IMPACT OF CREDIT ON ASSET ACCUMULATION AMONG POULTRY FARMERS IN SOUTHWESTERN NIGERIA

By

AyobamiOmowumi GBAYEGE

Matric No: 90030

B.Sc., M.Sc. Agricultural Economics (Ibadan)

A thesis submitted in partial fulfilment of the award of PhD in the Department of Agricultural Economics, Faculty of Agriculture University of Ibadan, Nigeria

June, 2021

CERTIFICATION

I certify that this work was carried out by AyobamiOmowumi GBAYEGE under my supervision in the Department of Agricultural Economics, of the Faculty of Agriculture, University of Ibadan, Nigeria.

…………………………………………………

Professor Sulaiman Adesina Yusuf

BSc, MSc, PhD Agricultural Economics (Ibadan)

Department of Agricultural Economics

Faculty of Agriculture

University of Ibadan, Nigeria

DEDICATION

To God Almighty, the giver of all good things.

ACKNOWLEDGEMENTS

Ajifowobaje and OluchiEzeagwufor their gift of friendship, and encouragements. You were simply amazing, thank you. I acknowledge and appreciate the care and spiritual guidance of Pst.L.O. Morafa, thank you so much. I recognise the tremendous support received from my colleagues: Mmes.AdenikeAbimbola, Christiana Adegebo, Messrs. B.A. Tijani, J.O. Diekola, D.O. Ehi, S.A. Williams, S.B. Oduola, Mses. OluwatoyinAbiri, OluwaseunMorolari and BolantaAworinde (late). Special thanks to Mrs.OluwatomiSomefun for all the care and love, God bless you. My sincere appreciation to Mrs. Margaret Onifade, Mrs.Omonike Adesina, Mr. K.O. Olojede and Mr. C.A. Ogbolu of the General Office of the Agricultural Economics Department, for their patience and understanding.

I am eternally grateful to my maternal grandparents – Chief. S.A. Oyinlola and Mrs OlufunmilayoOyinlola (*Baba and Maami Agba*). Thank you so much for the training, love, and care from my childhood. I am so sure that you are watching from heaven right now, super proud of your little girl for this accomplishment. Thank you for all those life lessons, which continued to guide me, I will choose you again and again as my grandparents. I do express my deep appreciation to my uncle, Pst.A.O. Oyinlola; aunt,Pst. Mrs. Modupe Oyinlola, my brother- OlaniyiAlo, cousins -Adebukola Adeoye, TomilolaAlasoadura, Olamide Oyinlola, RhodaChinewubeze and Joshua Oyinlola,for their support and love in the course of my academic endeavour. My deepest appreciation goes to my parents – Mr. S.O. Gbayege and Pst. Mrs.OyinadeAlo,for preparing me for the future. Thank you for believing in me. Mum, you are simply the best.Thank you for watching my back even when I had to spend hours away from home, your sacrifices and prayers are not in vain, I am grateful Mum.

Finally, I thank my husband- AkinwaleDesmondand son- Royalty Akinwale-Desmond, for their understanding, love, support and care. I love you so deeply.

ABSTRACT

Maintaining consistent production level during adverse circumstances (such as disease and fire outbreaks) has been a challenge to most poultry farmers in Southwestern Nigeria, leading to reduced output and income. Credit use helps to transform opportunities and increase capacity for accumulating assets which could be converted during such adverse periods to meet household and production needs. Studies on the relationship between credit and asset accumulation are limited. Therefore, the impact of credit on poultry farmers' asset accumulation in Southwestern Nigeria was investigated.

A three-stage sampling procedure was used. Oyo and Ogun States were selected based on prevalence of poultry production. Six and four Local Government Areas were proportionately selected from Oyo and Ogun, respectively. A total of 550 poultry farmers comprising 330 from Oyo and 220 from Ogun were randomly selected. Data were collected with the aid of questionnaire on farmers' socio-economic characteristics (age, sex, marital status, household size, educational level, years of experience), production enterprise (Egg Only- EO, Meat Only- MO, egg and meat), labour type (Family Only- FO, Hired Only- HO, family and hired) and association membership. Information on farming mode: full or part-time; Flock Size (FS); Account Relationship with Financial Institutions (ARFI) and Credit Users (CU) were also collected. Asset accumulation was disaggregated into household and productive assets. Data were analysed using descriptive analysis, double hurdle regression, Foster, Greer and Thorbecke poverty index and propensity score matching at $\alpha_{0.05}$.

Age, household size and farming experience were 43.7±10.4 years, 5±1.94 persons and 8.2±6.7 years, respectively. Ninety percent were male, 90.9% married, 53.6% were engaged full-time, 51.7% had tertiary education, while 57.0% were members of the association. Credit Users (CU) were 25.7% and the average amount of credit received was ₦831,000.0 per annum. The EO producers were more among CU (73.2%) than the Non-Credit Users (NCU) with 71.6%, HO labour was higher among CU (25.4%) than NCU (18.5%) and ARFI was also higher for CU (90.6%) than NCU (59.0%). Asset accumulation of CU (₦6,490,744.0) was significantly higher than NCU (₦2,468,466.6). Household asset accumulation was ₦4,051,528.0 for CU and ₦1,920,570.0 for NCU. Productive asset accumulation was ₦2,439,216.0 for CU and ₦547,896.6 for NCU. Credit was increased by vocational training (β=0.5318), being married (β=0.6037) and ARFI (β=1.3296) but reduced by FS (β= -5.11E-06). Amount received as credit was determined by per capita asset value (β=6.39E-09), ARFI (β= -0.0542), EO (β= -0.0892), MO (β= -0.0711), HO labour (β= -0.0621) and part-time farming (β=0.0471). Household asset poverty (HAP) line was ₦339,960.75 per annum, Asset Poor (AP) farmers were higher for NCU (81.0%) than CU (55.0%), poverty severity (PS) was higher for NCU (63.0%) than CU (35.0%). Productive asset poverty line was ₦137,476.22 per annum, AP farmers were higher for NCU (69.0%) than CU (55.0%), PS was lesser for NCU (45.5%) than CU (46.1%). The impact of credit on asset value of CU was ₦3,982,443.0 and ₦1,751,858.0 for household and productive assets, respectively.

Credit improved the asset accumulation of poultry farmers in Southwestern Nigeria, especially for household assets.

Keywords: Asset accumulation, Poultry farmers, Asset poverty, Credit users, Propensity score matching.

Word Count: 495

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

LIST OF ACRONYMS

GDP	Gross Domestic Product
NBS	National Bureau of Statistics
FAO	Food and Agriculture Organization
MT	Metric tons
USDA	United States Department of Agriculture
DFID	Department for International Development
CBN	Central Bank of Nigeria
ATT/ ATET	Average Treatment Effect on the Treated
ATE	Average Treatment Effect
ATU	Average Treatment Effect on the Untreated

CHAPTER ONE

INTRODUCTION

1.1   Background to the Study

The economy of many developed countries especially in sub-Saharan Africa (SSA) depends on agriculture (crops, fisheries, forestry, and livestock production). In addition to being the source of food, the agricultural sector is the major employment source and sustenance for majority of the population, and each of the agricultural sector components also contributes at varying degrees to the country's overall Gross Domestic Product (GDP).

Despite the contribution and importance of each of the agricultural sector's components, attention and focus have been on the crop production sub-sector. This could be due to the erroneous conclusion and belief that the crop sub-sector is the only important aspect of agriculture and the most relevant in human dietary composition. For instance, in Nigeria, studies (Olagunju and Babatunde, 2011; Otunaiya*et al*., 2014; Robinson, 2017) have shown that the livestock sub-sector also contributes immensely to the economic growth and development of the nation. For instance, the livestock sub-sector contributes about one-third of Nigeria's agricultural GDP, serving as a major source of revenue to the government. It is also a major component of nutritional food-supplying the protein needs for the teeming population thereby accounting for the delivery of a "high-quality animal protein with about 36.5% of total protein intake of both young and old" (Nanono, 2019). In addition, it is a major poverty reduction tool, considering the number of people who are employed and earn their living consistently through the livestock production chain.

It is imperative to take a deeper look at the significance of the livestock sub-sector in the nutrition security ofthe Nigerian populace. This subsector is endowed with an estimated 19.5 million cattle, 72.5 million goats, 41.3 million sheep, 7.1 million pigs,

278,840 camels and 165 million chickens; 11.6 million ducks, 2.1 million turkeys, and 974,499 donkeys making the nation the topmost livestock producer in Africa according to the survey conducted by the National Bureau of Statistics (NBS) in 2012. A rapid growth of livestock production in Nigeria has also been reported, in excess of 750,000 MT at 2018 (FAO, 2019). The poultry subsector, out of all the subsectors of Nigeria's agriculture, is found to be the most commercialised according to Nwandu*et al.*(2016), constituting about 56 percent of the total livestock production, and accounting for about 10 percent of agricultural domestic products of the Nigerian economy while the total contribution to the Nigeria's GDP was 21.9 percent (FAO, 2019).

Poultry is made up of numerous diversities of domesticated birds such as chickens, ducks, turkeys, guineas, pigeons and geese. It is raised commercially for both meat and eggs constituting about 30 percent of the overall output of livestock in Nigeria (Oni *et al*., 2005); and a vital means of alleviating poverty particularly, owing to its capacity for enhancing the income generating ability required for minimum standard of living (Schiller, 2001; Afolabi *et al.,* 2014). Poultry producers are often engaged in either small, medium or in some cases large-sized farms depending on the size of their flock, a function of capacity in terms of the available resources and other factors which could be economic or environmental (Ojo, 2003; Arowolo*et al*., 2012). The poultry industry in Nigeria has been rapidly developing, from 185,300 metric tons (MT) in 2001 to 268,000 MT in 2011 with egg production alone valued at $527.49 million and totalled 636,000 MT; ranked 19th in world hen egg production in the same year. The estimation of commercial poultry production in Nigeria was around $800 million in 2012 according to United States Development in Agriculture (2013). Egg and chicken meat production were in excess of 700,000 MT in 2017 despite 0.32% decline in 2016 (World Bank Annual Report, 2019).

Despite the remarkable growth of the poultry industry in Nigeria, it has not translated to improved expansion in terms of income and the ability to withstand shocks for the farmers (Unaeze and Akinola, 2016). Poultry production in Nigeria is characterized by various kinds of shocks, such as covariate and idiosyncratic risks. Covariate risks include constraining influences such as tough economic times, climate change, disease outbreak, flood; while idiosyncratic risks comprisebird mortality, costly production inputs, theft of birds, high cost of vaccination services among many others (Adepoju*et*

al., 2013; Pradhan and Mukherjee, 2017). On the basis that the poultry sector is predominantly driven by small scale farmers with low capital base, low output, low income and low investments (Alabi and Isah, 2002; Abula*etal*., 2013; Olagunju, 2010; Otunaiya*et al*., 2012); majority of the poultry producers lack capacity to continue in business when faced with shocks, thus resulting in the collapse of the enterprise leading to serious threat on their livelihoods (Oboth, 2003; Ibrahim and Bauer, 2013; Esiobu*et al*., 2014). Moreover, at their current low level of production, income generation, savings and asset accumulation that could have been deployed for future capital investments or used to enlarge production levels often proved difficult; as no fund is available to be invested under such conditions (Karlan and Morduch, 2008).

Reduction in farmer's ability to create necessary opportunities (embark on the use of improved technology, purchase better stock or infrastructure and uptake management practices) to increase income level often lead to the inability to sustain income level, stabilize consumption, and decisively mitigate threats when faced with shocks (Scoones, 1998; Department for International Development, 2000; Ellis, 2000; Awotide*et al*., 2015). Loss or declining income primarily makes it difficult to build up assets. Generally, the more assets people have, the less vulnerable they are and when people lose their assets due to hazards, stress or shocks, their level of security get eroded (Moser, 2006). Assets are found to be critical factors in the recovery and reconstruction process, as they determine response to adverse situations.

Asset accumulation acts as a buffer, offering a leeway to wealth and serving as a way of ensuring that farmers recover from shocks in times of disaster and bounce back to production (Awotide*et al.,* 2015). Asset endowment in some situations, could serve as the only financial source in times of economic downturns or production emergencies (Fisher and Weber, 2004). A majority of these farmers are poor and do not have enough left to save or accumulate assets because a larger share of their income is spent on consumption (Akanni, 2007; Heise*et al*., 2015). The inability of farmers to save or accumulate assets could threaten or worsen farmers' well being whenever there is insufficient stock to sustain a particular level of consumption during shocks, leading to a growing concern of economic insecurity (Awotide*et al*., 2015).

