers practicing subsistence farming.

On the other hand, the results of a research carried out by Wambua (2020) contradict with this study estimates. Data from 1,160 smallholder farmers in five East African nations, including participants and non-participants in 23 regional projects, were examined by the researcher. They came to the conclusion that household wellbeing improved among individuals who had greater total agricultural and livestock yield. In their 2011 study of rural non-farm employment in Croatia, Mollers and Buchenrieder

discovered that agricultural income appeared to act as a lever. This indicates that even the tiniest and most impoverished farm households were reliant on agricultural revenue in order to survive. However, these results do not agree with this study's estimations.

The findings of this study are also incongruent with the study by Nyikahadzoi *et al*., (2019) who posits that increased farm income arising from overall higher crop and livestock productivity enhances household welfare. This is so because increased farm income leads to higher overall household income which at the same time results into reduced poverty. The higher household income is used to purchase key household commodities that leads to improved livelihood and general happiness of the household members. Unrelated results were opined in a study by Boakye *et al*., (2021), who argued that alternative farm income sources significantly and positively relate with household welfare. The argument is that farm income is a collection of different sub components proceeding from the different activities on household farms which is either direct or indirect gain to the household. When the household sells off the output from the farm, then direct income accrues to the household while subsistence use of farm output results into indirect income gain to the household (Verkaart, *et al.,* 2017). At a subsistence level, more output produced from the farm, enables the household to cater for its food consumption needs and hence better livelihood and happiness for the household members.

The Pareto optimality theory supports the findings of the present study. The theory, which asserts that changes in the economic pattern (which also embodies household farm income changes) increase the welfare of consumers through gain and loss compensation (Backhaus, 1980). The theory argues that households need to increase farm income sources to be able to generate food for the household as well as selling off the surplus food to acquire other consumptive commodities required to improve the

welfare of the members. According to Pareto, any situation is optimal if all possible moves from it results in some individual being made worse off but can fully be compensated by the gainers (Buchanan, 2017).

4.5.3 Influence of Non-Farm Income on Household Welfare

The estimations that were produced from the preferred models used in this study showed that the estimated partial slope coefficient on the logarithm of non-farm income was positive and statistically significant at the 5% level of significance. The estimations are demonstrably trustworthy from a theoretical perspective since they agreed with the a priori theories. The study may infer that non-farm income is a major factor in influencing the degree of wellbeing experienced by families based on the statistical significance of the partial slope coefficient on the logarithm of non-farm income. Estimates also showed that household well-being was most significantly positively marginally impacted by non-farm income. The implication of this finding is that households' non-farm incomes may be increased or intensely improved, which can tremendously enhance households' well-being. The fact that the descriptive statistics also showed that the largest annual mean income came from non-farm income (annual mean of non-farm income was Ug. Shs. 3,015,507) compared to other household income components, such as the annual mean of farm income of Ug. Shs. 302,910 and the annual mean of the diversified income of Ug. Shs. 271,678 is further support for the most significant marginal effect of non-farm income on household welfare. In addition to higher earnings from non-farm income, the crucial role that non-farm income plays in household welfare can also be explained by the fact that most non-farm income-generating activities have higher job productivity, higher returns, higher sustainability, less susceptibility to the whims of nature, and a more formalized nature.

Examples of the kinds of economic activities that make up sources of non-farm income that households may benefit from include non-farm rentals, wages from public service employment, earnings from transportation services, marketing, retail and wholesale trade, tourism services, manufacturing, construction, and mining, as well as self-employment activities. The flow of proceeds that accrue to households from such non-farm activities have a tendency to be dependable. Households may base the acquisition of capital for investment and planning on such earnings, and such earnings may be depended on for planning and future developments. As a consequence of this, non-farm income has grown judicious in terms of its ability to influence the wellbeing of households throughout the life horizon of the household.

According to Mollers and Buchenrieder (2011), non-farm income is a significant factor in bringing households out of poverty and, as a result, enhancing their welfare. According to Mollers and Buchenrieder (2011), the primary source of earnings for farm households in the middle class comes from sources other than the farm itself. According to research, a person's income from sources other than farming plays an important part in reducing the income gap that exists in rural areas. The household receives the necessary resources thanks to the earnings from sources other than the farm, which may then be invested in the farm in order to create further income for the household. In spite of this, non-farm income makes it possible for a household to purchase household consumptive goods, which increases the members' standard of living and overall happiness, which in turn boosts the welfare of the household.

The findings of the study are in agreement with those of Mat, *et al.* (2012), who used survey data from rural Kedah to investigate the impact of non-farm income on poverty and income inequality among Malaysian farmers. According to Mat, *et al.* (2012) research, households with non-farm income have the ability to either raise or lower

poverty levels. According to the research, households with non-farm income have the potential to either make poverty levels worse or make them better. This study findings concur with those of Kazungu and Guuroh (2014), who examined pertinent case studies, books, and earlier publications and found that non-farm rural activities, such as operating a store or a small farm, aid farm households in overcoming income disparities and preventing rural-urban migration. According to their findings, non-farm rural activities support farm households in overcoming income gaps and preventing rural-urban migration. The results of this study also agree with those of a study that was carried out by Woniyi and Salman (2011). In that study, the amount of non-farm income variety was examined, along with its effects on the welfare of farming households and the variables affecting non-farm income diversity. The researchers came to the conclusion that farming households that do not engage in non-farming activities were more susceptible to poverty than farming households that do engage in non-farming activities that generate income. This study's research findings are consistent with the findings of other authors who have conducted comparable research, such as Stifel (2010), Adjognon *et al.*, (2017), Barrett *et al.*, (2001), and Danso-Abeam *et al.*, (2020), amongst others.

The results of the research are in line with the findings of Asmah (2011), who explored how several proxies of Ghana's agricultural sector changes changed over time and weighted their relative importance in effecting rural livelihood diversification and household wellbeing. Asmah investigated how numerous proxies of Ghana's agricultural sector changes shifted over time. The research conducted by the author revealed that the vast majority of household assets are purchased with non-farm income sources, and these assets have a substantial influence on the wellbeing of the household. In point of fact, Kijima *et al.* (2006) judged income from sources other than farming to

be the most reliable source of income for households, making it essential to the well-being of members of the family. In addition to this, Al-amin and Hossain (2019) demonstrate in their research that income from sources other than farming can lessen the extent, severity, and level of poverty.

Kinuthia *et al.* (2018), on the other hand, studied non-farm activities in Uganda and Tanzania and their impacts on both agricultural output and farmers' well-being. They found that non-farm activities have a negative impact on both was discovered that non-agricultural activities did not have any influence on agricultural productivity in either country, and as a result, having no bearing on the economic well-being of the families in either country. In the same way that Tsiboe *et al.*, (2016) found, when they investigated the relationship between the various types of non-farm work and the availability of food nutrients in households in northern Ghana, they found that households that participated in the labor market in search of additional income did not appear to have a better food security status than those that were only engaged in farming. In addition, Kien (2019) found that non-farm entrepreneurship had negligible effects on wellbeing in terms of per-capita expenditures and per-capita durable assets. In addition, Kowalski *et al.* (2016) found that non-farm businesses do not provide households who are temporarily susceptible with insurance against potential hazards.

