AGRICULTURAL EMPLOYMENT AND POVERTY DYNAMICS AMONG RURAL HOUSEHOLDS IN NIGERIA

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CERTIFICATION

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DEDICATION

I dedicate this thesis to the glory of God, my inestimable wife- Olajumoke and to my daughter- Oyinkansola for her encouraging smiles during the programme.

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ABSTRACT

Arising from drudgery associated with traditional agriculture, infrastructure deficit and low farm output, rural households have been moving out of agriculture to escape poverty. Previous studies focused on agricultural labour participation and welfare in Nigeria with little emphasis on household transitions over time. Therefore, agricultural employment and poverty dynamics among households in rural Nigeria were investigated.

Data from the General Household Survey Panel (2010/2011, 2012/2013, 2015/2016) collected in Nigeria were used. Information on Socioeconomic Characteristics-SC (age, sex, Marital Status-MS, education, Household Expenditure-HE, Household Size-HS, Asset Ownership-AO and Dependency Ratio-DR, Access to Credit-AC) and sector of employment were used. Others include Information and Communication Technology access-ICT, Market Distance-MD, Household Member Migration-HMM, Distance to Major Road-DMR, Zones (North East-NE, North West-NW, South South-SS, South West-SW and South East-SE). Households that were Continuously in Agriculture (CA), Moved Out of Agriculture (MOA), Moved into Agriculture (MA) and Never in Agriculture (NA) were grouped based on their primary employment. Households were classified as Chronically Poor (CP), Transitory Poor (TP), Transitorily Non-poor (TNP) and Never Poor (NP) based on the poverty situation over the periods. Data were analysed using descriptive statistics, Foster, Greer and Thorbecke weighted poverty measure, Markov chains, binary and multinomial probit regression models at $\propto_{0.05}$.

Age of household heads were 48.6±14.4, 51.0±14.5 and 53.8±14.2 years while HS was 6.0±3.0, 6.2±3.1 and 6.3±3.3 persons in 2010/2011, 2012/2013 and 2015/2016, respectively. The CP households accounted for 31.4 percent of the sample while those TNP, NP and TP were 15.8 percent, 35.7 percent and 17.1 percent, respectively. Households in NE (11.9 percent, 23.6 percent) and NW (19.9%, 29.1%) had more people moving out of agriculture between 2010/2011-2012/13 and 2012/2013-2015/2016 periods, respectively. Households that were CA and CP, CA and TNP, CA and NP were 19.5%, 10.1% and 18.2%, respectively. Similarly, MOA and CP, NIA and NP accounted for 10.6% and 10.1%, respectively. The DMR (0.0042) increased the probability of being CA and CP while ICT (-0.1544) and HMM (-0.2975) reduced it. Probability of MOA and being CP increased with HMM (0.7572), NE (0.4481), while DMR (-0.0195) and AO (-0.1083) reduced it. Probability of being NA and NP was increased with education (0.2609), AO (0.0926) and SS (0.3295), while being male (-0.8129), HS (-0.0604), being married (-0.1598) and HMM (-0.5774) reduced it. Dependency ratio (0.090), MD (0.076), being male (0.505), HS (0.113), AO (0.141), NW (0.418), SE (0.499) and AC (0.2953) increased the probability of being CA relative to NA, while HMM (-0.474), SS (-0.425), NE (-0.849), ICT (-0.355), and education (-0.051) reduced it. Market distance (-0.041), DR(−0.024), education (-0.046), AO (-0.195) and ACR (-0.095) reduced the probability of MOA relative to being NA, but was increased by being married (0.755), HS (0.109), NE (0.864), NW (0.387), ICT (0.444), and HMM (1.084), increased it.

Rural households who stayed in agriculture were chronically poor compared to those households who moved to non-agriculture. Access to credit, education and infrastructure investments reduced poverty and enhanced agricultural employment decisions.

Keywords: Agricultural employment, Poverty dynamics, Markov chains, Transition.

Word count: 482

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LIST OF ABBREVIATIONS

National Living Standards Survey	NLSS
Household Size	HS
Per Capita Expenditure	PCE
Mean Per Capita Expenditure	MPCE
Households	HHs
Household Size	HS
Foster, Greer and Thorbecke	FGT
Living Standard Measurement Study/General Household Survey	LSMS/GHS
National Bureau of Statistics	NBS
Federal Capital Territory	FCT
Enumeration Areas	EAs
Probability Proportionate to Size	PPS
Agriculture to Agriculture	Ag-Ag
Agriculture to Non-Agriculture	Ag-NA
Non-Agriculture to Non-Agriculture	NA-NA
Non-Agriculture to Agriculture	NA-AG
North East	NE
North Central	NC
North West	NW
South East	SE
South West	SW
South South	SS
Price Waterhouse Coopers	PWC

CHAPTER ONE

INTRODUCTION

1.1   Background to the Study

Poverty reduction is at the centre of global development policies, programmes and projects (Dagunga *et al.* 2020; Lakner *et al*., 2019; Edig and Schwarze, 2011; Oyekale and Oyekale, 2006). Globally, there are reported cases of escape from poverty over the past generation (Ravallion, 2013). An estimated 736 million people around the world live in chronic poverty compared to 1.85 billion in 1990 (World Bank, 2019). Households that are in extreme poverty lack resources to meet their basic needs, thus they cannot afford food, health care, potable water and sanitation, good schools for some or all their children and shelter (World Bank, 2018a; Touray, 2016; Sachs, 2005). There is a consensus in literature that agriculture is at the core of poverty reduction among rural poor and by extension urban poor through declining food prices (McArthur and McCord, 2015; Thirtle *et al.,* 2001). Also, productivity in agriculture growth can induce a growth process that is inclusive and pro-poor (Ajibefun, 2015). This is because improvements in agricultural productivity can increase farmers output, benefit smallholder farmers and landless labourers (through increased labour demand) because of greater employment and lower food prices for all consumers (Thirtle *et al*., 2001). Therefore, agriculture is a veritable tool for the achievement of long-term economic growth and poverty reduction-most especially chronic poverty (Christiaensen *et al*., 2011).

Agricultural employment refers to the share of labour whose livelihood depends on agricultural activities (Odozi *et al.* 2018). Labour is known to be a very important input in the agricultural production process (Bruce, 2019). Labour involves all human efforts (physical, skill and mental power) utilised in production around which other production resources or processes revolve (Bassey *et al*., 2016). Labour accounts for a sizeable portion of the cost of production (Bruce, 2019). According to Shaib *et al*., (1997) cited in Bassey *et al*., (2016), over 9 out every 10 activities in subsistence production systems

depend on human labour while technology-driven production systems require about 50-60 percent human labour. Farm household is a complex system built on human capital and remittances interacting with the farm production unit and off-farm activities (Chapoto *et al*., 2011).

Poverty has been defined as the situation in which an individual cannot sustainably access his/her basic needs and lead a socially acceptable and meaningful life (Zulher and Ratnasih, 2021). Therefore, poverty is typified by subhuman living conditions and exposure to shocks and risks (Shido-Ikwu, 2017; Oyekale and Oyekale, 2006). Meanwhile, poverty dynamics explain the transitions in and out and nature of poverty among households or individuals over a given time horizon (Hossain *et al*., 2006; Dillon and Quinones, 2010). The dynamics of poverty can be linked to the changing pattern of asset ownership and technology use in situations of risk and uncertainty (Barett *et al*., 2016).

Dynamics of agricultural employment explains the flow of labour from agriculture to another sector especially those with better welfare packages within at least two time periods (Sportel, 2013). Change in sectoral employment can contribute significantly to poverty reduction, as it may help people escape low-wage poverty traps (Aggarwal, 2016; Sachs, 2005). Similarly, the main assumption in poverty dynamics literature is that some of the poor are mobile as they are not poor all the time (Barrett *et al*., 2016). Therefore, it follows that people slide in and out of poverty and as such poverty varies with time (Yaqub, 2000).

The need for studies that provide insights into rural labour markets in the developing countries have been documented in literature (Sportel, 2013). This need is premised on the prevalence, territorial variation and volatility of informal institutions and the need to understand the dynamics (Kelly, 2001). According to Sportel (2013), rural labour is reactive to economic realities hence the reason labour moves from one sector and/or location to another based on perceived benefits. Rural labour is not organised enough to formally request for improved remunerations or work conditions from their employers given that such arrangements are not backed up by contracts. Therefore, labour decisions around enterprise or sectoral employments and transitions have signalling effects on employers and markets (Bryceson, 2019; Sportel, 2013). The amount of labour farmers can access depends on the type of labour (family or hired) and the number of hours

(man-days) they are willing and able to work given available capital (Bassey *et al*., 2016). Labour movement out of agriculture is a challenge in Africa given the food insecurity and malnutrition challenges that currently plague the region (Bryceson, 2019). Therefore, there is a need to investigate the relationship between agricultural labour employment decisions and poverty.

Poverty can be persistent or intermittent (Basu, 1997; Iversen, 2013). The rural poor in the developing world are within the ambits of poverty owing to limited or no access to physical, human and social capital (Iversen, 2013; Mafimisebi *et al*., 2010). Households that are poor in terms of capital are particularly vulnerable to chronic poverty while the initial distribution of assets might help other households to accumulate more wealth. Poverty reduction in Nigeria remains a moving target as an average Nigerian is four times poorer than four decades ago (Awoyemi and Abdelkrim, 2009). In fact, the overall dependency ratio is estimated at 234 dependents per 100 gainfully employed workers in the urban areas (Adekoya, 2014).

1.2   Problem Statement

Poverty incidence has increased over the years and about 70 percent of the Nigerian population is poor (IFAD, 2012). The country which was once among the richest 50 countries in the early 1970s, currently sits among the 25 poorest countries in the world (Adeoti, 2014). The number of people surviving on less than US$1.25/day increased from 64.61 percent in 2003/2004 to 68 percent in 2010 and staggered to 67 percent in 2020 (Trading Economics, 2022; Adeoti, 2014). According to the World Poverty Clock (2019) cited in Iheonu and Urama (2019), Nigeria is currently the poorest nation and the poverty capital of the world with 86.9 million people living in extreme poverty. Agriculture which is the main sector of employment of the rural poor is prone to risks and shocks due to the traditional state of the sector (Mafimisebi, 2021; Osabohien *et al.* 2020a; Adepoju *et al.* 2019). Hence, the income earning potentials and welfare of households are affected by the outcome of their farming activities. Employment transitions in and out of agriculture can account for static and dynamic poverty within households in rural Nigeria. This implies those that are permanently engaged in agriculture and living in rural Nigeria might likely be poor, their geographic location accounting for a dearth of opportunities that could potentially lift them out of poverty.

According to IFPRI (2008), there has been a sustained decrease in the proportion of the labour force working in agriculture, the rural population and the proportion of the nation's earnings accruing from agricultural commodity exports. There is evidence in literature implying sustained decline in farm labour supply over the years (Babatunde and Qaim, 2010). The rural-urban migration of youths and ageing of farmers constrain agricultural labour availability, household food security and consequently poverty status of farming households (Odozi *et al*. 2018; Oluwatayo, 2018). Outcomes of the agricultural labour market significantly affect the welfare of rural households in Nigeria, hence, low incomes/returns accruing to the smallholder farmers, drudgery and inefficiency has resulted in limited or total loss of interest in agriculture by youth, who are expected to replace the ageing farmers (Mafimisebi, 2021).

Despite the various government interventions aimed at significantly reducing poverty in Nigeria, poverty remains pervasive (Ajibefun, 2015). Apparently, past programmes were addressing the symptoms rather than the underlying causes as the situation continues to get worse (Mbanasor *et al,* 2012). Meanwhile, the poorest half of the population account for a meagre 10 percent of the national income (Mbanasor *et al*., 2012). Whether analysed in absolute or relative terms, the proportion of poor is growing in Nigeria (Oyekale and Oyekale, 2006; Awoyemi, 2011). In their study, Obayelu and Awoyemi (2010) found 84 percent of the poor in Nigeria live in rural areas. Poverty is a national issue with rural Nigeria being the areas worst-hit (Olugbire *et al*. 2020; Adeoti, 2014; Awotide *et al*., 2013). Therefore, the dearth of opportunities in rural Nigeria continues to put farming households within the ambits of poverty thus increasing the number of working poor and compromising their living standards.

The issues surrounding agricultural employment and its effect on poverty dynamics among rural households in Nigeria have been explained. This study therefore seeks to find answers to the pertinent questions below:

(i)   What is the poverty incidence and level of sectoral movements of labour in rural Nigeria?

(ii)   What is the extent of poverty and labour transition among rural households in Nigeria?

(iii)   What is the influence of labour employment in the agricultural sector on the poverty status of rural households in Nigeria?

(iv)   What are the factors influencing agricultural employment in rural Nigeria?

(v)   What are the determinants of poverty and agricultural employment in rural Nigeria?

1.3   Objectives of the Study

The broad objective of the study is to examine the effect of agricultural employment on poverty dynamics among farming households in Nigeria. The specific objectives of this study are to:

(i)   profile poverty incidence and labour transitions in and out of agriculture based on socioeconomic characteristics of farming households in Nigeria

(ii)   analyse poverty transition and sectoral movement in and out of agriculture among rural households in Nigeria

(iii)   examine the causal relationship between agricultural employment and poverty among rural households

(iv)   determine the factors influencing agricultural employment in rural Nigeria

(v)   examine the determinants of poverty and agricultural employment in rural Nigeria.

1.4   Justification of the Study

Labour movements in and out of agriculture based on farm operations and perceived benefits in different time periods could account for differences in economic outcomes among farming households (Monteforte, 2019; Korzenevica, 2020). Past studies focused on labour participation and transition decisions from the market perspective (Fadayomi *et al*., 2014; Omoruyi *et al*., 2011; Babatunde and Qaim, 2010). Therefore, there is a need to analyse the effect of agricultural employment decisions of households on poverty. This study attempted to fill this void in literature and would serve as a building block for future studies on agricultural employment dynamics.

Past studies on poverty in Nigeria (Oyekale and Oyekale, 2006; Obayelu and Awoyemi, 2010; Adepoju, 2012; Adeoti, 2014) placed emphasis on static poverty analysis, however this study investigated the effect of agricultural employment decision on poverty using a dynamic approach. The main constraint to past approaches is that many rural households experience temporary transitions in and out of poverty and a permanent movement across the poverty line is difficult to distinguish from temporary movements when only short panel data sets are available. This study utilised the Living Standard

Measurement Survey/ General Household Survey (LSMS/GHS) panel data sets collected in 2010/2011, 2012/2013 and 2015/2016 in order to identify and isolate medium-term trends from transitory movements. This study used Panel probit regression to analyse the relationship between labour dynamics and poverty in rural Nigeria. Panel probit regression provides the opportunity to model and test complicated behavioural hypotheses (Hsiao, 2014). Also, Markov Processes was used to analyse poverty transitions and labour dynamics among rural households in Nigeria. This analytical tool is particularly useful in forecasting the long run dynamics as it requires a minimum of two periods in estimating the situation of rural households around poverty and labour mobility decisions in the coming years. This is relevant for policy making as policy makers can plan while avoiding unpleasant economic conditions.

This study adds to knowledge and existing literature on labour and poverty dynamics in Nigeria. There had been so many government interventions targeted at reducing poverty in Nigeria in the past. The programmes include the Seven Point Agenda (established in 2007), Transformation Agenda (established in 2010), Economic Recovery and Growth Plan (ERGP established in 2017) (Adeoti, 2014; Arogundade *et al*., 2011). The last effort was the agricultural promotion policy of the current administration in Nigeria. However, there is a need for government interventions to be intentional and engage rural households based on empirical knowledge of sectoral movements and poverty dynamics. It is therefore pertinent to understand the complexity of labour dynamics within the context of local and socially regulated labour markets (Moeis *et al.* 2020; Sportel, 2013). Again, insights from this study can help Nigeria in the quest to achieve the Sustainable Development Goals (SDGs) 1 and 8. The findings will guide policy makers in designing and implementing appropriate interventions for rural households in Nigeria.

1.5   Outline of the thesis

The thesis is divided into five chapters with Chapter one providing a background, explaining the problem, providing a justification for the study and defining the objectives. Chapter two reviews relevant literature and discusses the theory behind this research work. Chapter three presents the technique used to organise, collect, measure, and analyse the data. Empirical results were presented and discussed in chapter four while chapter five concludes the report with a summary, conclusion, recommendations, and suggestions for further studies.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Theoretical Framework

2.1.1 Lewis-Ranis-Fei Model

The Lewis (1954) theory of dualistic economic development is one of the earliest efforts at situating economic development within the context of labour-surplus and resource-poor countries (Ercolani, 2010). According to the theory, the traditional agriculture and modern industry can be distinguished based on the marginal return and labour productivity (Guan and Li, 2020). The Lewis theory assumes that the economy which comprises of agriculture and non-agriculture is characterised by vast amounts of surplus labour resulting in low marginal productivity of labour that tends towards zero (Ranis, 2004).

The agricultural wage rate is based on the allocation rule that equates the average productivity otherwise referred to as institutional wage while the non-agricultural sector is capital-intensive with huge resources relative to labour. The non-agricultural sector is profit-driven but pays approximately 30percent higher than the agricultural institution (Lewis, 1954). The non-agricultural sector extracts capital by absorbing excess human resources from agriculture. The widening of the non-agricultural sector is based on an infinitely elastic labour supply from the agricultural sector due to labour surplus. When the surplus is fully engaged, the supply curve for labour in the non-agricultural sector would slope upwards (Zhang *et al.* 2018).

Lewis' dual sector model can be widened by considering an alternate link between the two sectors that is yet to be thoroughly investigated. This is associated with the land used for cultivation and capital input consumed by both sectors, as there is a likelihood that farm holding is released to the industrial sectors (Sarap, 1995) or to advance the course of industrialization (Tuyen and Huong, 2013). Farm holding reallocated due to the development in industry provides a platform for growth and industrial development thus creating cities, industrial areas, and better infrastructure. This type of industrialization will expedite movement of labour away from agriculture. Albeit, not

all farmers gain the full benefit, as those with low education become unemployed or in the informal sector (Tran *et al.,* 2013; Nguyen *et al*., 2005).

John C.H. Fei and Gustav Ranis expanded the Lewis model by leveraging the classical examples of the dualistic economy propelled by agricultural development (Ecrolani and Wei, 2010). Therefore, Ranis and Fei explained the key role played by labour productivity in industrial expansion (Pu *et al.* 2019). They further explained that the labour flow from the agricultural sector could negatively affect the aggregate production if agricultural technology is unchanged (Li, 2020). Therefore, the reduced agricultural production level will result in increased food prices consequently resulting in a rise in the prevailing industrial wage to offset the prices that resulted in the decline of real income (Ercolani and Wei, 2010). In addition, Ranis and Fei introduced the concept of agricultural surplus by introducing agricultural labour productivity and a dynamic mechanism. The assumption is that the agriculture sector could free up labour if agricultural productivity improves, hence the transformation of agricultural surplus into industrial capital to guarantee economic development. This implies that agricultural productivity would be sufficient to allow a lower proportion of the population to focus on food and raw materials while the surplus labour can be reallocated to the burgeoning industry towards improving total output.

Ranis and Fei (1961) formalised this theory by integrating it into Rostow's (1956) three "linear-stages-of-growth" theory based on the marginal productivity of agricultural labour. Ranis and Fei (1961) noted that the economy is static at the pre-conditioning stage. The break-out point marks the stage at which an emerging non-agricultural sector is created. Meanwhile, the surplus agricultural labour accounts for low marginal productivity and average marginal productivity which jointly define agricultural institutional wage (Pu *et al.* 2019). Once the underutilised agricultural labour force is absorbed, the agricultural marginal productivity of labour begins to increase but stays below the institutional wage. This point marks the shortage point at which the economy moves into phase 2 of development (Ercolani and Wei, 2010).

During the second phase, the remaining agricultural unemployment is gradually absorbed. Once this process terminates, the economy becomes fully commercialised and proceeds into the third phase where the agricultural labour market is entirely commercialised (Guan and Li, 2020). This study is hinged on Lewis-Ranis-Fei theory.
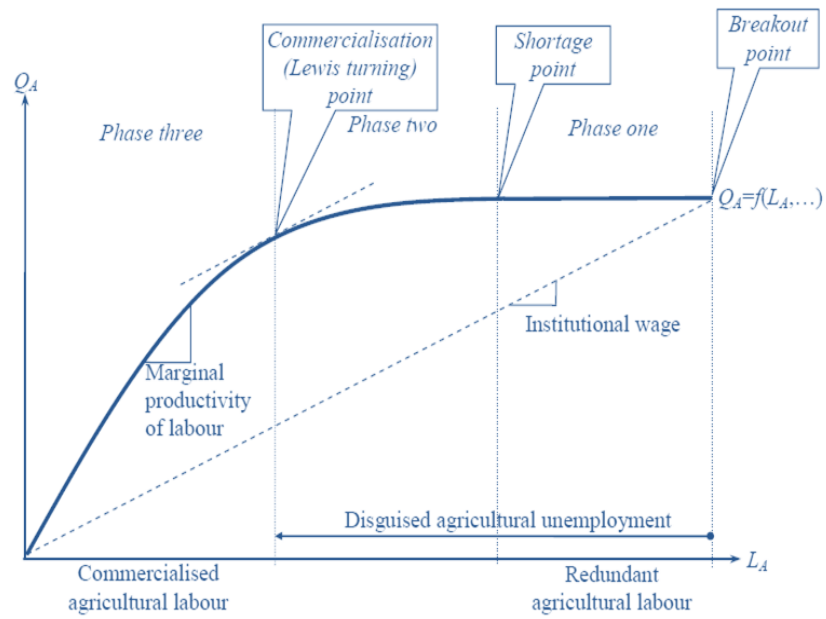
Figure 2.1:   Lewis-Rans-Fei Phases of Economic Development

Source: Ercolani and Wei (2010)

2.1.2 Jorgenson's Agricultural Surplus Theory

In attaching significant value to agricultural development in a dual economy, Dale Jorgenson provided an alternative perspective to the labour mobility discourse. Jorgenson attempted to explain the relationship between economic development, industrial sector expansion and the decline of the agriculture. According to the theory, the employability of the industry is infinite while the agricultural sector is finite thus leading to labour transfer (Jorgenson, 1967). A major difference between Jorgenson's theory and Lewis-Ranis-Fei model is the de-prioritization of labour surplus (Ruttan, 2017). In this model, labour mobility is viewed as a product of inevitable change in the pattern of consumption and demographic change (Chen, 2020). Therefore, labour mobility occurs due to a shift of consumer demands since agricultural products are physiologically limited while industrial products are infinite.

Jorgenson then applied the agricultural surplus narrative in deepening his explanation on the relationship between demographic transformation and labour productivity. According to the theory, there is a level of food production where food output per person outweighs the minimum per capita output required for a maximum population growth which is the point of agricultural surplus. Therefore, a positive agricultural surplus means the growth rate of agricultural labour force will be less than the population growth, consequently, the ratio of agricultural labour force to the industrial labour force would rise to ensure migration to the industrial sector (Pu *et al.* 2019). However, if the reverse occurs, such economy will be confined by the Leinbenstein's 'low-level equilibrium trap' that would ground the manufacturing sector over time and result in capital depreciation without replacement. The level of agricultural surplus accounts for industrial development and the rural surplus labour available for migration.

2.1.3 Harris-Todaro Push Theory

John Harris and Michael Todaro formulated a model to provide insights into the soaring rate of unemployment in Nairobi and other major cities in Kenya in the early 1960s. They studied workers' migration within a dual economic system-rural and urban sector (Espindola *et al*. 2006). The difference between both sectors is the product type, production technology and the process of wage determination. The Harris-Todaro theory is also known as the "push" factor theory, in which the "push" factor for the rural-urban migration results in an increase in urban informal (services) sector employment (Guan and Li, 2020). According to Fields (1990), the migration process implies that the underemployment and unemployment in the urban informal sector equilibrates the flow of migrants while responding to urban-rural differentials in expected earnings. The theory states that there is high competition in the formal labour market, consequently those who are pushed to the informal sector are less competitive. Therefore, they are less competitive or unable to compete in the formal labour market because of low human capital stock. Meanwhile, firms in the informal sector have low technology, capital are smaller in size relative to the formal sector players. The excess labour pushed into the informal sector accepts the prevailing low wages in anticipation of being able to eventually enter into the high-wage jobs offered by manufacturing (Folawewo, 2013). Real wages were high in urban formal sector jobs relative to the rural traditional sector (Fields, 2007). However, low-wages in the informal sector did not mean workers operating within the space were less productive compared to their peers in the high-wage paying sector. Literature suggests that the higher wages in the manufacturing sector may be due to the activities of labour unions constantly agitating for improved wages (Fields, 2007).

Harris and Todaro attempted to solve this problem by proposing two policies. First, a policy on formal sector job creation for the unemployed. This according to them would raise the number of urban unemployed given the deficit in the number of jobs required. Hence, the first solution was not feasible in addressing the problem (Fields, 2007). Second, a rural development policy was proposed such that there would be an increase in rural traditional sector wage creation thereby reducing unemployment. They concluded that labour should be encouraged to return to rural areas and as such the way out of unemployment in urban areas would be rural development (Fields, 2007; Espindola *et al*., 2006)

2.1.4 Theories on Poverty

Poverty is multidimensional, complex and dynamic with gender dimensions which vary from one context, location or individual to the other (Stock et al, 2014, Mafimisebi, 2021). Poverty can be defined based on capability, income, assets and general living conditions. Poverty is a product of financial resource deprivation, food insecurity, social exclusion and limited access to basic amenities. Poverty can be multidimensional and it is a component of ill-being (Chambers, 2006; Handley *et al.*, 2009). The United Nations defined poverty as a denial of choices and a violation of human dignity (Gordon, 2005; Ghebru and Holden, 2016).

In order to have a uniform measurement of poverty, the World Bank suggested an income or consumption approach (Ravallion and Chen, 2008). Therefore, a person is poor if his or her consumption or income falls short of a minimum standard for basic needs. In fact, the World Bank uses daily reference lines set at US$1.25 and US$2 to make comparison and analysis easy. The following important terms are defined:

1. Absolute Poverty: This refers to severe deprivation of basic needs (food, clothing, water and sanitation, information and education among others). The absolute poverty line estimates the monetary requirement of a household or individual to acquire the goods and services based on the absolute threshold for each of the basic needs.

2. Relative Poverty: This is measured when poverty is expressed as a function of the society and individual lives. This implies households with income or expenditures lower than a fraction of the national average are regarded as poor.

3. Poverty Line: This is a benchmark or minimum income deemed adequate within a country. For the purpose of comparison and aggregation, the international poverty line was reviewed to USD1.25 at 2005-based purchasing power parity (Ravallion *et al.*, 2009).

4. Poverty Trap: This occurs when poverty persists over time as a result of deprivations and subhuman conditions under which people live for a reasonable time (Davis and Sanchez-Martinez, 2014).

There are two distinct views on poverty-classical and neoclassical theories. There are a few differences and similarities between the two concepts. While the utility concept is a feature of neoclassical economics, it is absent in classical economics

(theories of value, labour and growth). According to the theories, individuals try to maximise utility over the consumption and labour choices while firms seek to maximise profit by obtaining marginal calculations of potential gain or loss from varying combinations of production inputs, types of consumption etc. Neoclassical theory was proposed by J.M. Keynes (Davis and Sanchez-Martinez, 2014). The main proponents of the classical theories are Adam Smith, David Ricardo and Carl Max (Investopedia, 2017). In classical economics, the profits accruing to firms are equal to the wages of workers i.e there is no difference between firms and individuals (Davis and Sanchez-Martinez, 2014).