Several studies have been undertaken in relation to credit access by smallholder farmers to break out of economic insecurity. Studies have also shown the positive impacts of credit access on asset accumulation, poverty and productivity increase (Akanni, 2007; Olagunju, 2010; Awotide*et al*., 2015). Consequently, Akpan *et al*.(2013) concluded that increased poultry production cannot be attained without exogenous stimulus such as credit. This is because credit can present the poultry farmers with the required resources to unlock growth potentials in the production and income level (Oboth, 2003; Akanji, 2001). The inability to build reserves by farmers stemmedfrom low saving capacity which is an extension of low earnings (Beverly*et al.,* 2001). Increasing capacity therefore requires farmers to earn income from production activities through increased investments and in turn use the returns to build reserves through savings and accumulation of assets (Grzelak, 2019). Credit as well as reliance on savings and de-accumulation of assets have been found to be a coping mechanism during shocks (Adepoju*et al*., 2013; Isitor*et al*., 2014). Credit as a resource could assist in stimulating farmers to earn more and build capital assets, by creating opportunities that could assist to improve production level and by extension the income, such that with improved income; savings and asset accumulation are made possible (Beverly *et al*., 2001; Adeyonu*et al*., 2017; Grzelak, 2019).

1.2   Problem Statement

Credit (formal and informal) among poultry farmers in Nigeria is generally poor. A low level of credit supply and a resultant minuscule credit use have constricted productivity, limited output, restricted expansion and shrunk farm incomes; in the sector largely driven by small-scale producers with limited capacities. Informal sources such as family and friends, cooperatives, money lenders, continue to dominate credit supply despite the capacity of formal lending institutions (commercial banks, micro finance banks and agricultural banks) to make large loanable funds available. The prominence of informal credit lending is attributed to low advance of credit by formal lending institutions (FAO, 2015). Many farmers continue to depend on family and friends as sources of credit while others rely on available resources within their means, thereby scaling down volume of operations resulting in low levels of commercial production of agricultural outputs (Ogundeji, 1998; Eboreime, 2008; Olowofeso*et al*., 2017).

4

Commercial production in the midst of modern technologies has been found to be attractive due to the easy adaptation of birds, high economic value and the increasing demand for products. Modern technology is an essential demand in modern poultry production and a vital component of managing poultry business. However, the financial viability of commercial poultry production comes with greater demands on inputs, labour, capital and technological requirements for a guaranteed output growth (Heise*et al*., 2015). Most farmers operate below fund secure levelsrequiredto embark on the use of improved technology, purchase better stock or infrastructure and uptake better management practices necessary for a viable commercial production. There are often no available funds to speed up production process or ensure that consumption is guaranteed in the next cycle (Adegbite, 2009; Ololade and Olagunju, 2013; Adeyonu*et al*., 2017). Inadequate funding deters farmers from the acquisition of necessary resources that would have assisted them to expand operations, become more productive, earn more income and remain in business when faced with shocks.

In Nigeria, credit use has been very low. Poultry enterprise like any other business requires credit (Shephard, 1979; Awotodunbo, 2008; Otunaiya*et al*., 2014). There have been efforts on the part of the Nigerian government at various times to institutionalize agricultural credit through the formulation of various policies, with the recent being the Agriculture Promotion Policy (APP) 2016-2020; with the sole aim of improving lending to farmers so as to improve their earnings and capacity. The ease with which credit is obtained and used is vital to the enhancement of the productivity growth of the sector, income improvement and well-being. However, poultry producers are still faced with myriads of problems which include little financial resources, lack of own funds or equity, covariate and idiosyncratic shocks.

The demand-supply gap in poultry production has been persistent, with 70% of chicken meat demand covered by importation despite the witnessed growth in the industry (Robinson, 2017). Farmers' responses to shocks have not been impressive, they are vulnerable and need to build capital asset base beyond solely meeting consumption needs. Often times, many government policies are directed toward income growth as a panacea to poverty reduction with little attention on creating avenues to reduce vulnerability and enhance farmers' capacity to withstand shocks

(Mejeha and Obunadike, 1998; Nimoh*et al*., 2011; Adepoju*et al.,* 2013). Assets have been found to generate economic, social, and psychological effects that income alone cannot (Beverly *et al.,* 2001). They are more stable and reliable form of financial resource than income.

The analysis of the volume of commercial bank's loans to the agricultural sector between 1990 and 2019 (Table 1.1) indicated that an estimated 3.6% of total commercial bank loans and advances was given to agricultural sector, when compared with the total loans by commercial banks (CBN, 2019). Low credit statusoffarmers in some areas have been linked to a number of factors, such asfarm size, farming experience, marital status, age, household size, educational level, enterprise type and collateral, among others (Vardan *et al*., 2006; Quoc, 2012; Ololade and Olagunju, 2013; Oladejo, 2016). Collateral issue among farmers is age long; farmers are often categorized as low earners and low savers with lack of collaterals which make them less suitable and unattractive to obtain credit from lending institutions (Baiyegunhiand Fraser, 2014; Adeyonu*et al*., 2017). Most farmers do not produce enough to increase their income and be able to accumulate assets that could be used as collateral. The circumstance of little or no savings makes it difficult to build capacity in terms of reserves. Majority of them have difficulty increasing their productive capacity and sustaining it, let alone build capital assets.

Table 1.1. Distribution of Commercial Banks' Loans and Advances (₦'Billion)

Year	Total Commercial Bank's Loans and Advances to Agriculture	Total Commercial Bank's Loans and Advances to All Sectors	% Distribution to Agriculture
1990	4.2	26.0	16.2%
1991	5.0	31.3	16.0%
1992	7.0	42.7	16.3%
1993	10.8	65.7	16.4%
1994	17.8	94.2	18.9%
1995	25.3	144.6	17.5%
1996	33.3	169.4	19.6%
1997	27.9	385.6	7.2%
1998	27.2	272.9	10.0%
1999	31.0	322.8	9.6%
2000	41.0	508.3	8.1%
2001	55.8	796.2	7.0%
2002	59.8	954.6	6.3%
2003	62.1	1,210.0	5.1%
2004	67.7	1,519.2	4.5%
2005	48.6	1,976.7	2.5%
2006	49.4	2,524.3	2.0%
2007	149.6	4,813.5	3.1%
2008	106.4	7,799.4	1.4%
2009	135.7	8,912.1	1.5%
2010	128.4	7,706.4	1.7%
2011	255.2	7,312.7	3.5%
2012	316.4	8,150.0	3.9%
2013	343.7	10,005.6	3.4%
2014	1,607.5	45,900.7	3.5%
2015	1,870.6	63,784.7	2.9%
2016	526.0	16,117.2	3.3%
2017	528.2	15,740.6	3.4%
2018	2,226.7	61,669.9	3.6%
2019	2,720.1	63,784.7	4.3%

Source: Computed from Deposit Money Bank's Returns, CBN Statistical Bulletins, 2019

The inherent feature of modern poultry production is frequent income loss and high consumption volatility due to frequent experience of different types of shocks (Iheke and Igbelina, 2016). Many poultry farmers in Nigeria are often less equipped to deal with associated risks with production and consumption as most of them have their income expended without adequate savings or stock, leaving them exposed and vulnerable in times of emergencies. Credit helps to increase production levels and stimulate the income generating ability of farmers, by making resources available in such a way that boosts returns on investments, improves income, enhances savings and makes accumulation of assets possible. Farmers need credit to build capital asset base.Accumulated assets can be relied on for sustenance during economic losses which otherwise would have negatively affected their production flow and by extension, total wellbeing. Credit is needed to increase farmers' capital base and not just income alone so they can sustain production and withstand shocks despite adverse circumstances. Asset poverty during crises worsens situations; the recovery of the farmer from shocks in the event of loss is slowed down, while the level of economic uncertainty grows. This therefore raises the following questions to which this study intends to provide answers:

i. Is there any difference in the level of asset accumulation among poultry farmers that use credit from those who do not use credit in the study area?
ii. What are the factors influencing access to credit among poultry farmers in the study area?
iii. What is the asset poverty status of poultry farmers in the study area?
iv. What is the impact of credit on asset accumulation of poultry farmers in the study area?

1.3   Objectives of the Study

The study's main objective was to analyse the impact of credit on asset accumulation among poultry farmers in Southwestern Nigeria. The specific objectives were to:

1. assess the level of assets accumulation among poultry farmers in the study area.

2. isolate the factors influencing credit access among poultry farmers in Southwestern Nigeria.

3. determine the asset poverty status of poultry farmers in the study area.

4. evaluate the impact of credit use on asset accumulation of poultry farmers in South Western Nigeria.

1.4 Justification of the Study

Asset building, for poultry farmers is critical for sustainability and productivity increase. This cannot be achieved without the support of the government through granting the farmers access to credit or making favourable policies than can facilitate the smallholder poultry farmers' access to credit. Although, there are policies targeted at the agricultural sector, specific credit related poultry sector policy is limited. This could be attributed to restricted research to poultry production without focus on credit in relation to asset accumulation. Hence, this study is expected to bring to the fore,the importance of credit on the poultry farmers' asset accumulation and provide policy recommendations that can assist policy makers to design asset accumulation policies as a strategic intervention, complimentary to other policies that could guarantee the sustainability of poultry farming in Nigeria.

Furthermore, there were previous attempts to investigate the impact of credit in agriculture (Olagunju 2010; Ayaz and Hussain, 2011; Ugbajah, 2011; Saleem *et al*., 2010; Obilor, 2013; Rahman *et al.,* 2014; Abdallah, 2016) but without the incorporation of widely accepted impact assessment methodologies. The implication of not adopting proper impact assessment methodologies is the risk of downplaying serious problems associated with selection bias. This is because there are other factors or pre-existing differences (selection bias) that might have been present at a point but no longer available when subsequent comparison is made at some other time.A poultry farmer could be using credit or not; and may take stock of asset accumulation over time resulting from credit received, but it may be difficult to measure with certainty the credit impact on the stock of accumulated assets.The development in impact studies is such that appropriate counterfactual state is established, to isolate and expedite the exact cause responsible for the change due (Heckman and Smith, 1997; Heckman and Vytlacil, 2005). The use of the econometric impact assessment method is an attempt to

draw causal inference with respect to the asset accumulation of farmers if credit had not been used and the composition of accumulated asset with respect to the credit source.

There is a dearth of literature, especially on the impact of credit on the asset accumulation of poultry farmers in Southwestern Nigeria; this study was an attempt to contribute toavailable impact studies accordingly.

A number of studies revealedpositive impacts of credit relative to capacity enhancement of farmers in terms of reduction in their poverty levelsand improved productivity (Wight *et al*., 2011; Jeiyol*et al*., 2013; Kiplimo*et al*., 2015). The enhancement of farmers' capacity through credit, can facilitate the accumulation of resources necessary for building capacity base in the form of asset accumulation. There is an expanding theoretical and empirical literature on assets-based poverty. Although, assets could be used as collateral to obtain credit, asset could also be accumulated from enhanced income when credit is used as a catalyst. For the purpose of obtaining a more thorough assessment of the connection between credit and asset accumulation, asset poverty was examined in the study, to show the relationship with the accumulation of assets among poultry farmers in Southwestern Nigeria. The evaluation of credit impact on asset accumulation is limited, hence the gap this study was aimed to fill.

1.5   Plan of the Report

The rest of the report is discussed as follows: chapter two is the review of relevant literature to the study, while chapter three provided information regarding the adopted methodology for the study. Results of the study were presented in Chapter four while Chapter five contains the conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1   Theoretical Review

Credit availability with access is reputed to be an important link between the adoption of innovation with respect to technologies, income growth among rural farmers. It has been identified as a fundamental ingredient of sustainable agricultural production. (Adegeye and Dittoh, 1985; Fatogbe, 2010; Awotide*et al*., 2015). It can be used to procure assets or stimulate accruals of returns from production activities to make accumulation of assets possible (Ololade and Olagunju, 2013).

The relationship between credit and asset accumulation has five dimensions: demand, supply, income, consumption and savings (Beverly *et al*., 2008). The demand and supply dimensions as connected with credit, income, consumption and savings dimension as related to asset accumulation. The demand dimension is used toinvestigate individual's preferences with respect to credit decisionswhile the supply dimension is in relation to credit provision by the lender; income, consumption and savings provide a framework for asset accumulation. There are quite a number of theories regarding credit, demand, supply, decision and asset accumulation. These include utility theory or rationalitytheory, theory of satisficing, delegated monitoring, transaction cost theory, credit rationing theory, life cycle hypothesisand behavioural economic theory.Consequently, theconsidered theories as guide for the study were:utility theory, credit rationing theory and life cycle hypothesis.