This research is supported by the social choice theory, which asserts that an increase in income for people and households improves both their utility and their wellbeing (Arrow, 1999; Atkinson, 1999). This research derives its support from this theory. According to Pressman & Summerfield (2000), increased consumption is a good indicator of rising levels of welfare since it is one of the components of human welfare that includes greater consumption. According to Pressman & Summerfield (2000), this suggests that increasing a household's income via the pathway of non-farm income will

indirectly result in an increase in the household's standard of living. In addition, people choose to have children and homes, and as a result, their well-being is tied to the total amount of money brought in by the household (Pressman & Summerfield, 2000). Therefore, the larger the income of the household, the greater the welfare that can be achieved by the household as a whole; but, the manner in which this revenue is distributed among the members of the household will influence the welfare that can be achieved by each individual member of the household. The current study extends literature on non-farm income and household welfare by establishing the heterogeneous influence of non-farm income on welfare using both consumption expenditure and poverty status using current and nationally representative panel data.

4.5.4 Influence of Remittance Income on Household Welfare

Remittance income can have a positive impact on household welfare. In this study, data on remittance income constituted of all transfers to the household from internal and external (international) sources. The results from this study indeed indicated that the estimated coefficient on the remittance income variable was positive and statistically significant at 5 percent level. The estimates were consistent with the study's a priori expectations and therefore the estimate on the remittance income variable came out as both theoretically valid and statistically reliable. This result led to rejection of hypothesis three of this study (H_{03}: remittance income has no significant influence on welfare among households in Uganda). Instead estimates from the regressions in this study indicated that households' remittance component of income has a significant positive effect on households' welfare.

Remittance income is unearned money that comes into the household from friends, the government, and family members who are stationed away from the household. According to Kangmennaang *et al.* (2017), remittance income is characterized as cash

inflows or receipts into households without the requirement of an equivalent exchange of goods or services. Additionally, remittances are the items and money that migrant workers send back to their country of origin (Thapa and Acharya, 2017). A cash influx from the cross-border migration of a nation's citizens is known as remittances. Researchers in the field of remittance income have acknowledged the crucial role remittance income plays in completing overall household income, reducing the likelihood that a household will relapse into poverty, and promoting consumption of commodities at the household level.

Remittances have grown in importance as a means of transferring money throughout the world as a result of migrant workers and immigrants returning a portion of their earnings back to their home nations (Bahadir, *et al.*, 2018). In the near future, it is anticipated that this tendency will continue. Munyegera and Matsumoto (2016) claim that friends and relatives frequently send money to one another in the form of remittances. This is particularly prevalent in rural areas with limited or no access to regulated financial institutions like banks. Compared to urban households, rural households are more likely to receive domestic remittances and less likely to get international remittances (Cuong and Linh, 2018). International remittances can have both micro and macroeconomic effects on an economy (Kumar, 2019). Remittance recipients' households experience less financial burden thanks to direct income augmentation at the micro level (Kumar, 2019). Remittance income has been shown in the literature to increase household food consumption (Rahman and Mishra, 2020).

Remittance income does in fact have impacts that increase income and decrease poverty, which improves wellbeing (see, for example, Cuong and Linh, 2018; Javed *et al.*, 2015; Li and Wang, 2015; Akanle and Adesina, 2017, among others). The study's estimates match quite nicely with these research' conclusions. The results of this study

concur with those of Evans & Kelikume's (2018) study, which showed that remittance income had favorable, substantial effects on wellbeing. This is true because remittance income bridges the financial gap that exists between what households can afford to spend on goods and services and how well-off the household as a whole is as a result. According to studies, remittance income is vital in helping recipient households escape poverty (Cuong and Linh, 2018). According to total expenditures, food and non-food expenditures, clothing expenditures, pot and pan expenditures, car expenditures, and saving rates, remittance money provides recipient households with valuable benefits (Javed *et al.,* 2015). Combatively, remittance income enables a household to acquire goods for raising household happiness, which in turn raises the household's standard of living.

The study's findings are consistent with research that looked at how remittances affect household welfare. Akanle and Adesina (2017) conducted the study, and their findings showed a favorable correlation between remittances and household wellbeing that goes beyond consumer spending due to respect gained from the community prior to receiving remittances. These results and ours have a good relationship. The analysis' results are consistent with those of an empirical investigation carried out by Abbas *et al.* (2014). This study assessed the impact of remittances on both household well-being and household poverty levels. The authors' conclusion was that foreign transfers of funds benefited families' general well-being. Additionally, Munyegera and Matsumoto (2016) suggested that real per capita consumption, a measure of household welfare, showed a significant positive relationship between remittance income received through mobile money. They evaluated the impact using this metric. In actuality, Bahadir *et al.* (2018) foresaw remittance income being a source of funding for household entrepreneurs' investments. As a result, welfare improvements appear and are attained when

remittance distribution is skewed in favor of entrepreneurial households. Furthermore, Jimenez & Brown's (2012) research have demonstrated that remittances are an essential kind of social protection for people in the lowest socioeconomic rungs. Thapa and Acharya (2017) found that households that get remittance payments are more likely than those that do not to spend more money on consumption, health care, and education. The incidence, depth, and severity of poverty among remittance receiver households were significantly lower than those of remittance non-recipient households, according to Kumar (2019), who examined the effects of overseas remittances on household welfare. Kumar (2019), further supported the findings of previous studies.

The study's findings, however, conflict with those of Li and Wang (2015), who examined the effects of increased remittances on wage, employment, and welfare levels in urban areas. They found that while an increase in remittances decreases the output of the informal sector and lowers the welfare of urban residents in the short term, it increases the output of the informal sector and raises it over the long term.

The social choice theory perspective, which contends that a rise in income for individuals and households enhances both their utility and their welfare, is in favor of this research (Arrow, 1999; Atkinson, 1999). The social choice theory viewpoint serves as the foundation for this study. People choose to have families and houses; therefore, their well-being is correlated with the overall amount of income the household generates (Pressman and Summerfield, 2000). When compared to those in less wealthy homes, those who make wiser decisions and end up in wealthy households experience higher levels of welfare. This shows that raising a household's income through the remittance income stream will obliquely improve the welfare of the household, according to Pressman and Summerfield (2000). The amount of welfare that each family member will experience will depend on how this money is allocated among the

members of the household. This is because the level of household welfare is directly proportional to the amount of remittance income that is received by the household. The current study was able to address endogeneity associated with explanatory variables as a result of the self-reporting kind of data collected from households and bi-causality of the study variables using instrumental variable estimation methods that previous studies have failed to address.

4.5.5 Influence of Diversified Income on Household Welfare

Having varied income and shifting income portfolios can improve the well-being of a household. This study used information on diverse household incomes, which is income that comes from sources other than formal agricultural revenue or formal non-farm income. The study's findings did, in fact, show that the predicted coefficient for the variable of diversified income was positive and statistically significant at the 5% level. The estimate on the diversified income variable was therefore found to be both theoretically valid and statistically trustworthy because it was compatible with the study's a priori expectations. As a consequence, the study's fourth hypothesis, “Diversified income has no significant influence on welfare among households in Uganda”, was rejected. Estimates from the regressions in this study, however, showed that households' wellbeing is significantly improved by their diverse income.