2.1.5 Classical Theory

Classical economic theories of value and distribution were propounded in the 18th and 19th century. The product value is inherent in the cost of producing the product. The explanation of costs in classical theory explains distribution. In agricultural systems a landlord is paid rent; workers obtain wages, while the capitalist tenant farmer got profit on investments. There is no exploration in the driving forces behind the different level of income flowing to the different economic agents involved (Stock *et al.* 2014).

In classical economics, it is generally assumed that outcomes of market transactions are efficient, and wages are the true representation/proxy for individual productivity. Therefore, the proponents assume poverty is an aftermath of poor individual choices which constrain productivity. Although, the proponents agree that significant differences in genetic abilities can also account for poverty. Therefore "incorrect decisions" (eg. having unprotected sex, unwanted children etc.) made by individuals may put them within the ambits of "poverty or welfare trap". Again, the interventions meant to reduce poverty are counterproductive resulting in economic inefficiency and reinforcement of poverty (though welfare dependence). There are two classical models; this study considers theory of culture and poverty and structural and situational theory.

2.1.6 Theories of culture and poverty

Culture: poverty is persistent because of some patterns of behaviour, priorities and values integrated into their culture which makes them trapped in poverty (Lewis, 1965 cited in Stock et al, 2014). However, children from affluent families can inherit wealth.

Therefore, the theories that imply that poverty can be addressed through a strategic shift in the value systems and motivation of families' policies have shown in recent times

that successive generations live in poverty due to perpetuating cultures of weak parenting, inappropriate wants, poor work ethic and education (Welshman, 2007, Yaqub, 2002). The model also assumes poverty reduction through fiscal means is not a solution but the need to reverse a cycle of negative values by changing behaviours of poor head of households (Field, 2010, Allen, 2011, Stock *et al*. 2014)

Structural and situational theories: the underlying assumption in structural and situational theories is that poverty is a consequence of widespread/high level of inequality in social structure including race, gender, income class and power. These stem from dual labour and radical economic theory which assumes poverty arise from class divisions and unequal wealth distribution in free market economies (Lindbeck and Snowey, 1984, Stock et al, 2014) or the changing impact of globalization and industrial decline putting entire communities in to poverty in certain locations and widening divisions between high-skilled, knowledge-based work and poorly paid, insecure and low-skilled work in service sectors (Raffo *et al*., 2007, Byrne, 2005).

Families with a history of poverty are poor, not because of individual or cultural inadequacies but because social structures such as education, health care and employment undermine their likelihood of exiting poverty. Functional theories state that poverty performs a "function" where poor families in low-paid work subsidise the rich, and different societal roles, have different levels of prestige (Townsend, 1979).

Structural theories argue that poverty is persistent because of structural discrimination of gender roles in and outside the family as in feminist theory (Arrow, 1971, Thoursie *et al*., 2012) or the arrangement of political systems that maintain social divides (Brady and Burrway, 2012). Therefore, access to household resources is dependent on the relative status of members and structured by norms emanating from power relationships supported by age, gender, class and race (Brannen and Wilson, 1987).

2.1.7 Individualistic/pathological theory of poverty

The underlying assumption of individualistic theories argues that personal characteristics of individuals such as lack of motivation and abilities push them into poverty. The theories derive from orthodox economic theory which assumes low or inadequate wages are due to individuals being insufficiently productive (Thurow, 1969, Townsend, 1979) and human capital theory where education, training, mobility, effort

and genetic factors influence poverty situation of individuals (Gorden, 1972, Townsend, 1979). Here, it is assumed that families are poor because of their choices.

There are other theories such as minority group theory which assumes large families/households and the unemployed are particularly vulnerable to poverty. This resulted in the concept of the life-cycle poverty dynamics by which families become vulnerable to poverty at certain periods such as childbearing, loss of breadwinner or loss of job or means of livelihood (Stock *et al.*, 2014).

2.2   Methodological Review

2.2.1   Poverty line approach/ Monetary Approach

This is the first quantitative method used by welfare economists to determine poverty status of households. There are two key methods for establishing the poverty line in literature. The measures include objective approach and the subjective approach. Subjective poverty measurement is built on the assumption that poverty can only be defined by the poor themselves (Nunes, 2008). However, there are views in literature that subjective poverty measures belong to the multidimensional poverty measures. This is because this approach views poverty in the context of powerlessness, low income or lack of assets and voicelessness (Titumir and Rahman, 2013). Rather than classifying income into necessities and luxury, the subjective approach poses the "minimum income question" (MIQ) whereby individuals or families are allowed to provide an income level they consider minimal for survival (Ravallion 1998). The responses are taken as the consumer cost functions at a point of maximal utility (Nunes, 2008).   The objective approach is further broken into absolute and relative poverty lines as discussed earlier. Some tools used in the objective approach include Foster-Greer-Thorbecke methodology (FGT), Sen-Shorrocks-Thon Index and Watts Index among others.

Studies that have used the poverty line or monetary approach include Balogun *et al.* (2021); Jayeola and Bayat (2020); Yisa *et al.* (2020) and Akpan *et al.* (2020). Therefore, FGT was used in this study because of the ease of use, depth of insights and wide application in literature as discussed above.

2.2.2   Capability Approach

This approach was developed by economists because of its usefulness in capturing multidimensional aspects of poverty and welfare (Titumir and Rahman, 2013). The proponents argue that the quality of life of people and capability to achieve various

"beings and doings" cannot be ignored in poverty measurement. Therefore, the capability approach focuses on human freedom and the requirements for a valued life (Titumir and Rahman, 2013). This approach was first proposed by Amartya Sen following her and other's criticisms of the unidimensional approach (Sen, 1976). The approach resulted in the evolution of a multidimensional approach to measurements of poverty, inequality and living standards. Hence, the Human Development Index (HDI) and Human Poverty Index (HPI) were built on the capability approach.

2.2.3　Human Poverty Index

This is a measure that does not consider income in its assessment of poverty. This is the approach typically employed by the United Nations Development Programme (UNDP) in its Human Development Report. Human Poverty Index measures deprivations in the three basic dimensions of Human Development Index (HDI). The dimensions are:

(i)　　　A long and healthy life and its corresponding deprivation used in the HPI is the risk of dying young using probability of not surviving to 40 as proxy.

(ii)　　Exclusion from the education opportunities is proxied by adult literacy rate.

(iii)　　A decent living standard determined from the unweighted mean of the percentage of population with consistent access to an improved water source and children underweight for age (UNDP, 2005).

The HPI is given by:

$$HPI = [\frac{1}{3}(A_1{}^{\alpha} + A_2{}^{\alpha} + A_3{}^{\alpha})]^{\frac{1}{\alpha}}$$
2.1

Where:

A_1 = the probability at birth of not surviving to age 40 (times 100).

A_2 = Adult illiteracy rate

A_3 = Unweighted average of the population without sustainable access to an improved water source and children underweight for age.

α=3 (number of dimensions).

Other poverty measures built on the capability approach include Alkire and Foster multidimensional poverty measure and Fuzzy set. Several studies have used the

capability approach in the analysis of poverty of households within developing countries (Adeoti, 2014, Oyekale and Okunmadewa, 2008).

2.2.4 Quasi Experimental Approach: This involves the use of Difference in Difference (DiD) methodology in estimating the impact of transitioning out of agriculture on the welfare of farming households (Moeis *et al.* 2020). Welfare of the households is measured using the cut-off approach built around the purchasing power parity per day and the monthly per capita expenditure of farming households (Dartanto *et al*. 2020). The DiD approach compares the outcome of the treated and control groups prior and post treatment support. If the outcome of the treatment group improves faster relative to the comparison group, after intervention, the treatment is taken as effective towards the outcome. Under this approach, three treatment categories exist-movement out of agriculture, movement to the formal sector and the dwindling per capita farm size. To estimate impact, the three treatments are introduced into the analysis of sample groups including pooled sample and subsamples of landless household, informal household, informal landless household and land owner household.

The Lewis Dual Sector Theory is then tested using the sub sample of landless households exiting agriculture to understand if there would be welfare gains from productivity increase in households engaged in non-agricultural activities. In addition, the model helps understand if dwindling farm size or land ownership will negatively affect the welfare of agricultural households (Moeis *et al.* 2020). The econometric model is given by:

$$Pov = \vartheta_1 Year_1 + \vartheta_2 Treatment_\mu + \vartheta_3 Treatment_\mu + \sum_{j=1}^{j} \theta_j SocioDemoj_{it} +$$

$$\sum_{l=1}^{L} \theta_t Regionall_{it} + \sum_{m=1}^{M} \theta_m Economicm_{it} + \varepsilon_{it} \qquad 2.2$$

$$Expercapita = \beta_1 Year_{it} + \beta_2 Treatment_{it} + \beta_3 TreatmentYear_{it} +$$

$$\sum_{j=1}^{j} \beta_j SocioDemoj_{it} + \sum_{l=1}^{L} \beta_1 Regionl_{it} + \sum_{m=1}^{M} \beta_m Econm_{it} + \varepsilon_{it}$$

$$2.3$$

where Pov is binary, 1= Poor based on the established cut-off of \$3.2/capita/day and 0 if otherwise, Expercapita is log PCE/month, Year is a dummy- 1 for treatment year, 0-otherwise. Sociodemo is a set of sociodemographic variables such as years of schooling, age, land ownership per capita, region is a set of location variables. Econ is a set of economic variables.

2.2.5 Ordered Logit Model

The Ordered Logit Model has been used to explore the relationship between labour transitions, land ownership and poverty transitions. The model aims to determine whether households who transition out of agriculture will never be poor and whether those who dispose their land holdings will be chronically poor. Poverty was determined using a $1 per day benchmark. The correlates are drawn from only the initial period to mitigate the risk of endogeneity with poverty spells. This approach, however, could not resolve all endogeneity problems, because unobserved heterogeneity could not be completely identified.

2.2.6 Markov Chains

A sequence of random variables X_0, X_1,…………with finite values in a set "S" is a Markov chain if at any time "n", the future states, X_{n+1}, X_{n+2},…………is contingent on the history X_0,………..,X_n only based on the current situation X_n. Markov chain represents any dynamic system whose state meets the recursion condition:

$$X_n = f(X_{n-1}, Y_n, n \geq 1)$$ 2.5

Where, Y_1 and Y_2 are independent and identically distributed (iid) and f is a deterministic function. This implies, the new state X_n is simply a function of the last state and an auxiliary random variable. This can be applied to queue lengths in call centres, poverty transitions, waiting times in production and service points, inventories in supply chain, water level, stock prices etc.

A Markov chain is given by:

$$X = \{X_n : n \geq 0\}$$ 2.6

On a countable set S for any $i, j \in S$ and $n \geq 0$ (non-negativity assumption),

$$P\{X_0, \ldots, X_n\} = P\{X_{n+1} = j | X_n\}$$ 2.7

$$P\{X_n = i\} = P_{ij}$$ 2.8

The P_{ij} is the chances that an object moves from state "I" to state "j". For instance, the chances of a household moving out of poverty (denoted as "i") to being non-poor (denoted as "j"). These transition probabilities satisfy:

$$\sum \quad j \in s \, P_{ij} = 1, i \in s$$ 2.9

And the matrix P= (P_{ij}) is the transition matrix of the chain.

The following conditions must be met before Markov chain can exist:

Condition 1: This is the Markov property which states that at any time "n", the next state X_{n+1} is conditionally independent of the past X_0,…..,X_{n-1} given the present state X_n. In

other words, the next state is a function of the past and present only through the present state

Condition 2: This states that the transition probabilities are not based on the time parameter "n", therefore the Markov chain is time-homogenous (Konstantopoulous, 2009). If the transition probabilities were functions of time, the process X_n would be non-time homogeneous.

The transition probabilities $\{P_{ij}\}$ form the transition probability matrix P:

P= $(P_{00} \ P_{01} \ P_{02} \ ... \ .... P_{10} \ P_{11} \ P_{12} \ ... \ ... \ P_{20} \ P_{21} \ P_{22} \ ... \ ... \ ... \ ... \ ... \ ... \ ... \ ... \ ...)$ 2.10

Where $\{P_{ij}\}$ have the properties:

$$P_{ij} \geq 0, all \ i, j \qquad\qquad 2.11$$

And $\sum_{all \ j} \quad P_{ij} = 1, \quad all \ i$ 2.12

2.3   Empirical Review

2.3.1 Poverty Trend in Nigeria

The percentage of citizens subsisting below national poverty line has been increasing almost consistently. This percentage increased from 66 percent in 1996 to 69.0 percent in 2010, staggered to 67 percent in 2013 and increased to 69 percent in 2015 (Salman, 2017; NBS, 2013). Meanwhile, poverty incidence is higher in rural Nigeria-73.2percent relative to urban areas-61.8 percent (Ajibefun, 2015; Kolawole and Omobitan, 2014). In fact, poverty has always been endemic in rural areas since 1980. In terms of geopolitical zones, NW (77.7 percent) and NE (76.3 percent) had the highest poverty rate as at 2010 (Kolawole and Omobitan, 2014). Available data show that the Nigerian population increased from 64.6million in 1980 to 88.5 million in 1990, 111.3 million in 2010 and 173.6 million in 2013 (NBS, 2013).

The poverty situation can be linked to higher infrastructure deficits and dearth of economic opportunities in rural areas than elsewhere. According to Adeoti (2014), households that were engaged in agriculture between 2004 and 2010 had the highest multidimensional poverty relative to those engaged in services and non- agriculture. This has been linked to the impact of some undesirable features of the sector such as low productivity and low income thus entrenching the households within the ambits of poverty (Waziri *et al*. 2020; Salman, 2017).

2.3.2 Labour /Agricultural Employment Dynamics in Rural Nigeria

The rapid urbanisation and rising population in Nigeria, have resulted in the development of dual labour market sectors (Folawewo, 2013). While the formal labour market is organised with regulations and formalised way of hiring and firing, the informal labour market is characterised by an undefined employment process (Moussir and Chatir, 2019; Oladeji, 2014; Leavy and White, 2000). Majority of the labour in rural Nigeria operate in the informal labour market due to dearth of opportunities and low human capital stock (Folawewo, 2013). The informal economy which is characterised by weak productivity growth accounted for 41.4 percent of Nigeria's Gross Domestic Product and 68% of employment between 2013 and 2016 (Price Water House Coopers, 2018). Informal sector including the agricultural sector are low-paying sectors. The Nigerian labour force has been increasing consistently since 1990 due to population increase. In fact, the Nigerian labour force which was estimated at 32,063, 706 in 1990 rose to 53,143,752 in 2010 and further increased to 62, 242, 961 in 2020 (World Bank, 2022). Similarly, the population which was 95.2 million in 1990, moved to 158.5 million in 2010 and increased to 206.1 million in 2020 (World Population Review, 2021),

Despite the agricultural real GDP, which averaged 4.5 percent, the growth of employment in agriculture was marginal between 2010 and 2014. PWC (2014) reported that a 1 percent rise in agricultural sector growth resulted in a 0.1 percent decline in agricultural employment between 2010 and 2014. This could be linked to urbanisation and low returns which has reduced youth participation in Agriculture (PWC, 2018, Mafimisebi, 2021). This according to PWC (2018) could be due to urbanisation which has limited youth participation in agriculture. This is traceable to labour flow from the rural areas to the more remunerative services and manufacturing activities in urban cities.

Despite reports in literature that labour has recently been moving from agriculture into other sectors in Nigeria (Odozi *et al*. 2018), the sector maintained its position as the biggest employer of labour over the years. While 67 percent of the Nigerian workers were in agriculture in 1996, approximately 60 percent were left in the sector by 2009. According to Adeyinka *et al.* (2013), labour moved from agriculture, wholesale and retail trade sectors to join sectors such as services, manufacturing, communication and transport sectors between 1996 and 2009. This implies that agriculture has been losing labour share for some time. Labour moves from sectors based on the level of labour

productivity (Monteforte, 2019; Islam, 2019). In addition, agriculture continues to lose labour to other sectors due to market failures around acquisition of productive assets such as land, capital, financial assets and public infrastructure thus constraining smallholder farmers' engagements (Salman; 2017; Tocco *et al*. 2012). The urban bias in providing of social services have been found to negatively affect the agricultural employment decisions of rural households (Odozi *et al*. 2018).

2.3.3 Review of Empirical Literature on Agricultural Labour Use, Employment and Welfare

Moeis *et al*., (2020) estimated the effects of land and labour mobility on poverty dynamics using Difference in Difference (DiD) estimations with the ordered logit models. The study revealed that land ownership and labour mobility affect poverty in the long term and how frequently households slide into poverty in Indonesia. In the situation of labour mobility, the coefficient of the transitioning out of agriculture variable is negative in 2000–2007 (short term) and 2000–2014 (long term). The probability of being poor decreases by 13.5 percentage points (short term) and 7.2 percentage points (long term) when agricultural households move out of agriculture sectors. Contrarily, during 2007–2014, labour mobility did not significantly influence the likelihood of being chronically poor. The study opined that the form of movement out of agriculture which significantly improves welfare is the movement out from the agricultural sector into the formal non-agricultural sector. This is because the formal sector jobs are more stable and higher (Dartanto, Moeis and Otsubo, 2020; Dar- tanto and Nurkholis, 2013).

The reduction of poverty among rural households requires significant investments in the agricultural sector. The entry point has always been the prioritisation of value addition, engagement in non-farm economic activities and social security to assist the poor in their outward movement out of poverty (Moeis *et al*. 2020). While a sustained income growth would address the rural poverty challenges, significant productivity improvements proxied growth in agricultural output is a key requirement. There are documented cases of poverty transitions without rural-urban migration but remunerative agricultural prices, wages and productivity (Mcculloch *et al.* 2007). According to Moeis et al., (2020), the proportion of workers engaged in agriculture has declined while those engaged in non-agriculture has risen over the years in Indonesia. The study linked this outcome to land fragmentation due to shared inheritance among households/family

members and reallocation to alternative income generating activities thus incentivising the farming families to exit agriculture. Moeis et al., (2020) also found that households exiting agriculture in the early 2000s had significant welfare gains. However, by the mid 2000s, transitioning out of agriculture did not necessarily translate to improved welfare particularly for landless farmers. In situations, where land is reallocated to non-agricultural activities, the rural communities become industrialised while opening up such communities to development. This implies that land reallocation ignites industrialization thus paving the way for the movement of labour out of agriculture. The demerit of this outcome is that most farmers would not benefit from the industrialization due to low education (Leavy and Hossain, 2014; Folawewo, 2013). This is further exacerbated by higher likelihood of agricultural workers to be poor compared to those working elsewhere (Adeoti, 2014; Amao and Awoyemi, 2009; Alisjahbanna, 2006). Agricultural assets have been found to be improving welfare (Israr and Khan, 2010). Apart from productivity improvements resulting in output growth, accumulation of assets helps farming households to access finance that may account for poverty reduction (Chingunhah *et al* 2020).

According to Abdulaziz and Abdullahi (2018), using propensity score matching revealed that labour dynamics measured by labour diversification has a direct influence on the wellbeing of the households irrespective of their poverty status. However, it contributes more to the wellbeing of non-poor households than the poor ones. Devi *et al*. (2013) analysed the dynamics of labour demand and its determinants in Punjab Agriculture. The study analysed data from 300 farm households using the 3-stage least squares method between 1985 and 2007 for wheat, paddy and cotton production. It was found that use of human labour on Punjab farms declined by about 23 percent in 2006-07. Devi *et al*. (2013) reported a 38 percent decline in family labour use, specifically 10 percent for total hired labour and 21 percent for permanent labour. This according to them is as a result of mechanisation of labour-intensive operations like harvesting of paddy and wheat.

Osugiri *et al*. (2012) analysed population dynamic, labour and smallholder farmers' Productivity in South East, Nigeria. The study analysed primary data from 120 farmers from 3-South Eastern states using regression analysis and gross and net margins. Osugiri *et al*. (2012) reported subsistence farming or net margin of NGN28, 360/ha and 46 percent of the farmers could not afford fertilisers and improved technology. In terms of

cost, labour had the highest factor cost (40.86 percent) owing to the high cost of hiring labour in the study area. They found coefficients of farm size and fertilisation positively influence crop production. However, Osugiri *et al*. (2012) found population density, cropping density and labour negatively influence crop production or output.

Agwu *et al*. (2012) assessed the determinants of agricultural labour participation among youths in Abia State, Nigeria. The study used descriptive statistics and probit regression models to analyse data on labour participation. They found women dominated agricultural production except bush clearing and mound making. Agwu *et al*., (2012) reported education, income from non-agricultural sources, occupation of the parents, farm size and rate of farm mechanisation influence labour participation among youths in Abia State.

Awotodunbo (2008) investigated labour use patterns among farmers in Osun State, Nigeria. The study used primary data from 100 farmers randomly selected from 10 villages in the LGA. Data was analysed using descriptive statistics and correlation analysis. Awotodunbo (2008) found inequality in income distribution owing to low productivity of labour input and labour shortage. It was found 81percent of the respondents employed between eleven to thirty labourers in each season, while no farmer relied on hired labour for farm operations. Awotodunbo (2008) also found farmers' age, labour cost and labour input productivity were positive correlates of labour-use patterns in Ife central LGA of Osun State, Nigeria.

Alisjahbana and Manning (2006) examined labour market dimensions of poverty in Indonesia using the logit model. Low participation in the workforce and high unemployment, while important, are less closely related to poverty status than expected was reported. It also found that people engaged in agriculture, irrespective of whether they were gainfully employed or not, had higher chances of being poor or near poor. Also, those that were underemployed had higher chances of being poor or near-poor, regardless of whether they worked in the formal or otherwise.

2.3.4 Review of Empirical Literature on Poverty and Poverty Dynamics

Oyekale and Oyekale (2006) assessed Income Shocks and Expected Poverty Dynamics in Rural Nigeria. They employed three stage Feasible Generalized Least Squares (FGLS) to analyse expected poverty in Nigeria using 2004 NLSS data. The study found an average Nigerian lived on USD 0.64 per day with the bulk of the households living in rural Nigeria The price-index deflated consumption expenditure revealed that 54.16 percent was poor in 2004 and it was expected to decline by 5.68 percent in 2006. However, Oyekale and Oyekale (2006) reported 29.50 percent of the population was never poor, 22.02 percent were transitorily non-poor. They also found 16.34 percent of the non-poor households would be poor in the near future and 32.14 percent was chronically poor. They found that while poverty was expected to decrease by 44.90 percent in the urban areas, it was to rise by 7.71 percent in rural Nigeria.

Obayelu and Awoyemi (2010) investigated the spatial dimension of poverty in rural Nigeria. They profiled zones based on their poverty situation using the NLSS data. Obayelu and Awoyemi (2010) reported that majority of the poor people dwell in rural Nigeria. In terms of zones, they found that North West contributed the highest to the national incidence and depth of poverty compared to South West accounting for the lowest incidence. While North Central had the greatest poverty severity with 0.15, North West had the highest (30 percent) contribution to national poverty. They also found gender, HS and age are correlates household welfare status using PCE as proxy.

Baiyegunhi and Fraser (2010) analysed the correlates of household poverty dynamics in Eastern Cape Province, South Africa. They used data collected in 2007 and 2008 for the study. Relevant data were analysed with the FGT and Tobit regression model. They found 66.67 percent of poor households in 2007 were still poor in 2008 while 39.5 percent of those that were non-poor in the base year fell into poverty in 2008. Baiyegunhi and Fraser (2010) found occupation, dependency ratio, access to credit, occupation and exposure to risks significantly influence poverty in South Africa.

Edig and Schwarze (2011) investigated the determinants of poverty transitions in Indonesia using panel data of HHs interviewed in 2005 and 2007. Using a benchmark of USD 1/day, they found that the headcount index decreased by 1.1 percent between 2005 and 2007. They found increasing poverty incidence proxied by number of people subsisting on less than USD 2/day. Edig and Schwarze (2011) also found limited

employment opportunities in the non-agricultural sector and low social capital were the correlates of poverty transitions.

Adeoti (2014) investigated trends and correlates of Multidimensional poverty in rural Nigeria using the 2004 and 2010 NLSS data. The study reported an increase in the adjusted poverty headcount ratio (0.984 percent), headcount ratio (3.65percent) and the intensity of poverty (4.92 percent) in 2010 compared to the level in 2004. The study also found health, assets and education were the dimensions with the most contribution to poverty in Nigeria. Adeoti (2014) reported female headed households, HS, agricultural employment and living in northern Nigeria increases the chances of being poor.

Mohammed and Haji (2014) analysed the dynamics of poverty among smallholder farmers in Ethiopia. The study employed the Jallan and Ravallion approach of modelling transient and chronic poverty and investigated the correlates with the Tobit regression model. The study utilized the Ethiopian Rural Household Survey (ERSH) panel collected in 1999, 2004 and 2009. They found a high incidence of both chronic and transient poverty among the sampled households. Mohammed and Haji (2014) reported 43 percent and 63 percent of the farmers had chronic and transient poverty. It was found that land holding and money value of livestock determine chronic and transient poverty. Again, Mohammed and Haji (2014) found an inverse relationship between labour participation and chronic poverty. In addition, a negative relationship exists between off-farm income and transient poverty.

Conceptual Framework
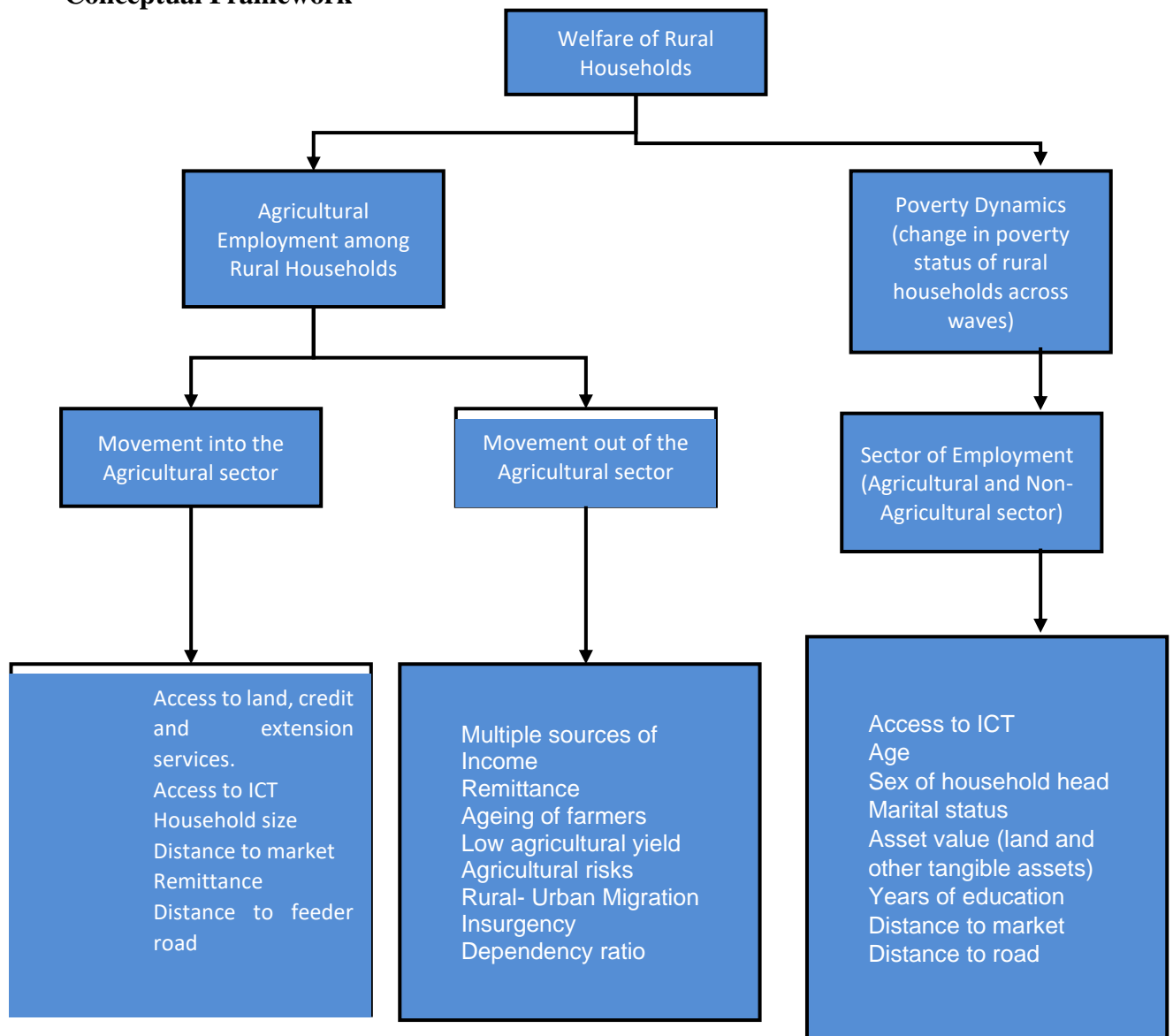
Figure 2.2: Conceptual Framework on the Effect of Agricultural Employment on Poverty

Source: Author's Concept, 2021.