2.1.1   Utility Theory

The decision of a farmer to use credit is hinged on preference and connected with the expected value derivable from taking such a decision as encapsulated in the utility theory. The assumption of the theory is rationality. The consumer is a rational decision maker and moves to maximise his utility. As posited by the theory, aconsumer might not be able to measure from the onset with precision, the exact utility derivable from several options,when faced with different options or choices with some amount of satisfaction or utility content. However, the consumer will choose an option that gives the most

satisfaction (Olayemi, 2004; Awotide*et al.*, 2015). The available options could be ranked in a way that shows the most preferred bundle of goods or choices in a manner that is consistent (Olayemi, 2004). The consistency in preferential order is transitive.That is, given a set of alternatives, a consumer is able to determine preference between the alternatives or if they are equally preferred. For instance, if A is chosen over B, and B is chosen over C, it could easily be inferred that A is preferred to C.

$$A \geq B \text{ and } B \geq C \text{ then } A \geq C$$

The underlying principle of interaction that exists between the demand for a resource and supply in the market economy, known as the law of demand and supply is explained by the General Equilibrium Theory developed by Walras in 1874. A point where supply and demand are equal (at equilibrium), at a given price referred to as market clearing price which is the price point where market actually clears(Figure 2.1) in a normal market. However, the scenario does not always play out the same way in a credit market. The attainment of equilibrium,most often,is difficult because of the inability of price (interest rate) to bring about equilibrium as would a normal market (Azzi and James, 1976). However, a lender sometimes fails to give out credit at the same price a borrower would demand, or a borrower is not able to demand credit at a price a lender would want to lend. It is expected that at a higher interest rate or price (Fig. 2.2), a seller would be more than willing to offer credit for sale in order to maximise profit in accordance with the theory of supply (Fig 2.2), but this does not always happen (Olayemi, 2004). The unwillingness of a supplier to offer goods or credit for sale at a higher price is the basis of Stiglitz and Weiss's work on Credit Rationing in 1981 (Stiglitz and Weiss, 1981).

For a normal demand supply curve (Fig. 2.1), there is a combination of low interest rate r_1, low supply SS and high demand DD as well as high interest rate r_2, more supply SS and low demand DD but this is not the case with credit rationed supply curve as shown in Figure 2.3 where the quantity of credit supplied, Q* remains perfectly inelastic. Although, the modern credit rationing theory by Rothschild and Stiglitz (1976) proposed the existence of equilibrium with an interest rate where market clears anda combination of loan whereby a high-quality borrower expressed preference for small rate of interest as well as reduced amount of loan; the equilibrium is not always stable.

13
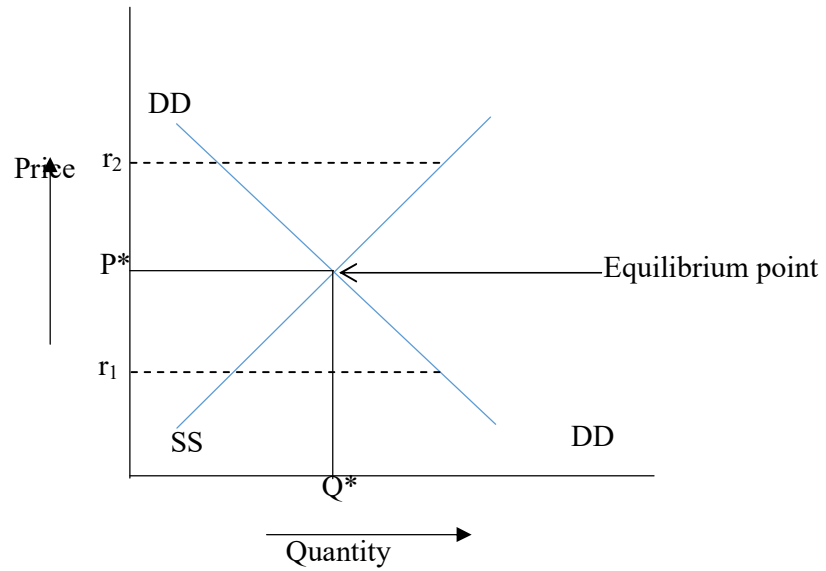
Fig. 2.1. Demand and Supply Graph Showing the Equilibrium Point in a Normal Market[1]

---

[1] DD represents demand, P* represents equilibrium price, SS represents supply, Q* represents equilibrium quantity, r represents interest rate
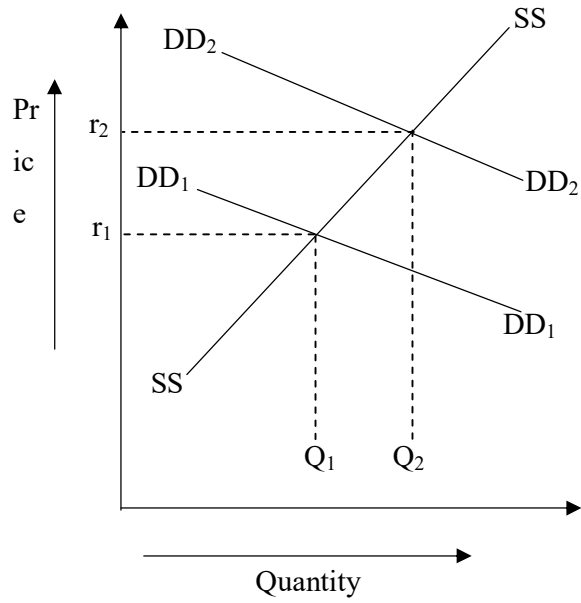
Fig. 2.2. Normal Supply Curve
Curve
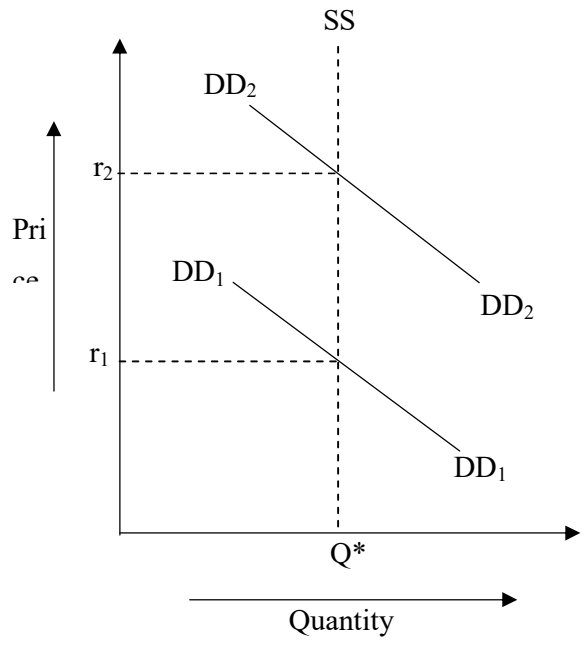
Fig. 2.3. Credit Rationed Supply

2.1.2   Credit Rationing Theory

According to the Credit Rationing theory, lenders are not willing to offer additional funds to a borrower even at a higher price (interest rate) in order to clear the excess demand as a result of default risk and asymmetric information (Stigliz and Weiss, 1981). Default risk is a situation whereby a borrower fails to fulfil the obligation of paying the money owed (both principal and interest) in a timely manner while in asymmetric information, the knowledge is one-sided, in that there is an incomplete knowledge of a party by another party leading to adverse selection and moral hazard. In a credit market, two parties are involved-the lender and the borrower, usually the borrower has a better information of his state than the lender, the latter might want to compensate for the imperfect knowledge by charging higher interest rate, it is a risk to be considered whether he wants to take or not, leading to credit rationing (Scott, 1957;Akerlof, 1970; Jaffee and Russell, 1976). Credit rationing focuses on the supplier side of the market, the demand is met with a smaller proportion of the desired amount despite being offered at a higher price or interest rate, such that the supply is far below the equilibrium price or interest rate, making equilibrium or a market clearing point impossible (Akerlof, 1970). The perception of a lender to ration credit is that borrowers that are willing to tolerate high interest rate are risky and is therefore not safe to lend to them. It suggests that the willingness of this group of "high risk" borrowers to accept higher interest rate could be due to a lower chance of a successful project which would reduce their chance of repayment (Stiglitz and Weiss, 1981).

To the contrary, the willingness of a borrower to tolerate high interest rate may not necessarily mean they are unsafe or of high risk but it could be that (i) borrowing at the high price was the only available option for them to continue in business instead of losing out completely, especially when the existence of their business or investment is threatened or critical and (ii)the amount of loanable funds available to lenders could also make lenders or borrowers to be constrained from lending or having their demand for credit met (Blinder and Stiglitz, 1983). For example, a farmer in dire need of salvaging the entire investments from total ruin will not mind doing so at an extra cost or higher interest rate as an available option. It therefore has nothing to do with an underlying intention to default on borrowed funds, but rather driven with exigencies to rescue already invested funds from total collapse or loss by sacrificing some

16

earnedincome in order to minimize the probability of losses (Unaeze and Akintola, 2016). In addition, there are instances where lenders are not able to readily make large loanable funds available even with high interest rate because a lender isfaced with several options of how to profitably put the loanable funds to use, as a rational profit maximiser (Rahji and Adeoti, 2010).

In some obvious situations, lenders themselves are rationed in terms of the amount of funds available to them for lendingas a result of "high reserves, high inflation and ceiling interest rates on deposits which are regulation-induced" (McKinnon, 1973; Balogun and Otu, 1991), making it difficult for lenders toboostthe amount of funds that could be offered as loans in the shortest time possible to meet requests from borrowers.Sometimes, borrowers are themselves constrained in terms of capacity and the ability to match up with conditions required to obtain as much credit as required or requested (Afolabi *et al*., 2014) especially with respect to their socio-economic characteristics. For all that it is worth, the decision of a farmer to use credit goesbeyond the present it is futuristic,asit is a way of increasing the capacity to ensure that both production and outcome situations are maintained; the ability to withstand shocks is further strengthened and a certain level of wealth and status is maintained throughout a lifetime (Awotide*et al*., 2015). This is further captured in the life cycle hypothesisadopted as the foundation for this study.

2.1.3 Life Cycle Hypothesis

The life cycle hypothesis (LC-H) presumes that consumption is based "on a constant percentage of anticipated life income" with an assumption that individuals are rational and forward planning.According to Modigliani and Brumberg (1954), savings and consumption are based on expected future income and not just the current resources or income. Thus, individuals seek to smooth consumption over the course of a lifetimeusing savings in the face of income fluctuation. According to this theory, it means that when the existing income being earned is below the expected lifetime income, there is a decrease of savings such that the only alternative given the circumstance is to borrow in order to finance or meet consumption needs. Contrarily, if current income rises above average expected lifetime income, saving increases. Saving is made possible when income or inflow exceeds consumption. In this instance, a part

of income not used up for consumption is saved or accumulated over the course of time as assets, while the consumed part could be for productive or non-productive activities. The theoryposited that savings and asset accumulation during good times(when income exceeds consumption)couldbe expended to guarantee a smoothening during tough or difficult times especially when income is loweredor ceases.Most times, individuals with low income are often left with limited resources after subsistence requirements are met, such that savings and asset accumulation are low (Beverly *et al.,* 2008).

Theories of determinants of savings and asset accumulation such as behavioural, economic, psychological and sociological have accentuated the need for bequeath, precautionary savings and policy effect as essential indicators relative to savings and assets accumulation. In this study however,the satisfaction derivable from the choice to save and accumulate assets for future consumption, security against contingencies, improved income generation follow neoclassical economics of rational decision (Beverly *et al*., 2008; Masoud, 2013; Awunyo-Vitor, 2018). Four reasons for saving were identified by neoclassical economics: (1) consumption maintenance when income ceases; (2) capacity building against upsetting circumstances and unexpected situations or emergencies- precautionary saving; (3) bequest-wealth transfers (4) saving towards specific goals or targets (Sturm, 1983). The average propensity of farmers to save can be enhanced either by the reallocation of resources from consumption in order to increase the amount that can be saved or by increasing current resource through capacity increase for generating more income (Sawada, 2002).