The portfolio diversification of household incomes, which again indicates society's structural development, is represented by the diversified household income. Indeed, several empirical research have shown that diverse income increases income and decreases poverty, which improves wellbeing (see, for example, Loison, 2019, Khan and Morrissey, 2020b). The study's estimates match quite politely with these research' conclusions. The findings of this study concur with those of Kakungulu *et al.*'s study from 2021, which used secondary data from the Uganda National Household surveys

to demonstrate the disparate welfare effects of rural income portfolios in Eastern Uganda. Their research revealed that income diversification increased household income, decreased vulnerability, and decreased poverty.

When creating macro input/output tables and classifying diversification into sectoral, functional, and locational categories, it is stated in accordance with accepted national accounting practices (Agyeman *et al.,* 2014). The definition of diversified income is "a situation where farm households rely on income from multiple sources; both farm and non-farm alternative sources." In a similar vein, "income diversification" refers to the process by which rural families create progressively more diverse portfolios of sources of income in order to meet their basic needs, improve their wellbeing, and manage risk (Wan *et al.,* 2016). Rural households are able to better meet their fundamental requirements, enhance their welfare, and manage risk thanks to diversity. Thus, Diversity is a crucial adaptive strategy that enables a decrease in economic risk, claim Weltin *et al.* (2017). This is true despite the fact that diversity is viewed as a way to deal with changing political landscapes and commercial needs.

Adepoju & Obayelu (2013) claim that engaging in alternative income-generating activities reduces the risk of low income, gives the household a source of cash, and boosts agriculture production by providing the funds required for investments in cutting-edge agricultural technologies. These advantages can be attained through boosting agricultural output, lowering income uncertainty, and offering a family supply of cash. Danso-abbeam *et al.*'s research from 2020a indicates that diversification is motivated by households' desires to raise their standard of living, combat hunger and poverty, and strengthen their current means of sustenance. Oyimbo & Olaleye (2016) claim that diversified households are more likely to spend more money on consumption and asset accumulation because they get more money at the end of the year or period

than non-diversified households do. The tendency of households with low incomes benefiting financially from having many sources of income is also expanding, claim Zhao & Barry (2014). Dedehouanou & Mcpeak (2019) claim that income diversification has improved access to, availability of, and consumption of food.

The study's findings support those of researchers Amfo *et al.* (2021) and Akaakohol & Aye (2014) who hypothesized that diversifying one's sources of income increases consumer spending. The results of this study are consistent with those of a study by Zakaria *et al.,* (2019), which examined the impact of livelihood diversification and found that diversified farm households fared better than non-diversified farm households. By doing this, diverse households can protect themselves against unforeseen events, which reduces their vulnerability to shifting economic conditions and a loss of income from a specific source. The findings of the current study are also consistent with research by Stifel (2010), Xu (2017), and Rahut *et al.* (2017), all of which found that diverse income significantly improves household welfare.

On the other hand, Khan and Morrissey (2020a) observed that households with many sources of income have lower consumption welfare. According to the study, diversification was a push factor, therefore among the poorest households that have seen their income fall, the bulk of diversification took place in agriculture. In a related study, Omotesho *et al.* (2020) looked at the number of income sources in rural households and how each source contributed to overall income and welfare. The results showed that the number of income sources in a household was inversely related to its livelihood status, with the study coming to the conclusion that the more diverse a household's income, the worse its livelihood status. Furthermore, a study on the impact of livelihood diversification on the reduction of poverty by Oyimbo and Olaleye (2016) revealed that it had a substantial and unfavorable impact on the degree of poverty in

the households of farmers. In their investigation of the effects of crop and income diversifications on consumer welfare, Mensah *et al.*'s study from 2021 found that agricultural diversification lowers consumption spending, which in turn lowers welfare. This study tested the pareto optimality theory and social choice theory, that were developed and tested from developed world setting, in a developing country context, thereby establishing the external face validity of the theory.

4.6 Summary of Hypotheses Testing Results

Four hypotheses were tested in this study on how the four explanatory variables (farm income, non-farm income, remittance income and diversified income) influence the dependent variable, household welfare as measured by the two proxies of consumption expenditure and poverty status. Table 4.13 shows the summary of hypotheses testing results.

Table 4.13: Summary of Hypothesis Testing Results

Hypothesis	Description	Welfare measure	β value	P-value	Decision
H_{01}	Farm income has no significant influence on household welfare in Uganda	Consumption expenditure	0.014527	0.082	Accepted
		Poverty status	0.021325	0.076	
H_{02}	Non – farm income has no significant influence on household welfare in Uganda	Consumption expenditure	0.262181	0.000	Rejected
		Poverty status	-0.246568	0.010	
H_{03}	Remittance income has no significant influence on household welfare in Uganda	Consumption expenditure	0.011652	0.000	Rejected
		Poverty status	-0.016760	0.001	
H_{04}	Diversified income has no significant influence on household welfare in Uganda	Consumption expenditure	0.071074	0.000	Rejected
		Poverty status	-0.200253	0.000	

Source: **Author (2023)**

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSSION AND RECOMMENDATIONS

5.1 Overview

The final chapter of the study summarizes the entire study; from statement of problem to results and discussions. The chapter presents a summary of the study and overall conclusion in reference to study objectives and study hypotheses. The section gives the highlights on the study objectives, data utilized, estimation techniques and the key results. Policy implications that stem from the estimates of the study as well as recommendations are also presented in this chapter. Lastly, the chapter presents the limitations and recommendations for further study.

5.2 Summary of Findings

The study focused on how household income affected wellbeing across districts in Uganda. The study specifically focused on four objectives: investigating the impact of farm income on Ugandan household welfare, evaluating the impact of non-farm income on household welfare, analyzing the impact of remittance income on household welfare, and assessing the impact of diversified income on household welfare. The study thus tested four hypotheses: that farm income has no significant impact on household welfare, that non-farm income does not have any significant impact on household welfare, that remittance income does not have any significant impact on household welfare, and that diversified income has no significant impact on household welfare.

5.2.1 Influence of Farm Income on Household Welfare

The first hypothesis was “farm income has no significant influence on household welfare”. The findings indicated that this hypothesis was accepted and thus established that farm income was an insignificant predictor of household welfare which meant that farm income could not be used to explain variations in household welfare. This also

meant that farm income activities are not important to household welfare as their effect could not be significantly explained by the model.

5.2.2 Influence of Non-farm Income on Household Welfare

The second hypothesis was “non-farm income has no significant influence on household welfare”. The study results revealed that the hypothesis was not supported and thus non-farm income significantly influence household welfare. This suggested that as a household engages more into activities away from the farm, they are able to earn stable income which in turn is used to consume commodities and attain a higher level of welfare. The results imply that the more non-farm income that a household earns, the higher the welfare level attained by the household.

5.2.3 Influence of Remittance Income on Household Welfare

The third hypothesis was “remittance income has no significant influence on household welfare”. The study results also indicated that remittance income significantly influences household welfare and thus the third hypothesis was rejected. This suggests that as more transfer that accrue to the household from both domestic and international sources, the better off the household for the remitted funds can be used to attain better medical care, education, transport as well as achieving better nutrition from the acquired food basket. The results imply that the more remittance income that a household earns, the higher the welfare level attained by the household.