2.4 Conceptual Framework

Agricultural employment decisions among rural households tend to influence poverty dynamics and consequently affect welfare across different periods. A household could decide either to prioritise agriculture by staying within the sector or move into agriculture from the non-agricultural sector or to move out of agriculture at a particular time. Labour movements in and out of agriculture are influenced by several factors as shown in figure 2.1. Movement of labour into agriculture depends on HS, distance to market, distance to major road, remittances, credit access, land and extension (Campbell and Ahmed, 2012; Tocco *et al.* 2012). Credit access, land and extension have been effective in enhancing agricultural production in Nigeria, and these could encourage farming households to move into and/or remain in agriculture (Asiedu *et al.* 2013, Osabohein *et al.* 2020b, Akinwumi, 2017). However, remittance is both an enabler and constraint to movement of labour into and out of agriculture in rural Nigeria. Remittance makes more money available to households enough to gain ownership over improved production technology and practises. Again, remittance can discourage households from moving out of agricultural production, as it often meets the consumption needs of rural households (Sunam *et al.* 2021).

Generally, movement out of agriculture can be linked to the need for livelihood diversification, high level of risk in agricultural production, ageing of farmers, remittances, insurgency in the Northern part of Nigeria and rural-urban migration. Movement out of Agriculture could also be necessitated by ageing of farmers since agricultural production activities at subsistence level which involves drudgery. The undesirable characteristics of Nigerian agriculture have been discussed in literature (Mafimisebi, 2021). The sector is characterised by low income resulting from poor yield due to heavy reliance on traditional technology, undercapitalisation, inadequate access to land and extension services and adverse climate change impact (Ajibefun, 2015). Again, some farming households that consider the non-farm sector more financially rewarding move out of agriculture (Campbell and Ahmed, 2012). Some others migrate to the cities where they perceive opportunities abound. This can be linked to the dearth of opportunities in rural Nigeria where most agricultural activities occur (Folawewo, 2013). In terms of poverty dynamics, sometimes households transition in and exit poverty while some households experience chronic poverty, and few are never poor. Change in poverty status of rural households within two periods can be linked to whether

they allocated their household labour to agricultural or non-agricultural activities. The sector which an individual decides to allocate labour to, is dependent on some socioeconomic and demographic characteristics which include age of household head, value of tangible assets (for example, land, machineries etc.), being married, sex of household head, dependency ratio, HS, years of education and access to ICT. Farming households moving out of agriculture might not be able to spend enough time (as they do initially) on farming and they may or may not be worse-off. In other words, their decision may move them into or out of poverty (Shepherd, 2007).

CHAPTER THREE

METHODOLOGY

3.1   Scope of the Study

The study utilised panel data from LSMS/GHS fielded by the NBS in 2010/2011, 2012/2013 and 2015/2016. Data were collected from 5,000 households (out of which this study utilised information of 2570 rural households) across the country (figure 3.1). Data were collected from enumeration areas-EAs in both rural and urban Nigeria. The data contain information on education, labour and finance, expenditure, assets, housing conditions, ICT, sources of family income etc. Dataset from rural households was selected for this study considering the intensity of agricultural activities within rural Nigeria.

Figure 3.1: Map of the Study Area

3.2   Sampling Procedure

This study utilized secondary data that was fielded by the NBS. NBS employed two-stage stratified cluster sampling. First, EAs were selected using probability proportionate to size-PPS. Stratification was done to separate urban EAs from rural EAs. Second stage involved random selection of households by systematically selecting 10 households per EA. The first selection was then carried out through random start 'r' generation. Households were then selected by adding the sampling interval to 'r'. Five hundred EAs were identified out of which 5,000 and 4,581 in wave 1 and 2 and wave 3 respectively (NBS *et al*. 2016). For this study, as a check against biasedness, 2,570 households were analysed in waves 1, 2 and 3.

3.3   Analytical Techniques

Descriptive statistical tools, FGT poverty index, Markov Chain, Panel Probit regression and Probit regression models were used in this study.

3.3.1   Descriptive Statistics

This includes percentages, means and standard deviation that were employed to profile the respondents.

3.4   Model Specification

3.4.1   FGT Model

The FGT weighted poverty index is given by:

$$A_\alpha = \frac{1}{n}\sum_{i=1}^{r} \quad (\frac{f-y_i}{f})^\alpha 3 \qquad\qquad 3.1$$

Where A_α= Poverty

 f= Poverty Line (2/3rd of mean per capita expenditure-MPCE)

r= sum total of households beneath the poverty line

n= total sample

y_i = PCE in increasing order for all households

α= aversion parameter that assumes the values of zero, one or two.

A_0 is the headcount index measuring the poverty incidence when α is equal to zero. This provides the proportion of the poor relative to the population (Adepoju and Adejare, 2013).

A_1 is the poverty gap that captures the depth of poverty among rural households. This is derived when α=1 thus explaining on the average the distance of the poor from the poverty line.

A_2 is when α=2, the poverty severity is measured and it explains inequality among the poor.

3.4.2 Analysis of Poverty Transitions and Movements in and out of Agriculture

Markov chain was used to analyse poverty transitions and movements in and out of agriculture. This study used the Markov Model to identify the relationship between entry and exit probabilities and the incidence of poverty. Therefore, a simple first-order Markov model considers the dynamics of movements in and out of poverty over a considerable time period as shown in figure 4.
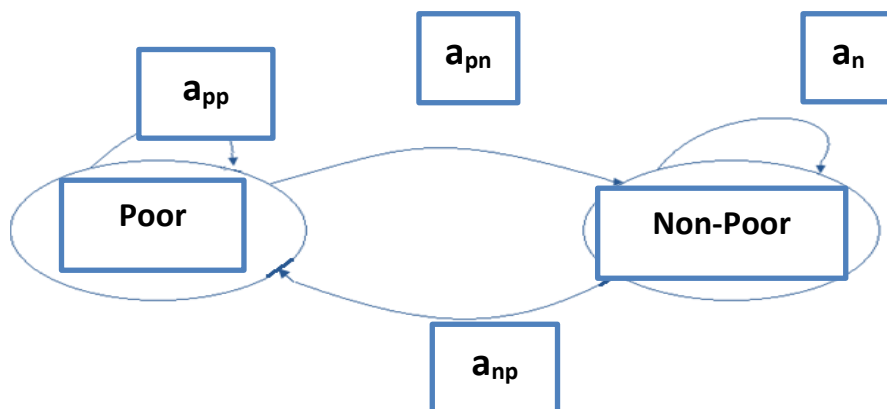
Figure 3.2:   Markov Model of Poverty Transitions

Source: Adapted from Baulch and McCulloch (1998) and Le Gallo (2004)

Where p denotes poor and n denotes non-poor, thus

a_{pp}= probability of staying poor, a_{nn}= probability of staying non-poor, a_{pn}= probability of exiting poverty, a_{np}= probability of entering poverty

Modelling for Labour Transitions

This study adopted the Markov Model to identify the relationship between entry and exit probabilities and labour transitions. Therefore, simple first-order Markov model consider the dynamics of movements in and out of agriculture within a considerable time period as shown in figure 5.
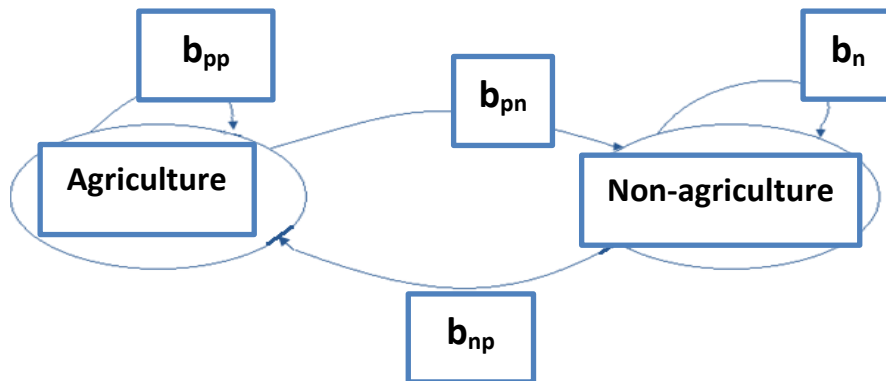
Figure 3.3: **Markov Model of Poverty Transitions**

Source: Adapted from Baulch and McCulloch (1998)

Where p denotes agriculture and n denotes non-agriculture, thus

b_{pp}= probability of staying in agriculture, b_{nn}= probability of staying out of agriculture,

b_{pn}= probability of exiting agriculture, b_{np}= probability of entering agriculture

i. Relationship between the Poverty of Households and Agricultural Employment Dynamics

The panel probit regression analysis was used to estimate the relationship between the poverty status of a household and the labour dynamics of the household head. The dependent variable is dichotomous in nature which represents the poverty status of a household where the poor household was assigned value one while zero was used to identify the non-poor households. Following Zampino, (2010), Michler and Josephson (2017) the panel probit model is stated as $Y_{it}^* = X_{it}'\beta^0 + \varepsilon_{it}, \ t = 1, \cdots, T, \ i = 1, \cdots, N,$

$$Y_{it} = 1 \ (Y_{it}^* > 0) \tag{3.2}$$

$$Y_{it}^* = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * X_3 + \beta_4 * X_4 + \beta_5 * X_5 + \beta_6 * X_6 + \beta_7 * X_7 + \beta_8 * X_8 + \beta_9 * X_9 + \beta_{10} * X_{10} + \beta_{11} * X_{11} + \beta_{12} * X_{12} + \beta_{13} * X_{13} + \beta_{14} * X_{14} + \varepsilon_{it} \tag{3.3}$$

where;

Y = Poverty status (1 = Poor, 0 otherwise)

X_1 = Sector of employment (1 = Agriculture, 0 otherwise),

X_2 = Age (Years),

X_3 = Married (Dummy- Married-1, 0 otherwise),

X_4 = = Access to ICT (Have access to at least one of radio, television and mobile phones, 1= yes, 0 otherwise),

X_5 = Household size (Headcount),

X_6 = Male (Dummy-1 = Male, 0 otherwise),

X_7 = Migration of at least one household member (1= Yes, 0 otherwise),

X_8 = Distance to major road (kilometre),

X_9 = Distance to major market from home (kilometre),

X_{10} = Dependency ratio (number of household members within 18 and 65 years old/ number of household members below 18 years and above 65 years old)

X_{12} = Value of Assets (₦)

X_{13} = Years of Education of the Household head

X_{14} = Zones (NE, NW, SE, SW, SS, base category is the NC),

i = index of number of rural households

t = index of time periods

ii.   Factors Influencing Agricultural Employment among Rural Households

The factors influencing agricultural employment were modelled using the Multinomial Probit (MNP) Regression Model.

Multinomial Probit model is given by:

$$Prob \ (A_i = j) = \frac{e^{\beta_k X_i}}{\sum_{k=1}^{j} e^{\beta_k X_i}}, j = 0,2 \dots \dots j, \ \beta_0 = 0$$

3.5

$$Marginal \ effects \ = \frac{\delta P_j}{\delta X_i} = \ P_j \left[\beta_j - \sum_{k=0}^{j} \quad P_k \beta_k \right] = P_j(\beta_j - \underline{\beta})$$

3.6

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots + \beta_{14} X_{14} + \ \mu_i$$

3.7

where: Z_i= Agricultural Employment Dynamics (1-Agric-Agric, 2-Agri-Non.Agri, **Base category is 3-Non.Agric-Non.Agric**, 4-Non.Agric-Agric)

X_1 =Age (Years),

X_2= Married (Dummy- Married-1, 0 otherwise),

X_3 = Access to ICT (Have access to at least one of radio, television and mobile phones, 1= yes, 0 otherwise),

X_4 = Household size (Headcount),

X_5 = Male (Dummy-1 = Male, 0 otherwise),

X_6 = Migration of at least one household member (1= Yes, 0 otherwise),

X_7 = Distance to major road (kilometre),

X_9 = Distance to major market from home (kilometre),

X_{10} = Dependency ratio (number of household members below 18 years and above 65 years old/number of household members within 18 and 65 years old)

X_{11} = Value of Assets (₦)

X_{12} = Years of Education of the Household head

X_{13} = Zones (NE, NW, SE, SW, SS, base category is the NC),

X_{14} = Access to remittances (1=Yes, 0 otherwise)

X_{15} = Access to credit (1=Yes, 0 otherwise)

X_{16} = Infrastructure Index (number of infrastructure a household has access to/ total count of infrastructure present i.e., radio, television, internet access, feeder roads).

iii. Determinants of Agricultural Employment and Poverty Dynamics

The probit model was used to analyse the determinants of agricultural employment and poverty dynamics among rural households in Nigeria. The explicit form of the model is expressed as:

$$Y_{ij} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \ldots \beta_{13} X_{13} + \mu_i \qquad \text{3.5}$$

Model Specifications

Y_{ij}=Dependent variable

Y_{i1}=Agric-Agric and Chronically Poor

Y_{i2}=Agric-Agric and Transitory Poor

Y_{i3}=Agric-Agric and Non-Poor

Y_{i4}=Agric-Non-Agric and Chronically Poor

Y_{i5}= Agric-Non-Agric and Transitorily Poor

X_1 =Age (years)

X_2= Married (Dummy- Married-1, 0 otherwise)

X_3 = = Access to ICT (Have access to at least one of radio, television and mobile phones, 1= yes, 0 otherwise)

X_4 = Household size (Headcount)

X_5 = Male (1 = Male, 0 otherwise)

X_6 = Migration of at least one household member (1= Yes, 0 otherwise)

X_7 = Distance to major road (kilometre)

X_9 = Distance to major market from home (kilometre)

X_{10} = Dependency ratio (number of household members within 18 and 65 years old/ number of household members below 18 years and above 65 years old)

X_{11} = Value of Assets (₦)

X_{12} = Years of Education of the Household head

X_{13} = Geopolitical zone (NE, NW, SE, SW, SS, base category is the NC)

Table 3.1: List of Variables and their *A-priori* Expectations

S/N	Variables	Description of variables	Expected Sign	Literature
1	Age	Discrete	+/-	Adeoti (2014) (-); Oluwatayo (2014) (+)
2	Years of education	Discrete	-	Adeoti (2014); Anyanwu (2013); Adeyinka *et al*. (2013); Oluwatayo (2009)
3	Marital Status	Dummy	+/-	Adeoti 2014 (-); Anyanwu, (2013) (-) Oluwatayo (2014) (+)
4	Access to ICT	Dummy	+	Tirkaso (2011)
5	Household Size	Discrete	+	Adeoti (2014); Anyanwu, (2013); Etim and Udoh (2015)
6	Primary occupation	Dummy	+/-	Agbaje et al. (2014) (-); Oluwatayo (2014) (-); Oyekale *et al.* (2012) (+)
7	Sex of household head	Dummy	+/-	Adeoti (2014) (+); Oluwatayo (2010) (-)
8	Rural-urban migration	Dummy	+	Awumbila et al. (2014); Reddy (2013).
9	Distance to market	Continuous	+	Gani and Adeoti, (2011)
10	Distance to road	Continuous	-	Khandker *et al*., (2006)

Source: Author's Compilation.

3.5 Limitations of the Study

In achieving the research objectives of the study, it is critical to point out some of the study limitations. First, the study only captured households in rural Nigeria and did not involve rural-urban labour transitions. Therefore, households in urban areas were not considered for this study. Second, in analysing labour dynamics, a number of questions should be raised by the NBS including the exact labour activities within the agricultural sector and non-agricultural sectors. However, the study used sets of data which contain an adequate number of households who reported changes in their main sector of employment or transitions, which underscored the reliability of the findings.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1   Socioeconomic Characteristics of the Rural Farming Households

This section profiled the socio-economic characteristics of the respondents such as sex, age, household size, and dependency ratio among others.

Table 4.1 reveals that most rural farming households were male-headed throughout the period under consideration. This may be due to the gender considerations in the allocation of resources in agriculture. The sex distribution of rural household leadership may be because rural areas are mostly characterized by dominance of agricultural practices as the major occupation, however, such occupation involves drudgery that men are more involved in. Also, this distribution could be because of some cultural ties where it is prestigious to have a male as the representative of a household at the community level even if the reported male-head is not the oldest member of the family. This is in line with the findings of Adeoti *et al.* (2016) and Oyekale *et al*. (2012) as they found most households in rural Nigeria were male headed.

Distribution of rural households based on marital status reveal that majority (83.6 percent, 84 percent and 83.6 percent) of the rural farming households' leadership were by married people in 2010/2011, 2012/2013 and 2015/2016 seasons respectively, while a little fraction (11.3 percent, 11.8 percent and 12.8 percent) are widowed in the referral periods. This could motivate household heads to move out of agriculture in search of perceived better economic opportunities. These results agree with Omotesho *et al.* (2016), Morolake, (2015), Oyekale *et al*. (2012) and Onyishi (2011) whose results indicate that most of rural farming households' heads were married. The highest percentage of the rural farming households (26 percent, 29.1 percent and 34.4 percent) were above 60 years old in 2010/2011, 2012/2013 and 2015/2016 seasons respectively, while a little fraction (6.6 percent, 4 percent and 1.6 percent) were below 30 years. The

mean ages of the household heads were 48.64 ±14.39, 51.01±14.45 and 53.76 ±14.19 years in the reference periods. This shows that the farming households in rural Nigeria are ageing as they are approaching the economically inactive period of their lives. This could pose a significant threat on the availability and efficiency of agricultural labour (Adeloye *et al.* 2022). Fasina (2013) reported that ageing of farmers significantly affects the nature of engagement and time allocated to agricultural activities.

Table 2 also shows that majority (38.8 percent, 38.1 percent and 36.0 percent) of the rural households had between 5 to 7 persons in 2010/2011, 2012/2013 and 2015/2016 respectively, while a few (1.0 percent, 1.2 percent and 2.3 percent) of them had at least 14 persons living together and eating from the same pot. The mean sizes of the rural households were 6.01 ±3.04, 6.22 ±3.14 and 6.27 ±3.27 in periods under consideration. This reveals that there is availability of family labour to the average rural household for their economic activities (Agbaje *et al.* 2013). This conforms with the findings of Awotide *et al.*, (2015) who reported that majority of the rural households are large. Dependency ratio increased between 2010/2011 and 2012/2013 and it reduced in the 2015/2016 season. The mean dependency ratio of the rural households was 0.94 ±1.01, 0.97 ±1.01 and 0.95 ±1.03 respectively in the 2010/2011, 2012/2013 and 2015/2016 periods. In terms of distance to market, there was no significant change across the three periods. The mean distance to market in 2010/2011, 2012/2013 and 2015/2016 periods respectively were 71.41 ±38.91, 71.43 ±38.96, 71.41 ±38.90 which are very high. This undermines the ability of households to access markets for inputs and their products which could affect their revenue base. Again, distance to major roads decreased across the period under review. This might be due to construction of new feeder roads across the country. However, the distance to market and distance to road are very high which is characteristic of rural Nigeria.

Table 4.1: Socioeconomic Characteristics of Rural Farming Households

	2010/2011	2012/2013	2015/2016
Sex	Percent	Percent	Percent
Male	87.74	87.78	87.82
Female	12.26	12.22	12.18
Age of Household head (years)			
< 30	6.65	3.97	1.56
30 – 39	21.95	18.52	15.25
40 – 49	24.67	25.72	24.32
50 – 59	20.74	22.68	24.47
≥ 60	25.99	29.11	34.40
	Mean = 48.64 (±14.39)	*Mean = 51.01 (±14.45)*	*Mean = 53.76 (±14.19)*
Marital Status			
Never Married	2.33	1.60	1.13
Married	83.62	84.01	83.58
Divorced	1.13	0.70	0.70
Separated	1.67	1.87	1.79
Widowed	11.25	11.83	12.80
Household size			
1 – 4	32.84	30.12	30.93
5 – 7	38.79	38.05	36.03
8 – 10	19.26	21.32	22.84
11 – 13	8.13	9.34	7.94
≥ 14	0.97	1.17	2.26

	2010/2011	**2012/2013**	**2015/2016**
Highest educational qualification			
No formal education	14.28	15.29	15.25
Primary	58.72	57.39	57.43
Secondary	18.40	18.68	18.68
Tertiary	8.60	8.64	8.64
	2015/2016		
	Mean	Mean	Std. Dev.
Dependency ratio	0.94 (±1.01)	0.97 (±1.01)	0.95 (±1.03)
Distance to market	71.44 (±38.91)	71.43 (±38.96)	71.41 (±38.90)
Distance to major road	18.32	8.32	8.32

Source: Data analysis (2020).

4.1.1 Profile of Labour Transitions in and out of Agriculture based on Household Socioeconomic Characteristics

The results presented in Table 4.2 revealed that between 89 and 90 percent of the households in agriculture were headed by men in the three waves. Similarly, male-headed households accounted for 77 percent of HHs that were in the non-agricultural sector in 2010/2011 which is slightly lower than the percentages of households that moved out of agriculture in 2012/2013 and 2015/2016 periods. Eighty one percent of the households that moved into agriculture in 2012/2013 were male headed while 76 percent of the households transiting out of agriculture in 2015/2016 period was headed by men. Similarly, male headed households accounted for 81 percent and 78 percent of households that moved into agriculture from non-agricultural activities in 2012/2013 and 2015/2016 respectively. This might be due to the gender considerations in the allocation of agricultural inputs which favour men. As noted in Table 4.2, most of the households were headed by married individuals. Therefore, all labour movements out or into agriculture or those that were permanent in or out of agriculture in the period under review were dominated by married household heads. The percentage of the female-headed households that were permanently involved in agriculture increased consistently from 71 percent to 72 percent and then 78 percent through waves 1, 2 and 3. This conforms with the findings of Vera-Toscano *et al.* (2004) as they documented the less likelihood of women to transition from agriculture due to the different household activities which compete with productive activities that they carry out.

In 2010/2011, 69 percent of the households that were permanently employed in agriculture had between 1 and 7 members while 85 percent of households that were not in agriculture had between 1 and 7 members. Also, the majority (82 percent and 64 percent) of the rural households that moved out of agriculture had between 1 and 7 persons in 2012/2013 and 2015/2016, respectively, while few households had at least 8 persons in their household (17 percent and 32 percent). Similarly, households with at least 8 members accounted for 22 percent of entrants into agriculture in both 2012/2013 and 2015/2016 periods compared to households with at most 7 members accounting for 78 percent and 79 percent in 2012/2013 and 2015/2016 respectively. Again, households

with at most 7 persons accounted for 83 percent and 82 percent of households that were permanently out of agriculture in the period under review, while 27 percent and 28 percent had at least 8 household members. Households with at most 7 members accounted for 65percent of the households that were permanently in agriculture in both 2012/2013 and 2015/2016 periods. The fact that a household head has more people he/she must fend for, might make him/her risk averse by sticking to agriculture rather than moving to other sectors. This is consistent with the findings of Adepoju (2018) and Brosig *et al.* (2007). The average age of household heads who transitioned from agriculture was 53.03 ±*15.92* and 53.61 ±*14.01* in 2012/2013 and 2015/2016 respectively. The average age for households within the agricultural sector in the period under review is *48.78 ±14.31, 50.94 ±14.23* and 53.72 ± *13.98* in 2012/2013 and 2015/2016 respectively. This implies that the household heads are ageing and approaching economically inactive periods of their lives. This situation affects households' decisions around labour mobility.

In 2012/2013, 50 percent of household heads who transitioned from agriculture had primary education compared to 49 percent of farmers who remained in agriculture from the 2010/2011 season. The situation was slightly different for households moving into agriculture in 2012/2013 and 2015/2016 as 48 percent and 37 percent respectively had primary education within those periods. This depicts a low level of education among the farming households and reiterates the findings of Mathenge *et al.* (2015). This low level of education according to Folawewo (2013) undermines the ability of rural households to access remunerative jobs that might improve their welfare.

In terms of zones, NC, NW, SE accounted for 76 percent of the 151 households that moved out of agriculture between 2010/2011 and 2012/2013 seasons. Within the same period, 12 percent and 7 percent of households that moved out of agriculture were in NE and SW zones respectively. However, the situation changed between 2012/2013 and 2015/2016 season when North East and North West zones accounted for 52.66 percent of the 657 households that moved out of agriculture. In terms of year-on-year analysis, there was a significant rise in the number of households that moved out of agriculture in NE and NW, Nigeria between 2012/2013 and 2015/2016. This might be due to the increasing activities of Boko Haram insurgents and Fulani herdsmen that destroyed lives and properties (including farmlands) thereby making agricultural production impossible during the period under review in North East and North Central zones respectively.