Agricultural production is often characterized by time-lags (the usual off-and on-season due to the fact that income is not immediately generated from production activities) and shocks. There could be a time S_0 when income drops during off-seasons or stops completely in the event of disaster or unforeseen circumstances like drought, fire or disease outbreak, climate change and other covariate shocks. At other times, there is no capacity for expansion or to convert opportunities because earnings have been expended on current consumption (Adeyonu*et al*., 2017). In situations like these, savings or investments stored up in the form of accumulated assets (productive resources or household) are exhausted to smooth consumption or jump start production

activities to generate income and even out consumption over the course of a lifetime (Deaton, 2005).
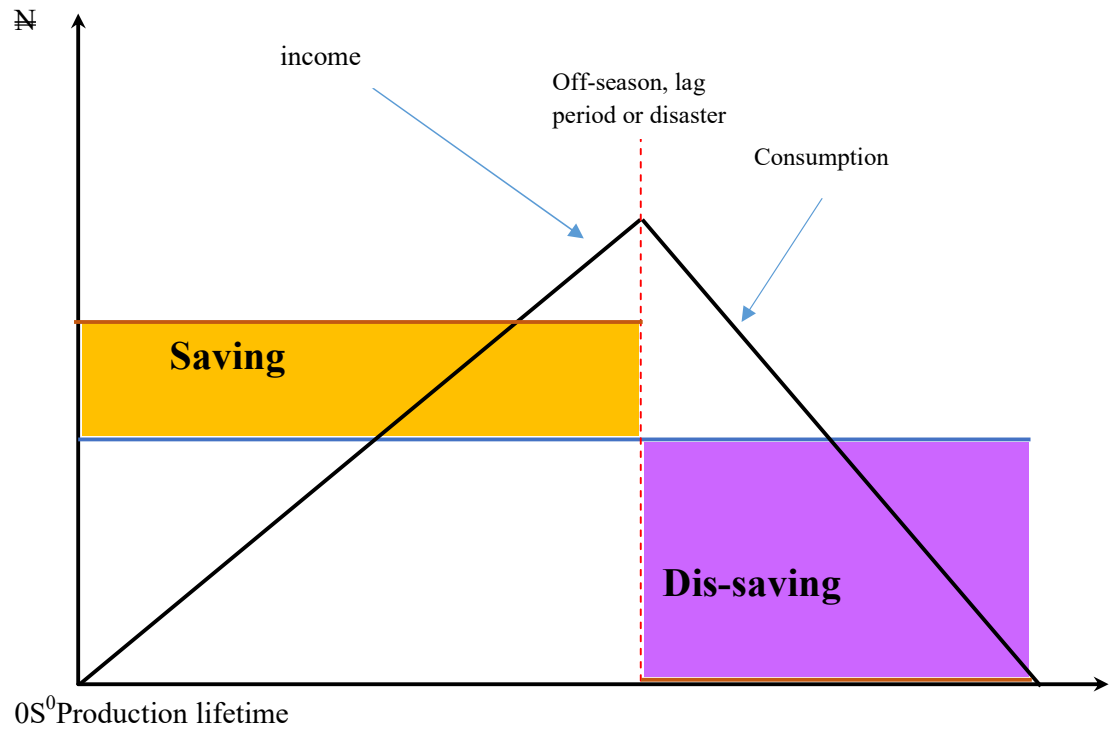
Fig. 2.4. Life Cycle Hypothesis (Deaton, 2005)

Credit could be usedto improve capacity in the form of enhanced opportunities to ensure that more income is generated, thereby providing a strong incentive for farmers to keep back some income as savings and accumulated assetswhich can only be possible in situations where the flow of resources outweigh what is required for consumption in the immediate (Roseweig and Wolpin, 1993). In situations where conditions of paltry asset holdings or little savings are commonly manifested, and the exchange technologies that can increase future income are non-existent; behaviours that reinforce poverty or impede wellbeing are automatically induced (Glewwe and Gillette, 1998).

2.2   Empirical Review

Henri-Ukoha*et al*. (2011) focussed on the factors that determine acquisition of loan from financial institutions by small-scale farmers in Ohafia agricultural zone of AbiaState, Southeast Nigeria. Using simple descriptive statistics as well as multiple regression models for data analysis, the amount of loan disbursed by financial institutions is influenced by the farmer's age, farm sizeeducational level and farming experience. Oboh and Kushwaha (2009) also found that factors affecting credit allocation among farmers in Benue State, Nigeria were education, age,farm size, household size,visitation by lenders and length of loan delay using multiple regression analysis.

Durojaiye*et al*. (2014) in their study on thedetermining factors of microcredit among those trading in grain in Southwestern States, using descriptive statistics and the multinomial logit model to analyse responses from 492 traders. Their findings revealed that credit variables such as interest rate, credit distance, and loan duration were the significant factors along with some social capital variables that determine credit demand whilethe supplied credit was inadequate for credit demandedbecause only about half could access credit. Olaoye*et al*. (2011) studied the factors that determine agricultural multipurpose credit demand among fish farmers in Ogun State, Nigeria with a total of 90 fish farmers sampled. Results showed that significant determining

factors of credit demand were level of education, loan duration, collaterals, guarantor and farming experience.

Okpara (2017) adopted multiple regressions and ANOVA to examine credit utilization, amount of credit demanded and obtained and the influencing factors of credit amountamong cassava farmers in Imo State. Findings showed that educational level, farm size, collateral, distance from home, farming experience, and interest rate had significant effect on credit amount demanded; while farm income level, interest rate, household size, age of farmer, size of farm and sex were the determinants of credit amount obtained.

Noumanet al. (2013) analysed the impact of farmers' socio-economic characteristics on access to agricultural credit in Pakistan. Using the logit model, the result showed that the amount of credit by farmers is significantly influenced by the age of the farmer, marital status, farming experience, size of farm and level of education. Their result indicates the existence of a strong connection between borrowers' socio-economic characteristics and access to agricultural credit.

Baiyegunhi and Fraser (2014) investigated smallholder farmers' access to credit in the Amthole District Municipal of South Africa using logistic regression. The results showed that households' income, value of assets, savings, dependency ratio, repayment capacity and social capital significantly influence credit market access. Ololade and Olagunju (2013) examined determining factors ofcredit access among rural farmers in Oyo State Nigeria. Not being married and being female reduced the probability of credit access. Furthermore, likelihood of credit access increases with availability of a guarantor but reduces with growing interest rate.

Agom (2001) in a study on the impact of micro-credit on the performance of agricultural enterprises in Cross River State, Nigeria using multiple statistical tools, investigated the significant difference between the average returns of credit users and non-credit users. Olagunju (2010) analysed credit impact on poultry's productivity in Southwestern Nigeria with the aid of logit and multiple regressions. Quasi-experiments were adopted in the selection of 300 poultry farmers and comparison made between those who willingly sourced for credit with those who have comparable conspicuous

biophysical and socio-economic attributes but did not acquire any loan for poultry production activities. The effect of institutional factors in addition to farmer's socioeconomic characteristics was determined with multiple regression model on livestock's productivity using the farmers' average net income differentials before and after as a proxy for poultry productivity for farmers who had access to loans.

Sanusi and Olagunju (2013) examined credit access and differentials in the efficiency of poultry farmers in Ogbomoso Agricultural zone. Ninety poultry farmers were randomly sampled as the source of primary data used. Logit regression model was employed for the identification of credit use effect by the poultry farm operators and stochastic production frontier employed to analyse the technical efficiency of credit using and non-credit using poultry farmers. Mghenyi (2015) also adopted the stochastic frontier production function to estimate the impact of group loans on maize profitability using data collected from 360 farm households in Kenya through stratified random sampling method. The author established the relationship of credit limit, loan amounts, and collateral with profitability. Abdallah (2016) examined the impact of agricultural credit on technical efficiency of Ghanaian maize farmers, using both the primary data of 569 farmers with dataset drawn from sub-Saharan Africa's intensification of food crops agriculture (Afrint II) in the 2008 period. A 2- stage estimation procedure (probit and stochastic frontier analysis) was employed to determine factors (including credit) of the technical efficiency of the maize farmers.

The use of logit, probit, and stochastic frontier analysis for impact studies have been flawed based on the fact that the causal effect is not explicitly isolated. In essence, the counterfactual situation is not adequately established which would have been instrumental to identifying the line causality. Impact literatures such as Blundell and Dias (2005); Mendola (2007); Duflo*et al*. (2008); Nguezet*et al.* (2012) and Awotide*et al*. (2015) explained that before an intervention impact or treatment effect could be properly evaluated, it is important to investigate the likely situation without the treatment. This is referred to as the counterfactual. This becomes necessary because of the possibility of other factors that may have changed or interfered with the treatment variables along with credit or directly related to individual characteristics which are observed (overt) or not observed (hidden).

Ibrahim and Bauer (2013) examined the micro-credit access and its impact on farm profit among rural farmers in the dry lands of Sudan, 200 farm households were chosen as the sample through the use of multi-stage random sampling technique. The analysis of collected data was done with ordinary least squares for the determination of credit impact on farm profits with Heckman selection model employed for the correction of selection bias as a resulted of omitted variable specification to provide consistent impact estimates

Awotide*et al.*(2015) studied the connection that exists between credit and productivity among selected small-scale cassava farmers in Nigeria with the use of primary data of about 800 farming households. Data were analysed using the endogenous switching regression model (ESRM) where the route and extent of non-probability farmers' selection with access to credit were evaluated, taking into cognizance associated biases as regards selection of individuals which is common with estimates of ordinary least square (OLS) methods with respect to effects of credit access.

Similarly, Mukasa *et al.*(2017) determined the impact of credit constraints on the farm productivity of smallholder farmers in Ethiopia. Nature, extent, credit constraints as well as productivity of the farm were investigated in the study using a panel of 5,308 smallholder farmers in Ethiopia. The ERSM as an impact assessment tool was used to isolate the impact of credit constraints on the farm productivity of the farmers. Abdallah *et al.* (2018) examined the "impact of agricultural credit on farm income under the savannah and transitional zones of Ghana". Using a primary data of 2,820 farm households; they applied impact evaluation assessment theory in non-random experiment through the use of endogenous switching regression (ESR) and propensity score matching (PSM) to verify the consistency of the estimateswhen addressing the selection bias and the endogeneity of the sample.

Ayaz and Hussain (2011) employed stochastic frontier in their analysis of the impact of institutional credit on the production efficiency of the farming sector in the Punjab district of Pakistan. The result revealed that levels of the technical efficiency of borrowers were higher than non-borrowers. Olagunju and Babatunde (2011) assessed credit impact on poultry productivity using data from 280 poultry farmers and attested

to the significance of the impact of credit onpoultry productivity. Manlagnit (2004) examined the level of accumulated assets and savings using acquired credit from community-oriented financial intermediaries (COFIs) as well as other sources of finance in the Philippines, using a household survey which included 333 households through a structured interview. Findings revealed a clear distinction between households that obtained credit and those that did not in terms of the ownership of assets, credit access as well as the use of loans obtained; households that obtained credit accumulated greater assets than those households without credit.

Adjei *et al*. (2009) examined multidimensional phenomenon and asset building and the extent through which finance can be used to provide both financial and non-financial services in a manner that affords the clients to build up their asset base. Results showed that involvement in the credit programme enabled clients to own savings, pay off debts in times of illness, and be able to take up financial responsibilities and purchase household durables. Chowa and Sherraden (2009) revealed that low-income generation is often associated with little assets and this is because of the unavailability of required savings to make assets acquisition possible. This obstruction to savings is more noticeable particularly where assets are part of the foundation for production in some situations. According to Adjei *et al*. (2009), accumulation or changes in the household ownership of assets such as household durables can be considered as an indicator of improvements or in change in living standards.

Considering the scale of operations for a majority of poultry farmers in Southwestern Nigeria, Otero and Rhyne (1994) observed that families that operate micro enterprises typically lack assets, especially marketable assets. Mamun *et al*. (2011) examined the "effect of participation in micro credit programmes on assets owned byhard core poor households in Malaysia". The findings confirmed a direct positive relationship between total productive assets and the loan amount obtained as well as gainfully employed members leading to an increase in household assets.

2.2.1 Poultry Production in Nigeria

Poultry production involves the domestication of birds for commercial purposes, through the production of meat or eggs; emerging as one of the most dynamic, fast growing and important agricultural enterprises in Nigeria with a networth above

₦1.2trillion (Adewole, 2017). Chicken is the most predominant of poultry among other varieties like chickens, turkeys, quails, squabs, geese and ducks (Adene and Oguntade, 2006). They are generally good converters of feed, have short production cycle with relatively low production cost per unit and high returns on investment. Those raised intensively for meat are known as meat chicken, while layers are those raised for eggs called egg-laying hens. They can be managed in an extensive, intensive or semi-intensive arrangement depending on the scale of operations, choice, stock and production systems. Raising birds in a controlled environment guarantees effective monitoring and quality control, as being operated at commercial levels for most producers. A majority of farmers notwithstanding still operate subsistence farming with mixed strains which are characterized by out-dated production techniques and inadequate management;this has lowered the expectations of meeting the demand for poultry products in Nigeria.

According to Ojo (2003), poultry production can be categorized into small, medium and large scale depending on the flock size.Small-scale producers have1,000 birds and below, medium producers have number of birds ranging from 1,001to ≤5,000 while large scale producers have flock size above 5,000. Commercial poultry farming in Nigeria is evolving with characteristic demand of increased labour as well as capital. There are also demandsfor input, innovation and technology leading to improvement in breeding techniques, husbandry and management skills aimed at increasing efficiency in production. This is expected to lead to lower production costs and improved returns in the long run, but still cost intensive in the immediate time. However, the industry is still plagued by risks and uncertainties including natural risks, poor market access resulting from inadequate infrastructure, disease outbreak, high mortality rate, social risks, weak feed industry, and economic risks such as high input prices, glut, price fluctuation, management problems and lack of capital (Alabi and Isah 2002; Oludimu*et al*., 2004; Apantaku, 2006; Adepoju*et al*., 2013; Adeyonu*et al*., 2017).