5.2.4 Influence of Diversified Income on Household Welfare

The fourth hypothesis was “diversified income has no significant influence on household welfare”. The results indicated that diversified income is a significant predictor of household welfare and thus the fourth hypothesis was rejected. This suggests that households that engage in diversified income generating activities are able

to earn higher diversified income and thus enjoy stable and better welfare. The results imply that the more diversified income that a household earns, the higher the welfare level attained by the household.

5.3 Conclusion

Since households perform essential macroeconomic duties that necessitate an increase in income for their welfare to grow, they are a crucial pillar of the economy. Therefore, it is crucial to comprehend how disaggregated income components contributed to the wellbeing of households in the past. By assessing the degree to which the disaggregated household income components influence the level of welfare among households, the study's findings generally provide a major contribution to the body of literature on household welfare. The current study's objective was to examine how the disaggregated household income components affected household welfare. With regard to households in Uganda, the study specifically looked at the impact of household disaggregated income components of farm income, non-farm income, remittance income, and diversified income on welfare (as measured by household consumption expenditure and poverty status of the household). With regard to each of the specific objectives of the current study, secondary panel data from UBOS provided a suitable statistical foundation for making broad generalizations and reaching significant conclusions. In light of the findings, the study makes the following conclusions.

The first objective was to determine the influence of farm income on household welfare. As a result of the findings, it was found that whereas other explanatory variables significantly affected household welfare, the farm income variable did not show any significant impact on household welfare. The study thus, concludes that households need to shift away from primary farm activities especially subsistence farming for more rich secondary activities for their welfare to flourish.

The second objective was to assess the influence of non-farm income on welfare among households in Uganda. The findings of the statistical research indicated that households with higher non-farm income were more likely to enjoy better welfare than their counter parts with low or none of the non-farm income. The findings of the study lead to the conclusion that in order for households to experience an increase in their overall level of welfare, they need to engage in activities that result in the generation of income off the farm. Some examples of such activities include wage employment, self-employment, trade and commercial companies, domestic manufacturing, and the provision of specialized services. As a result, it was determined that households that earn more from non-farm activities are able to experience lower level of poverty and higher consumption expenditure and thus higher level of welfare.

The third objective was to evaluate the influence of remittance income on welfare among households in Uganda. The findings of the study suggested that there is a considerable beneficial influence of remittance income on the level of wellbeing among households. Consequently, it is inferred that receiving remittance has an impact on the quality of life of household members. For the received cash may either be utilized to fill the gap in household consumption spending or it can be invested to produce more income for the household. As a result, it was determined that households that receive remittances experience higher welfare than their counter parts that do not receive.

The fourth objective was to analyze the influence of diversified income on welfare among households in Uganda. The study found that diversified income has a positive and significant effect on welfare among households. The study infers that households with diverse sources of income not only are able to supplement and boost the overall income but also have a hedge against uncertainties. Therefore, embracing diverse

sources of income enables households attain higher levels of consumption as well as escaping poverty that boosts the wellbeing of households in Uganda.

Basing on the study findings, the study concludes that farm income, though it exhibits a positive relationship, does not significantly affect household welfare. The study also concludes that households with higher non-farm income experience higher welfare. Further still, the study concludes that households that receive more remittances are happier than those that receive less or none. The study also concludes that households with diverse income enjoy better welfare than their counter parts without such income. The study also concludes that among all the income components, non-farm income is the most important predictor of household welfare. Given the dearth of knowledge on the antecedent relative role the disaggregated income components on household welfare, the current study fills this gap in the welfare literature. The study provides broader understanding of household welfare drivers, specifically in Ugandan setting. The findings provide important insights to households and policy makers to focus on engaging in non-farm income, remittance and diversified income activities to enhance welfare among households.

5.4 Implications of the Study

5.4.1 Implications to Knowledge

The current study contributes to the existing body of knowledge especially on literature regarding the influence of the disaggregated income components on household welfare. First, the study under took a heterogeneous approach in establishing the influence of income on household welfare by using two welfare measures that is, consumption expenditure and household poverty status for a comprehensive welfare analysis as opposed to previous studies that have predominantly employed consumption expenditure as the commonest proxy measure for welfare. Secondly, the study

employed current and nationally representative data for the period 2013 – 2020 to analyze the effect of farm income on household welfare in Uganda, examine the effect of non-farm income on household welfare in Uganda, evaluate the effect of remittance income on household welfare in Uganda and determine the effect of diversified income on household welfare in Uganda. More recent data was rationally required for analysis in order to opine the role of the disaggregated income components in enhancing welfare of households across the districts of Uganda. Third, this study used instrumental variable analysis to addresses the potential endogeneity arising from badly measured income components to households and heterogeneous variable relationships while estimating with robust standard errors unlike previous studies. Moreover, this study also fills the gap of the relative contribution of the disaggregated income components (farm income, non-farm income, remittance income and diversified income) across districts in Uganda. Fourth, the study was conducted from developing country (Uganda) context enabling establishment of external face validity of the welfare theories. More so, this study demystifies mixture in literature about the influence of the income components by joining and making conclusion on the mixed results in empirical literature.

5.4.2 Implications to Policy and Practice

The study provides a platform for important implications to households since it identifies the drivers of household welfare. Basing on the findings of the study, households need to embrace non-farm income activities such as formal employment, self-employment outside the farm, trade and other such service sector activities for households to thrive and improve their welfare. Consequently, households should implement interventions that sets a firm ground for non-farm income activities with a

purpose of enhancing household welfare. If households participated more in activities that generated income outside farming, their standard of living may improve.

The findings of the study also indicated that remittance income was a significant predictor of welfare among households in Uganda. Accordingly, effective and better strategies should be deployed among households to attract remittance income. Households need to harness remittances by encouraging their unemployed and under employed energetic household members to migrate in such for employment both internally and externally. This makes such households stronger economically and thus use it for consumption and or investment to improve their welfare. Enabling households to have their members relocate to places with better opportunities and thus send remittance income back home could increase their welfare.

The study results also revealed that diversified income was significant at influencing the welfare of households. Based on findings on diversified income of this study, households need not to focus on a single source of income but also look at passive income with a purpose of improving their welfare. Subsequently, appropriate strategies should be embraced by households to ensure diverse income accrues to the household. This makes such households resilient and sound financially to escape the poverty trap and increase their level of consumption for better livelihood. Household welfare can be enhanced through increased household engagements that bring them more diversified income. This implies that households that engage in passive income economic activities like investment in bonds, treasury bills, village SACCOs, could increase their welfare than households that rely on only active or main income generating economic activity.

There is need for a structural shift of households from being predominantly engaged in primary economic activities such as subsistence farming to secondary economic activities such as manufacturing and services in order to increase household welfare.

The study findings have important implications for the households, business environment and leaders. The results guide household heads and other adult household members in Uganda on how to improve on the level of welfare in terms of consumption budget and poverty level of their households. From the study, it was found that increasing overall income of the household results in an increase in the level of welfare among households. First, three of the four components of household income (non – farm income, remittance income and income diversification) have direct influence on welfare among households. It was therefore clinched that households need to focus on enhancing their level of income from the different sources in order to escape the poverty trap and thus ensure better welfare for their members. Households ought to enhance their incomes through embracing non-farm activities so as to achieve higher level of welfare. Also, household need to focus on attracting more remittance income through encouraging and supporting the unemployed and under employed members to migrate internally and externally. Further, household ought to embrace diversified income through engaging in passive household activities to improve their welfare. While a structural shift could see households from being predominantly engaged in primary economic activities such as subsistence farming to secondary economic activities in order to increase household welfare.