Table 4.2: **Analysis of Household Labour Dynamics based on Socioeconomic Characteristics**

	2010/2011 (Base Year)		2010/2011- 2012/2013				2012/2013- 2015/2016			
	Ag-Ag (%)	NA-NA (%)	Ag-Ag (%)	Ag-NA (%)	NA-NA (%)	NA-AG (%)	Ag-Ag (%)	Ag-NA (%)	NA-NA (%)	NA-AG (%)
Sex										
Male	89.73	76.94	90.10	84.77	75.56	80.45	89.04	90.72	86.44	77.65
Female	10.27	23.06	9.90	15.23	24.44	19.55	10.96	9.28	13.56	22.35
Marital Status										
Never married	1.70	5.76	1.09	1.99	3.01	4.51	1.20	0.76	0.00	2.23
Married	86.32	68.92	86.93	78.15	75.94	69.17	95.20	86.30	86.44	72.91
Divorced	0.69	3.51	0.50	1.32	0.75	1.88	0.53	1.07	0.00	1.12
Separated	1.24	4.01	1.19	3.97	1.50	6.02	1.73	1.67	1.69	3.07
Widowed	10.04	17.79	10.30	14.57	18.80	18.42	1.35	10.20	11.86	20.67
Household size										
1-4 people	30.17	47.37	26.53	47.02	46.62	32.33	28.94	26.48	50.85	44.13
5-7 people	39.11	37.09	37.97	35.10	36.47	45.86	35.90	37.75	30.51	34.36
8-10 people	20.50	12.53	23.37	13.25	13.91	14.29	24.20	26.03	13.56	12.85
11-13 people	9.12	2.76	10.74	3.97	2.63	7.52	8.82	6.39	5.08	7.54
≥14 people	1.11	0.25	1.39	0.66	0.38	0.00	2.14	3.35	0	1.12
Mean	6.23	4.81	6.53	5.15	4.79	5.64	6.42	6.59	4.96	5.25

	2010/2011 (Base Year)		2010/2011- 2012/2013				2012/2013- 2015/2016			
S.D	3.07	2.63	3.15	2.82	2.78	2.78	3.29	3.20	2.55	3.21
Level of Education										
No formal educated	21.14	11.03	22.52	16.56	7.14	15.79	19.99	27.09	11.86	10.89
Primary education	50.25	38.60	48.71	49.67	34.96	47.37	50.13	46.12	44.07	37.43
Secondary education	21.19	30.83	21.68	20.53	35.34	20.30	19.79	21.46	28.81	31.56
Tertiary education	7.42	19.55	7.08	13.25	22.56	16.54	10.09	5.33	15.25	20.11
Age of Household head (years)										
<30	6.59	7.02	4.06	3.31	4.51	2.26	1.34	1.98	0.00	1.96
30-39	21.60	23.81	17.97	19.87	18.80	24.81	15.84	13.85	20.34	14.53
40-49	24.18	27.32	25.94	19.87	28.95	22.56	23.53	24.81	16.95	27.93
50-59	21.23	18.05	23.22	21.19	20.30	21.05	25.13	24.05	30.51	21.51
≥60	26.39	23.81	28.81	35.76	27.44	29.32	34.16	35.31	32.20	34.08
Mean	48.78	47.85	50.94	53.03	50.64	50.43	53.72	53.61	54.51	54.09
S.D	14.31	14.77	14.23	15.92	15.23	14.55	13.98	14.01	14.44	15.36
Zones										
NC	18.56	19.05	18.71	16.56	21.80	13.53	19.39	16.13	11.86	21.23
NE	18.79	7.52	19.31	11.92	7.52	7.52	16.38	23.59	3.39	10.06
NW	26.90	16.54	27.43	19.87	12.78	24.06	26.40	29.07	15.25	15.36
SE	18.01	16.54	17.33	27.15	16.17	17.29	19.65	12.02	37.29	17.32
SS	11.98	33.08	11.53	17.88	33.08	33.08	12.63	13.39	30.51	27.09
SW	5.76	7.27	5.69	6.62	8.65	4.51	5.55	5.78	1.69	8.94
Total	100	100	100	100	100	100	100	100	100	100

Source: Data Analysis (2020)

4.1.2 Poverty Profile of Rural Households

The poverty lines for 2010/2011, 2012/2013 and 2015/2016 periods expressed as two-thirds of the MPCE were ₦28,596.60, ₦32,252.52 and ₦39,493.65 respectively (see Table 4.3). Therefore, a household with PCE under the poverty line in the reference period was regarded as poor while a household with a PCE that is at least equal to the poverty line was non-poor. The poverty status was then assessed based on the poverty incidence (P_0), depth (P_1), and severity (P_2) (see Table 4.4).

Poverty incidence among the rural households in 2010/2011, 2012/2013 and 2015/2016 was 50 percent, 53 percent and 56 percent respectively. The poverty depth increased from 0.22 in 2010/2011, to 0.23 for 2012/2013 and 2015/2016. This implies that a poor household required an average of ₦6,291.25 in 2010/2011, ₦7,418.08 in 2012/2013 and ₦9,083.54 in 2015/2016 to move out of poverty. Generally, poverty incidence and depth were higher across all observations from 2012/2013 to 2015/2016. This may be due to the inflation rate that was record high at 15.7 percent in 2016 compared to 10.8 percent and 8.5 percent in 2011 and 2013 respectively (see figure 4.1) (World Bank, 2018).

Table 4.3: Expenditure Deciles and Poverty Lines

Decile	Period		
	Wave 1	Wave 2	Wave 3
1	6,744.64	7,909.36	9,292.00
2	12,287.24	14,209.40	17,435.80
3	17,186.89	19,045.99	23,877.04
4	22,100.76	24,900.80	30,208.66
5	27,717.98	30,890.60	36,664.46
6	34,518.48	37,733.34	44,954.13
7	42,383.69	46,391.00	54,305.58
8	53,433.33	58,766.18	68,706.07
9	71,951.11	81,309.60	97,785.34
10	140,624.80	162,591.60	209,175.24
Mean PCE	42,894.90	48,378.78	59,240.47
⅔ Mean PCE	28,596.60	32,252.52	39,493.65

Source: Data Analysis (2022)
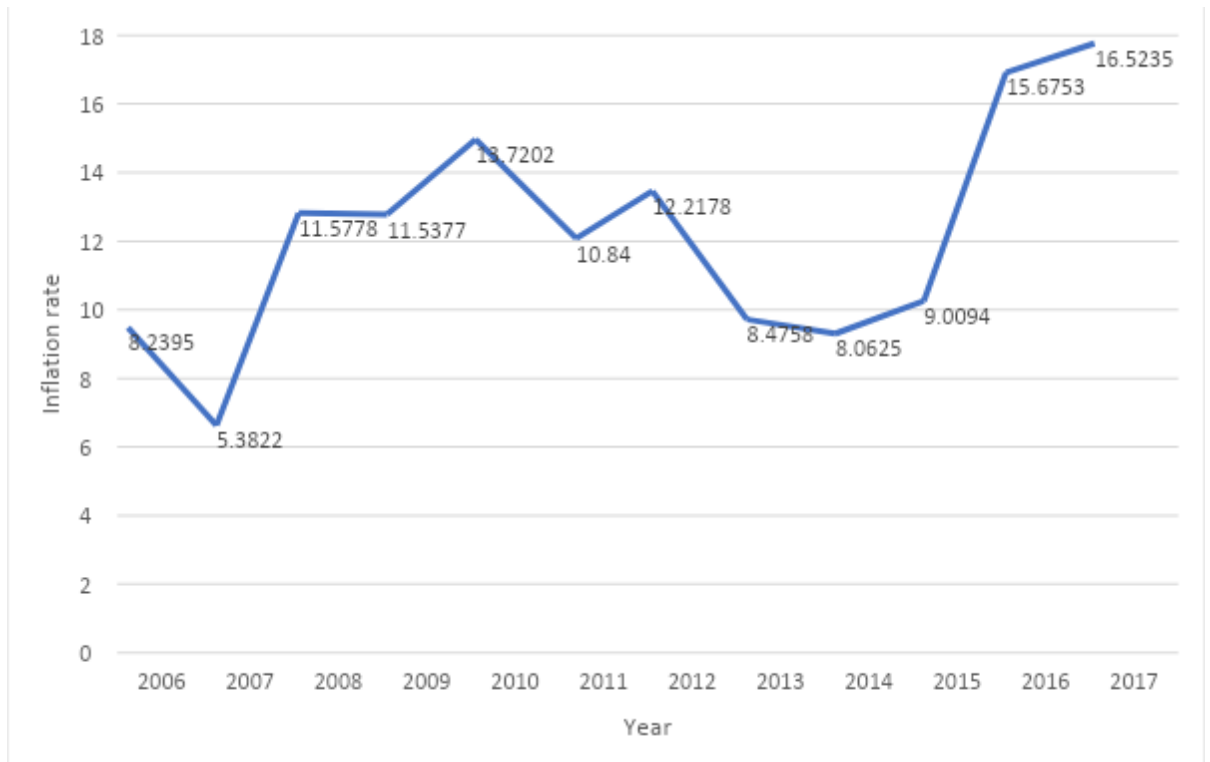
Figure 4.1: Trends in Inflation in Nigeria (2006-2017)

Source: Author's representation of underlying data from World Bank (2018)

Poverty was disaggregated based on zone, sex, age, being married, labour movement, education, and HS. Disaggregating by household size, it was found that poverty and household size were positively related. In fact, poverty increased with increasing household size. Specifically, households with at most four people had the lowest poverty incidence, depth, and severity in 2010/2011, 2012/2013 and 2015/2016 respectively. Households with 11-13 people had the highest incidence of 60 percent and 70 percent in both 2010/2011 and 2015/2016. However, households with at least 13 people had the highest poverty incidence 66 percent in 2012/2013. Households with at least 13 members had the highest poverty gap and severity across the three waves. Therefore, households with large members have lower per-capita expenditure which consequently aggravates their poverty situation.

In terms of marital status, households headed by a married individual had a higher poverty incidence compared to households headed by non-married individuals. This could be linked to larger household sizes that married heads are likely to have compared to their non-married colleagues. In addition, single household heads have ease of movement and increased chances of taking up new opportunities which could improve their poverty status. The poverty depth is higher for married households compared to non-married households across the waves. ₦6,291.60, ₦7,418.08 and ₦9,478.48 will be required to lift a household led by a married head out of poverty in 2010/2011, 2012/2013 and 2015/2016 respectively. This is compared to ₦4,289.49, ₦4,837.88 and ₦4,344.30 among non-married household heads in both periods. Also, the poverty severity index of 0.13 in the three periods reveals a higher inequality level in PCE among households headed by a married individual compared to 0.09, 0.08 and 0.06 among households headed by non-married individuals in the period under review. This confirms the earlier reports of Agbaje *et al*. (2013) and Oyekale *et al.* (2012).

The age distribution revealed household heads aged 30 and 59 years old, had the highest poverty gap, depth and severity relative to the other age categories. The reason for the high incidence of poverty incidence within this age group may be because the households are fairly large. Conversely, household heads that were at most 30 years had the lowest poverty indices. Similarly, households whose heads were at least 60 years

old had relatively low incidence, depth and severity. This could be because the households are small and rely on remittances (Adepoju and Adejare, 2013).

Households headed by males were poorer relative to those headed by women in the periods under review. Households headed by a male required ₦6,577.22 and ₦7,418.52 on the average to exit poverty in 2010/2011 and 2012/2013 respectively, a household headed by a female would need ₦4,575.46 and ₦4,837.88 to exit poverty in the same period. In 2015/2016, the poor male headed household required an average of ₦9,478 compared to the poor female headed household that required an average of ₦3,949.37 to move out of poverty.

Rural households in NE, NW and NC had the highest poverty incidence in 2010/2011 and 2012/2013. Across these regions, poverty gap was 0.21, 0.27 and 0.26 meaning that the households required an average of ₦6,005.29, ₦7,721.08 and ₦7,435.12 respectively to exit poverty in 2010/2011. Households in the NE, NW and NC regions of the country required an average of ₦8,708, ₦8,063.13 and ₦7,418.08 respectively in 2012/2013. The situation was similar in 2015/2016 when poverty incidence increased in the NE, NW and NC. However, the Southern region recorded the lowest incidence- SE (41percent), SS (34 percent) and SW (37 percent) in 2015/2016 periods. The poverty gap stood at 0.32, 0.28 and 0.22 of the rural households in these regions (NE, NW and NC) implying that the poor households require an average of ₦12,637.97, ₦11,058.22 and ₦8,688.60 respectively to exit poverty in 2015/2016. The analysis of poverty severity showed a higher level of expenditure disparity between households in NE and those in NW. However, across the six geopolitical zones, households in the SS zone had the lowest inequality in the distribution of expenditure. This corroborates the findings of Adeoti (2014) and Obayelu and Awoyemi (2010).

In terms of educational status, household heads who do not have formal education had the highest poverty incidence, depth and severity and would require ₦6,005.29, ₦ 4,837.88 and ₦6,318.98 to exit poverty in 2010/2011, 2012/2013 and 2015/2016 respectively. Conversely, household heads with tertiary education presented the lowest poverty incidence and depth. The analysis of poverty severity revealed that the highest inequality in household expenditure occurred in households headed by individuals who do not have formal education.

Households that were involved in agriculture in 2010/2011 had a higher poverty incidence of 52 percent compared to 37 percent poverty incidence among households that were not. In terms of poverty depth, a poor household whose head was in agriculture in 2010/2011 required ₦6,577.22 to move out of poverty relative to poor households whose heads were not in agriculture that require ₦4,003.52.

The distribution of households by labour mobility revealed that households whose head did not transit from agriculture to non-agricultural sectors in 2012/2013 had higher poverty incidence than their counterparts who did. Specifically, households whose heads did not move out of agriculture in 2012/2013 had poverty incidence of 57 percent, depth of 0.25 and severity of 0.14 while those who did had slightly lower poverty incidence (55 percent), depth (0.25) and severity (0.14). This implies that poor households whose head remained in agriculture and those who exited agriculture between 2010/2011 and 2012/2013 required ₦8,063.13. Households that were permanently out of the agricultural sector between 2010/2011 and 2012/2013 had the lowest poverty incidence 24 percent, depth of 0.08 and severity of 0.04. Similarly, households that moved into agriculture had incidence of 26 percent, depth of 0.09 and severity of 0.04. The poverty situation was worse across all groups in 2015/2016. Specifically, households whose heads did not move out of agriculture between 2010/2011, 2012/2013 and 2015/2016 had poverty incidence of 57 percent, poverty depth of 0.25 and severity of 0.14 and 57 percent poverty incidence, poverty depth of 0.23 and severity of 0.12 in 2012/2013 and 2015/2016 respectively. This is compared to poverty incidence (55percent, 68percent), depth (0.25, 0.31) and severity (0.14, 0.19) for households that moved out of agriculture in 2012/2013 and 2015/2016 periods respectively. This implies that poor households whose head remained in agriculture and those who moved out of agriculture between 2012/2013 and 2015/2016 required an average of ₦8,063.13 compared to ₦12,243.03 for households whose head left agriculture to exit poverty. This finding provides a basis for the one-way movement of youth out of Agriculture. However, households that were never involved in agriculture had the lowest poverty incidence of 24 percent, poverty depth of 0.08 and severity of 0.04. Entrants into the agricultural sector in 2015/2016 also had a low poverty incidence of 23 percent, depth of 0.06 and severity of 0.03. The better outcomes obtainable in non-agricultural sectors provide incentives for rural youth to deprioritise agriculture having seen the economic outcomes of their parents and perceived low-income earning potentials of agriculture (Akpan, 2010)

Table 4.4: Poverty Status of Rural Households in 2010/2011, 2012/2013 and 2015/2016.

Variable	2010/2011			2012/2013			2015/2016		
	Incidence	Gap	Severity	Incidence	Gap	Severity	Incidence	Gap	Severity
Household Size (People)									
<5 people	0.30	0.11	0.06	0.24	0.08	0.04	0.29	0.09	0.04
5-7 people	0.47	0.21	0.12	0.50	0.20	0.11	0.49	0.18	0.09
8-10 people	0.60	0.28	0.16	0.63	0.27	0.15	0.69	0.30	0.17
11-13 people	0.59	0.26	0.15	0.67	0.30	0.17	0.70	0.31	0.17
>13	0.56	0.29	0.18	0.66	0.38	0.26	0.65	0.41	0.27
Marital status									
Never married	0.19	0.10	0.06	0.22	0.05	0.02	0.24	0.10	0.04
Married	0.52	0.23	0.13	0.55	0.24	0.13	0.57	0.24	0.13
Divorced	0.08	0.03	0.01	0.17	0.08	0.04	0.31	0.11	0.06
Separated	0.31	0.11	0.06	0.20	0.06	0.02	0.17	0.06	0.04
Widowed	0.39	0.18	0.10	0.39	0.17	0.09	0.32	0.12	0.06
Age (Years)									
<30 years	0.40	0.19	0.11	0.49	0.19	0.10	0.49	0.16	0.08
30-59 years	0.51	0.22	0.13	0.54	0.23	0.13	0.58	0.25	0.14
>60 years	0.50	0.22	0.13	0.52	0.24	0.14	0.52	0.21	0.12
Gender									
Male	0.51	0.23	0.13	0.55	0.23	0.13	0.58	0.24	0.13
Female	0.36	0.16	0.09	0.38	0.15	0.08	0.34	0.10	0.05
Zone									
NC	0.55	0.26	0.16	0.49	0.23	0.15	0.53	0.22	0.12
NE	0.52	0.21	0.11	0.61	0.27	0.15	0.70	0.32	0.19
NW	0.57	0.27	0.16	0.59	0.25	0.14	0.67	0.28	0.15
SE	0.49	0.21	0.11	0.53	0.22	0.12	0.41	0.14	0.07
SS	0.28	0.11	0.06	0.40	0.16	0.09	0.34	0.13	0.07

Table 4.4 Cont'd: Poverty Status of Rural Households in 2010/2011, 2012/2013 and 2015/2016.

SW	0.44	0.15	0.08	0.37	0.14	0.07	0.37	0.14	0.08
Educational level									
No Education	0.65	0.33	0.21	0.61	0.27	0.15	0.68	0.28	0.16
Primary Education	0.51	0.22	0.12	0.57	0.25	0.14	0.56	0.23	0.13
Secondary Education	0.45	0.18	0.09	0.46	0.18	0.10	0.49	0.20	0.11
Tertiary Education	0.24	0.08	0.04	0.29	0.10	0.05	0.35	0.12	0.06
Labour mobility									
Permanently in agriculture	0.52	0.23	0.13	0.57	0.25	0.14	0.57	0.23	0.12
Agric-Non- Agric (exit)				0.55	0.25	0.14	0.68	0.31	0.19
Non-agric-Non-agric (permanently in non-agric)	0.37	0.14	0.08	0.24	0.08	0.04	0.38	0.16	0.10
Non-agric-agric (entrant)				0.26	0.09	0.04	0.23	0.06	0.03

Source: Data Analysis (2020)

4.1.3 Poverty Transition and Sectoral Movements in and out of Agriculture among Rural Households in Nigeria

Following FGT (1984) methodology, the poverty incidence was used to categorise rural households into two poverty states, Non-Poor and Poor, which are inherently stochastic, mutually exclusive and collectively exhaustive. These desired statistical properties are not only necessary for adequate application of the Markov processes, they are made possible by the fact that the poverty status of a given household is contingent upon its total expenditure (or income) and size which usually change over time consequently influencing the poverty line (Oyekale *et al.* 2012). Transitioning of rural households in and out of these poverty states over time, hence poverty dynamics, is described by the following Markov chain as shown in the first pane of Table 4.

These transition probabilities (P) show that there is a 66 percent chance that the status of a previously non-poor rural household will stay the same in the current period. Also, if a rural household was poor in the previous period, there is a 65 percent chance that it is still in that state. This implies that if the socioeconomic characteristics of rural households remain static, their poverty status tends to remain the same. Conversely, there is a little chance (34 percent) for rural households to alternate their poverty status between the previous and current period. This result is consistent with the findings of Adepoju (2018) who reported that majority of rural households in Nigeria were chronically poor.

Vector of initial probabilities, $P_{(0)}$, of rural households to be non-poor or poor in 2015/2016 respectively was; $P_{(0)} = \{0.51, 0.49\}$. This shows that, on the average, 51 percent and 49 percent of rural households are currently non-poor and poor respectively. Hence, about forty-nine out of every hundred rural households in Nigeria can be regarded as relatively poor among their peers.

The second pane of Table 4.5a showed the absolute (unconditional) and n-step transition (conditional) probabilities of being in any of the poverty states after a specified number of transitions were computed using the Chapman-Kolomogorov equations; $[P_{(n)} = P_{(0)} P^n]$. Thus, the proportion of rural households that will be in any of the states in the next period is given as: $P_{(2)} = \{0.51, 0.49\}$. This stipulates that by the next period, the number of rural households who are poor, out of every hundred, would have increased to 51, from 49, such that about 2 percent of them would have moved from being non-poor into poverty.

The n-step transition matrix (P^n) is the conditional probabilities of a rural household in the system transiting into a state given that a particular state has already occurred. The two-step transition matrix (P^2) as presented in the second pane of Table 4.5a reveal that if a household was non-poor at the end of a period, the probability is 0.55 that this household will remain in that state in the next two periods. In other words, if 100 rural households were living above the poverty line at the end of a period, about 45 of them are expected to have transited into living below the poverty line in two periods. Similarly, a poor rural household has probability of 0.54 to remain in this state two periods later. Therefore, suggesting that if 100 rural households were poor at the end of a period, about 46 of them would have transited into non-poor after two periods. Hence, the poverty status of rural households in Nigeria is transitory.

Vector of the limiting state probabilities is given as $\pi_j = \{0.50, 0.50\}$. These probabilities stipulate that, in the long run, there will be a slight increase in the proportion of poor rural households as a few of them would have left the non-poor state over time.

Table 4.5a: **Markov Processes for Transitory and Chronic Poverty in Rural Nigeria**

	Initial probabilities (n = 0)		n = 1		Steady-state probabilities (n = ∞)	
	Non-poor	*Poor*	*Non-poor*	*Poor*	*Non-poor*	*Poor*
Non-poor	0.6563	0.3437	0.5508	0.4492	0.5041	0.4959
Poor	0.3493	0.6507	0.4566	0.5434	0.5041	0.4959
P(n) =	**0.5144**	**0.4856**	**0.5050**	**0.4950**	**0.5041**	**0.4959**

Source: Data analysis (2020)

Depending on the number of farming households whose heads changed (or remained in) their primary sector of employment, a household can be categorised into two mutually exclusive states; viz Moved and No move. The former state captures those households whose head had changed his/her job sector between the beginning and end of the period under study, while the latter state represents those who never left their original employment sector. The movement of rural households in and out of these employment sectors over time, hence labour dynamics, is described by the following Markov chain as shown in the first pane of Table 4.5b.

These transition probabilities (P) show that there is 88 percent chance that the employment status of a household previously in the agricultural sector to stay the same in the current period. If a rural household left agriculture sector in 2012/2013, there is a 47 percent chance that it has not gone back to any form of agricultural practises in 2015/2016. If a household is previously in the agricultural sector, there is a 12 percent chance that it has changed its sector of primary employment in the current period. Finally, there is a 53 percent chance for a household who was in non-agricultural sector in 2012/2013 to remain employed in that sector in 2015/2016.

Similarly, the vector of initial probabilities, $P_{(0)}$, which is the starting probability of rural households being in any of these two sectoral employment states in the current period 2015/2016 is; $P_{(0)}$ = {0.84, 0.16}. This implies that, on the average, 83.8 percent and 16.2 percent of rural households are currently primarily employed in the agricultural and non-agricultural sectors respectively. Hence, about eighty-four of every hundred rural households in Nigeria rely on some form of agricultural practice as their primary source of income. This further underscore the relative importance of agriculture as the highest employer of labour in the country.

4.1.4 Absolute (unconditional) and n-step Transition (conditional) Probabilities

Given the initial probabilities (P_0) of starting in a particular state and the transition matrix (P), using the Chapman-Kolomogorov equations; $[P_{(n)} = P_{(0)} P^n]$, the absolute probabilities of being in any of the employment sectors after a specified number of transitions are computed. Thus, the proportion of rural households that will be in any of the states next period (i.e. 2018/2019) is given as: $P_{(2)} = \{0.81, 0.19\}$. This reveals that by the next period, the number of rural households who are primarily employed by the agricultural sector, out of every hundred, would have reduced to 81, from 84, such that about 3.6 percent of them would have moved out of the agricultural sector.

The n-step transition matrix (P^n) is the conditional probabilities of a rural households in the system transiting into a state given that a particular state has already occurred. The two-step transition matrix (P^2) as presented in the second pane of Table 4.5a, reveal that if a household is in the agricultural sector at the end of a period, the probability is 0.84 that this household will remain there two periods later. In other words, if 100 rural households depend on some sort of agricultural practice as primary source of income at the end of a period, about 16 of them are expected to have transited into any form of non-agricultural practises in two periods. Similarly, a household in the non-agricultural sector has probability of 0.34 to remain in this state two periods later. Therefore, suggesting that if 100 rural households depend on some sort of non-agricultural practice as primary source of income at the end of a period, about 66 of them would have transit into a kind of agricultural practice after two periods.

4.1.5 Steady-state probabilities

The absolute probabilities after *n* transitions always converge uniquely to a limiting (steady-state) distribution as *n* tends to infinity. These probabilities are independent of the initial probabilities such that the probabilities π remain unchanged after one transition and for this reason they represent the steady-state distribution. Vector of the limiting state probabilities is given as $\pi_j = \{0.80, 0.20\}$. These probabilities stipulate that, in the long run, there will be a slight increase in the proportion of rural households primarily employed by the non-agricultural sector as a few of them left the agricultural

sector over time. Hence majority of rural households will always be involved one way or the other in agricultural practises especially as their main source of livelihood (Islam, 2019). This confirms the Lewis theory that underpins this study. Therefore, the agricultural sector will lose labour to the non-agricultural sector over time reflecting the developmental milestones of rural areas (Dartanto *et al*. 2020, Moeis *et al.* 2020).

Table 4.5b: Markov Processes for Agricultural Labour Dynamics

	Initial probabilities (n = 0)		n = 1		Steady-state probabilities (n = ∞)	
	Agric	*Non-Agric*	*Agric*	*Non-Agric*	*Agric*	*Non-Agric*
Agric	0.8836	0.1164	0.8353	0.1647	0.8010	0.1990
Non-Agric	0.4683	0.5317	0.6628	0.3372	0.8010	0.1990
P(n) =	**0.8377**	**0.1623**	**0.8073**	**0.1927**	**0.8010**	**0.1990**

Source: Data Analysis (2020)

4.1.6 Relationship between Labour Dynamics and Poverty (using Contingency Table)

Majority of the households that were chronically poor between 2010/2011 and 2012/2013 were permanently in agriculture (see Table 4.6a). Again, 84 percent of households that were previously poor but were non-poor (transitorily non-poor) in 2012/2013 period did not move out of agriculture in the year under review. Again, households whose heads were permanently in agriculture accounted for 87 percent of the households that were transitorily poor. The study found households whose heads did not transit from agriculture between 2010/11 and 2012/2013 accounting for 62 percent of households that were non poor in the two reference periods. Similarly, households whose head were not involved in agriculture between 2010 and 2013 had 22 percent of households that were never poor. In total, 2020 households accounting for 79 percent of the surveyed households did not transition from agriculture between 2010/2011 and 2012/2013.

The results presented in Table 4.6a imply that households that did not transit from agriculture accounted for majority of the households that were chronically poor, transitorily non-poor, never poor and transitorily poor. This finding shows that agriculture might not necessarily limit the welfare of farming households, which is consistent with the opinion of Moeis *et al*., (2020). Therefore, it is crucial to provide more resources, innovative farming knowledge and other services to make farming more competitive and sufficiently attractive to reduce movement of farming households out of agriculture. The result of the chi square test that was conducted (see Table 4.6a) revealed a significant relationship between agricultural employment and poverty among households in rural Nigeria.

Table 4.6a: Labour-Poverty Dynamics Relationship Matrix (2010-2013)

	Poor-poor	Poor-Non-poor	Non-poor-Non-poor	Non-poor-poor	Total
Agric-Agric	717	339	591	373	2020
Percentage	(27.90)	(13.19)	(23.00)	(14.51)	(78.60)
Agric-Non-Agric	28	31	78	14	151
Percentage	(1.09)	(1.21)	(3.04)	(0.55)	(5.88)
Non-agric-Non-agric	11	21	211	23	266
Percentage	(0.43)	(0.82)	(8.21)	(0.90)	(10.35)
Non.agric-agric	27	14	72	20	133
Percentage	(1.05)	(0.55)	(2.80)	(0.78)	(5.18)
Total	783	405	952	430	2,570
Pearson Chi2	305.016				
Pr	0.0000				

Source: Data Analysis (2020)

The results presented in Table 4.6b revealed the relationship between labour dynamics and poverty transitions of households in rural Nigeria. Specifically, 61 percent of households that were chronically poor were permanently in agriculture while 66 percent of the households that were transitorily non-poor did not transit from agriculture to other sectors. The study also found that 51 percent of households that were never poor were permanently in agriculture. Also, 60 percent of the households that were transitorily non-poor were permanently in agriculture. Households that did not transit agriculture for other sectors were 58 percent of the surveyed households. Again, households that exited agriculture for other sectors accounted for 34 percent, 24 percent, 17 percent and 30 percent of households that were chronically poor, transitorily non-poor, never poor and transitorily poor respectively. In terms of transitions, households that moved out of agriculture between 2013 and 2016 accounted for 26 percent of the sample that was considered for this study. The findings imply that rural labour will continue to move from agricultural sector to non-agriculture while most households will be engaged in the sector at any given time. Therefore, there is a need to invest in rural infrastructure and critical agricultural inputs to encourage labour to stay within the sector. In addition, findings show the need to prioritise social security for the households that are chronically poor and create decent opportunities for those that are transitorily poor.