A large proportion of poultry producers in Southwestern Nigeria are small and medium scale farmersdue to poor financial standing in keeping up with demands and high business risks which have limited the degree of accruals in terms of revenue (Oludimu*et al*., 2004). The supply of credit to farmers has been advocated to be an

effective strategy in boosting production and expansion in agriculture, through the transformation of subsistence farming to commercial scale while also assisting in the improvement of farmers' earned income levels (Mahmood *et al.*, 2009; Phillip *et al.*, 2009).

2.2.2 Credit

Drawing on the definition of agricultural credit by Adegeye and Dittoh (1985),credit involves a series of actions or steps taken which culminateat a point where the control of the use of money is finally secured by the farmer.It is a sequence of interdependent and related procedures whose interactionsare necessary to achieving the overall objective of getting funds and using such for desired benefits. Efforts at incorporating agricultural credit as a formidable system aimed at supporting agricultural production in Nigeria began in 1946; with the establishment of the Nigerian Local Development Board (NLDB). According to Badiru (2010): "Credit institutions can be categorised into three groups (i) formal such as commercial banks, microfinance banks, the Nigeria Agricultural and Cooperative Rural Development Bank (NACRDB), and state government-owned credit institutions; (ii) semi-formal, such as non-governmental organizations (NGO), microfinance institutions (MFIs) and cooperative societies; and (iii) informal, such as money lenders, rotating savings and credit associations (RoSCAs)".

Achieving the anticipated benefit of credit therefore goes beyond just access but it involves utilization, that is, the actual deployment of credit to achieve desired results. Credit access can assist in making demand decisions through effective utilization of information which is necessary for profitable decision making. This is done byanalysing personal, socio-economical, institutional and other related factors that could significantly influence credit use or its intensity. Credit access is therefore not the same as credit use because an individual can have access to credit without necessarily using it; credit use is dependent on prevailing circumstances which could either be demand or supply related. In spite of that, a farmer cannot use credit except there is access, which is the ability to obtain the credit. There could be access of credit

26

without use but there cannot be use of credit without access. Credit access has to do with the ability to obtain credit while the use of credit is the deployment of credit to achieve a purpose. A farmer may have the ability to obtain credit without deploying it to achieve the desired purpose whereas for there to be credit use, there must first be access to credit.

In a credit market, there exists an interaction between a borrower and a lender such that money isoffered to be borrowed and it is accepted, thusthere is participation in credit market. Often, credit market participation is taken to be the same with credit access, but it is not, the ability to obtain credit can be taken to mean access; however, market participation is the actual borrowing from a credit source since a farmer may decide otherwise and not borrow. Credit market participation therefore goes beyond credit access because it is backed with actual demand and use, since there is the possibility of a credit demand being met with refusal andsubsequently turned down. Distinguishing between credit access which is the prospect of benefit derivation of an individual from credit and the use of credit which is the actual transformation power to turn anticipated benefit to reality is crucial. Thus, non-use of credit could be involuntary or voluntary (Claessens, 2006); voluntary non-users of credit have access but do not use it either because they have no need for credit or due to some related factors that makes credit use not feasible. Involuntary non-users on the other hand desire credit use but lack access owing to some reasons.

Formal and informal credit institutions have evolved over the years with bothco-existing in developing countries. Farmers canchoose from these alternative credit sources with informal credit institutions playing the leading role in credit provision especially with farmers' difficultyin securing credit from the formal institutions because of the notion that agriculture is a highly risky venture (Adegbite, 2009). Other reasons adduced to the attention garnered by informal lending institutions above formal lending institutions are the absence of most formal institutions at farmers' location, the demand for high interest rates driven by perception, unfavourable loan duration, high transaction costs, cumbersome procedures, delays in loan processing, complex mechanism, demand for collaterals, imperfect information and many other reasons which continue to be an albatross to farmersgetting credit from formal lending institutions (Kodieche, 2002; Rahji and Fakayode , 2009).

Studies have shown that the availability of credit does not necessarily translate to actual demand for credit or its use, because lack of access can be a clog in the actual use of credit, oftenattributed to supply or demand related factors from lack of information or awareness (Beck and de la Torre, 2007); social, environmental, interest rate, collateral issues, distance to the source of credit, credit characteristics and socio-economic characteristics(Beck *et al*., 2007). Credit availability and use are vital to increased agricultural production through the conversion of opportunities and increase in income beyond immediate consumption (Adegbite *et al*.,2007).

2.2.3   Asset Accumulation

Increasing farmers' income has been at the forefront of many interventions, especially in relation to agricultural development through credit access and utilization (Beverly *et al*., 2008, Awotide*et al*., 2015; Awunyo -Vitor, 2018). This is not unconnected with the underlying assumption thatenhancing a farmer's capacity would expand the revenue base which invariably would improve the farmer's well-being, makinghim less vulnerable to poverty (Otunaiya, 2012; Afolabi *et al*., 2014; Adeyonu*et al*., 2017).

However, there has been advocacyfrom some sources for asset-based approach or measures as a compliment to income-based approach or poverty measures (Sherraden, 1991; Haveman and Wolff, 2000; Barret and Swallow, 2006; Carter and Barret, 2006; Dillon and Quinones, 2011; Awotide*et al.,* 2015). Assets are different from income, while the former is a reservoir of economic value, the latter is a flow of resources.Lack of available assets to serve as buffer for sustenance in the event of unforeseen circumstances, uncertainties or reduction in incomeis likely to negatively affect farmers' productivity (Adeyonu*et al*., 2017).Poultryproduction as with other agricultural enterprises involves many risks consequent on fluctuations in product prices or output which makes income unstable over time (Adepoju*et al.,* 2013; Esiobu*et al.,* 2014; Unaeze and Akintola, 2016).

More often than not, income varies inpoultry production because of the unstable production environment which is beyond what the farmer could handle. These include changes in market demand as a result of glut or low demand with pressure on output and input prices among many other factors; with an attendant distortion in the farmer's

net worth and by extension future planning. An income snapshot cannot adequately give a reliable picture of the farmer's capacity in terms of net-worthbecause asset value gives abetter accurate measure of wealth than income or consumptionvalue (Awotide*et al*., 2015). Stock of resources accumulated helps to create reserves for the flow of resources instead of spending all on immediate consumption or needs (Sawada, 2002).

Asset poverty estimates the degree of adequacy of stock of assetto sustain a certain consumption levelor basic needs during a momentary tough period (Fisher and Weber, 2004).There is no over emphasizing that increased income saved and invested in accumulating assets can act as a buffer in bad times (Ravallionand Chen, 2001; Ellis, 2000; Moser and Felton, 2007). Assets therefore provide more than just an income-based snapshot but an all-encompassing representation of long-term living standards accumulated over time, which are long lasting. Evidence is rife in literature that there is a higher propensity for farmers to increase income generating ability, invest in a wide range of assets with an improved livelihood, a reflection of the multi-dimensional poverty facetswhen there is access to credit utilized for anticipated benefits. (Montgomery *et al*., 1996; Sen, 1997; Otunaiya*et al*., 2014; Yaqoob *et al*., 2017).

Assets can be categorized in various ways, it could be tangible and intangible; productive and non-productive; fixed and current and so on depending on varying degrees of risk, how fast they can be converted to cash or liquidated, their tangibility, yield and the ability to generate income, appreciate or depreciate. Common approach as classified by Belbase (1991); Deaton (1993) and Dunn (1994) is the productive and non-productive assets following an assumption about what use the assets are being put into whether for generating income or otherwise. For poultry farmers, productive assets would be regarded as those assets that are directly used in the generation of income such as the cage, feeders, wheel barrow, drinkers and the likes while non-productive assets or household assets are those assets not directly used for income generating activities.

2.3   Analytical Review

The impact of credit on assets accumulation has rarely been studied in its entirety;of course, there have been several attempts at the general analysis of the impact of credit

in agriculture. Many of the impact studies with respect to credit were done simply by comparing the differences in themeans of groups of credit users and non-credit users, or throughthe use of simple regression methods which involves including credit status variables as regressors (Nguezet*et al.*, 2012; Awotide*et al.*, 2015).

2.3.1 Impact Evaluation

The assessment of variations attributable to certain intervention, treatment, programme or strategy, whether intended or unintended is known as impact evaluation. It is different from outcome monitoring aimed at confirming or ascertaining the achievement of set targets or goals. Impact evaluation involves a process which seeks to provide insight or answer to cause-and-effect questions, to look for changes in an outcome that can be explained or attributed directly to a programme, being able to situate observed changes as resulting directly from the intervention and not as a result of other factors. The impact of an intervention could be evaluated in the short, medium or long term (Baker, 2000).

It is important to appraise and provide evidence if a particular intervention made a difference as well as the extent of such a difference, in addition to giving an answer to the question of what would have happened if there was no exposure to such intervention (i.e counterfactual). According to literature, two prominent biases in impact evaluation are the selection on observables and unobservable (Rosenbaun, 2002), it is advised that these should be corrected for in order to get an unbiased programme impact result fit for policy suggestions. The central issue in evaluation studies therefore is to be able to isolate the actual impact on the object of consideration.

Propensity Score Matching

Propensity score matching (PSM) was originally developed for a programme or treatment impact by comparing outcomes of the exposed to treatment and those without treatment. The idea of PSM is to locate individuals that are not exposed to the intervention or treatment but similar in all pre-characteristics to those who are exposed

to the treatment, then check for differences in outcomes which are due to exposure to the intervention (Rosenbaum and Rubin, 1983; Ravallion, 2005; Mendola, 2007; Yaqoob *et al.*, 2017). It is a matching method based on a balancing score (propensity score)the likelihood of treatment and a possible solution of surmounting the problem often associated with selection bias in an impact evaluation.

The PSM was introduced as an alternative method of analysing the main objective of the study instead of multiple linear regression analysis. Basically, this statistical analysis explains changes caused by credit on the asset accumulated by the poultry farmers, the composition of accumulated assets along the productive and household assets. A feature of interest in the use of PSM method above other methods of evaluation is the highlight of common support problem by the matching estimators since the effects of treatment and intervention could only be estimated within the common support. Data requirement in PSM is relatively large due to the necessity of random allocation which is a burden; nonetheless the method comes handy in impact evaluation.

To obtain an unbiased and consistent evaluation of the actual credit impact on the asset accumulation of credit using poultry farmers, a comparison is made between the average credit impact among group of poultry farmers that use credit and another group of poultry farmer that do not use credit but possess characteristics similar to the former. The adoption of PSM was aimed at eliminating selection bias (as a factor in non-observable studies) resulting from the observable and unobservable attributes of the farmer. This procedure was incorporated in the study by considering both categories of farmers that use credit and those without credit through algorithm matching. Ignoring the need to make provision for different groups of credit and non-credit users would have affected the final outcome of the analysis through the presentation of spurious and biased estimates leading to an overestimation, underestimation or a report of impact when really none exists.

Given observed characteristics X or exogenous variables; Propensity score is

$$p(X) = P\left(D = \frac{1}{X}\right) = P(X) \qquad (2.1)$$

According to Rosenbaum and Rubin (1983), the suggestion of a balancing score as a function of the relevant observed covariates is to allow for independence between the binary treatment assignment and conditional distribution. Therefore, being able to match using the propensity score is a sure wayofeliminating the selection bias of the treated and untreated so as to estimate the treatment effects and control covariates, since for a homogenous sub-group, the distribution of covariates is similar for both the exposed to treatment as well as the control units (the credit users and non-credit users in this case).

The assumption of independence conditionality that should exist between the treatment assignment and potential outcomes given the observed covariatesin the PSM, suggests that when a particular value of the propensity score is used, the average treatment effect estimate which is the difference between those exposed to intervention(treated) and those not exposed to intervention (control) is unbiased (Rubin, 1990; Caliendo and Kopeinig,2005; Imbens and Wooldridge, 2009). This by implication inferred that unbiased treatment effect can be estimated and obtained given that all relevant covariates have been controlled for, this is closely related to the assumption of omitted variable bias in the linear regression models.