The findings are worthwhile to households outside Uganda. If these Ugandan households are not assisted to improve their income, their low levels of welfare would have spill-over effects to households across the globe. The spill – over effect can in turn affect the business community as their market lies in the households to consume the

manufactured products. This means that Uganda and other producing countries could in turn loose revenue in form of taxes as many production units could have to close business as a result of the lost market. The study findings provided an important justification that when households appreciate the need for better welfare, they are able to generate strategies which make them more resilient and attain sustainable levels of welfare.

5.4.3 Implications to Theory

This study concurrently explored existing theories, namely: Pareto optimality theory and the social choice theory to cognize household welfare. Farm income, non-farm income, remittance income, and diversified income were the allegories that were offered by the theoretical evaluation of the two theories that were being examined in this study. These factors, which were generated from the two theories that were discussed, come together to create an original explanation for household wellbeing in Uganda. The factors explain the welfare of households by a total of 42%, whereas additional variables that were not a part of the model explain 58% of the variation in welfare of households. As a result, the utilization of a multi-theoretical approach provides a superior explanation of household welfare among families in Uganda as opposed to the application of a single theory.

The explanatory model established by this study shows how farm income, non-farm income, remittance income and diversified income individually influence the level of welfare among households in Uganda with non-farm income having the greatest influence on welfare. The current investigation suggests that the approaches theorized in the developed contexts when combined are utilizable in other settings. Household welfare until now lacks an integrated theoretical foundation and guidance for success,

which partly contributes to the low level of household welfare, especially in the developing world. This study is thus a contribution towards the theoretical explanation of household welfare and an effort towards generating a substantial theory to guide household welfare. The results are evident that the use of a multi-theoretical approach is instrumental in investigating household welfare in Uganda.

The results of this study provide theoretical evidence on the different proxy measurement of welfare. Unlike previous studies that have employed only one measure of welfare, in this study two proxy measures have been selected and used in this study. That is consumption expenditure and poverty incidence and this has given a more meaningful analysis of welfare with more comprehensive conclusions. That withstanding, household income has also been decomposed into four facets of farm income, non-farm income, remittance income and income diversification to appreciate which of the income components is the most significant contributor to the welfare of the household for which non-farm income has emerged as the main predictor.

The study contributes to philosophy by using positivist paradigm which provides a better approach to the study of welfare among households in Uganda. Positivist paradigm is concerned with observable facts and stresses objectivism while focusing on presenting explanations. In addition, positivistic studies are easily repeatable in real life using quantitative data. An explanatory design was used with a panel analysis stance which helped to better explain the association between the variables. This implies that positivistic explanatory design is critical in household welfare studies for meaningful cause effect relationships. In addition, the study also employed the fixed effect – random effect model with focus on instrumental variable approach to address endogeneity prone to household level variables. This implies that the FE – RE

instrumental variable approach is appropriate in estimating the link between household income and welfare.

5.4.4 Recommendations of the Study

The study findings revealed that households with higher non-farm income enjoy better welfare compared to their counterparts with less income from non-farm activities. Therefore, this study recommends households to enhance their non-farm income through engaging in non-farm activities like paid labour, starting own non-farm business enterprises and other such services in the industry and services sectors that will ensure these households receive not only higher income but also sustainable income.

Households in Uganda should also harness remittance income since such income was found to positively influence household welfare such that high remittance income receipts will lead to higher welfare. Households need to improve their remittance income receipts by encouraging their idle and able household members to migrate both internally and externally and in turn send them remittance for betterment of their welfare.

The study findings also revealed that higher diversified income influences welfare of the household in the same direction. Households therefore need to pay attention to their passive income so that they have a shield in times of economic shocks to rely on as well as guarantee higher welfare for their members. Most importantly, households need to embrace such passive income as investment in village SACCOs, taking time deposits, investing in stock markets, among others that all guarantee receipt of passive income for the betterment of livelihood in the household.

5.5 Limitations and Areas for Further Research

The contributions made by the current study notwithstanding, there are limitations that future studies need to bridge. First, the study emphasized the short-term effect of household income on welfare. In addition, the study employed a panel design with time gaps in which the data for the missing period could have affected the nature of influence of farm income, non-farm income, remittance income as well as diversified income on welfare among households in Uganda. The study recommends future studies to measure the dynamic effect of income on welfare using dynamic models like ARDL, GMM with the aid of time series data. Also, the positivistic research method used in this study may not have given a comprehensive analysis of the study variables thus, the study recommends the adoption and use of critical realism for more meaningful welfare analysis.

Secondary, the study may also be extended to a regional or continental study to get a good perspective of household welfare in Africa, which would subsequently provide an opportunity for comparative studies between, regions and continents. The study can as well be replicated in other developing countries to determine whether similar findings can be obtained. This conjectures that a study in a different setting brings a deeper understanding of the combination of variables that constitute a perfect model fit. A replicated study in other cultural-social settings or a cross-country comparative study may extend the generalizability of the findings and test their consistence.

Due to unavailability of data, some salient variable measures of welfare such as assets value were dropped at analysis time as the bureau lacked all time data collected on such variables and therefore welfare was not comprehensively analyzed. The study

recommends a cross sectional study with primary data collection to enable capturing of all salient variables and meaningful analysis.

The study also focused on direct effect of household income on welfare among households across the districts of Uganda. Moreover, the study tested the hypotheses without any controls of salient variables such as household size, age, education, marital status of household head and other household factors that may affect the welfare. The study recommends future studies to consider introducing a third variable; mediator or moderator variables in a controlled environment so that the results can revalidate the generalizability of the model(s).