Table 4.6b: Labour-Poverty Dynamics Relationship Matrix (2013-2016)

	Poor-poor	Poor-Non-poor	Non-poor-Non-poor	Non-poor-poor	Total
Agric-Agric	502	266	468	260	1,496
Percentage	(19.53)	(10.35)	(18.21)	(10.12)	(58.21)
Agric-Non-Agric	272	97	158	130	657
Percentage	(10.58)	(3.77)	(17.23)	(5.06)	(25.55)
Non-agric-Non-agric	10	8	31	10	59
Percentage	(0.39)	(0.31)	(1.21)	(0.39)	(2.30)
Non.agric-agric	24	34	260	40	358
Percentage	(0.93)	(1.32)	(10.12)	(1.56)	(13.93)
Total	808	405	917	440	2,570
Pearson Chi2(9)	294.713				
Pr	0.0000				

Source: Data Analysis (2020)

4.2   Relationship between Labour Dynamics and Poverty

The coefficients of sector of employment, marital status (being married only), age, access to ICT, farm size, household size, distance to market, migration, asset value, years of education, living in NW, SE and SW significantly influence the likelihood of a rural farming household to becoming poor (see Table 4.7). In terms of the model diagnostics, panel probit regression model was compared with probit regression model and it was found to be more appropriate. Wald test results showed that the model is appropriate for the analysis (i.e. goodness of fit). Also, Wooldridge test showed that there is no autocorrelation in the model hence its appropriateness for the analysis.

There is a direct relationship (P<0.001) between the sector of employment and poverty status of the rural households. Specifically, households whose heads are employed by agriculture have a 5.6 percent higher chance of being poor. This finding underscores the need to provide support for households in agriculture towards improving their welfare. This is consistent with the findings of Islam, (2019), Oseni *et al.* (2014), Oyekale *et al.* (2012) and Tocco *et al* (2012). A positive relationship exists between age of household head and the probability of the household to be poor. Specifically, a year increase in the age of the household head will increase the probability of the household being poor by 0.1 percent. This is consistent with the findings of Olarinde *et al*. (2020). The results of the Probit panel data regression model revealed that being married increases the probability of rural households becoming poor by 11 percent. This might be due to the fact that married household heads may have larger household size and higher dependency ratio compared to their counterparts that are not married.

Access to ICT has a negative relationship with poverty. In fact, households whose heads have access to ICT have 5.6 percent decrease in the probability of being poor. This may be due to the ability to learn superior and sustainable agricultural practices and increased access to market that ICT provides. A direct relationship exists between household size and poverty. A unit increase in household size increases the likelihood of a household to be poor by 5.9 percent. This is consistent with the findings of Tirkaso, 2011; Oyekale *et al*. (2012); Salami *et al.* (2017); Adepoju (2018) and Dimelu *et al.* (2020).

A positive relationship exists between distance to market and poverty. A kilometre increase in the distance of a household to the market will increase the probability of being poor by 0.09 percent. This is because increase in distance to market compromises

the ability of households to access markets on time with significant effect on transportation costs which undermines the welfare of such households. Therefore, more markets should be provided to rural households to improve their access to markets. This is consistent with the findings of Patridge and Rickman (2008) and Emran and Hou (2013) who reported poverty rate increased with distance to market. The value of household assets was also found to be negatively related to household poverty. Therefore, as households acquire more assets, the probability of being poor declines. This is consistent with the findings of Olarinde et al. (2020) who reported a negative relationship between poverty and asset ownership. The study found a positive relationship between farm size and the probability of a household being poor. This might be because most households had small land holdings and the low level of adoption of technology. A negative and statistically significant relationship exists between years of education and poverty. Specifically, a year increase in the number of years of education will reduce the probability of a household becoming poor by 0.9 percent. This may be linked to the fact that education would influence the adoption of improved inputs and efficient use of resources. This is consistent with the findings of Adeoti (2014); Awotide *et al.* (2010), Apata *et al.* (2010) and Oni and Yusuf, (2008). This also corroborates the findings of Oyekale *et al.* (2012) and Amao *et al.* (2016). The results also revealed that households based in NE, NW and SE Zones of Nigeria have 3.2 percent, 5.6 percent and 14.2 percent increase in the chances of being poor. However, households based in South-West Nigeria have a 7 percent decrease in the chances of being poor.

Table 4.7: Relationship between Agricultural Employment and Poverty

Variables	Coefficient	Marginal Effects
Agricultural employment	0.2023*** (0.0455)	0.0556
Age of household head	0.0058** (0.0016)	0.0010
Married	0.4095*** (0.1016)	0.1147
ICT Access	-0.2023*** (0.0402)	-0.0556
Household size	0.2129*** (0.0087)	0.0585
Male	0.0217 (0.1127)	0.0060
Migrated	0.0591 (0.0469)	0.0163
Distance to major road	-0.0024 (0.0015)	-0.0007
Distance to market	0.0032*** (0.0006)	0.0009
Dependency ratio	0.0225 (0.0188)	0.0062
Asset value	-0.6453*** (0.0339)	-0.1774
Year of education	-0.0330*** (0.0045)	-0.0091
NE	0.1463* (0.0717)	0.0318

Variables	Coefficient	Marginal Effects
NW	0.2183***	0.0560
	(0.0691)	
SE	0.5143***	0.1415
	(0.0789)	
SS	-0.0107	-0.0029
	(0.0774)	
SW	-0.2625***	-0.0699
	(0.1031)	
Farm size	0.0516***	0.0142
	(0.0144)	
Access to credit	-0.0752	-0.0207
	(0.0498)	
Constant	-0.6602***	
	(0.2414)	
LR test	153.16***	
Wald chi2	1153.91***	
Wooldridge test; F(1, 2569)	2.588	
Observations	7,710	7,710
Number of id	2,570	2,570

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Data Analysis (2020)

4.3   Determinants of Agricultural Employment

The MNP regression model was used to determine the correlates of agricultural employment in Nigeria. The results presented in Tables 4.8a, 4.8b and 4.8c revealed the factors influencing the decision of households to remain in the agricultural sector, move out of agriculture and movement into the agricultural sector. Households that were not engaged in agriculture at any time in the period under review were adopted as the base category. The log likelihood of the model showed that the model is a good fit. The Chi square was significant at 1 percent which showed that the model is a good fit.

Distance to market, distance to road, years of education, sex, HS, access to ICT, migration, access to credit and living in NE, SE and SS Nigeria were the determinants of agricultural employment decision of households between 2010/11 and 2012/13 periods (see Table 4.8a). Similarly, there is a direct relationship between distance to road and staying in the agricultural sector between 2010/11 and 2012/13 periods. This implies that most households that were involved in agriculture had a high distance to the nearest road. Specifically, households living far from the nearest market and road have 0.06 percent and 0.36 percent higher probability of staying in agriculture respectively in the period under review. This implies that most households that remained in the agricultural sector in the period under review were not located close to markets or roads. A negative relationship exists between distance to road and the probability of moving out of agriculture between 2010/11 and 2012/13. Specifically, a kilometre increase in distance to major road will reduce the probability of a household to exit agriculture between 2010/11 and 2012/13 by 0.25 percent.

An inverse relationship exists between the number of years spent schooling and the decision of households to either stay in agriculture or exit agriculture between 2010/11 and 2012/13 periods. However, a direct relationship exists between the number of years spent schooling and the probability of a household to move into agriculture from the non-agricultural sector. Specifically, a unit increase in the number of years spent schooling will reduce the chances of households being engaged in agriculture or moving out from agriculture elsewhere by 0.68 percent and 0.24 percent respectively. This may be due to the low educational attainment among the households considered for this study. A direct relationship exists between being a male and the chances of the household staying in the agricultural sector between 2010/11 and 2012/13 periods. This

might be due to the gender considerations in the access to agricultural inputs that favours men.

A direct relationship exists between household size and the likelihood of that household to either move out of agriculture or remain in the sector between 2010/11 and 2012/13 periods. This means households with large members would have access to more family labour and decide to stay within the sector. Again, most of the households moving out of agriculture are fairly large hence the positive relationship between movement out of agriculture and household size. Specifically, a unit increase in household size will increase the chances of a household to stay in agriculture or move out by 1.83 percent and 0.01 percent. However, an inverse relationship exists between the likelihood of a household moving into agriculture from the non-agricultural sector. An inverse relationship was found between household size and the probability of a household moving into agriculture from the non-agricultural sector. This means that large households may not move into the agricultural sector. This may be due to the perception that agriculture does not pay competitive rates. An inverse relationship exists between ICT access and the probability of a household staying in the agricultural sector. Also, a direct relationship was found between ICT access and the probability of a household exiting agriculture between 2010/11 and 2012/13. This might be linked to inadequate access to ICT among rural households in Nigeria.

An inverse relationship exists between value of assets and the probability of staying in agriculture or exiting agriculture for the non-agricultural sector. This means that a percentage increase in the asset value of rural households will reduce their probability of exiting agriculture by 1.8 percent between 2010/11-2012/13. This can be explained by the type of assets that households within the rural communities possess. Therefore, households that possess land may not consider leaving agriculture. Similarly, an inverse relationship exists between value of assets and the probability of a household staying in the agriculture sector. This might be due to the low level of asset acquisition among rural farming households. There is a direct relationship between the value of assets and the probability of moving into agriculture from the non-agricultural sector in between the 2010/11 and 2012/13 periods. Specifically, a percentage increase in the value of household assets would raise the probability of such households to move into the agricultural sector by 0.67 percent.

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Households with at least one migrated member have a higher probability of leaving agriculture. In fact, a household having at least one migrated member will result in about 8.8 percent increase in the probability of leaving agriculture between 2010/11 and 2012/13 periods respectively. The study also found an inverse relationship between households having at least a migrated member and the probability of staying in agriculture between 2010/11 and 2012/13. This implies that as household members continue to migrate to urban communities with seemingly better welfare improvement opportunities, the remaining household members may consider other income generating activities and deprioritize agriculture. A direct relationship exists between credit access and the probability of a household staying in agriculture between 2010/11 and 2012/13. This implies that households with access to credit would be able to expand their economic activities and improve their income. Therefore, households with access to credit have a 6.7 percent higher chances of staying in agriculture in the period under review. This corroborates the findings of Omotesho *et al*. (2016), who reported a direct relationship between access to farm credit and participation of farmers in agricultural activities.

 In terms of regional effects, households living in North-East Nigeria have a higher probability of moving out of agriculture between 2010/11 and 2012/13. Specifically, households living in North-East, Nigeria have 0.53 percent higher probability of moving out of agriculture in 2010/11-2012/13. Similarly, households living in the North-East had a 0.63 percent decrease in the probability of staying in agriculture in the period under review. This may be due to the security challenges within these regions that makes it increasingly difficult to engage in agriculture. However, households living in South East, Nigeria have a higher likelihood of staying in agriculture in the period under review.

Table 4.8a: **Determinants of Agricultural Labour Dynamics (2010/11 and 2012/13)**

Variables	Ag-Ag		Ag-NA		NA-Ag	
	Coefficient	**Marginal Effect**	**Coefficient**	**Marginal Effect**	**Coefficient**	**Marginal Effect**
Age of household head	-0.0019 (0.0053)	-0.0005	0.0006 (0.0070)	0.0002	0.0046 (0.0082)	0.0003
Dependency Ratio	0.0672 (0.0759)	0.0045	0.0398 (0.0987)	0.0023	0.1245 (0.1038)	0.0035
Distance to major market	0.0046** (0.0022)	0.0006	0.0044 (0.0028)	0.0006	-0.0030 (0.0034)	-0.0003
Distance to major road	0.0074** (0.0063)	0.0036	-0.0230** (0.0093)	-0.0025	-0.0147 (0.0113)	-0.0008
Years of education	-0.0770*** (0.0168)	-0.0068	-0.0909*** (0.0216)	-0.0024	0.0023*** (0.0254)	0.0034
Male	0.6318*** (0.2991)	0.0865	0.5102 (0.4426)	0.0006	-0.3972 (0.4817)	-0.0447
Household size	0.1908*** (0.0304)	0.0183	0.1665*** (0.0371)	0.0001	-0.0781* (0.0445)	-0.0039
ICT Access	-0.3535*** (0.1692)	-0.1165	0.4988** (0.2290)	0.0684	0.4779* (0.2897)	0.0326
Natural Log of Asset Value	-0.2106*** (0.0577)	-0.0057	-0.3857*** (0.0748)	-0.0183	0.0634* (0.0878)	0.0067
North-East	-0.6530** (0.2911)	-0.0063	1.1222*** (0.3527)	0.0529	0.7254 (0.4432)	0.0038
NW	-0.2283 (0.2252)	-0.0124	0.4335 (0.3280)	0.0185	0.5550 (0.4041)	0.0168
SE	0.4456* (0.2535)	0.0613	0.1630 (0.3459)	0.0171	-0.0015 (0.4117)	-0.0134
SS	-0.5010** (0.2235)	-0.0703	0.3918 (0.3139)	0.0002	0.0687 (0.3553)	0.0248
SW	0.1148 (0.3201)	0.0242	-0.3320 (0.4599)	-0.0328	0.3978 (0.5022)	0.0177
Married	-0.1574 (0.2801)	-0.0479	0.1204 (0.4127)	0.0207	0.3180 (0.4640)	0.0203
Migration	-0.9676***	-0.1694	1.8823***	0.0879	1.2900***	0.0173

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Variables	Ag-Ag		Ag-NA		NA-Ag	
	(0.2230)		(0.2548)		(0.2876)	
Infrastructure	-0.1055 (0.1007)	-0.0124	0.0660 (0.1295)	0.0022	0.0330 (0.1546)	0.0025
Remittance	0.0386 (0.0736)	0.0016	0.0851 (0.0895)	0.0044	0.0558 (0.0960)	0.0008
Access to credit	0.3751* (0.2043)	0.0674	-0.0214 (0.2746)	-0.0302	0.0047 (0.3181)	0.0128
Number of observations	2570					
LR Chi2	312.012 0.0000					
Prob>Chi2	-1978.842					
Log Likelihood						

Source: Data Analysis (2020)

Distance to market, distance to road, years of education, sex, household size, access to ICT, value of asset, migration, access to credit and living in NE, NW, SE and SS Nigeria were the determinants of agricultural employment decision of households between 2012/13 and 2015/16 periods (see Table 4.8b). This study found a direct link between dependency ratio and being permanently in agriculture and movement into agriculture in the period under review. This implies that the chances of a household remaining in agriculture and movement into agriculture will increase by 1.4 percent and 0.6 percent respectively if the dependency ratio increases. This might be due to the high dependency ratio within rural Nigeria.

A direct relationship exists between distance to market and the probability of households working in agriculture between 2012/13 and 2015/16 periods. Specifically, households living far from the nearest market have a 0.11 percent higher probability of staying in agriculture. This implies that most households that were involved in agriculture had a high distance to the nearest market. Also, an inverse relationship was found between distance to market and the probability of a household to move out of agriculture and move into agriculture. This implies that shorter distance to market would expose the households to more opportunities which might influence their decision to exit or move into agriculture. Specifically, a kilometre increase in distance to market will reduce the probability of a household to exit agriculture between 2012/13 and 2015/16 by 0.03 percent. Conversely, there is a positive relationship between distance to market and the probability of a household moving into agriculture. This is because long distance to market might discourage households to deprioritise agriculture. This is consistent with the findings of Osebeyo and Aye (2014) who reported a positive relationship between distance to market and market participation of farmers. According to Table 4.8b, there is an inverse relationship between distance to road and the probability of a household to move out or into agriculture in the period under review. Specifically, a kilometre increase in the distance to road will reduce the probability of a household to move out or into agriculture by 0.22 percent and 0.18 percent respectively.

An inverse relationship exists between the number of years spent schooling and the decision of households to either stay in agriculture or exit agriculture between 2012/13 and 2015/16 periods. Specifically, a unit increase in the number of years spent schooling will reduce the probability of households being engaged in agriculture or moving out from agriculture elsewhere by 0.71 percent and 0.09 percent respectively. This may be

due to the low level of education among the households considered for this study. There is a direct relationship between being a male and the likelihood of the household staying in the agricultural sector or households moving out of the agricultural sector between 2012/13 and 2015/16 periods. This might be due to the fact that most households considered for this study are male headed and the gender considerations in the access to productive resources that favours men.

A direct relationship exists between household size and the probability of moving out of agriculture or remaining in the sector between 2012/13 and 2015/16 periods. This implies that households with large members would have access to more family labour and decide to stay within the sector. Specifically, an increase in household size will raise the chances of a household to stay in agriculture or move out by 1.31 percent and 0.24 percent. However, there is an inverse relationship between the probability of a household moving into agriculture from the non-agricultural sector. A negative relationship exists between household size and the likelihood of a household moving into agriculture from the non-agricultural sector. This implies that large households may not move into the agricultural sector. This may be due to the perception that agriculture does not pay competitive rates. A negative relationship exists between access to ICT and the probability of a household staying in the agricultural sector. Also, a direct relationship exists between ICT access and the probability of a household exiting agriculture between 2012/13 and 2015/16. This might be due to inadequate access to ICT among rural households in Nigeria. There is a negative relationship between value of assets and the probability of staying in agriculture or exiting agriculture for the non-agricultural sector. This means that a percentage increase in the asset value of rural households will reduce their probability of exiting agriculture by 1.72 percent between 2012/13-2015/16. This can be explained by the type of assets that households within the rural communities possess. Therefore, households that possess land may not consider leaving agriculture. Similarly, a negative relationship exists between value of assets and the probability of a household staying in the agriculture sector. This might be due to the low level of asset acquisition among rural farming households. A direct relationship between asset value and the probability of moving into agriculture from the non-agricultural sector in between 2012/13 and 2015/16 periods. Specifically, a percentage increase in the value of household assets would increase the probability of such households to move into the agricultural sector by 14.67 percent.

Households with at least one migrated member have a higher probability of leaving agriculture. In fact, a household having at least one migrated member will result in about 7.55 percent increase in the probability of leaving agriculture between 2012/13 and 2015/16 periods respectively. This implies that as household members continue to migrate to urban communities with seemingly better welfare improvement opportunities, the remaining household members may consider other income generating activities and deprioritize agriculture. A direct relationship exists between access to credit and the probability of a household staying in agriculture between 2012/13 and 2015/16. This means households with credit access would be able to expand their economic activities and improve their income. Therefore, households with access to credit have a 7.37 percent higher probability of staying in the agriculture sector in the period under review. Similarly, a negative relationship exists between credit access and the chances of a household moving out of agriculture. A direct relationship between male headed households and the probability of moving out of agriculture or staying in agriculture in the period under review (see Table 4.8b). This might be because most households in this study are male-headed.

In terms of regional effects, households living in North-East Nigeria have a higher probability of moving out of agriculture between 2010/11 and 2012/13. Specifically, households living in North-East, Nigeria respectively have 6.53 percent higher probability of moving out of agriculture in 2012/13-2015/16. Similarly, households living in the North-East had a 1.81 percent decrease in the probability of staying in agriculture in the period under review. This may be due to the security challenges within these regions that makes it increasingly difficult to engage in agriculture. Similarly, households living in NW, Nigeria and the probability of either staying in agriculture or moving out of the agricultural sector. However, households living in South East, Nigeria have a higher probability of staying in agriculture in the period under review.

Table 4.8b: Determinants of Agricultural Labour Dynamics (2012/13 and 2015/16)

Variables	Ag-Ag		Ag-NA		NA-Ag	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Age of household head	0.0032 (0.0038)	0.0001	0.0061 (0.0047)	0.0004	0.0030 (0.0050)	5.21e-6
Dependency Ratio	0.0898** (0.0516)	0.0143	0.0672 (0.0619)	0.0002	0.0002 (0.0660)	0.0062
Distance to major market	0.0076** (0.0016)	0.0011	-0.0041** (0.0019)	-0.0003	0.0053*** (0.0019)	0.0002
Distance to major road	0.0029 (0.0042)	0.0029	-0.0244*** (0.0062)	-0.0022	-0.0261*** (0.0068)	-0.0018
Years of education	-0.0508*** (0.0118)	-0.0071	-0.0456*** (0.0142)	-0.0009	-0.0149*** (0.0051)	-0.0031
Male	0.5045*** (0.2138)	0.0405	0.7551*** (0.2741)	0.0436	0.1313 (0.2665)	0.0029
Household size	0.1132*** (0.0213)	0.0131	0.1091*** (0.0250)	0.0024	0.0507* (0.0266)	0.0036
ICT Access	-0.3550*** (0.1211)	-0.0172	0.4436*** (0.1562)	0.0785	0.2645** (0.1691)	0.0372
Natural Log of Asset Value	0.1411*** (0.0386)	0.0653	-0.1946*** (0.0474)	-0.0114	0.0504*** (0.0040)	0.0147
NE	-0.8492** (0.2180)	-0.0414	0.8640** (0.2505)	0.0181	0.6610** (0.2677)	0.0065
NW	0.4179** (0.1812)	0.1086	0.3866* (0.2179)	0.0049	0.3371 (0.2350)	0.0004
SE	0.4985*** (0.1811)	0.0743	-0.0153 (0.2291)	-0.0388	-0.0343 (0.2373)	-0.0276
SS	-0.4245*** (0.1639)	-0.0278	-0.3704* (0.2058)	-0.0097	-0.0632 (0.2038)	-0.0272
SW	-0.1650 (0.2215)	-0.0484	-0.0354 (0.2762)	-0.0133	-0.1782 (0.2978)	-0.0067
Married	-0.1459 (0.1999)	-0.0285	-0.1023 (0.2486)	-0.0226	-0.1249 (0.2482)	-0.0178
Migration	-0.4737*** -0.0033		1.0843*** 0.0755		0.7289*** 0.0219	

	(0.1391)		(0.1572)		(0.1642)	
Infrastructure	0.0212 (0.0714)	0.0597	0.0371 (0.0867)	0.0013	0.0845 (0.0929)	0.0058
Remittance	0.0424 (0.0445)	0.0737	0.8190 (0.5604)	0.0602	-0.0441 (0.0676)	-0.0076
Access to credit	0.2953** (0.1427)	0.0628	-0.0953** (0.1822)	-0.0364	0.0028 (0.1876)	0.0151
Number of observations	2570					
LR Chi2	451.04 0.0000					
Prob>Chi2	-1970.378					
Log Likelihood						

Source: Data Analysis (2020)

Age, distance to market, distance to road, years of education, sex, household size, access to ICT, value of asset, migration, access to credit, remittance and living in NE, NW, SE and SS Nigeria were the determinants of agricultural employment decision of households between 2010/11 and 2015/16 periods (see Table 4.8c). This study found a direct relationship between age and the chances of being permanently in agriculture, movement out of and movement into agriculture in the period under review. This implies that the probability of a household remaining in agriculture, movement out and movement into agriculture will increase by 0.03 percent, 0.03 percent and 0.05 percent respectively if the age increases.

A direct relationship exists between distance to market and the probability of households working in agriculture between 2010/11 and 2015/16 periods. Also, a direct relationship exists between distance to market and the probability of a household to move out of agriculture. This implies that most households that were involved in agriculture had a high distance to the nearest market. Specifically, households living far from the nearest market have a 0.02 percent higher probability of staying in agriculture. This implies that most households that remained in the agricultural sector in the period under review were not located close to markets or roads. A direct relationship exists between distance to market and the probability of a household moving out of agriculture in the period under review. Specifically, a kilometre increase in distance to market will increase the probability of a household to exit agriculture between 2010/11 and 2015/16 by 0.03 percent. This is because long distance to market might discourage households to prioritise agriculture. An inverse relationship exists between distance to road and the probability of a household to move out or move into agriculture in the period under review. Specifically, a kilometre increase in the distance to road will reduce the probability of a household to move out or move into agriculture by 0.26 percent and 0.29 percent respectively.

An inverse relationship was found between the number of years spent schooling and the decision of households to either stay in agriculture or exit agriculture between 2010/11 and 2015/16 periods. Specifically, a unit increase in the number of years spent schooling will reduce the chances of households being engaged in agriculture or moving out from

agriculture elsewhere by 0.44 percent and 0.29 percent respectively. This may be due to the low educational attainment among the households considered for this study. In addition, a direct relationship exists between the number of years spent schooling and the probability of households moving into agriculture. This implies that educated households have a 0.13 percent higher probability of moving into agriculture. This result corroborates the earlier findings of Odozi and Adeyonu (2021) and Okunlola *et al.* (2020).

This study found a direct relationship between being a male and the likelihood of the household staying in the agricultural sector or households moving out of the agricultural sector between 2010/11 and 2015/16 periods. This might be because most households in this study are male headed and the gender considerations in the access to productive resources that favours men. A direct relationship exists between household size and the probability of a household either to move out of agriculture or remain in the sector between 2010/11 and 2015/16 periods. This implies that households with large members would have access to more family labour and decide to stay within the sector. Again, most of the households moving out of agriculture are fairly large hence the positive relationship between movement out of agriculture and household size. Specifically, a unit increase in household size will increase the probability of a household to stay in agriculture or move out by 1.25 percent and 0.33 percent. This is consistent with the findings of Ibidapo *et al*. (2017) who reported a direct relationship between household size and labour participation.

A positive relationship exists between household size and the probability of a household moving into agriculture from the non-agricultural sector. This implies that large households may not move into the agricultural sector. This may be due to the perception that agriculture does not pay competitive rates. These findings corroborate the earlier report of Adepoju and Osunsanmi (2018). An inverse relationship exists between ICT access and the probability of a household staying in the agricultural sector. Also, a positive relationship exists between ICT access and the chances of a household exiting agriculture between 2010/11 and 2015/16. This might be linked to inadequate ICT access among rural households in Nigeria. There is a negative relationship between value of assets and the probability of staying in agriculture or exiting agriculture for the

non-agricultural sector. This implies that a percentage increase in the asset value of rural households will reduce their probability of exiting agriculture by 1.72 percent between 2012/13-2015/16. This can be explained by the type of assets that households within the rural communities possess. Therefore, households that possess land may not consider leaving agriculture. Similarly, an inverse relationship exists between value of assets and the probability of a household staying in or moving out of the agriculture sector. This might be due to the low level of asset acquisition among rural farming households.

Households with at least one migrated member have a higher probability of leaving agriculture. In fact, a household having at least one migrated member will result in about 8.66 percent increase in the probability of leaving agriculture between 2010/11 and 2015/16 periods. This implies that as household members continue to migrate to urban communities with seemingly better welfare improvement opportunities, the remaining household members may consider other income generating activities and deprioritize agriculture. However, a direct relationship exists between having at least one migrated member and the probability of moving into agriculture.

An inverse relationship exists between credit access and the likelihood of a household moving out of agriculture between 2010/11 and 2015/16. This means that households with credit access have higher chances of staying within the agricultural sector in the period under review. Specifically, households with access to credit have 3.04 percent lower chances of exiting agriculture. A direct relationship was found between male headed households and the chances of moving out of agriculture or staying in agriculture in the period under review (see Table 4.8c). This might be because most households considered for this study are male-headed. A direct relationship exists between access to remittance and the probability of a household staying in agriculture. Remittance receiving households have 1.4 percent higher probability of staying in agriculture between 2010/11 and 2015/16.

In terms of regional effects, households living in North-East Nigeria have a higher probability of moving out of agriculture between 2010/11 and 2015/16. Specifically, households living in North-East, Nigeria respectively have 8.79 percent higher probability of moving out of agriculture in 2010/11-2015/16. Similarly, households living in the North-East had a 0.61 percent decrease in the probability of staying in agriculture in the period under review. This may be due to the security challenges within

these regions that makes it increasingly difficult to engage in agriculture. Similarly, there is a direct relationship between households living in NW, Nigeria and the probability of moving out of the agricultural sector. However, households living in SE, Nigeria have a higher likelihood of staying in agriculture in the period under review. Households living in SS have lower probability of either staying or moving out of agriculture between 2010/11 and 2015/16. In addition, a direct relationship exists between households living in the SS region and the probability of moving into agriculture in the period under review.