Conditional Independence Assumption (CIA) premised on the propensity score (PS) can be expressed as follows:

$$Y(1), Y(0) \amalg D\big(P(X)\big), \forall\, X \,(2.2)$$

The sample is sub-classified into strata with their boundaries using the estimated propensity score values of the treated and control groups; then, the average difference in outcomes of the groups was estimated across all the strata through the computation of themean difference in outcomes, within each of the propensity score stratum. (Rosenbaum and Rubin, 1983; D'Agostino, 1998). In order to evaluate the level of attainment of the balance covariate by a propensity sub-classification, a simple diagnostic test can be used. There is also a re-estimation of propensity score if the differences between the groups remain after sub-classification with consideration that the combination of the variables are out of place, otherwise an adjustment of regression may be applied at the final stage (Dehejia and Wahba, 1999).

A propensity score analysis of observational data (Rubin,1973a),is used for two groups with characteristics that are similar such that comparisons are made within the matched samples of the treated and control units.Each of the outcomes of the analysis is binary with respect to whether farmers use credit recorded as 1and 0 if the farmers do not use credit.

Types of Propensity Score Matching

There are quite a number of matching techniques suggested in literature that could be adopted for computing the ATT (which is the treatment effect of the population of poultry farmers that actually use credit and the policy instrument for this study) to match credit users and non-credit users with similar propensities. In the estimation of treatment effects, the most popular is the average treatment effect (ATE) referred to as population average treatment. It represents the average difference of potential outcome across the sample. Another estimated parameter is the average treatment on the untreated (ATU). The ATE was estimated as the weighted average of ATT and ATU.The selection of a specific matching algorithm is circumstantial, because the manner of data composition affects how the different estimators will perform. However, major methods of matching treatment and control groups are nearest neighbour, caliper, stratified, kernel and weighing.

a. **Nearest Neighbour Matching**

Nearest Neighbour Matching is adjudged as the most straightforward and common; farmer is chosen from the control group (non-credit users) and matched to another farmer from a treated group (credit users) with a propensity score that is the closest.The Nearest Neighbour (NN) matching estimator"with replacement" or "without replacement". In the "with replacement" variant as the name implies allows the use of matching partner from the control group (non-credit user farmer) more than once to match the treated or the credit user farmer,and then be replaced for availability to match another farmer from the treated group. On the other hand, in the case of "without replacement", a farmer from the control group can only matched once.

The type of NN employed has trade-off between bias and variance. For instance, allowing for the replacement of non-credit using farmer after matching increases the quality by decreasing bias; there is a shift of attention on this especially if the way the

propensity scores are distributed among control and treated groupsis different. The possibility of getting bad matches is high in situations where credit users with high propensity scores are more thannon-credit users to be matched with, this is because some credit users with high-score would then be matched with non-credit users with low score or risked not beingmatched at all. This scenario is prevented from happening by allowing for replacement,this lowers to a large extent the available number of non-credit user or control group units that will be used to construct the counterfactual outcome which in turn increases the matching estimator variance (Smith and Todd, 2005). To guarantee consistency of estimator for a NN matching without replacement, random ordering is essential because of the dependency of the estimates on the sequence at which the matching of observations is carried out.

Although, there were suggestions to oversample through the use of more than one nearest neighbour, however, it is not without a compromise of increased bias resulting from average poorer matches and reduced variance which is a resultant effect of constructing counterfactual through the use of more information for each participant(Smith, 1997). However, to correct for oversampling, it is necessary to decide the number of matching partners to be selected for each of the treated unit and also the weight to be assigned whether uniform or triangular weight.

b. Caliper Matching

The nearest neighbour matching could be faced with a situation of bad matches in circumstances where the neighbour that seems closest is a distance away. To prevent the occurrence of scenario as this, a tolerance level is imposed on the maximum propensity score distance known as caliper. Performing fewer matches however tend to increase the variance of the estimates; applying caliper matching therefore means that those poultry farmers in the non-credit using group are chosen as matching partners for credit user poultry farmers that are located within the propensity range or caliper closest when the propensity score is concerned. Imposition of a tolerance level or caliper allows for replacement (just like NN) to guard against bad matches andenhance the quality of matching. Notwithstanding, knowing the tolerance level ahead or a priori is a key challenge for the calipermatching (Smith and Todd, 2005).

In another vein, Dehejia and Wabba (2002) suggested using radius matching which is another kind of caliper matching,in its own case, it allows for the use of all the available members for comparison as long as they are within the caliper instead of being constrained to using just the nearest neighbour within the caliper. The advantage of this method is that many available comparison units within the caliper can be used, by allowing for extra units particularly to cater for available good matches or in other instance, lesser units in case of unavailability of good matches. thereby sharing the attractive feature of oversampling as a possibility in NN but in this case, and avoiding bad matching risks.

c. Stratified Matching

This matching estimator is also known as interval matching; the common support of the propensity score is segmented into strata, then the outcomes of the differences in the means of the treated and control observations are used to calculate the impact within each set of interval or strata (Rosenbaun and Rubin, 1983). The number of strata as suggested by Cochrane and Chambers (1965) should be above five to remove about 95% bias associated with a single covariance. This is corroborated by Imbens (2004), that five strata remove any associated bias with all covariates between the treated and untreated units. Checking the propensity score balance is also another way of justifying the decision with respect to the number of strata chosen. The within stratum should be checked for balanced propensity score, if otherwise, it is necessary to divide the strata, an unbalanced propensity score is an indicator of large strata.Conversely, unbalanced covariates despite a balanced propensity score, shows inadequacy of the propensity score specification which requires a re-specification by using "higher order terms or interactions" (Dehejia and Wahba, 1999).

d. Kernel Matching

A common feature of previously discussed matching estimators is that the treated counterfactual is constructed using just a small number of observations from the untreated or control group. However, in the case of Kernel Based Matching (KBM) and Local Linear Matching (LMM)- which are non-parametric estimators-, the counterfactual outcome is constructed by using the weighted average of all the farmers in the control group (Caliendo and Kopeinig, 2005). The estimators compare the

outcome of each of the treated unit to a weighted average of the outcomes of all the untreated or control units while attaching the highest weight on those units with scores closest to the treated unit. The kernel function and the bandwidth parameter also need to be chosen for this method (Caliendo and Kopeinig, 2005).

The advantage of KBM is the achievement of reduction in variance because of the application of more information;however, a major setback is the possibility of using observations with bad matches. Hence, a major consideration and importance of this method is the "proper imposition of the common support condition" (Caliendo and Kopeinig, 2005). It was noted by Smith and Todd (2005), that kernel matching can be seen as a weighted regression of the counterfactual outcome on an intercept with weights given by the kernel weights.Weights as referred here, depends on the distance between each unit of the untreated group and the treated group from where the counterfactual is estimated. It is noteworthy therefore, that the choice of kernel function and the bandwidth parameter is a necessity when choosing kernel matching (Silverman, 1986).

e. Weighting on Propensity Score

As the name implies, a balanced sample of participating units and control units could be obtained by using propensity scores as weights (Imbens, 2004). There can be a direct implementation of the estimator provided the propensity score is known as the change in untreated individual. It brings to the fore how propensity scores are estimated when weighing estimators are implemented (Zhao, 2004). Hirano and Imbens (2002), suggested a combination with regression adjustment as a direct way of implementing the weighting on propensity score estimator.

2.3.2 Double Hurdle Model

The double-hurdle model was originally articulated by Cragg (1971), based on the assumption that individuals make two decisions with respect to participation and amount to be expended. As the name suggests, two hurdles must be crossed with the assumption that two consecutive decisions are undertaken by farmersindependently regardingcredit market participation. Farmers make decision on (i) credit demandwhich is access to credit and (ii).credit amount which is the amount of loan

obtained or received. There is need for a farmer to cross the "first hurdle" which confirms credit access decision before the second hurdle, which dictates the extent or intensity of credit use in terms of the loan amount obtained.

There are two equationsthat formed the components of the double hurdle model as follows:

$$d_i *= Z_i'\alpha + \varepsilon_i \tag{2.3}$$

$$y_i* = \beta'\text{Xi} + \mu_i \tag{2.4}$$

$\begin{pmatrix} \varepsilon_i \\ \mu_i \end{pmatrix} \sim N\left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & \sigma^2 \end{pmatrix}\right]$ The diagonality of the covariance matrix reveals the assumption of independent distribution of the two error terms.

Equation (2.3) is the participation decision in the credit market, the decision by farmer to access credit or not represented by an indicator function ($d_i *$) whered_i^* is the unobservable indicator variable that determines whether farmer i access credit (d_i^*=1) or (d_i^*=0), α is the vector of unobserved parameters to be estimated, Z_i^* is the vector of observed explanatory variables explaining the credit use status of the individual and ε_i is the unobserved random variable capturing all factors other than Zi that influence credit use.

Equation (2.3), the first hurdle implies that farmer i will access credit if $\varepsilon_i > -\alpha Z_i'$, and the probability of observing farmer i access credit is $P(\varepsilon_i > -\alpha Z_i')$.

The second model estimated the individual's intensity of credit access, that is the amount of loan obtained represented by a function as in equation (2.4) as reproduced below:

$$y_i* = \beta'Xi + \mu_i$$

Where y_i* is alatent[2] variable that shows the intensity of credit access or the credit amount obtained by the farmer- a measure of latent demand for credit- where β' is a vector of unobserved parameters to be estimated, Xi is a vector of independent covariates that explain individual i's choiceof credit amount. μ_i is an unobserved

_____

[2] Heckman (1979) defined latent variable as a variable that may or may not be directly observed.

random variable capturing all other factors besides Xi that influence the decision about the amount of credit. The function describes the process that generated observed intensity of demand for credit, for example how much of credit is being obtained by the poultry farmers. Equation (2.4) is referred to as the "Second Hurdle".

The assumption that the decision to use credit does not really matter was relaxed by the double hurdle model, which is the limitation of Tobit model in determining why no demand for credit was made, havingattributed the access to credit, the first hurdle of credit market participationto the second hurdle which is the amount of credit received and those with zero access to credit means no demand forcredit was made (Humphreys et al., 2010). It includes the possibility of no demand of credit at all byfarmers P ($\varepsilon_i >$ - α'Zi) < = 1. If both ε_i and μ_i are distributed normally and the mean of independent random variables is zero with constant variance, the double hurdle model would have a likelihood function stated below:

$$LogL = \sum_0 \left[1 - \emptyset(z_i{'}\ \alpha)\emptyset\left(\frac{\beta{'} X_i}{\sigma}\right)\right] + \sum_+ \ln\left[\emptyset(z_i{'}\ \alpha)\frac{1}{\sigma}\emptyset\left(\frac{y_i - \beta{'} X_i}{\sigma}\right)\right] \qquad (2.5)$$

The double hurdle model gives allowance for differences between the observable and unobservable factors that affect credit use (ε_i , $Z_i'\alpha$) and those that affect the intensity of credit (μ_i , $\beta{'} X_i$). Since Z_i' can contain variables not in Xi, the double hurdle model permits for some level of independence with respect to how some variables can affect only the decision to use credit and not the intensity or magnitude. Consequently, the marginal effect of independent variables, estimated in order to indicate the probability variation if the dependent variable changes by a unit and subsequently estimate the average marginal effect for the whole population.

$$ME = \frac{\partial P_i}{\partial X_i} = \frac{e^{\beta{'} X_i}}{\left(1 + e^{\beta{'} X_i}\right)^2}\beta_i \qquad (2.6)$$

Elasticity of dependent variables is calculated as:

$$E_{xi} = \frac{\partial \wedge(\beta{'} X_i)}{\partial X_i}\frac{X_i}{\wedge(\beta{'} X_i)} = \frac{e^{\beta{'} X_i}}{\left(1 + e^{\beta{'} X_i}\right)^2}\frac{X_i}{\wedge(\beta{'} X_i)_i} \qquad (2.7)$$

Where E_{x_i} shows elasticity of ith variable and represents logistic cumulative distribution function.

2.4   Summary of Reviewed Literature

The reviewed theories reveal preference borne out of rationality of individualswith respect todecisions guided by the choice that givesmaximum satisfaction. There is a degree of deliberation and thoughtfulness in credit decision from both the supplier and the users of credit, such that the decision to either use credit or not, where to source for the credit, amount of credit, what to use the credit for either investment, production, consumption or savings are based on which of the alternatives offer the most utility; having formed a subjective expectation of the outcome of each possible course of action. Furthermore, the preference of a credit supplier is revealed in the lending decision theory such that not all that demand credit get and not all the amount demanded is given out in all situations but guided by the most beneficial option of profit maximization and business continuity as revealed in credit rationing. It therefore shows that credit access will continue to be a mutual beneficial interaction between the credit users and the suppliers.