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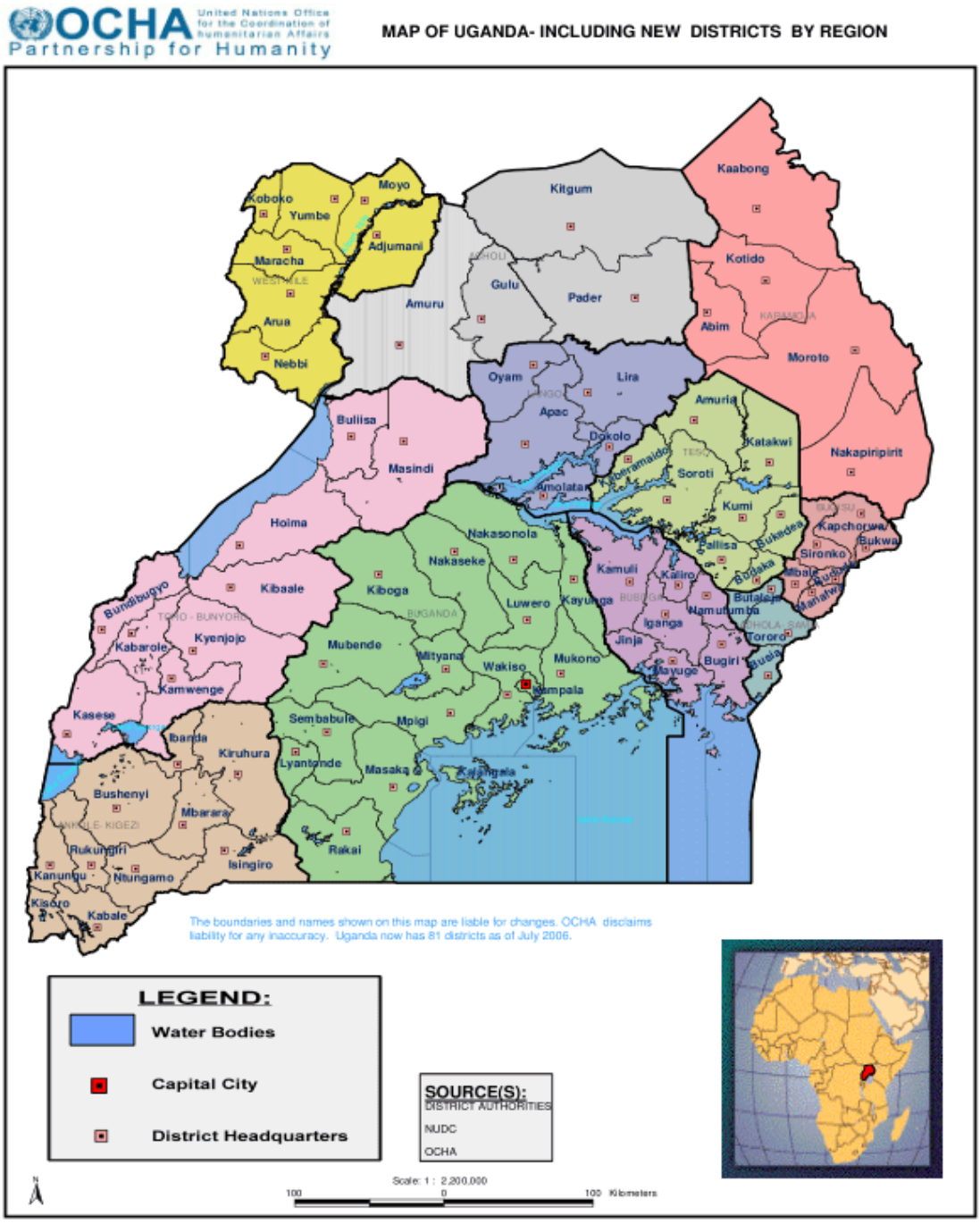
APPENDICES

Appendix. 1: Map of Uganda Showing Districts in Uganda



Appendix. 2: A Map of Uganda Showing its Neighborhoods

Appendix. 3: Sub-regions in Uganda 2019/2020

SN	SUB – REGION	DISTRICTS	NUMBER OF DISTRICTS
A	**KAMPALA**	1. Kampala	**01**
B	**BUGANDA SOUTH**	1. Bukomansimbi 2. Butambala 3. Gomba 4. Kalangala 5. Kalungu 6. Lwengo 7. Lyantonde 8. Masaka 9. Mpigi 10. Rakai 11. Ssembabule 12. Wakiso 13. Kyotera	**13**
C	**BUGANDA NORTH**	1. Buikwe 2. Buvuma 3. Kayunga 4. Kiboga 5. Kyankwanzi 6. Luwero 7. Mityana 8. Mubende 9. Mukono 10. Nakaseke 11. Nakasongola 12. Kasanda	**12**
D	**BUSOGA**	1. Bugiri 2. Buyende 3. Iganga 4. Jinja 5. Kaliro 6. Kamuli 7. Luuka 8. Mayuge 9. Namayingo 10. Namutumba 11. Bugweri	**11**
E	**BUKEDI**	1. Budaka 2. Busia 3. Butaleja 4. Kibuku 5. Pallisa 6. Toororo 7. Butebo	**07**
F	**ELGON**	1. Bududa 2. Bukwo	**09**

		3. Bulambuli 4. Kapchorwa 5. Kween 6. Manafwa 7. Mbale 8. Sironko 9. Namisindwa	
G	**TESO**	1. Amuria 2. Bukedea 3. Kaberamaido 4. Katakwi 5. Kumi 6. Ngora 7. Serere 8. Soroti 9. Kapelebyong	**09**
H	**KARAMOJA**	1. Abim 2. Amudat 3. Kaabong 4. Kotido 5. Moroto 6. Nakapiripirit 7. Napak 8. Nabilatuk	**08**
I	**LANGO**	1. Alebtong 2. Amolatar 3. Apac 4. Dokolo 5. Kole 6. Lira 7. Otuke 8. Oyam 9. Kwania	**09**
J	**ACHOLI**	1. Agago 2. Amuru 3. Gulu 4. Kitgum 5. Lamwo 6. Nwoya 7. Pader 8. Omoro	**08**
K	**WEST NILE**	1. Adjumani 2. Arua 3. Koboko 4. Maracha 5. Moyo 6. Nebbi 7. Yumbe 8. Zombo 9. Pakwach	**09**

L	**BUNYORO**	1. Buliisa 2. Hoima 3. Kibaale 4. Kiryandongo 5. Masindi 6. Kagadi 7. Kakumiro 8. Kikuube	**08**
M	**TOORO**	1. Bundibugyo 2. Kabarole 3. Kamwenge 4. Kasese 5. Kyegegwa 6. Kyenjojo 7. Ntooroko 8. Bunyangabu	**08**
N	**ANKOLE**	1. Buhweju 2. Bushenyi 3. Ibanda 4. Isingiro 5. Kiruhura 6. Mbarara 7. Mitooma 8. Ntungamo 9. Rubirizi 10. Sheema	**10**
O	**KIGEZI**	1. Kabale 2. Kanungu 3. Kisoro 4. Rukungiri 5. Rubanda 6. Rukiga	**06**

Source: UBOS (2020)

Appendix. 4: Overview of UNPS and Methodology of Data Collection

The Uganda Bureau of Statistics (UBOS) has conducted large-scale surveys that have national coverage with varying core modules and objectives. Since 2009, UBOS has been conducting Uganda National Panel Survey (UNPS). This survey is important for monitoring changes in outcomes as well as the impact of Government policies on indicators of national and international development frameworks to inform policy makers about growth (in income, poverty or service delivery etc.). The UNPS provides data on an annual basis that enables tracking of outcome indicators in the National Development Plan (NDP), National Standard Indicators (NSI), and Sustainable Development Goals (SDGs) among others. It also validates the dynamism of routine data systems and provides frequent feedback on the performance of key Government programmes like the National Agricultural Advisory Services (NAADS), National Information platform on Nutrition, Social Assistance Grant for Empowerment (SAGE), Operation Wealth Creation (OWC), and Youth Livelihood Pogramme (YLP) among others. The 2018/19 Uganda National Panel Survey (UNPS) is the seventh in the series of Panel surveys that the Uganda Bureau of Statistics (UBOS) has conducted.

Survey Objectives

The overall objective of the UNPS Program is to collect high-quality data on key outcome indicators such as poverty, service delivery, governance and employment among others; to monitor Government's development programmes like the NDP among others, on an annual basis.

The specific objectives of the survey are:

- To provide information required for monitoring the NDP and other development objectives like the NSI, SDGs as well as specific programs such as the National Agricultural Advisory Services (NAADS), OWC, and YLP among others.
- To provide high quality nationally representative information on income and poverty dynamics at the household level.
- To provide annual data on agriculture in order to characterize and monitor the performance of the agricultural sector.
- To provide data for annual compilation of key statistical indicators like the Gross Domestic Product (GDP) and satellite accounts.