Table 4.8c: Determinants of Agricultural Labour Dynamics (2010/11 and 2015/16)

Variables	Ag-Ag		Ag-NA		NA-Ag	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Age of household head	0.0103** (0.0040)	0.0003	0.0124*** (0.0048)	0.0003	0.1467** (0.0049)	0.0005
Dependency Ratio	-0.0223 (0.0509)	-0.0091	0.0626 (0.0581)	0.0113	-0.0386 (0.0628)	- 0.0034
Distance to major market	0.0035** (0.0016)	0.0002	0.0062** (0.0018)	0.0005	-0.0008 (0.0020)	-0.0003
Distance to major road	0.0010 (0.0042)	0.0045	-0.0246*** (0.0059)	-0.0026	-0.0361*** (0.0073)	-0.0029
Years of education	-0.0607*** (0.0120)	-0.0044	-0.0729*** (0.0143)	-0.0029	0.0396*** (0.0152)	0.0013
Sex	0.5828** (0.2271)	0.0459	0.9039*** (0.2865)	0.0618	-0.0121 (0.2806)	-0.0532
Household size	0.1169*** (0.0222)	0.0125	0.1195*** (0.0253)	0.0033	0.0461* (0.0274)	0.0049
ICT Access	-0.4753*** (0.1287)	-0.1471	0.3341** (0.1573)	0.0918	0.0370 (0.1689)	0.0269
Natural Log of Asset Value	-0.1633*** (0.0421)	-0.0121	-0.2544*** (0.0499)	-0.0917	-0.0067 (0.0053)	0.0269
NE	-0.4557** (0.0709)	-0.0061	0.9453*** (0.2378)	0.0879	-0.0150 (0.2809)	-0.0543
NW	0.0630 (0.1861)	0.1790	0.3687* (0.2207)	0.0042	-0.0279 (0.2350)	-0.0150
SE	0.4008** (0.1937)	0.0663	0.3473 (0.2345)	0.0073	-0.1600 (0.2426)	-0.0444
SS	-0.4837** (0.1700)	-0.0598	-0.4193** (0.2152)	-0.0028	0.2118* (0.0359)	0.0031
SW	-0.1676 (0.2414)	-0.0753	0.1974 (0.2874)	0.0356	0.1896 (0.2894)	0.0034
Married	0.2179 (0.2125)	0.0495	-0.1460 (0.2625)	-0.0461	0.2622 (0.2690)	0.0142

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Variables	Ag-Ag		Ag-NA		NA-Ag	
Migration	-0.5693 (0.1524)	-0.0421	1.1936*** (0.1665)	0.0866	0.8958*** (0.1718)	0.0291
Infrastructure	0.0831 (0.0750)	0.0051	0.0387 (0.0883)	0.0034	0.0501 (0.0938)	0.0036
Remittance	0.1408** (0.0601)	0.0165	0.1010 (0.0667)	0.0026	0.1010 (0.0635)	0.0008
Access to credit	0.1633 (0.1496)	0.0629	-0.1299** (0.1860)	-0.0304	-0.1878 (0.2009)	-0.0256
Number of observations	2570					
LR Chi2	480.39 0.0000					
Prob>Chi2	-1970.520					
Log Likelihood						

Source: Data Analysis (2020)

4.3.1 Determinants of Agricultural Employment and Poverty Dynamics in Rural Nigeria (Households staying in Agriculture and being Poor-2010/2013)

Movements from; staying in agriculture and being poor in both 2010/2011 and 2012/2013 periods are determined by distance to market, distance to road, access to ICT, living in South-East, Nigeria and migration (see Table 4.9a).

A direct relationship between distance to market and the likelihood of a household staying in agriculture and being poor in both periods. Specifically, a unit increase in distance to market will raise the chances of staying in agriculture and being poor between 2010/2011 and 2012/2013 by 0.11 percent. This can be linked to the high average distance to market which constrains access to market thereby undermining the welfare of rural farming households. This is consistent with the findings of Patridge and Rickman (2008). Similarly, a direct relationship exists between distance to road and the chances of a household staying in agriculture and being poor in both periods. Specifically, a unit increase in distance to road will increase the likelihood of a household staying in agriculture and being poor in both 2010/2011 and 2012/2013 by 0.24percent. An inverse relationship exists between access to ICT and the probability of a household staying in and being poor in both periods. Households with ICT access have 11.38 percent lower likelihood of staying in the agriculture sector and being poor in both 2010/2011 and 2012/2013. This implies that households that have access to ICT will be exposed to opportunities which might help in diversification and welfare improvements. Households with at least a member that has migrated have 10.56 percent lower probability of staying in agriculture and being poor between 2010/2011 and 2012/2013 periods. In terms of regional effects, households in SE, Nigeria and the probability of a household staying in agriculture and being poor in both periods. Households living in South-East, Nigeria have 0.16 percent lower probability of staying in agriculture and being poor in the period under review.

Table 4.9a: Determinants of Poverty and Labour Dynamics in Rural Nigeria (2010/11 and 2012/13)

Variables	Agric-Agric and Poor-Poor	Marginal effect
Age of household head	-0.0016 (0.0045)	-0.0003
Dependency Ratio	-0.0590 (0.0546)	-0.0013
Distance to major market	0.0054*** (0.0018)	0.0011
Distance to major road	0.0111* (0.0060)	0.0024
Years of education	-0.0765 (0.0818)	-0.0163
Male	-0.1350 (0.3898)	-0.0287
Household size	0.0340 (0.0226)	0.007
ICT Access	-0.5346*** (0.1321)	-0.1138
Natural Log of Asset Value	0.0733 (0.0486)	0.0156
NE	0.1797 (0.2137)	0.0763
NW	-0.0218 (0.1972)	-0.0051
SE	0.3500* (0.2112)	0.0156
SS	0.0586 (0.2203)	0.0133

SW	-0.2075	-0.0524
	(0.3644)	
Married	0.0222	0.0473
	(0.1234)	
Infrastructure index	0.0040	0.0085
	(0.0779)	
Migration	-0.4961***	-0.1056
	0.1327	
Constant	0.1987	
Number of observations	783	
LR Chi2	70.88	
Prob>Chi2	0.0000	
Pseudo R^2	0.1045	
Log Likelihood	-303.669	

Source: Data Analysis (2020)

4.3.2 Determinants of Agricultural Employment and Poverty Dynamics in Rural Nigeria (Households staying in Agriculture and being Transitory Non-Poor)

There is an inverse relationship between dependency ratio and the probability of a household working in agriculture and being transitory non-poor in the period under review. Households with high dependency ratio of a household have a lower likelihood of being transitory non poor by 3.8 percent. This may be due to the high dependency ratio in the households considered for this study. This corroborates the findings of Osebeyo and Aye (2014) as they reported an inverse relationship between market participation and dependency ratio. Households that have access to ICT have 11 percent lower probability of staying in agriculture and being transitory non-poor in the period under review. This may be linked to the higher likelihood of households with access to ICT to work in the non-agricultural sectors due to higher access to information that ICT provides. A direct relationship was found between living in NW region and being in agriculture and transitory non-poor between 2010 and 2013 (see Table 4.9b). This implies that most households in NW Nigeria working in the agricultural sector that were poor in 2010/2011 moved out of poverty in 2012/2013.

Table 4.9b: Determinants of Poverty and Labour Dynamics in Rural Nigeria (2010/11 and 2012/13)

Variables	Agric-Agric and Poor-Non-Poor	Marginal effect
Age of household head	0.0003 (0.0062)	8.0e-04
Dependency Ratio	0.1480* (0.0861)	0.0376
Distance to major market	0.0016 (0.0022)	0.0004
Distance to major road	0.0036 (0.0059)	0.0009
Years of education	-0.0073 (0.097)	-0.0018
Male	0.4187 (0.3915)	0.1063
Household size	0.0197 (0.0280)	0.0050
ICT Access	-0.4458** (0.1787)	-0.1131
Natural Log of Asset Value	-0.0603 (0.0624)	-0.0153
NE	0.0636 (0.0176)	0.0221
NW	0.4759* (0.2493)	0.1105
SE	0.2081 (0.2825)	0.0544

SS	-0.0704 (0.2746)	-0.0204
SW	-0.3386 (0.2789)	-0.1069
Married	-0.0064 (0.1307)	-0.0016
Infrastructure index	0.0271 (0.103)	0.0069
Migration	0.0531 (0.1820)	0.0135
Constant	0.8549	
Number of observations	405	
LR Chi2(15)	29.41	
Prob>Chi2	0.0309	
Pseudo R^2	0.0743	
Log Likelihood	-183.301	

Source : Data Analysis (2020)

4.3.3 Determinants of Agricultural Employment and Poverty Dynamics in Rural Nigeria (Households staying in Agriculture and being Non-Poor)

There is a direct relationship between dependency ratio and the probability of a household working in agriculture and being non poor in the period under review. Households with high dependency ration have a 3.5 percent higher chance of being non poor. This study also found a direct relationship between distance to road and the chances of households staying in agriculture and being non poor between 2010 and 2013. Specifically, a kilometre increase in distance to road will raise the probability of a household being in agriculture and staying non poor in the period under review. This may be due to the infrastructure deficit that characterises rural Nigeria where most households are engaged in agriculture.

According to Table 4.9c, an inverse relationship was found between the number of years of education and the probability of households engaged in agriculture and being non-poor in both periods. A unit increase in the number of years spent schooling will decrease the probability of a household engaged in agriculture and being non-poor between 2010 and 2013. This implies that most educated household heads may not work in the agricultural sector due to the opportunities that are available in non-agricultural sectors that appear to be more attractive. This is consistent with the findings of Iheonu *et al.* (2020). A direct relationship exists between sex of household heads and the likelihood of the households staying in agriculture and being non-poor between 2010 and 2013. Specifically, male-headed households have 11 percent higher probability of staying in agriculture and being non-poor in the period under review. This may be due to gender considerations in the allocation of critical agricultural resources that favours men and the fact that most households considered for this study are headed by men. An inverse relationship exists between ICT access and the probability of a household staying in agriculture and being non-poor between 2010 and 2013. Households that have access to ICT have 16percent lower probability of staying in agriculture and being non-poor. This may be due to the opportunities in non-agricultural sectors that households have access to on ICT platforms. In terms of regional effects, households living in South-East Nigeria have 16percent higher probability of working in the agricultural sector and being non-poor between 2010 and 2013.

Table 4.9c: Determinants of Poverty and Labour Dynamics in Rural Nigeria (2010/11 and 2012/13)

Variables	Agric-Agric and Non-Poor-Non-Poor	Marginal effect
Age of household head	0.0012 (0.0032)	0.0004
Dependency Ratio	0.0992** (0.0436)	0.0348
Distance to major market	0.0016 (0.0013)	0.0006
Distance to major road	0.0111*** (0.0039)	0.0039
Years of education	-0.1617*** (0.0531)	-0.0567
Male	0.3197* (0.1928)	0.1122
Household size	0.0247 (0.0182)	0.0087
ICT Access	-0.4669*** (0.1136)	-0.1639
Natural Log of Asset Value	-0.0265 (0.0343)	-0.0093
North-East	0.2253 (0.1633)	0.0805
NW	0.1832 (0.1537)	0.0658
SE	0.4530*** (0.1618)	0.1559
SS	-0.1641 (0.1419)	-0.0604

SW	0.1317 (0.1932)	0.0476
Married	-0.1317 (0.0636)	-0.0046
Infrastructure index	-0.0512 (0.0636)	-0.0180
Migration	-0.1403 (0.1073)	-0.0492
Constant	0.4171	
Number of observations	952	
LR Chi2(15)	105.19	
Prob>Chi2	0.0000	
Pseudo R^2	0.0820	
Log Likelihood	-588.550	

Source: Data Analysis (2020)

4.3.4 Determinants of Agricultural Employment and Poverty Dynamics in Rural Nigeria (Households staying out of Agriculture and being Non-Poor-2010/2013)

According to Table 4.9d; staying in non-agriculture and being non-poor in 2010/2013 period is determined by dependency ratio, distance to market, years of education, sex, household size, living in NE and NW, Nigeria and migration.

An inverse relationship between dependency ratio and the chances of a household staying in non-agriculture and being non-poor in the periods. Specifically, households with high dependency ratio have a 2.37 lower chance of staying in non-agriculture and being non-poor between 2010/2013. This implies that an additional mouth to feed will reduce per capita income of the household members and make them consider agriculture as a livelihood option. However, a direct relationship exists between distance to market and the probability of a household staying out of agriculture and being non-poor in both periods. Specifically, a unit increase in the distance to market will increase the chances of a household staying in non-agriculture and being non-poor between 2010/2013 by 0.10 percent.

A direct relationship exists between educational attainment and the chances of a household staying in non-agriculture and being non-poor in the period under consideration. This means households with higher years of education are more likely to be involved in the lucrative non-agricultural jobs which translates to higher income stream and improved welfare than their counterparts with lower years of education. Also, sex was found to have an indirect relationship with staying in non-agriculture and being non-poor between 2010/2013 by 8.82 percent. This implies that male headed households have a lower chance of staying out of agriculture and being non-poor in the period under review. Households with at least a member that has migrated have lower probability of staying out of agriculture and being non-poor between 2010 and 2013. Specifically, households with migrant members have 10 percent lower probability of being engaged in the non-agriculture sector and being non-poor between 2010 and 2013.

Household size also has a negative relationship with staying in non-agriculture and being non-poor between 2010/2013. A unit increase in the household size will decrease the probability of a household staying in non-agriculture and being non-poor between 2010/2013 by 1.07 percent. Households with more members are likely to supply labour

to agricultural activities. In terms of regional effects, households in NE and NW, Nigeria have a negative relationship with the probability of a household staying in non-agriculture and being non-poor in both periods. Households living in NE and NW are likely to have a probability of staying in non-agriculture and being non-poor in the period under review by 15.0 and 9.79 percent, respectively.

Table 4.9d: Determinants of Poverty and Labour Dynamics in Rural Nigeria (2010/11-2012/13)

Variables	Non-Agric-Non-Agric and Non-Poor –Non-Poor	Marginal effect
Age of household head	0.0019 (0.0037)	-0.0005
Dependency Ratio	-0.0967* (0.0521)	-0.0237
Distance to major market	-0.0039** (0.0016)	-0.0010
Distance to major road	0.0009 (0.0043)	0.0002
Years of education	0.1691*** (0.0608)	0.0414
Sex	-0.0360*** (0.2117)	-0.0882
Household size	-0.0415* (0.0222)	-0.0107
ICT Access	0.0838 (0.1316)	0.0206
Natural Log of Asset Value	0.0393 (0.0394)	0.0096
NE	-0.7140*** (0.2173)	-0.1503
NW	-0.4023** (0.1883)	-0.0979
SE	-0.2322 (0.1839)	-0.0607
SS	0.1777 (0.1594)	0.0538

SW	-0.1818	-0.0485
	(0.2208)	
Married	-0.0032	-0.0008
	(0.0707)	
Infrastructure index	-0.0671	-0.0164
	(0.0736)	
Migration	-0.4195***	-0.1027
	(0.1331)	
Constant	-0.4041	
Number of observations	952	
LR Chi2(15)	81.96	
Prob>Chi2	0.0000	
Pseudo R^2	0.0886	
Log Likelihood	-421.464	

4.3.5 Determinants of Agricultural Employment and Poverty Dynamics in Rural Nigeria (Households engaged in Agriculture and being Transitorily Poor-2010/2013)

Staying in agriculture and movement from non-poor to poor in 2010/2013 period is determined by distance to market, marital status and living in South-South, Nigeria (see Table 4.9e). According to Table 4.9e, there is a direct relationship between distance to market and the probability of a household staying in agriculture and moving from non-poor to poor in the 2010/2013 period. Specifically, a unit increase in distance to market will increase the likelihood of staying in non-agriculture and being transitory poor between 2010/2013 by 1 percent. This implies that the farther the distance to market, the more discouraged households are, to move out of agriculture. An inverse relationship exists between being married and the probability of staying in agriculture and moving from non-poor to poor between the 2010/2013 period. Married household heads have a lower probability of staying in agriculture and moving from non-poor to poor in the period under consideration. In terms of regional effects, living in SS, Nigeria has an inverse relationship with the probability of a household staying in agriculture and moving from non-poor to poor in the 2010/2013 periods. Households in South-South are less likely to stay in agriculture and move from non-poor to poor in the period under review by 29.5 percent.

Table 4.9e: Determinants of Poverty and Labour Dynamics in Rural Nigeria (2010/11 and 2012/13)

Variables	Agric-Agric and Non-Poor- Poor	Marginal effect
Age of household head	-0.0019 (0.0060)	0.0003
Dependency Ratio	0.0728 (0.0705)	0.0017
Distance to major market	0.0042* (0.0022)	0.0010
Distance to major road	0.0019 (0.0064)	0.0004
Years of education	-0.0897 (0.0962)	-0.0212
Sex	-0.3025 (0.4472)	-0.0714
Household size	-0.0035 (0.0294)	-0.0082
ICT Access	-0.0665 (0.1719)	0.0157
Natural Log of Asset Value	-0.0032 (0.0593)	-0.0008
NE	0.0732 (0.2777)	0.0145
NW	-0.1886 (0.2624)	-0.0427
SE	0.1883 (0.3108)	0.0038
SS	-0.9745** (0.2631)	-0.2946

SW	-0.1674 (0.4043)	-0.0375
Married	-0.3032** (0.14772)	-0.0715
Infrastructure index	-0.0070 (0.1024)	-0.0017
Migration	-0.1217 (0.1966)	-0.0287
Constant	2.2829**	
Number of observations	430	
LR Chi2(15)	54.17	
Prob>Chi2	0.0000	
Pseudo R^2	0.1281	
Log Likelihood	-184.289	

Source: Data Analysis (2020)

4.3.6 Determinants of Agricultural Employment and Poverty Dynamics in Rural Nigeria (Households staying in Agriculture and being Poor-2013/2016)

Movements from; staying in agriculture and being poor in both 2012/2013 and 2015/2016 periods are determined by age, distance to road, access to ICT, living in SE, Nigeria and migration (see Table 4.10a).

An inverse relationship exists between age and the likelihood of a household staying in agriculture and being poor in both periods. Specifically, a unit increase in age will reduce the probability of staying in agriculture and being poor between 2012/2013 and 2015/2016 by 0.20 percent. This is because most household heads in the sample are non-poor and aged which limits their ability to engage in agricultural activities. Conversely, a direct relationship exists between distance to a major road and the probability of a household staying in agriculture and being poor in both periods. A kilometre increase in distance to road will increase the probability of a household staying in agriculture and being poor in both 2012/2013 and 2015/2016 by 0.12percent. An inverse relationship exists between ICT access and the chances of a household staying in agriculture and remaining poor in both periods. Households with ICT access have 2.98 percent lower probability of staying in the agriculture sector and being poor in both 2012/2013 and 2015/2016 periods. This implies that households that have access to ICT will be exposed to opportunities which might help in diversification and welfare improvements. Also, households with at least one member that has migrated have a 6.94 percent lower probability of staying in agriculture and being poor between 2010/2011 and 2012/2013 periods. In terms of regional effects, households in South-East Nigeria have a higher probability of staying in agriculture and being poor in both periods. Specifically, households living in South-East Nigeria have 20percent higher probability of staying in agriculture and being poor in the period under review.

Table 4.10a: Determinants of Poverty and Labour Dynamics in Rural Nigeria (2012/13 and 2015/16)

Variables	Agric-Agric and Poor-Poor	Marginal effect
Age of household head	-0.0085* (0.0044)	-0.0020
Dependency Ratio	-0.1553 (0.0568)	-0.0036
Distance to major market	-0.0008 (0.0016)	-0.0002
Distance to major road	0.0042*** (0.0014)	0.0012
Years of education	0.0120 (0.1896)	0.0258
Sex	0.0378 (0.0997)	0.0998
Household size	-0.0009 (0.0048)	-0.0123
ICT Access	-0.1544*** (0.0298)	-0.0298
Natural Log of Asset Value	0.0560 (0.0467)	0.0131
NE	-0.2910 (0.1896)	-0.0759
NW	-0.1856 (0.1907)	-0.0467
SE	0.0739* (0.0423)	0.2009
SS	0.2005 (0.2191)	0.0431
SW	0.3145 (0.4015)	0.0642

Married	-0.0594 (0.1390)	-0.0138
Infrastructure	-0.0187 (0.0744)	-0.0044
Migration	-0.2975** (0.1285)	-0.0694
Constant	0.1987	
Number of observations	808	
LR Chi2(15)	78.11	
Prob>Chi2	0.0000	
Pseudo R^2	0.1060	
Log Likelihood	-329.404	

Source: Data Analysis (2020)

4.3.7 Determinants of Agricultural Employment and Poverty Dynamics in Rural Nigeria (Households staying in Agriculture and being Transitory Non-Poor)

There is a negative relationship between households with at least a migrant member and the probability of a household working in agriculture and being transitory non-poor in the period under review. Households with at least one migrant member have 14.8percent lower probability of staying in the agricultural sector and being transitory non-poor between 2012/2013 and 2015/2016. This implies that migrating household members encourage their household to consider other sectors apart from agriculture as their livelihood source. This may be linked to the higher likelihood of households with access to ICT having higher access to information are able to adopt innovations. Results shown in Table 4.10b revealed a negative relationship between living in SW, Nigeria and staying in agriculture and being transitorily non-poor between 2013 and 2016. This implies that most households in SW, Nigeria working in the agricultural sector that were poor in 2012/2013 did not move out of poverty. This might be due to the higher poverty incidence that was recorded in the 2015/2016 period.

Table 4.10b: Determinants of Poverty and Labour Dynamics in Rural Nigeria (2012/13 and 2015/16)

Variables	Agric-Agric and Poor-Non-Poor	Marginal effect
Age of household head	0.0049 (0.0058)	0.0014
Dependency Ratio	-0.0787 (0.0597)	-0.0224
Distance to major market	-0.0011 (0.0021)	-0.0003
Distance to major road	0.0098 (0.0062)	0.0028
Years of education	0.0796 (0.0868)	0.0227
Male	0.2404 (0.4359)	0.0685
Household size	-0.0338 (0.0265)	-0.0096
ICT Access	0.3629** (0.1621)	0.1034
Natural Log of Asset Value	0.0728 (0.0596)	0.0208
NE	0.2332 (0.2561)	0.0613
NW	-0.2037 (0.2229)	-0.0618
SE	0.3102 (0.2866)	0.0792
SS	0.1027 (0.2707)	0.0283
SW	-0.4544* (0.2728)	-0.1465

Married	0.1061 (0.1480)	0.0302
Infrastructure	-0.0549 (0.0997)	-0.0156
Migration	-0.5199*** (0.1676)	-0.1481
Constant	0.8549	
Number of observations	405	
LR Chi2(15)	44.01	
Prob>Chi2	0.0009	
Pseudo R^2	0.0848	
Log Likelihood	-237.623	

Source: Data Analysis (2020)

4.3.8 Determinants of Agricultural Employment and Poverty Dynamics in Rural Nigeria (Households staying in Agriculture and being Non-Poor)

There is a direct relationship between distance to road and the probability of a household working in agriculture and being non poor between 2012/2013 and 2015/2016. A marginal increase in the distance to road will increase the probability of a household in agriculture to be non-poor by 0.43 percent between 2012/2013 and 2015/2016. This might be due to the infrastructure deficit that characterises rural Nigeria where most households are engaged in agriculture. According to Table 4.10c, an inverse relationship exists between education attainment and the probability of households engaged in agriculture and being non-poor in both periods. A unit increase in the number of years spent schooling will decrease the probability of a household engaged in agriculture and being non-poor between 2013 and 2016. In fact, households whose heads have a higher number of years spent schooling have 5.9percent lower probability of working in agriculture and being non-poor in the period under review. This implies that most educated household heads may not work in the agricultural sector due to the opportunities that are available in non-agricultural sectors that appear to be more attractive. A direct relationship exists between sex of household heads and the probability of the households staying in agriculture and being non-poor between 2013 and 2016. Specifically, male-headed households have 1.4 percent higher probability of staying in agriculture and being non-poor in the period under review. This may be due to gender considerations in the allocation of critical agricultural resources that favours men and the fact that most households considered for this study are headed by men. The results presented in Table 4.10c, revealed an inverse relationship between access to ICT and the chances of a household staying in agriculture and being non-poor in the period under review. Households that have access to ICT have 14percent lower probability of staying in agriculture and being non-poor between 2013 and 2016. This may be due to the opportunities in non-agricultural sectors that households have access to on ICT platforms. In terms of regional effects, households living in South-South Nigeria have 12percent lower probability of working in the agricultural sector and being non-poor between 2013 and 2016.

Table 4.10c: Determinants of Poverty and Labour Dynamics in Rural Nigeria (2012/13 and 2015/16)

Variables	Agric-Agric and Non-Poor- Non-Poor	Marginal effect
Age of household head	0.0035 (0.0032)	0.0012
Dependency Ratio	0.0093 (0.0436)	0.0033
Distance to major market	0.0002 (0.0013)	0.0001
Distance to major road	0.0121*** (0.0037)	0.0043
Years of education	-0.1686*** (0.0519)	-0.0593
Sex	0.3390* (0.1923)	0.1192
Household size	0.0395** (0.0184)	0.0139
ICT Access	-0.3944*** (0.1106)	-0.1387
Natural Log of Asset Value	-0.0392 (0.0360)	-0.0138
NE	0.0191 (0.1662)	0.0067
NW	0.0662 (0.1576)	0.0231
SE	0.1060 (0.1628)	0.0368
SS	-0.3316** (0.1449)	-0.1215

SW	-0.0660 (0.1932)	-0.0236
Married	0.0456 (0.0642)	0.0161
Infrastructure index	-0.0019 (0.0634)	-0.0007
Migration	-0.0990 (0.1093)	-0.0348
Constant	0.4171	
Number of observations	917	
LR Chi2	93.21	
Prob>Chi2	0.0000	
Pseudo R^2	0.0731	
Log Likelihood	-591.001	

Source: Data Analysis (2020).

4.3.9 Determinants of Agricultural Employment and Poverty Dynamics in Rural Nigeria (Households staying out of Agriculture and being Non-Poor-2013/2016)

The results presented in Table 4.10d revealed that; staying in non-agriculture and being non-poor in 2013/2016 period is determined by age, migration, years of education, marital status, distance to market, years of education, sex, household size, living in North-East and South-South, Nigeria, migration and asset ownership.

An inverse relationship exists between age and the chances of a household staying in non-agriculture and being non-poor in the 2013/2016 periods. Specifically, a unit rise in age will decrease the likelihood of the household staying in non-agriculture and being non-poor between 2013/2016 by 1.7 percent. This implies that an additional mouth to feed will reduce per capita income of the household members and make them consider agriculture as a livelihood option. A direct relationship between educational attainment and the likelihood of a household staying in non-agriculture and being non-poor in the period under consideration. A year increase in the years spent schooling will increase the likelihood of a household engaged in the non-agricultural sector and being non-poor between 2013 and 2016 by 5.64 percent. This implies that educated household heads may likely be involved in the lucrative non-agricultural jobs which translates to higher income stream and improved welfare relative to their counterparts with lower years of education. Also, sex was found to have a negative relationship with staying in non-agriculture and being non-poor between 2013/2016 periods by 17.6 percent. Households with at least a member that has migrated have lower probability of staying out of agriculture and being non-poor between 2013 and 2016. Specifically, households with migrant members have 12.5 percent lower probability of being engaged in the non-agriculture sector and being non-poor between 2013 and 2016. There is a direct relationship between the value of assets and the chances of working in the non-agricultural sector and being non-poor in the period under review. Households with high asset stock have a 2percent higher probability of engagement in the non-agricultural sector and being non-poor between 2013 and 2016. This implies that households who have assets are able to put them to productive use and enhance their welfare.