In addition, individuals are not just concerned about the present but the future, with respect to continuity in production and livelihood that assures consumption throughout life time as shown in the life cycle hypothesis. Poverty literature (Dunn, 1994; Barret and Swallow, 2006; Bourguignon, 2002; Awotide*et al*., 2015) emphasized a shift of attention from income poverty or consumption deficiency but also of assets deficiency based on the background that individuals may have enough income for immediate consumption but poor if there is no stock of assets to guarantee the same level of consumption at another time, especially when there is no additional income or inflows for a certain period of time. Many empirical studies havefound out that when traditional measures which are income-based standards are employed to calculate poverty rate, asset poverty rate is always higher. Most farmers lack capacity or buffer required for sustenance in the event of a loss, shrivelled income or ill health and though they may have enough in the present, in the real sense, they are poor. Assets potentially contribute greatly to social standing of individuals and its enhancement; its accumulation can go a long way in assisting to position an individual to benefit more

from intervention and take on new opportunities. The need for asset poverty measurement among poultry farmers therefore gives more complimentary information and a holistic view of the poverty status rather than income poverty status alone.

Credit canbe used as a catalyst to increase capacity, which in turn can increase income level, such that income generated could be used to cater beyond immediate needs where individuals or farmers are be able to save and build up assets for future consumption and cater for other future needs irrespective of productioncircumstances. However, credit amount is important if meaningful transformation is expected to take place; with respect to capacity and the enhancement of farmers, many farmers still operate below their potentials, as reported in literature because credit access and amount are still generally low. For there to be a stock of resources, income flow of resources must be accumulated, income generated from productive activities should be increased beyond immediate consumption to cater for the future. The asset accumulation status of farmers,beside income and consumption are a reflection of the capacity of farmers. Question then is, how helpful is credit especially among those with access? and to what extent has credit access helped in terms of the accumulation of resources for future stability towards meeting their consumption and production needs for the present and the future?

An impact study is not just concerned with examining the differences in the means outcome of varying groups with common denominators. In this case, groups of those that access credit or not to explain observed difference but that there are other factors which may be responsible. For instance, this study looked at how access to credit has impacted the level of asset accumulation of farmers in the study area; there are other possible factors that may also be responsible apart from credit access. The average impact of credit (which is the treatment here) on the group of poultry farmers can be obtained by comparing with another similar group of poultry farmers who do not use credit in order to give an unbiased and consistent evaluation of the credit impact on asset accumulation of credit users.

2.5   Conceptual Framework

Figure 2.5 shows the concept of credit as an important component in asset accumulation of farmers, such that the accumulated assets can also be transformed and

utilized for future production or consumption even when there is no income in the immediate.

The conceptual framework was developed to explain the interactions between demand and supply of credit in a way that informs asset build up. Studies on credit (Olagunju, 2010; Ayaz and Hussain, 2011; Sanusi and Olagunju, 2013; Awotide*et al*., 2017) explain factors influencing the demand of credit (Durojaiye*et al.*, 2014; Okpara, 2017), the credit-rationing behaviour of lenders (Stiglitz and Weiss, 1981; Awunyo-Vitor *et al*., 2014) as well as its impact on farmer's income (Ibrahim and Bauer, 2013; Abdallah *et al*., 2018) and asset accumulation (Manlagnit, 2004; Beverly *et al.*, 2008). Access to credit provides greater incentives and opportunities to improve the capacity to increase farmers' investment level and enhance theirproduction through the use of improved technology, purchase of better stock, infrastructure and modern management practices with subsequent influence on output and income (Awotide*et al*., 2017). An increase in the output and income level will enable better consumption smoothening in the face of shocks as well as boost coping strategies through savings and the accumulation of assets (Mukasa *et al*., 2017).

Awareness is essential to credit framework (Nguezet*et al*., 2012). It is a prelude to gaining access into credit market participation as the decision to use credit cannot occur without it. Lack of awareness therefore can cause individuals to assume rejection and be excluded from the credit market (Claessens, 2006). Credit information gathering on source, cost, features, lenders' characteristics as well as self-appraisal or characteristics of the borrower before the decision to demand credit are considered. The choice of making credit demand, access and utilization is a chain formation that constitutes behavioural outcomes through the analysis of personal, socio-economic, institutional and other related factors that might significantly influence credit (Nguezet*et al*., 2012). Farmers therefore make choice with respect to deciding for credit or not, the amount, source, purpose,drawing on the option or a combination of options with the most utility (Awunyo-Vitor *et al*., 2014). The demand for credit is aimed at augmenting equity resources to strengthen production activities as well as increase output level through the conversion of opportunities for growth using modern technology and better infrastructure (Abdallah, 2016; Okpara, 2017).

It is the choice and decision of farmers to demand for credit based on projected benefits to be derived from improved productivity levels as well as enhanced income (Awotide*et al*., 2015). Some farmers may still be limited and not allowed to participate in the credit market despite applying for credit, either by outright refusal or when offered a lesser amount than what was applied for, which is consistent with the credit rationing theory (information asymmetry and adverse selection) leading to two groups of borrowers of those with credit and those without (Ololade and Olagunju, 2013). There exist therefore differences in the allocation of resources among the two groups that further influence which activities to undertake,the management practice to embark on, size of farm and other production decisions. Suppliers of credit tend to ration, leaving some farmers credit constrained (Akerlof, 1970; Jaffee and Russell, 1976) as a result of "asymmetric information and adverse selection" that occurs within credit market.

Farmer can choose to request or make a demand for credit while the lender decide to grant the requested credit amount fully, partially or none at all, the circumstances surrounding this scenario is presumed to be influenced by the characteristics of both the supplier of credit and the borrowers (Awunyo-Vitor *et al*., 2014). This has an adverse effect on the farmers' investment and expansion programmes, as well ason the output and income level which by extension influence the consumption, savings and asset accumulation level (Petrick, 2005).

Preference for credit demand and utilization for investment in production activities is premised upon the rationality behaviour of an individual with respect to making choices that result in the optimal level of benefit throughout lifetime (Awotide*et al*., 2015). Improved production, enhanced output level and increased income are expected as an outcome of access of farmers to credit (Awunyo-Vitor *et al*., 2014). There is a relationship between investment level in a production activity and the output as well as the income level (Zeller and Sharma, 2002). Therefore, the transformation of income (flow of resources) into stock of resources (assets) can only be made possible ifconsumption needs in the immediate are taken care of. In other words, resources can only be stocked where there is an increase in saving, which is an indication of better consumption smoothening and steady flow of resources resulting from improved output level that can be sustained if farmers consistently produce. However, with the

low level of income, coupled with liquidity constraints, savings and asset accumulation to meet future needs, support production or consumption activities will not be made possible (Olaoye*et al*., 2011; Nouman*et al*., 2013; Ololade and Olagunju, 2013; Adeyonu*et al*., 2017).

Whenever there is low resource holdings or low asset stock that could be converted in the immediate for necessary support, potentials for growth and development are limited (Sawada, 2002). The need to provide consumption for the future, provision of security against emergencies and generate income are some of the behavioural considerations regarding savings (Beverly *et al.*, 2001). The study conceptualized asset accumulation as a spin-off on farmers' participation in the credit market, such that farmers who use credit are not liquidity constrained as there exist an increased amount of money available to convert opportunities, to improve output and enhance income level which subsequently leaves a positive effect on savings and by extension asset accumulation (Awunyo-Vitor *et al*., 2014; Mukasa *et al*., 2017; Abdallah *et al*., 2018).

```
┌─────────────────────────┐                    ╭──────────────────╮
│ Farmer'ssocio-economic  │                    │ Features of      │
│ characteristics,Awareness│                   │ lending          │
│ Environmental factors   │                    │ institutions     │
└─────────────────────────┘                    ╰──────────────────╯
            │                                           │
            ▼                                           ▼
    ┌───────────────┐                          ┌───────────────┐
    │ Credit Demand │──────────────────────────│ Credit Supply │
    └───────────────┘                          └───────────────┘
                              │
              ┌───────────────┴───────────────┐
              ▼                               ▼
    ┌────────────────────┐         ┌────────────────────┐
    │ Credit Unconstrained│         │ Credit Constrained │
    │ Farmer/ Access     │         │ Farmer/ No access  │
    └────────────────────┘         └────────────────────┘
              │
              ▼
    ┌────────────────┐          ┌────────────────────────────┐
    │ Resource       │◀ ─ ─ ─ ─ │ Flock size,                │
    │ allocation     │          │ Expenditure on input       │
    └────────────────┘          │ Infrastructure             │
              │                 │ Management practices, marketing│
              ▼                 └────────────────────────────┘
    ┌────────────────┐
    │ Improved Output│
    └────────────────┘
              │
              ▼
    ┌────────────────────────┐
    │ Increased income for farmers│
```

43

Figure 2.5Conceptual Framework of Credit Impact on Asset Accumulation (Adapted from Awunyo-Vitor, 2018).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1   The Study Area

The study was carried out inSouthwestern Nigeria made up of Oyo, Ogun, Osun, Ekiti and Ondo States.

An impressively large number of commercial poultry production is located in South-West Nigeria, more than 65% of Nigeria's commercial poultry is estimated to be located in the region, while 25% is based in South-South and South-East geo-political zones.The balance of 10% or less of Nigeria's commercial poultry is based in the North-Central, North-West and North-East States (PAN, 2015). Southwest lies on longitude 20 48' - 60 0' E and latitude 50 5' - 90 12'N; shares borders with the Republic

of Benin in the west, Kogi and Edo States in the east, and Kwara State in the north, its coast in the south lies on the Gulf of Guinea on the Atlantic Ocean. Southwest Nigeria is geographically located around 114,271 kilometres square in about 12% of Nigeria's total land mass, with a typical rainforest vegetation and an estimated population of 46.7 million people (Ogundipe*et al*., 2019).There are two seasons (i) dry season that is from (November to March) and (ii) the rainy season (April to October). Agriculture remains the major occupation of the inhabitants, other activities engaged by the people are trading, carpentry, food vending, fish smoking, hair dressing, marketing, tailoring,food production and processing.
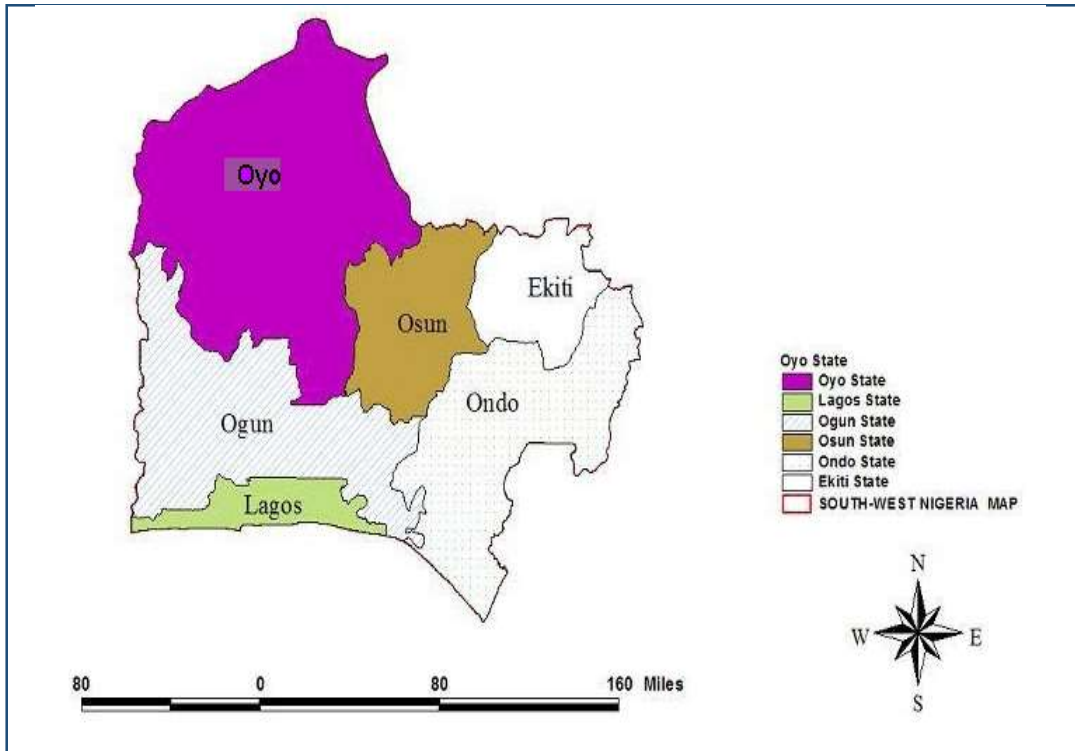
Figure3.1Map of Southwestern Nigeria

3.2   Method of Data Collection

The data for this study were obtained through primarily source. Data collection was done electronically by Computer Assisted Personal Interviewing (CAPI) using Surveybe Implementer softwareowing to its desirable benefits above the Paper Assisted Personal Interviewing (PAPI) data collection methodon socio-economic characteristics, farm and financial source data, farm resources, input usage, loan data, loan repayment, formal credit records, production capacities, marketing and sales of output, revenue, credit access, asset accumulation, food security and others. The questionnaire was configured using Surveybe and then loaded on to the device. The enumerator read the questions to the respondent, and imputed the responses directly into the device. This electronic data capture approach was adopted and used in this survey to give room for immediate data retrieval during analysis.