Scope

The 2018/19 UNPS administered four modules to sampled households to suit the survey's multiple objectives. These included the Socio-economic, Woman; Agriculture and Community modules. These core modules were revised to account for the changing socio-economic environment; though they largely remain the same in every annual survey round to ensure comparability. The details of each of the modules are highlighted below:

1. **The Socio-economic module** covered a set of core sections which are implemented annually. This module collected information on household background characteristics including: domestic tourism, Social Assistance Grant for Empowerment (SAGE), education and literacy, the health status and health seeking behaviour of household members, child nutrition and health,

labour force status, housing conditions, water and sanitation, energy use, household incomes and non-agricultural household enterprises, household assets, household consumption expenditure, shocks and coping strategies, financial inclusion and welfare indicators.

2. **The agriculture module** covered households engaged in agricultural activities such as crop and/or livestock production. The questionnaire focused on: land ownership, livestock rearing and farming of main crops. The extensive agricultural module allows for the annual estimation of land area, both owned and cultivated, as well as production figures for main crops and livestock. Additional information for the characterization of the sector, e.g. irrigation facilities, access to extension services, decision making and different gender roles was also collected.
3. **The Woman module** targeted women of reproductive age (15-49 years). It specifically collected information on use of contraceptives for purposes of measuring the Contraceptive Prevalence Rate (CPR), and the unmet need for family planning in Uganda at the time of the survey. The Module also includes information on women's nutrition, mama kit, the place of delivery and assistance during delivery for all births in the last two years.
4. **The Community module** collected information about the general characteristics of the community (LC I), availability and access to community facilities, client satisfaction with the health services provided, education and health infrastructure with a special focus on teacher and health worker absenteeism; as well as works and transport service.

Specific information was collected on anthropometric measurements. Samples of salt, oil and fats were taken for measuring food fortification, and blood samples from women (15-49 years) and children (6-59 months) were also drawn for Modified Relative Dose Response (MRDR) and malaria testing.

Survey Design

The UNPS is carried out over a twelve-month period (a "wave") for the purpose of accommodating the seasonality associated with the composition of and expenditures on consumption on a nationally representative sample. The survey is conducted in two visits in order to better capture agricultural outcomes associated with the two cropping seasons of the country. The UNPS therefore interviews each household twice in a year, in visits approximately six months apart.

In 2009/10, the UNPS set out to track and interview 3,123 households that were distributed over 322 Enumeration Areas (EAs), selected out of 783 EAs that had been visited during the Uganda National Household Survey (UNHS) in 2005/06. The distribution of the EAs covered by the 2009/10 UNPS was such that it included all 34 EAs in Kampala District, and 72 EAs (58 rural and 14 urban) in each of the other regions i.e. Central excluding Kampala, Eastern, Western and Northern which make up the strata.

Within each stratum, the EAs were selected with equal probability with implicit stratification by urban/rural and district (in this order). However, the probabilities of selection for the rural portions of ten districts that had been oversampled by the UNHS

2005/06 were adjusted accordingly. Since most IDP (Internally Displaced People) camps in the Northern region are currently unoccupied, the EAs that constituted IDP camps were not part of the UNPS sample. This allocation allows for reliable estimates at the national, rural-urban and regional levels i.e. at level of strata representativeness which includes: (i) Kampala City, (ii) Other Urban Areas, (iii) Central Rural, (iv)Eastern Rural, (v) Western Rural, and (vi) Northern Rural.

In the UNPS 2010/11, the concept of Clusters instead of EAs was introduced. A cluster represents a group of households that are within a particular geographical area up to parish level. This was done due to split-off households that fell outside the selected EAs but could still be reached and interviewed if they still resided within the same parish as the selected EA. Consequently, in each subsequent survey wave, a subset of individuals was selected for tracking (see section 4.1 for details).

In the UNPS 2013/14 (Wave 4) fieldwork, one third of the initial UNPS sample was refreshed with the intention of balancing the advantages and shortcomings of panel surveys. Each new household will be visited for three consecutive waves, while baseline households will have a longer history of five or six years, given the start time of the sample refresh. In the UNPS 2018/19 (Wave VII) fieldwork continued with the sample that was selected UNPS 2013/14.

Tracking

Panel surveys consider tracking as one of the core components to refresh the sample and thereby reducing attrition. Tracking considers the mobility of the target population, the success with which those

who move are found and interviewed, and the number of refusals. In Wave 7 tracking was done at both the household and individual-level. It aimed at locating members in the locations where they were last interviewed. If core members of a household had since moved, then they were targeted for individual tracking. A detailed information about tracking can be found in the Basic Information Document (BID).