Household size also has a negative relationship with staying in non-agriculture and being non-poor between 2013/2016 periods. Large households have lower chances of

staying in non-agriculture and being non-poor between 2013/2016 of 1.31 percent. Households with more members are likely to supply labour to agricultural activities. Households that are headed by married heads have a 3.46 lower probability of staying out of agriculture and being non-poor in both 2012/2013 and 2015/2016 periods. This may be due to the fact that most households considered for this study were headed by married heads. This is consistent with the findings of Gani and Adeoti (2011). In terms of regional effects, households in NE and NW, Nigeria have an inverse relationship with the chances of a household staying in non-agriculture and being non-poor in both periods. Households living in NE and NW are likely to have a probability of staying in non-agriculture and being non-poor in the period under review by 6.90 and 8.81 percent, respectively.

Table 4.10d: Determinants of Poverty and Labour Dynamics in Rural Nigeria (2012/13 and 2015/16)

Variables	Non-Agric-Non-Agric and Non-Poor –Non-Poor	Marginal effect
Age of household head	-0.0077** (0.0039)	-0.0017
Dependency Ratio	0.0192 (0.0520)	0.0041
Distance to major market	-0.0014 (0.0016)	-0.0003
Distance to major road	0.0032 (0.0039)	0.0006
Years of education	0.2609*** (0.0636)	0.0564
Sex	-0.8129*** (0.2267)	-0.1758
Household size	-0.0604** (0.0237)	-0.0131
ICT Access	0.0120 (0.1360)	0.0026
Natural Log of Asset Value	0.0926** (0.0444)	0.0200
NE	-0.3417* (0.2054)	-0.0690
NW	-0.2882 (0.1980)	-0.0597
SE	-0.2550 (0.1970)	-0.0536
SS	0.3295** (0.1661)	0.0881

SW	-0.1575 (0.2353)	-0.0347
Married	-0.1598** (0.0766)	-0.0346
Infrastructure index	0.0283 (0.0789)	0.0061
Migration	-0.5774*** (0.1557)	-0.1249
Constant	-0.5202	
Number of observations	952	
LR Chi2	81.96	
Prob>Chi2	0.0000	
Pseudo R^2	0.0886	
Log Likelihood	-421.464	

Source: Data Analysis (2020)

4.3.10 Determinants of Agricultural Employment and Poverty Dynamics in Rural Nigeria (Households engaged in Agriculture and being Transitory Poor-2013/2016)

A direct relationship was found between access to ICT and the likelihood of a household staying in agriculture and being transitory poor (see Table 4.10e). Specifically, households with access to ICT have 10.48 percent higher probability of staying in the agriculture sector and being transitory poor in 2012/2013 and 2015/2016 period. In terms of regional effects, living in South-South Nigeria has a negative relationship with the likelihood of a household staying in agriculture and moving from non-poor to poor in the 2013/2016 periods. Households in South-South are less likely to stay in agriculture and move from non-poor to poor in the period under review by 18.33 percent.

Table 4.10e: Determinants of Poverty and Labour Dynamics in Rural Nigeria (2012/13 and 2015/16)

Variables	Agric-Agric and Non-Poor-Poor	Marginal effect
Age of household head	-0.0028 (0.0055)	-0.0008
Dependency Ratio	-0.0499 (0.0661)	-0.0137
Distance to major market	0.0005 (0.0020)	0.0014
Distance to major road	0.0084 (0.0060)	0.0023
Years of education	0.0107 (0.0920)	0.0029
Sex	0.6563 (0.5332)	0.1795
Household size	0.0156 (0.0276)	0.0043
ICT Access	-0.3832*** (0.1698)	-0.1048
Natural Log of Asset Value	0.0458 (0.0590)	-0.0125
NE	0.0159 (0.2429)	0.0040
NW	-0.0525 (0.2473)	-0.0135
SE	-0.0092 (0.2923)	-0.0023
SS	-0.5873** (0.2601)	-0.1833

SW	-0.4383 (0.3469)	-0.1309
Married	0.2413 (0.1701)	0.0661
Infrastructure index	0.0668 (0.0967)	0.0183
Migration	-0.2111 (0.1718)	-0.0577
Constant	-0.4395	
Number of observations	430	
LR Chi2	31.58	
Prob>Chi2	0.0170	
Pseudo R^2	0.0699	
Log Likelihood	-210.020	

Source: Data Analysis (2020).

4.3.11 Determinants of Agricultural Employment and Poverty Dynamics in Rural Nigeria (Households moving out of Agriculture and being Poor-2013/2016)

Movements from agriculture and being poor in both 2012/2013 and 2015/2016 periods are determined by distance to road, asset value, living in NE and SS, Nigeria and migration (see Table 4.10f).

A negative relationship exists between distance to road and the chances of a household moving out of agriculture and being poor in both periods. Specifically, households living far from a major road will have less likelihood of moving out of agriculture and being poor between 2012/2013 and 2015/2016 by 0.36 percent. This is because long distance to the road may discourage households from pursuing other economic activities as the options would be limited. Households with at least a member that has migrated have 14 percent lower probability of moving out of agriculture and being poor between 2012/2013 and 2015/2016 periods. In terms of regional effects, households in NE Nigeria have a higher likelihood to transition out of agriculture and being poor in both periods. Specifically, households living in North-East, Nigeria have a 9.8 percent higher probability of moving out of agriculture and being poor in the period under review. This might be due to the insecurity situation which makes participation in economic activities difficult. However, a negative relationship exists between living in South South, Nigeria and moving out of agriculture and being poor. In fact, living in South South Nigeria raises the probability of a household moving out of agriculture and being poor by 6.5 percent.

Table 4.10f: Determinants of Poverty and Labour Dynamics in Rural Nigeria (2012/13 and 2015/16)

Variables	Agric-Non-Agric and Poor-Poor	Marginal effect
Age of household head	0.0066 (0.0049)	0.0013
Dependency Ratio	0.0582 (0.0610)	0.0108
Distance to major market	0.0027 (0.0018)	0.0005
Distance to major road	-0.0195*** (0.0067)	-0.0036
Years of education	0.0111 (0.0149)	0.0021
Sex	-0.1216 (0.4279)	-0.0225
Household size	0.0246 (0.0218)	0.0045
ICT Access	0.1041 (0.1375)	0.0192
Natural Log of Asset Value	-0.1083*** (0.0552)	-0.0200
NE	0.4481** (0.1994)	0.0982
NW	0.3242 (0.2023)	0.0672
SE	-0.3964* (0.2417)	0.0565
SS	-0.4797* (0.2584)	-0.0652
SW	-0.3336 (0.4728)	-0.0493

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Married	-0.0594	-0.0138
	(0.1390)	
Infrastructure	-0.0006	-0.0002
	(0.0819)	
Migration	0.7572**	0.1400
	(0.1344)	
Constant	0.5035	
Number of observations	808	
LR Chi2(15)	79.15	
Prob>Chi2	0.0000	
Pseudo R^2	0.1304	
Log Likelihood	-263.393	

Source: Data Analysis (2020)

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1   Summary

The study examined the effect of agricultural employment on poverty among farming households in rural Nigeria. Panel data on 2,570 households in rural Nigeria covering 2010/2011, 2012/2013 and 2015/2016 which were collected by the NBS was utilised for this study. The data were analysed using descriptive statistical tools, FGT Methodology, Markov Processes and Panel Probit regression model. The results revealed that most household heads were men. The mean ages of the household heads were 48.64 ±14.39, 51.01±14.45 and 53.76 ±14.19 years in the reference periods. The mean household size was about seven persons while most of the household heads were married in the reference period. Some of the household heads had primary school education in the reference periods. The mean distance to market in 2010/2011, 2012/2013 and 2015/2016 periods respectively were 71.41 ±38.91, 71.43 ±38.96, 71.41 ±38.90 km which are extremely high. The mean distance to the nearest major road decreased from 17.59km in 2010/2011 to 7.47km in 2012/2013 and 7.45km in 2015/2016.

In terms of labour dynamics, few of the households moved out of agriculture between 2010/2011 and 2012/2013 while 39.5 percent of the households moved out of agriculture between 2012/2013 and 2015/2016. In terms of geopolitical zones, NW, SS and SE accounted for 69 percent of the 284 households that moved out of agriculture between 2010/2011 and 2012/2013 seasons. However, the situation changed between 2012/2013 and 2015/2016 season when SS, NE and SE Zones accounted for majority of the households that moved out of agriculture. In terms of year-on-year analysis, there was 58.2 percent rise in the number of households that exited agriculture in North East, Nigeria.

Disaggregating households by labour mobility of household heads, it was found that households whose head did not transit from agriculture to non-agricultural sectors in 2012/2013 had higher poverty incidence than their counterparts who did. Specifically, households whose heads did not move out of agriculture in 2012/2013 had poverty incidence of 52 percent, depth of 0.23 and severity of 0.13 while those who did had lower poverty incidence (55 percent), depth (0.25) and severity (0.14). However, households that moved out of agriculture in 2015/2016 had a higher poverty incidence of 68 percent compared to 57 percent among households that did not move out of the agricultural sector. The poverty situation was worse in both groups in 2015/2016. The results of the Markov processes revealed that there was an 88 percent chance that the employment sector of a household previously in the agricultural sector would stay the same in the current period. If a rural household left the agriculture sector in 2012/2013, there is a 47 percent chance that it has not gone back to any form of agricultural practises in 2015/2016. If a household is previously in the agricultural sector, there is a 12 percent chance that it has changed its sector of primary employment in the current period. Finally, there is a 53 percent chance for a household who was in the non-agricultural sector in 2012/2013 to remain employed in that sector in 2015/2016.

The poverty incidence showed that 53 percent and 55 percent of the rural households were poor in 2012/2013 and 2015/2016 respectively as revealed by FGT. The poverty depth stood at 0.23 in both 2012/2013 and 2015/2016. This implies that a poor household requires an average of N7,418.08 in 2012/2013 and N9,083.54 in 2015/2016 to move out of poverty. The regression results revealed sectoral movement of labour, age, access to ICT, distance to market, asset value, years of education, living in NW, SE and SW as correlates of poverty among rural households in Nigeria.

5.2   Conclusion

The study investigated the effect of agricultural employment on poverty among rural households in Nigeria. The result which emanated from the analysis of panel datasets collected in 2010/11, 2012/13 and 2015/16 by the NBS indicated that households were transitioning in and out of agriculture. More households (39 percent) moved out of agriculture in 2015/2016 to non-agricultural sectors compared to 11 percent in 2012/2013. The decision of households on the sector of employment and movement from one sector to another over time affects welfare outcomes especially among farming

households in rural Nigeria. Specifically, households that were not engaged in agriculture between 2010/11 and 2015/16 were less poor relative to other households. Again, the study found a direct relationship between employment in agriculture and poverty dynamics. However, there was no evidence that households that moved out of agriculture were significantly better than households that did not.

The study provided evidence that households that moved out of agriculture in 2012/2013 had lower poverty incidence relative to those who did not while the opposite was the case in 2015/2016 period. However, the poverty situation of all the households were worse in 2015/2016 regardless of the labour decision compared to other previous years. The regression results revealed that despite the fact that most rural households are involved in agriculture, access to credit, distance to road, distance to market, number of years of education, household size, having at least one migrated member, asset value and living in NE, NW and SS regions significantly influenced agricultural employment decisions of rural households in Nigeria. In particular, age, distance to road, access to ICT, living in South-East, Nigeria and migration influenced the poverty among households who stay permanently in agriculture.

5.3   Recommendations

Based on the findings of the study, the following recommendations are suggested:

1. Government, development partners and financial institutions should improve rural households' access to credit through the provision of tailored financial services for agricultural activities. This would enable them to be able to buy more agricultural inputs and other productivity enhancing assets which can lead to poverty reduction. This is because credit access was found to positively influence the decision of rural households to be engaged in the agricultural sector.

2. Family planning awareness should be intensified among rural households in Nigeria by the National Orientation Agency, Community Based Organisations, traditional institutions and other relevant organizations. The large household size reduces per capita income thus entrenching the farming households within the

ambits of poverty. This is particularly important as households with large size significantly influence the poverty status of rural households.

3. Government and multilateral organisations should enhance capacity building of rural households through education as it helps households to adopt innovations, improve agricultural income and enhance their agricultural employment decisions. This is because education significantly determines the agricultural employment decision and poverty of households considered for this study.

4. Government should consider policy reprioritisation in favour of rural areas for infrastructural development to minimise rural-urban migration and encourage more people to move into agriculture. Distance to major roads and markets influence the agricultural employment decisions of rural households.

5.4 Contributions to Knowledge

1. Markov processes, contingency tables and panel probit regression models were used as against the conventional methodology of static poverty measures. This made it possible to trace the poverty status of households in rural Nigeria over an extended period of time by analysing the changes occurring over time. Specifically, households that were engaged in agriculture had a 5 percent higher chance of being poor relative to those that were not. The Markov chain analysis showed that some rural households were likely to transit in and out of poverty and agriculture in the long term. The contingency table revealed that households that moved out of agriculture and those that were engaged in the sector accounted for the highest proportion of those that were chronically poor.

2. The study established the nexus between agricultural employment and poverty among households in rural Nigeria thus unravelling that being in agriculture or not permanently remaining in agriculture may or may not necessarily bring about poverty reduction. The study found that households that transited out of agriculture between 2012/2013 and 2015/2016 periods had higher poverty incidence relative to those that were engaged in agriculture. The situation which was different in the previous period (2010/11 to 2012/2013) indicates that moving out of agriculture will not solve the poverty problem.

3. Determinants of poverty and agricultural employment were also understood through the study as this is very important for appropriate welfare targeting especially among rural households in Nigeria. The agricultural employment decisions of rural households in Nigeria were influenced by access to credit, distance to road, distance to market, number of years of education, household size, having at least one migrated member, asset value and living in NE, NW and SS regions. In particular, age, distance to road, access to ICT, living in SE, Nigeria and migration influenced the poverty among households who stay permanently in agriculture.

4. The study provided some useful policy prescriptions such as increased investment in rural infrastructure by relevant stakeholders as this will not only enhance agricultural employment and also halt rural-urban migration and enhance local economic development.

5.5   Suggestions for further studies

- The study focused on rural Nigeria, there is a need to extend this study to urban Nigeria based on the possible variation in agricultural employment and poverty dynamics across the country
- Infrastructural endowments could account for employment opportunities and decisions among rural households. There is a need for further research into the possible effect of infrastructure on agricultural employment decisions
- Agricultural employment decisions could account for differences in productivity levels among farming households. There is a need for further studies on the impact of agricultural employment decisions on productivity in rural Nigeria.

REFERENCES

Adekoya O. 2014. Analysis of Farm Households Poverty Status in Ogun State, Nigeria. *Asian Economic and Financial Review*, 4.3:325-340.

Adeloye K.A., D.O. Torimiro and T.O Adebo (2022). Factors Influencing a Succession Plan Among Aged Crop Farmers in Rural Communities of Ogun State, Nigeria. *The Journal of Agricultural Sciences*, 17.3:458-470.

Adeoti A.I. 2014. Trend and Determinants of Multidimensional Poverty in Rural Nigeria. *Journal of Sustainable Development and Agricultural Economics*, 6.5:220-231.

Adeoti A.I , Ayevbuomwan O.S. and O.A. Popoola 2016. Analysis of Women Empowerment in Rural Nigeria: A Multidimensional Approach. *Global Journal of Human Social Science: Sociology and Culture, 16*.6:36-40.

Adepoju A.A. 2018. Investigating Endogeneity Effect of Agricultural Commercialisation on Household Poverty Status in Oyo State Nigeria: A Cdsimeq approach. *International Journal of Agriculture, Innovations and Research*, 7.1:93-101.

Adepoju A.O. 2018. Determinants of Multidimensional Poverty Transitions among Rural Households in Nigeria. A paper presented at the 30th International Conference of Agricultural Economists held between July 28-August 2, 2018, 1-32.

Adepoju A.O. and O. Osunsanmi 2018. Gender Differentials in Labour Market Participation of Rural Households in Non-Farm Activities in Oyo State, Nigeria. *International Journal of Sustainable Agricultural Research*, 5.4:85-95.

Adepoju A.O., O.K. Omolade and O.A. Obayelu 2019. Does Credit Constraint in Agriculture influence choice of Nonfarm activities? Evidence from rural Nigeria. *International Journal of Development and Sustainability*, 8.5:329-345.

Adepoju A.O. 2012. Poverty Transitions in Rural South West, Nigeria. *Global Journal of Science Frontier Research Agriculture and Biology*, 12.2:19-29.

Adeyinka A., S. Salau and D. Vollrath 2013. Structural Change in the Economy of Nigeria. Nigeria Strategy Support Program II Working Paper No. 24 of International Food Policy Research Institute (IFPRI), 1-29.

Agbaje M.A, F.Y. Okunmadewa, B.T. Omonona and O.A. Oni 2013. An Assessment of Vulnerability to Poverty in Rural Nigeria. ARPN Journal of Agricultural and Biological Science, 8.1:60-75.

Agbaje M.A., F.Y. Okunmadewa, O.A. Oni and B.T. Omonona 2014. Spatial Dimension of Vulnerability to Poverty in Rural Nigeria. Quarterly *Journal of International Agriculture*, 53.1:25-53.

Aggarwal A. 2016. Growth, Structural Transformation and Poverty Reduction: Issues and Challenges with Special Reference to India. A paper prepared for presentation at the Inter-Agency Expert Group Meeting on "Employment and Decent Work for Poverty Eradication, in Support of the Second UN Decade for the Eradication of Poverty (2008-2017)" Bangkok: 4-6 May 2016, 1-12.

Agwu N.M., E.E. Nwankwo and C.I. Anyanwu 2012. Determinants of Agricultural Labour Participation among Youths in Abia State, Nigeria. *International Journal of Food and Agricultural Economics*, 2.1:151-164.

Ajibefun I.A. 2015. Nigeria's Agricultural Policy, Productivity and Poverty: The Critical Nexus. Inaugural Lecture 69 delivered at the Federal University of Technology, Akure on the 2nd June, 2015, 1-94.

Armida S. Alisjahbana and Chris Manning 2006. Labour market dimensions of poverty in Indonesia, Bulletin of Indonesian Economic Studies, 42.2: 235-261.

Akinkunmi, M. A. 2017. Analysis of access to credit and agriculture performance in Sub-Saharan Africa. *International Journal of Agricultural Economics*, *2*.6:160-164.

Akpan S.B. 2010. Encouraging Youth's Involvement in Agricultural Production and Processing. Policy Note 29 of International Food Policy Research Institute, 1-4.

Akpan S.B., Okon U.E., Udo U. J. and I.S. Akpakaden 2020. Analysis of Income Inequality and Poverty Incidence among Oil Palm Farmers in Akwa Ibom State, Nigeria. Ife Journal of Agriculture, 32.2:112-117.

Allen G. 2011. Early Intervention. The Next Steps. An Independent Report to Her Majesty's Government, London: HM Government, 1-135.

Amao J.O. and T.T. Awoyemi 2009. Determinants of Adoption of Improved Rice Varieties and its Impacts on Farmers Poverty Level in Iwo Agricultural Development Program of Osun State, Nigeria. *Journal of Rural Sociology,* 9.1:1-8.

Amao J.O., K. Ayantoye and G.E. Fanifosi 2017. An Analysis of Multidimensional Poverty and its Determinants in Rural Nigeria, 9.11:303-311.

Apata T.G., O.M. Apata, O.A. Igbalajobi and S.M.O. Awoniyi 2010. Determinants of Rural Poverty in Nigeria: Evidence from Smallholder Farmers in South Western Nigeria. *Journal of Science and Technology Education Research*, 1.4:85-91.

Alisjahbana, A. S., and Manning, C. 2006. Labour market dimensions of poverty in Indonesia. *Bull. Indonesian Econ. Stud., 42.*2: 235–261.

Arogundade K.K., Adebisi S.O. and V.O. Ogunro 2011. Poverty Alleviation Programmes in Nigeria: A Call for Policy Harmonisation. *European Journal of Globalisation and Development Research*, 1.1:1-14.

Arrow K. 1971. The theory of discrimination working paper industrial relations section 30A, Princeton University, pp1-7.

Asiedu, E., Kalonda-Kanyama, I., Ndikumana, L., and Nti-Addae, A. 2013. Access to credit by firms in Sub-Saharan Africa: How relevant is gender? *American Economic Review*, *103*.3, 293-97.

Anyanwu J.C. 2013. Marital Status, Household size and Poverty in Nigeria: Evidence from the 2009/2010 Survey Data. Working Paper Series No 180, African Development Bank, Tunis, Tunisia, 1-28.

Awotide B.A., T.T. Awoyemi, K.K. Salman and A. Diagne 2013. Impact of Seed Voucher System on Income Inequality and Rice Income per Hectare among Rural Households in Nigeria. A Randomised Control Trial (RCT) Approach. *Quarterly Journal of International Agriculture*, 52.2:95-117.

Awotide B.A., T. T. Awoyemi and I.B. Oluwatayo 2015. Gender Analysis of Income Inequality and Poverty among Rural Households in Nigeria: Evidence from Akinyele Local Government Area, Oyo State. *Journal of Biology, Agriculture and Health Care, 5.*3, 20-27.

Awotodunbo A.A. 2008. Labour Use Pattern among Farmers in Ife Central Local Government Area of Osun State. *International Journal of Agricultural Economics and Rural Development*, 1.2:1-9.

Awoyemi T.T. 2011. Rural Non-Farm Incomes and Poverty Reduction in Nigeria. A research report submitted to the African Economic Research Consortium (AERC), 1-40.

Awoyemi T.T. and A. Abdelkrim 2009. Explaining Polarization and its Dimensions in Nigeria: A DER Decomposition Approach. A Paper Prepared for the 14th Annual Conference on Econometric Modelling for Africa, Sheraton Hotel, Abuja, Nigeria, 8-10 July, 2009, 1-22.

Babatunde R.O. and M. Qaim 2010. Off-farm Labour Market Participation in Rural Nigeria: Driving Forces and Household Access. A paper contribution to the 5th IZA/World Bank Conference: Employment and Development held between 03-04 May, 2010, Capetown, South Africa, 1-29.

Baiyegunhi L.J.S. and G.C.G. Fraser 2010. Determinants of Household Poverty Dynamics in Rural Regions of the Eastern Cape Province, South Africa. A Paper presented at the Joint 3rd African Association of Agricultural Economics (AAAE) and 48th Agricultural Economist Association of South Africa (AEASA) Conference, Capetown, South Africa, September 19-23,2010, 1-33.

Balogun, O. S., Olorukooba, M. M., Balogun, O. L., Alabi, O. F., Tor Lawrence, G., Nwahia, O. C., and Bala, U. J. 2021. Welfare and Poverty Status Among Maize Farming Households in Lere Local Government Area of Kaduna State, Nigeria. *RJOAS*, 6.114:86-96.

Barett B.B., T. Gary and L. McBride 2016. Well-Being Dynamics and Poverty Traps. *Annual Review of Resource Economics*, 8:1-32.

Bassey N.E., Edet M.E. and D.I. Agom 2016. Impact of Institutional Labour Productivity in Nigeria: A co-integration approach. *Agricultural Research Journal*, 6.2:49-55.

Baulch, B. and J. McCulloch, N. 1998. Being Poor and Becoming Poor. Poverty Status and Poverty Transitions in Rural Pakistan. IDS Working Paper No 79. Institute for Development Studies. Sussex, 1-2.

Bhatta S.D. and S.K. Sharma 2006. The Determinants and Consequences of Chronic and Transient Poverty in Nepal. CPRCC Working Paper 66, 1-41.

Brady D. and R. Burroway 2012. Targeting Universalism and Single Mother Poverty: A Multilevel Analysis. Across 18 Affluent Democracies. *Demography*, 49: 719-746.

Brannen J. and C. Wilson 1987. "Introduction", in J. Brannen and C. Wilson (eds.) Give and Take in Families. Studies in Resource Distribution. London: Allen and Unwin, 1-17.

Bruce A.B. 2019. Farm entry and persistence: Three pathways into alternative agriculture in Southern Ohio. *Journal of Rural Studies*, 69:30-40.

Bryceson D.F. 2019. Gender and generational patters of African deagrarianization: Evolving labour and land allocation in smallholder peasant household farming, 1980-2015. *World Development*, 113:60-72.

Campbell D and Ahmed I. 2012. The Labour Market in Developing Countries, 1-19.

Chapoto A., D. Banda, S. Hagglade and P. Hamukwala 2011. Factors Affecting Poverty Dynamics in Rural Zambia. Working Paper Number 55, Food Security Research Project Lusaka, Zambia, 1-44.

Christiaensen L., L. Demery and J. Kuhl 2011. The (Evolving) Role of Agriculture in Poverty Reduction-An Empirical Perspective. *Journal of Development Economics*, 96:239-254.

Chen, W. 2020. Agricultural Development Mode: Relevant Theoretical Research at Home and Abroad. In *Challenges and Opportunities for Chinese Agriculture*. Palgrave Macmillan, Singapore, 17-67.

Dartanto, T., Moeis, F. R., and Otsubo, S. 2020. Intragenerational economic mobility in Indonesia: A transition from poverty to middle class during 1993–2014. *Bull. Indonesian Econ. Stud., 56*.2:193–224.

Devi Y.L., J. Singh, K. Vatta and S. Kumar 2013. Dynamics of Agricultural Labour Demand and its Determinants in Punjab Agriculture. *Agricultural Economics Research Review*, 26.2:267-273.

Dillon A. and E.J. Qinones 2010. Gender Differentiated Asset Dynamic in Northern Nigeria. ESA Working Paper No 11-06 of the Agricultural Development Economics Division, The Food and Agricultural Organization of the United Nations, 1-33.

Dimelu, M. U., Umoren, A. M., and Chah, J. M. 2020. Determinants of Youth Farmers' Participation in Agricultural Activities in Akwa Ibom State, Nigeria. *Journal of Agricultural Science*, *12*.12:201-211.

Ecrolani M.G. and Z. Wei 2010. An Empirical Analysis of the Lewis-Ranis-Fei theory of Dualistic Economic Development for China, 1-40.

Emran M.S. and Z. Hou 2013. Access to Markets and Rural Poverty: Evidence from Household Consumption in China. *The Review of Economics and Statistics*, 95.2: 682-697.

Edig X.V. and S. Schwarze 2011. Short-term Poverty Dynamics of Rural Households: Evidence from Central Sulawesi, Indonesia. *Journal of Agriculture and Rural Development in the Tropics and Sub Tropics*, 112.2:141-153.

Etim N.A. and J.E. Udoh 2015. Are Larger Households Really Poor? *International of Development and Sustainability*, 4.8:886-896.

Espindola A.L., J.J. Silveira and T.J.P. Penna 2006. A Harris-Todaro Agent Based Model to Rural-Urban Migration. *Brazilian* Journal *of Physics, 36.3A:603-609.*

Fasina O.O. 2013. Farmers Perception of the Effect of Aging on Their Agricultural Activities in Ondo State, Nigeria. *The Belogradchik Journal for Local History, Cultural Heritage and Folk Studies*, 4.3:371-387.

Field F. 2010. The Foundation Years: Preventing poor children becoming poor adults: The report of the independent review on poverty and life chances, London Cabinet Office, 1-98.

Fields G. 1990. Labour Market Modelling and Urban Informal Sector Theory and Evidence. In Turnham, Salome and Schwartz (eds.). The informal Sector Revisited, Development Centre Seminars, OECD, Paris, 49-69.

Fields G. 2007. The Harris-Todaro Model. Retrieved (14 January, 2019) from digital common.ilr.cornel.edu/workingpapers21, 1-2.

Folawewo O. 2013. *The Informal Labour Market in Developing Countries.* Ibadan, Nigeria: Hope Publications, 1-39.

Foster, J. E., Greer, J. and E. Thorbecke 1984. A class of decomposable poverty measures. *Econometrica,* 52: 761-776.

Ghebru H. and S. Holden 2016. Land Access, Land Rental Markets and Rural Poverty Dynamics in Ethiopia: Panel Data Evidence using Survival Models. A paper prepared for presentation at the 2016 World Bank Conference on Land and Poverty, World Bank, Washington DC, March 14-18, 2016, 1-32.

Gordon D.M. 1972. Theories of Poverty and Underemployment, Lexington: Lexington Books, 147-162.

Guan B., and X. Li 2020. Analysis of Rural Labor Transfer Based on Network Data Mining and Financial Time Series Statistics. In: Huang C., Chan YW., Yen N. (eds) Data Processing Techniques and Applications for Cyber-Physical Systems (DPTA 2019). Advances in Intelligent Systems and Computing, vol 1088. Springer, Singapore. https://doi.org/10.1007/978-981-15-1468-5_214

Ibidapo I., Faleye O.M., Akintade T.F., Oso O.P. and E.O. Owasoyo 2017. Determinants of Youth Participation in Dry Season Vegetables Cultivation in Urban Areas of Ondo State, Nigeria. *Journal of Agricultural Science and Practice*, 2:109-114.

Idowu A.O., T.T. Awoyemi, B.T. Omonona and A.O. Falusi 2011. Non-farm Income Diversification and Poverty among Rural Farming Households in South West, Nigeria. *European Journal of Social Sciences*, 21.1:163:177.

IFAD 2012. Enabling Poor Rural to Overcome Poverty in Nigeria, 1-8.

(IFPRI) International Food Policy Research Institute 2008. Agricultural Public Spending in Nigeria. IFPRI Discussion Paper 00789, 1-120.

Iheonu C.O. and N.E. Urama 2019. Addressing Poverty Challenges in Nigeria. African Heritage Institution Policy Brief No 21, 1-5.

Iheonu C.O., Nwodo, O.S., Anaduaka, U.S. and U. Ekpo 2020. Inequality and Female Labour Force Participation in West Africa. AGDI Working Paper No. WP/20/076, 1-22.

Investopedia 2017: Labour Theory of Value. Retrieved from www.investopedia.com/terms/l/labour-theory-of-value.asp on 24 December, 2017.

Islam R. 2019. Labour Market Outcomes and Inclusive Development: Experiences of South Asian Countries. In: Mamgain R. (eds) Growth, Disparities and Inclusive Development in India. India Studies in Business and Economics. Springer, Singapore, 76-102.

Israr, M., and Khan, H. 2010. Availabilty and access to capitals of rural household in Northern Pakistan. *Sarhad Journal of Agric,* 26.3:443-450.

Jaiyeola, A. O. and A. Bayat 2020. Assessment of trends in income poverty in Nigeria from 2010–2013: An Analysis Based on the Nigeria General Household Survey. *Journal of Poverty*, 24.3:185-202.

Kelly P. 2001. The political economy of local labour control in the Philippines. *Economic Geography*, 77.1:1-22.

Kolawole and O.A. Omobitan 2014. Raging Poverty and Agricultural Output in Nigeria: An Empirical Investigation. *Journal of Economics and Sustainable Development*, 5.6:1-10.

Konstantopoulos T. 2009. Introductory Lecture Notes on Markov Chains and Random Walk, 1-128.

Korzenevica M. 2020. Moving, staying and returning under uncertainty: Labour migration and identity formation among Young Nepali Men. *Geoforum*, 112:148-157.

Lakner C., D.G. Mahler, M. Negre and E.B. Prydz 2019. How Much Does Inequality Matter for Global Poverty? Policy Research Working Paper 8862 of the World Bank, 1-24.

Leavy, J., and Hossain, N. 2014. Who wants to farm? Youth aspirations, opportunities and rising food prices. IDS Working Papers, 1-44.

Leavy J. and H. White 2000. Rural Labour Markets and Poverty in Sub-Saharan Africa, 1-36.

Lewis O. 1965. Urbanization without Breakdown: A Case Study in Health, D.B and Adams R.N (eds), Contemporary Cultures and Societies of Latin America, Newyork: Random House, 1-6.

Le Gallo, J. 2004. Space-Time Analysis of GDP Disparities among European Regions: A Markov Chains Approach. *International Regional Science Review,* 27.2:138–163.

Lil. C. 2020. Rural Labour Mobility in the Process of Industrialization in Early Industrializers: the UK, France, the US and Germany. A Doctoral Thesis submitted to Graduate Program in Economic Development of the Institute of Economics of the State University of Campinas, 1-356.

Lindbeck A and D.J. Snower 1984. involuntary unemployment as an Insider-Outsider Dilemma, Seminar Paper No. 309, Institute for International Economics Studies, University of Stockholm, Sweden, 1-53.

Mafimisebi T.E. 2021. Agribusiness Income and Conquest of Poverty: What Nexus? Inaugural Lecture Series 137 delivered at the Federal University of Technology, Akure on the 19th of October, 2021, 1-116.

Mafimisebi T., A. Oguntade and O. Mafimisebi 2010. Re-Engineering Agriculture for Enhanced Performance through Financing. *Journal of Economics, Finance and Administrative Science*, 15.29:1-15.

McArthur J.W. and G.C. McCord 2015. Fertilizing Growth: Agricultural Inputs and their Effects on Economic Development, 1-56.

Mbanasor J.A., I.N. Nwachukwu, N.M. Agwu, M.E. Njoku and J. Onwumere 2012. Analysis of Income Inequality and Poverty Dynamics among Rural Farm Households in Abia State, Nigeria. *International Journal of Food and Agricultural Economics*, 1.2: 99-104.

McCulloch N., Weisbrod J and P. Timmer. 2007. Pathways Out of Poverty During an Economic Crisis: An Empirical Assessment of Rural Indonesia. *Policy Research Working Paper;* No. 4173, 1-50.

Michler, J. D., and Josephson, A. L. 2017. To specialize or diversify: Agricultural diversity and poverty dynamics in Ethiopia. *World Development*, *89*:214-226.

Monteforte F. 2019. Structural change, the push-pull hypothesis and the Spanish labour market. *Economic Modelling*, 79.6:1-22.

Moeis F.R., T. Dartanto, J.P. Moeis and M. Ikhsan 2020. A longitudinal study of agriculture households in Indonesia: The effect of land and labor mobility on welfare and poverty dynamics. *World Development Perspectives*, 20: 1-17.

Mohammed J. and J. Haji 2014. Dynamics of Poverty among Smallholder Farmers in Ethiopia. *Journal of Economics and Sustainable Development*, 5.24:1-15.

Morolake, B. 2015. Analysis of Women Empowerment in Cassava Production and Processing as a means of household poverty status in Kwara State, Nigeria. 7-15.

(NBS) National Bureau of Statistics 2012. Nigeria Poverty Profile 2010, 1-31.

NBS 2016. World Bank and Federal Ministry of Agriculture and Rural Development. LSMS-Integrated Surveys on Agriculture General Household Survey Panel 2015/2016 report, Abuja: NBS; 2016, 1-12.

Nunes, C. P. 2008. Poverty measurement: The development of different approaches and its techniques. *ECINEQ WP*, (2008-93), 1-7.

Obayelu O.A. and T.T. Awoyemi 2010. Spatial Dimension of Poverty in Rural Nigeria. *Journal of Development and Agricultural Economics*, 2.6: 231-244.

Odozi J.C. and A.G Adeyonu 2021. Household Level Determinants of Employment and Earnings in Rural Nigeria. *Congent Economics and Finance*, 9.1:1-16.

Odozi C.J., I.O. Patience, J.Awaebe and M. Agbugu 2018. Employment in the Nigerian Agricultural Labour Market: Barriers and Forecast, 1-11.

Okunlola D.A., O.A. Bolarinwa, O.A. Alawode and O.M. Adetutu 2020. Determinants of Non-participation in Labour Force among Women of Reproductive Age. *African Population Studies*, 34.2:5171-5186.

Oladeji S.I. 2014. Educated and Qualified, but Jobless: A challenge for Sustainable Development in Nigeria. Inaugural Lecture 262 delivered at Obafemi Awolowo University, Ife on the 11th of March, 2014, 1-126.

Olarinde L.O., Abass A.B., T. Abdoulaye, A.A Adepoju, E.G. Fanifosi, M.O. Adio, O.A. Adeniyi and A. Wasiu 2020. Estimating Multidimensional Poverty among Cassava Producers in Nigeria: Patterns and Socioeconomic Determinants. *Sustainability 2020*, 12.13:1-16.

Olugbire, O. O., Obafunsho, O. E., Olarewaju, T. O., Kolade, R. I., Odediran, F. A., and Orumwense, L. A. 2020. The composition and determinants of rural non-farm income diversification in Nigeria. *Journal of Agribusiness and Rural Development*, 57.3:279-288.

Oluwatayo, I.B 2018. Vulnerability and Adaptive Strategies of Staple Food Crop Farmers to Seasonal Fluctuations in Production and Marketing in Southwest Nigeria, *Climate and Development,*11.8: 659-666.

Oluwatayo I.B. 2014. Gender Dimensions of Poverty and Coping Options among Smallholder Farmers in Eastern Nigeria. *Mediterranean Journal of Social Science*, 5.27:49-61.

Oluwatayo I.B. 2010. Microcredit and household Poverty status in Rural Nigeria: Experience from Selected Agencies in Ekiti State. *International Journal of Business and Emerging Markets*, 2.1:77-90.

Omoruyi O., C. O'Donoghue and O.G. Igbinonwanhia 2011. Labour Market and Demographic Patterns in Nigeria. *Knowledge Review*, 3.3:1-12.

Omotesho K.F., Ogunlade I., M.A. Lawal and F. B. Kehinde (2016). Determinants of Level of Participation of Farmers in Group Activities in Kwara State, Nigeria. *Journal of Agricultural Faculty of Gaziomapasa University (JAFAG)*, 33.3: 21-27.

Oni O.A. and S.A. Yusuf 2008. Determinants of Expected Poverty among Rural Households in Nigeria. African Economic Consortium (AERC) Research Paper 183, 1-34.

Onyishi, C. N. 2011. Empowerment and women's participation in development processes: a study of Nsukka community in Nsukka local government area of Enugu state, 16-17.

Osabohien, R., Matthew, O., Olurinola, I., and Aderounmu, B. 2020a. Agricultural transformation, youth participation and food security in Nigeria. *AIMS Agriculture and Food*, 5.4: 911-919.

Osabohien, R., Mordi, A., and Ogundipe, A. 2020b. Access to credit and agricultural sector performance in Nigeria. *African Journal of Science, Technology, Innovation and Development*, 19:1-9.

Osebeyo S.O. and G.C. Aye 2014. Transaction Costs and Marketing Decision: A Case Study of Smallholder Tomato Farmers in Makurdi, Nigeria. *Urban Planning and Transport Research*, 2.1:333-340.

Oseni G., K. McGee and A. Dabalen 2014. Can Agricultural Households Farm their way out of Poverty? World Bank Policy Research Paper 7093, 1-23.

Osugiri I.I., A.I. Ugochukwu, S.U.O. Onyaguocha, Onyemauwa C.S. and G.N. Ben-Chendo 2012. Population Dynamics, Labour and Smallholder Farmers' Productivity in South East, Nigeria. *Journal of Economics and Sustainable Development*, 3.12:1-7.

Oyekale A.S and T.O. Oyekale 2006. An Assessment of Income Shocks and Expected Poverty Dynamics in Rural Nigeria, 1-25.

Oyekale, A.S and Okunmadewa, F.Y. 2008. Fuzzy Set Approach to Multidimensional Poverty Analysis in Abia State, Nigeria. *Journal of Applied Sciences,* 3.7:490-495.

Oyekale A.S., A.O. Adepoju and A.M. Balogun 2012. Determinants of Poverty among Riverine Rural Households in Ogun State, Nigeria. *Stud Tribes Tribals, 10*.2:99-105.

Patridge M.D. and D.S. Rickman 2008. Distance from Urban Agglomeration Economies and Rural Poverty. Journal of Regional Science, 48.2:285-310.

Raffo C, Dyson A., Gunter H., Hall D., Jones L. and A. Kalambouka 2007. Education and Policy. A Critical Review of Theory, Policy and Practice. York : Joseph Rowntree, 1-91.

Ranis G. 2004. Labour Surplus Economies. Working Paper 900 of Economic Growth Center, Yale University, 1-22.

Ravallion M. 2013. Poverty Lines in Theory and Practice. LSMS Working Paper No. 133, Washington, World Bank Publications, 1-3

Ravallion M. 1998. Poverty Lines in Theory and Practice. LSMS Working Paper No. 133, Washington, World Bank Publications, 1-5.

Sachs J. 2005. The End of Poverty: How we can make it happen in our lifetime. Penguin Publishers, 1-50.

Salami M.F., R.O. Babatunde, O.E. Ayinde and E.I. Adeoti 2017. Determinants of Poverty among Local Rice Processors in Kwara State, Nigeria. *Trakia Journal of Sciences*, 4:386-391.

Salman K.K. 2017. Naira's free fall: Any hope for Nigerian Farmers? A Faculty Lecture delivered at the Faculty of Agriculture and Forestry, University of Ibadan on the 15th of March, 2017, 1-55.

Sen A.K. 1976. Poverty: An Ordinal Approach to Measurement. *Econometrica,* 46.437-446.

Shepherd A. 2007. Understanding and Explaining Chronic Poverty: An Evolving Framework for Phase III of CPRC's Research. Chronic Poverty Research Centre Working Paper 80, 1-41.

Stock L., J. Corlyon, C.C. Serrano and M. Gieve 2014. Personal Relationships and Poverty an Evidence and Policy Review. A Report Prepared for the Joseph Towntree Foundation by the Tawistock Institute of Human Relations, 1-116.

Pu, X. , Cheng, L. and Liu, H. 2019. Summary of the Research on the Transfer of Rural Surplus Labor Force. *Open Access Library Journal*, 6: 1-6.

(PWC) PricewaterhouseCoopers 2018. Structural Transformation and Jobless Growth in Nigeria, 1-12.

Ruttan, V. W. 2017. Two Sector Models and Development Policy: Comment. In *Subsistence Agriculture and Economic Development*. Routledge, 353-360.

Shepherd A. 2007. Understanding and Explaining Chronic Poverty: An Evolving Framework for Phase III of CPRC's Research. Chronic Poverty Research Centre Working Paper 80, 1-41.

Shido-Ikwu B.S. 2017. Economic Recession in Nigeria: A Case for Government Intervention. *SSRG International Journal of Economics and Management Studies*, 4.6:50-53.

Sportel T 2013. Agency within a socially regulated labour market: A study of 'unorganised' agricultural labour in Kerala. *Geoforum*, 47:42-52.

Sunam, R., Barney, K., and McCarthy, J. F. 2021. Transnational labour migration and livelihoods in rural Asia: Tracing patterns of agrarian and forest change. *Geoforum*, *118*:1-13.

Thirtle C., Irz X., L. Lin, V.McKenzie Hill and S. Wiggins (2001). Relationship Between Changes in Agricultural Productivity and the Incidence of Poverty in Developing Countries. DFID Report No 7946, 1-33.

Thoursie-Skogman E, Arizo, K and E Lindahl 2012. Labour Supply Responses to Paid Parental Leave. Working Paper, (IFAU) Institute for Evaluation of Labour Market and Education Policy, 1-7.

Tirkaso W.T. 2011. Information Communication Technologies and Poverty Reduction in Rural Ethiopia. A Master Thesis submitted to the Department of Natural Resources and Agricultural Sciences, Faculty of Natural Resources and Agricultural Science, Swedish University of Agricultural Science, 1-58.

Touray M. 2016. Definitions and Measures of Poverty. July 2016 Briefing Notes of Development Initiatives, 1-8.

Trading Economics 2022. Nigeria-Income Poverty retrieved from Nigeria - Income Poverty - 2022 Data 2023 Forecast 1990-2020 Historical (tradingeconomics.com) on the 29th of January 2022.

Tsehay A.S. and S. Bauer 2012. Poverty and Vulnerability Dynamics: Empirical Evidence from Smallholders in Northern Highlands of Ethiopia. *Quarterly Journal of International Agriculture*, 51.4:301-332.

Waziri, M., Ibrahim, A. Z. B., and Md, Z.B. 2020. Investigating the empirical relationship between government intervention programs and poverty alleviation: a case of Nigeria. *Journal of Economic and Administrative Sciences,* 36.4: 323-338.

World Bank. 2018a. Poverty and Shared Prosperity 2018: Piecing Together the Poverty Puzzle. Washington, DC, 1-201.

World Bank 2018b. Inflation, consumer prices annual data retrieved from https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=NG on Jan 1, 2019.

World Bank 2019. Poverty overview retrieved from https://www.worldbank.org/en/topic/poverty/overview on Oct 18, 2019.

World Bank 2022.Labor force, retrieved from Labor force, total - Nigeria | Data (worldbank.org) on January 29, 2022.

World Population Review 2021. Nigerian Population 2021 retrieved from Nigeria Population 2021 (Demographics, Maps, Graphs) (worldpopulationreview.com) on the January 29, 2022.

Zampino, S. 2010. A probit analysis of poverty dynamics in Nicaragua. *Agora International Journal of Economical Sciences*, *4*.1:1-7

Zhang Y., K. Zhao and J. Li 2018. Setting up the uniform social security system under huge rural labour migration in China: A quantitative analysis using a SICGE Model, 1-32.

Zulher, Z., and Ratnasih, C. 2021. Financial development and poverty reduction in developing countries. *Accounting*, *7.3*:667-674.

Yisa, E. S., Adewumi, A., Adebayo, C. O., and Opuama, I. I. 2020. Effects of Off-farm Income on Poverty and Food Security Status of Farmers in Paikoro Area of Niger State, Nigeria. *Asian Journal of Economics, Business and Accounting*, *15*.4:56-65.

APPENDICES

Appendix1: Determinants of poverty and labour dynamics in rural Nigeria (2013-2016)

Variables	Agric-Non-Agric and Non-Poor-Non-Poor	Marginal effect	Agric-Non-Agric and Poor-Non-Poor	Marginal effect
Age	0.0016 (0.0045)	0.0003	-0.0042 (0.0068)	-0.0008
Dependency Ratio	0.0443 (0.0598)	0.0067	0.1219* (0.0686)	0.0235
Distance to major market	0.0043** (0.0018)	0.0007	-0.0004 (0.0024)	-0.0001
Distance to major road	-0.0180*** (0.0066)	-0.0027	-0.0117 (0.0079)	-0.0023
Years of education	-0.0145 (0.0127	-0.0022	-0.0044 (0.0176)	-0.0009
Sex	-0.4481* (0.2605)	-0.0680	-0.5520 (0.4669)	0.1064
Household size	-0.0100 (0.0270)	-0.0015	0.0908*** (0.0312)	0.0175
ICT Access	-0.1724 (0.1469)	-0.0261	-0.1830 (0.1954)	-0.0363
Natural Log of Asset Value	-0.0004 (0.0535)	-0.0001	0.0189*** (0.0736)	0.0353
North-East	0.6257*** (0.2162)	0.0174	0.2070 (0.2954)	0.0453
North-West	0.1494 (0.2303)	0.0706	0.4734* (0.2681)	0.0923
South- East	0.4793** (0.2353)	0.0247	0.2130 (0.3490)	0.0364

South-South	0.2042 (0.2187)	0.0168	-0.1482 (0.3686)	-0.0207
South-West	0.1489 (0.2839)	0.0180	0.3759 (0.3506)	0.0699
Married	-0.0464 (0.2300)	0.0362	-0.6034 (0.4450)	0.0302
Infrastructure	0.0171 (0.0883)	-0.0007	0.1320 (0.1210)	0.0252
Migration	0.2390 (0.1465)	-0.0348	0.7586*** (0.1941)	0.1450
Constant	0.4171		1.219	
Number of observations	917		405	
LR Chi2(15)	35.46		51.52	
Prob>Chi2	0.0054		0.0000	
Pseudo R^2	0.0062		0.1544	
Log Likelihood			-237.623	

Source: Data Analysis (2020)

Appendix II:

Determinants of Labour Dynamics in Rural Nigeria (Households exiting agriculture)

The results presented in Appendix II revealed that the movements from agriculture to non-agricultural sector (exit) is determined by the dependency ratio, distance to road, distance to market, Sex, Asset value, Household size, living in NE and NW Nigeria, being married and migration of at least one household member. The log likelihood of the Probit model showed the goodness of fit of the model.

The results revealed a positive relationship between dependency ratio and the probability of a household exiting agriculture between 2012/13-2015/16 and 2010/11-2015/16. Specifically, a unit increase in the dependency ratio will increase the probability of a household exiting agriculture by 1.4 percent and 1.3percent respectively in both periods. This may be due to the responsibilities that the household head must bear. A negative and statistically significant relationship exists between distance to road and the probability of a household exiting agriculture. Therefore, a kilometre increase in the distance to road will reduce the probability of a household exiting agriculture by 0.28 percent in 2010/11-2012/13, 0.29 percent in 2012/13-2015/16 and 0.31percent in 2010/11-2015/16 periods. Similarly, the study found a negative relationship between distance to market and the probability of households moving out of agriculture by 2.8 percent, 2.9 percent and 3.1 percent in 2010/11-2012/13, 2012/13-2015/16 and 2010/11 and 2015/16 periods respectively. This can be linked to the access to market, industries in the urban areas and the support services including finance that is difficult to access in communities that are far from the road hence limiting their choices around employment.

There is a negative relationship between sex of household head and the probability of moving out of agriculture between 2012/13-2015/16 and 2010/11-2015/16 periods. Therefore, households headed by men have 4.5 percent and 6 percent lower probabilities of exiting agriculture in the period under review. This may be due to the gender considerations in the allocation of agricultural inputs including land, improved seeds and strains of livestock and finance among others. This study found a positive and statistically significant relationship between household size and the probability of a household moving out of agriculture between 2010/13 and 2015/16. Specifically, a unit increase in the household size will increase the probability of a household moving out

of agriculture by 0.4percent. This may be due to the reduction in per capita income that comes with increase in household size which serves as an incentive for household heads to consider remunerative jobs or economic activities.

A negative relationship exists between asset value and the likelihood of moving out of the agricultural sector in 2010/11-2012/13 and 2010/11-2015/16 periods. This implies that a percentage increase in the asset value of rural households will reduce their probability of exiting agriculture by 1.8 percent and 1.5 percent in 2010/11-2012/13 and 2010/11-2015/16 respectively. This can be explained by the type of assets that households within the rural communities possess. Therefore, households that possess land may not consider leaving agriculture. In terms of regional effects, households living in North-East and North-West regions, Nigeria have a higher probability of moving out of agriculture between 2010/11-2012/13 and 2010/11-2015/16. Specifically, households living in North-East and North-West, Nigeria respectively have 4.4 percent and 2.6 percent higher probability of moving out of agriculture in 2010/11-2012/13. Similarly, households living in the North-East had a 7.5 percent increase in the probability of a household moving out of agriculture in both 2012/13-2015/16 and 2010/11-2015/16 periods This may be due to the security challenges within these regions that makes it increasingly difficult to engage in agriculture. In addition, North-East and North-West regions accounted for 53 percent of the households that exited agriculture between 2012/2013 and 2015/2016.

Households with at least one migrated member have a higher probability of leaving agriculture. In fact, a household having at least one migrated member will result in about 10.1 percent, 8.9percent and 9.8 percent increase in the probability of leaving agriculture in 2010/11-2012/13, 2012/13-2015/16 and 2010/11-2015/16 periods respectively. This implies that as household members continue to migrate to urban communities with seemingly better welfare improvement opportunities, the remaining household members may consider other income generating activities and deprioritize agriculture.

Appendix III: Determinants of Labour Dynamics-Agric. to Non-Agric. (2010/11-2015/16)

Variables	2010/11-2012/13		2012/13-2015/16		2010/11-2015/16	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Age	0.0026 (0.0027)	0.0004	0.0028 (0.0027)	0.0004	0.0025 (0.0026)	0.0005
Dependency Ratio	-0.0097 (0.0366)	-0.0017	0.0751** (0.0307)	0.0135	0.0747** (0.0307)	0.0134
Distance to market	0.0003 (0.0010)	0.0001	-0.0020** (0.0010)	-0.0003	-0.0023*** (0.0010)	-0.0004
Distance to road	-0.0162*** (0.0036)	-0.0028	-0.0183*** (0.0040)	-0.0029	-0.0175*** (0.0036)	-0.0031
Years of education	0.0050 (0.0075)	0.0009	0.0019 (0.0078)	0.0013	-0.0060 (0.0074)	-0.0011
Sex	0.0014 (0.1848)	0.0002	-0.2860** (0.1805)	-0.0449	-0.3470** (0.1772)	-0.0622
Household size	-0.0017 (0.0124)	-0.0003	0.0150 (0.0132)	0.0024	0.0203* (0.0123)	0.0036
ICT Access	0.00609 (0.0835)	0.0105	-0.1312 (0.0876)	-0.0206	-0.0242 (0.0782)	-0.0043
Natural Log of Asset Value	-0.0055*** (0.0280)	-0.0182	-0.0451 (0.0288)	-0.0071	-0.0848*** (0.0283)	-0.0152
North-East	0.2529*** (0.1172)	0.0437	0.4174*** (0.1150)	0.0748	0.4177*** (0.1149)	0.0749
North-West	0.1491**	0.0257	0.0121	0.0019	0.2600**	0.0466

	(0.1176)		(0.1217)		(0.1166)	
South- East	-0.1083	-0.0187	-0.0229	-0.0350	0.0570	0.0102
	(0.1329)		(0.1373)		(0.1326)	
South-South	-0.0027	-0.0005	-0.0223	-0.0036	-0.0521	-0.0093
	(0.1267)		(0.1297)		(0.1300)	
South-West	-0.2578	-0.0445	0.1210	0.0190	0.2002	0.0359
	(0.1696)		(0.1700)		(0.1638)	
Married	0.1665	0.0287	-0.1190	-0.0187	-0.2160	-0.0387
	(0.1596)		(0.1596)		(0.1578)	
Migration	0.5822***	0.1005	0.5455***	0.0856	0.5482***	0.0983
	(0.0793)		(0.0812)		(0.0759)	
Infrastructure	0.0126	0.0022	0.0209	0.0033	0.0320	0.0057
	(0.1477)		(0.0491)		(0.0468)	
Number of observations	2570		2570		2570	
LR Chi2	106.98		97.88		143.14	
Prob>Chi2	0.0000		0.0000		0.0000	
Pseudo R^2	0.0618		0.0613		0.0778	
Log Likelihood	-812.319		-749.121		-848.020	

Source: Data Analysis (2020)

Appendix IV: Deflated Per Capita Expenditure and Poverty

In testing for consistency and robustness, the mean per capita expenditures for 2012/13 and 2015/16 were deflated using the 2010/11 mean per capita expenditure to control for inflation. In addition, this was used to validate the results derived from using different poverty lines of N32, 252.52 in 2012/13, N39, 493.65 in 2015/16.

Appendix V: Deflated Poverty Line

	2012/13			2015/16		
	Incidence	Gap	Severity	Incidence	Gap	Severity
Deflated Poverty line	0.5347	0.2284	0.1281	0.5642	0.2357	0.1303
Non-deflated poverty line	0.5347	0.2284	0.1281	0.5642	0.2357	0.1303