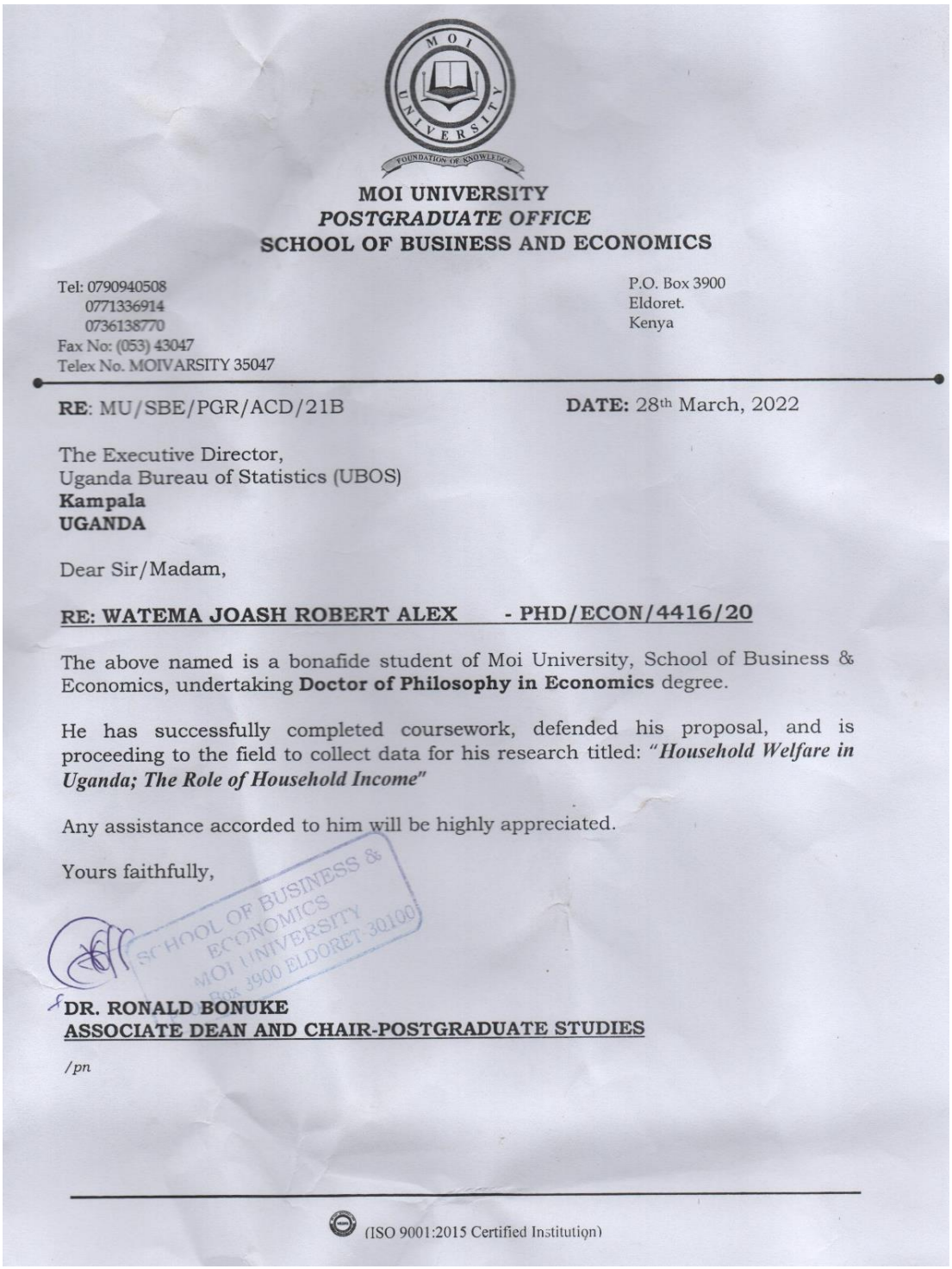
Field work

A Centralized approach to data collection was employed whereby nine mobile field teams recruited from the headquarters were dispatched to different sampled areas. Each team comprised of one Supervisor, three Enumerators and one Driver. The teams were recruited based on the languages mostly used in each of the four statistical regions. The field teams visited UNPS households twice in a year in order to capture seasonality for the households engaged in agricultural activities as well as households‟ consumption expenditure patterns.

Data Management System

The households to be covered for the wave are uploaded in the system at the headquarters. The headquarters then assigns the households for that particular trip to the team leaders who then assign to their respective interviewers. The completed households from the field are sent to the headquarters which are reviewed by a team of office editors for consistency checks. The editors will approve or reject the work which needs clarification back to the field teams. The approved work by the editors is exported in stata format for secondary editing by office staff in preparation for analysis.

Appendix. 5: Introductory Letter from Moi University, School of Business and Economics



MOI UNIVERSITY
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RE: MU/SBE/PGR/ACD/21B **DATE:** 28th March, 2022

The Executive Director,
Uganda Bureau of Statistics (UBOS)
Kampala
UGANDA

Dear Sir/Madam,

RE: WATEMA JOASH ROBERT ALEX - PHD/ECON/4416/20

The above named is a bonafide student of Moi University, School of Business & Economics, undertaking **Doctor of Philosophy in Economics** degree.

He has successfully completed coursework, defended his proposal, and is proceeding to the field to collect data for his research titled: ***"Household Welfare in Uganda; The Role of Household Income"***

Any assistance accorded to him will be highly appreciated.

Yours faithfully,

SCHOOL OF BUSINESS & ECONOMICS MOI UNIVERSITY P.O. BOX 3900 ELDORET 30100

DR. RONALD BONUKE
ASSOCIATE DEAN AND CHAIR-POSTGRADUATE STUDIES

/pn

(ISO 9001:2015 Certified Institution)

Appendix. 6: An OLS Regression of "Farm Income" on Logconsexp"

```
Linear regression                               Number of obs     =      3,129
                                                F(1, 3127)        =    2238.53
                                                Prob > F          =     0.0000
                                                R-squared         =     0.2759
                                                Root MSE          =     5.2522

------------------------------------------------------------------------------
             |               Robust
     logfinc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  logconsexp |  -2.765792   .0584572   -47.31   0.000    -2.88041   -2.651173
       _cons |   45.28332   .8575368    52.81   0.000    43.60192    46.96471
------------------------------------------------------------------------------
```

Appendix. 7: An OLS Regression of "Non-farm Income" on "Logconsexp"

```
Linear regression                               Number of obs     =      2,061
                                                F(1, 2059)        =      96.34
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0401
                                                Root MSE          =     1.2211

------------------------------------------------------------------------------
             |               Robust
     lognfinc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  logconsexp |   .1703394   .0173542     9.82   0.000     .1363058    .2043731
       _cons |   11.89979   .2477284    48.04   0.000     11.41396    12.38561
------------------------------------------------------------------------------
```

Appendix. 8: An OLS Regression of "Non-farm Income" on "Logconsexp"

```
------------------------------------------------------------------------------
   logremit |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
logconsexp |   .0167279   .0009401    17.79   0.000     .014885    .0185708
     _cons |   163224.2   6715.113    24.31   0.000      150061    176387.5
------------------------------------------------------------------------------
```

Appendix. 9: An OLS Regression of "Diversified Income" on "Logconsexp"

```
Linear regression                               Number of obs     =      7,903
                                                F(1, 7901)        =     794.44
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0860
                                                Root MSE          =     5.0447

------------------------------------------------------------------------------
             |               Robust
    logdivinc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  logconsexp |   1.071306   .0380088    28.19   0.000     .9967986    1.145813
       _cons |  -12.56601    .516702   -24.32   0.000    -13.57888   -11.55313
------------------------------------------------------------------------------
```

Appendix. 10: An OLS Regression of "Farm Income" on "Poverty Status" of a HHH

Source	SS	df	MS	Number of obs	=	3,129
				F(1, 3127)	=	29.97
Model	1131.09589	1	1131.09589	Prob > F	=	0.0000
Residual	118002.711	3,127	37.736716	R-squared	=	0.0095
				Adj R-squared	=	0.0092
Total	119133.807	3,128	38.0862554	Root MSE	=	6.143

logfinc	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
HHpovstatus						
poor	1.403936	.2564363	5.47	0.000	.9011351	1.906736
_cons	3.945653	.1261318	31.28	0.000	3.698343	4.192962

Appendix. 11: An OLS Regression of "Non-farm Income" on "Poverty Status" of a HHH

Source	SS	df	MS	Number of obs	=	2,061
				F(1, 2059)	=	78.00
Model	116.725726	1	116.725726	Prob > F	=	0.0000
Residual	3081.26208	2,059	1.49648474	R-squared	=	0.0365
				Adj R-squared	=	0.0360
Total	3197.98781	2,060	1.55242127	Root MSE	=	1.2233

lognfinc	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
HHpovstatus						
poor	-.7155925	.0810249	-8.83	0.000	-.8744918	-.5566932
_cons	14.44216	.0288337	500.88	0.000	14.38562	14.49871

Appendix. 12: An OLS Regression of "Diversified Income" on "Poverty Status" of a HHH

Source	SS	df	MS	Number of obs	=	7,903
				F(1, 7901)	=	114.73
Model	3148.78129	1	3148.78129	Prob > F	=	0.0000
Residual	216838.661	7,901	27.4444578	R-squared	=	0.0143
				Adj R-squared	=	0.0142
Total	219987.442	7,902	27.8394637	Root MSE	=	5.2387

logdivinc	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
HHpovstatus						
poor	-1.610879	.15039	-10.71	0.000	-1.905683	-1.316075
_cons	3.012193	.0654536	46.02	0.000	2.883887	3.1405