Furthermore, a focus group discussion (FGD) was organised at two locations in each of the selected states, with a group of 8 and 10 farmers respectively for interactive sessions. This is aimed at generating views, opinions and for gaining insights into the perception, needs, problems, beliefs and reasons on various issues pertaining poultry production in the study areas. Issues on credit use with respect to sources, preferences, availability,and asset ownership, information exchange in the industry, production management, market, disease prevention, product prices, association membership and extension services were deliberated on. The outcome of the FGD provided explanations for some observations regarding the behaviour and attitude of farmers toward credit, sources of credit, access to capital and support services, government policies, government intervention funds, lending institutions, extension services, and association membership, marketing strategies, disease management, loan default, information sources, challenges and possible solutions.

3.3   Sampling Technique

The sample frame was the registered list of commercial poultry farmers with the Poultry Association of Nigeria (PAN), South West. Commercial poultry farmers in this context are farmers that raise birds for the purpose of selling the products (egg or chicken meat)in exchange for money, irrespective of the flock size. A rapid identification survey was conducted on 2,376 poultry farmers drawn from the PAN

registrationlist for verification; 1,358 farmers were found still involvedin poultry business and available at the specified locations as registered.

The sample selection was done using a three- stage sampling procedure. Firstly, two states (Oyo and Ogun) were purposively selected among the six South Weststates based on prevalence of poultry production. Secondly was the purposive selection of six and four local government areas (LGAs) from Oyo and Ogun States respectively,based on the concentration of poultry farmers among other LGAs in each of the states.Oyo State has 33 LGAs while Ogun has 20. Thirdly and finally was the selectionof fifty-five poultry farmers randomly from each of the 10 LGAs that were selected to make a total of five hundred and fifty (550) poultry farmers, for flexibility in ensuring that a minimum representative sample for the study was achieved. However, five hundred and thirty-nine poultry farmers (539) were eventually used for the analysis of the study. The local government areas selected for the survey were: Iddo, Afijio, Atiba, Oyo West, Oyo East and Oluyole LGAs (Oyo State), while in Ogun State, the LGAs were Ijebu North, Ijebu Ode, Abeokuta South and Ewekoro,due to large presence of poultry farmers.

Data collection was carried out between May and July 2017 through direct questions to the farmers during their normal production period. Output -meat, eggs, spent layers- were converted into monetary value, using individual selling prices. The cost of labour, feed, veterinary services, drugs, vaccines, chemicals, rent, and services were collected and aggregated for individual farmer. Fixed costs including the cost of buildings, cages, feeders, drinkers, incubators, dressing machines, beak trimmers, heaters, vaccinators, sprayers, motorcycles, and bicycles were also collected. Information such as the initial cost of available resources, estimated current cost and expected useful-life, productive assets, household assets, livestock owned, remittancesand other sources of revenue or income were gathered for the analysis of the farmer's net worth. The depreciation of the fixed assets was considered in the cost and returns analysis in poultry production.

3.4   Method of Data Analysis

Descriptive statisticsuch as frequency distribution, mean, standard deviation, percentages, was used to analyse the socio-economic characteristics of the farmers. The Double Hurdle Model was used to examine factors influencing credit access and its intensity. T-test statistics was used to testif the difference between the asset accumulation of farmers that accessed credit and those that did notwas significant or not. Asset poverty status was measured using the Foster-Greer-Thorbecke (FGT) model to give a summary of asset poverty incidence, gap as well as the severity of poverty among poultry farmers in the study area. Propensity score matching was used to estimate the impact of credit access on the asset accumulation of poultry farmers in the study area, by comparing the asset accumulation of farmers with credit access and those without credit access conditional on some observable characteristics.

3.4.1   Model Specification and Estimation

Descriptive statistics was employed for the analysis of the level of credit use among the poultry farmers in the study area to describe the frequency distribution by showing patterns of credit use, credit amount and the socio-economic characteristics. These include age, sex, marital status, household size, educational level, years of experience, enterprise type, management type, farming status, flock size, labour engagement, account relationship and association membership in the study area. (Awoyinka and Adeagbo, 2006; Okunade, 2007; Duflo*et al*., 2008; Fletschner, 2009; Saleem *et al*., 2010).

The decision of a farmer to use credit stems from making a choice that maximises the most utility. Adapting the general utility model as presented byVojáčekand Pecáková(2010), the utility U of the alternative decisions k to use credit or not for farmer i can be expressed as alinear combination of factors, which are represented by X_k with parameters β_k and the unobserved random factors ε_k. Given a choice of set k of credit decision, farmer *i* will make decision based on the choice that maximises utility after attaching a perceived utility to each provided alternative. The theory assumes non-satiation and rationality on the part of the decision maker; that an individual will always prefer more to less because of rationality, which further reinforces the choice of an option above the other. This invariably means that the utility that is obtained from the option that was chosen is more than the utility of the

other alternatives that were not considered; the utility derived from the chosen option therefore will depend on its features and that of other available choices (Rungie*et al.*, 2012).

The general utility model is expressed as follows:

$$U_{ik} = \beta_{ik} X_{ik} + \varepsilon_{ik} = V_{ik} + \varepsilon_{ik} \qquad (3.1)$$

K	=	alternative decisions to use credit takes the value of 1 and 0 otherwise.
U_{ik}	=	utility that farmer i gets from the choice of alternative k
β_{ik}	=	unobserved parameters to be estimated
X_{ik}	=	socioeconomic and institutional characteristics
ε_{ik}	=	random error term
V_{ik}	=	systematic utility that poultry farmer i gets from the choice of alternative k.

Therefore, the deterministic component of utility with respect to a farmer's decision to use credit or not is a function of the hidden features of the farmer's individual preference and specificattributes (Awotide*et al.*, 2015).

$$V_{ik} = \beta_{ik} X_{ik} \qquad (3.2)$$

According to Vojáček and Pecáková(2010), if the option with greatest utility is chosen by the farmer, then the likelihood or probability (π_{ik})of selecting alternative k over alternative k' is therefore expressed as:

$$\pi_{ik} = P(V_{ik} + \varepsilon_{ik} > V_{ik} + \varepsilon_{ik}) = P(\varepsilon_{ik'} - \varepsilon_{ik} < V_{ik} - V_{ik'}) \qquad (3.3)$$

π_{ik}	=	Cumulative frequency distribution of a random variable $\varepsilon_{ik'} - \varepsilon_{ik}$
P	=	Probability
V_{ik}	=	unobserved parameters to be estimated of decision to use credit

$V_{ik'}$ = unobserved parameters to be estimated of decision not to use credit

ε_{ik} = random error term of decision to use credit

ε_{ik}' = random error term of decision not to use credit

It explains that the satisfaction derivable from a good directly influences its demand; while the decision to demand and use credit is not absolutely dependent on the characteristics of the farmer, there are other factors beyond the farmer that determine credit use. These include credit availability, price, characteristics of the lender, socio-economic factors, institutional factors, and environmental factors (Abula and Agada, 2013; Ibrahim and Bauer, 2013; Filli*et al*., 2015).

Objective 1: Assess the level of asset accumulation among poultry farmers in the study area by examining the difference between asset accumulation of farmers that use credit and those that did not use credit, using the test of mean's difference to show if there exist any significant difference. The value of assets accumulated by credit users and non-credit users were disaggregated into productive and household assets so that comparison could be made with respect to average assets accumulated per farmer.

Productive assets can be described as assets that are acquired for use in generating income while household assets are stock of resources acquired or owned by farmers but not primarily for income generation or production purposes. These include fixed and non-fixed assets. Fixed assets are acquired for use in revenue generation and productive operations; they are usually required for long term purposes, not easily converted to cash and more often than not, fixed assets last longer than a year. Household assets on the contrary are categorized as assets that are not used primarily for income generation by farmers, could also be fixed or non-fixed such as liquid assets (financial assets are excluded for the sake of this study due to data limitations). Household assets can be easily converted to cash. Generally, assets depreciate gradually over their useful life, thereby reducing their value.

Productive assets are calculated to be the total net worth of all income generating activities which includes the total value of flock (poultry), production equipment[3], raw materials as stock, other enterprise fixed assets and materials. The net worth of productive assets is the market value of all productive assets minus current liability which are all formal or informal unpaid debts. Other non-productive or household assets considered in the study include jewellery, bicycle, furniture, benches, telephone, wooden cots, the total market value of house, chairs, stove/cooker, radio/television,tables, bed/mattress,tape recorderand other valuable household assets; also measured as the net worth of household assets (see appendix for list of items). The market value of the assets was measured by asking "how much would you have received in exchange if you were to sell any of these items today? How much do you think it's worth?" (Awotide*et al.*, 2015).

Test of mean's difference was used relative to normal distribution and specified below:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \qquad\qquad (3.4)$$

t	=	t-statistics
$\bar{x}$	=	sample mean
s^2	=	standard deviation of the sample
n_1	=	sample size

Hypothesis Testing:

To test if the level of asset accumulation among poultry farmers that use creditand poultry farmers that do not use credit in the study area were the same.

Null Hypothesis (H_0): The level of asset accumulation among credit user poultry farmers is less than or equal to the level of asset accumulation of non-credit user poultry farmers.

---

[3]Depreciation cost of fixed assets was used in the analysis to factor in reduction in value based on wear and tear,initial cost, estimated current cost and the expected useful life.

Alternative Hypothesis (Ha): The level of asset accumulation of a credit user poultry farmer is greater than the level of asset accumulation of a non-credit user poultry farmer.

Where: H_0 is the null hypotheses, Ha is the alternative hypothesis

ALCU is the asset accumulation[4] level of credit using poultry farmers.

ALNCU is the asset accumulation level of non-credit using poultry farmers.

Objective 2: Following the works of Cragg (1971); Jones (1989); Newman *et al.* (2003); Moffatt (2003) and Brad *et al.* (2010), the Double Hurdle Model was used to isolate factors influencing credit access and its intensity among poultry farmers in this study.

The first model estimated the probability of the farmer's use of credit and thereby predicted a two-fold result of the regressand from set of regressors. The choice of this method is premised on its conventionality especially as it concerns statistical analysis with dichotomous variable outcome (Hosmer and Lemeshow, 2000), measured as 1 or 0, where 1 = credit access and 0 = no credit access. Estimation result was then used to identify factors that significantly contribute to the probability of credit use (Y=1).

$$Y = \beta_0 + \beta_i X_i + e_i$$

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \cdots + \beta_{13} X_{13} \qquad (3.5)$$

Where,

Y is dichotomous dependent variable which takes 1, if farmer used credit and 0, if farmer did not use credit

β_0 = Intercept

β_i = regression coefficients that explicate the possibility of credit use by poultry farmers

e_i = error term

X_i = Independent variables (1,2, 3……13) as defined below

---

[4]Asset accumulation disaggregated into productive and household assets.

X_1 =   Age in years (years)

X_2 =   Square of age to capture the life cycle effect

X_3 =   Sex (dummy: male =1 and female = 0)

X_4 =   School years (number of years spent acquiring formal education)

X_5 =   Vocational Training (dummy = 1 if farmer attended any training that emphasizes skill or knowledge for the poultry farming; 0 otherwise)

X_6 =   Per capita asset value (ratio of total asset measured in naira value to the household size)

X_7 =   Marital Status (dummy: married =1, 0 otherwise)

X_8 =   Account relationship with financial institutions (dummy: yes = 1, 0 otherwise)

X_9 =   Production enterprise (dummy: egg=1, 0 otherwise; meat =1, 0 otherwise; both = base)

X_{10} =   Flock size (number of birds)

X_{11} =   Source of labour (dummy: family =1, 0 otherwise; hired =1, 0 otherwise; both = base)

X_{12} =   Total Income (Naira)

X_{13} =   Secondary Occupation (Dummy= if a farmer is engaged in other income activity, 0 otherwise)

In a bid to generate unbiased parameter, diagnostic tests were performedto check for the existence of multicollinearity among the covariates which could badly undermine the parameter estimates of the regression models. Diagnostic testbecomes essential because of the underlying assumption that available data rarely conform exactly to the background theory of the applied model (Greene, 1997).

The list of selected independent variables as well as the*a-priori* expectations for the double hurdle model are as shown inTable 3.2.

Table 3.1 List of Independent Variables and *A-priori* Expectations

Independent variables	A priori expectation	Source
Age in years	+	Asante-Ado et al., 2016; Akugudu*et al.,* 2009; Mpuga, 2004; Zeller, 1994.
Age Squared	-	
Sex	+, -	Biyase and Fisher, 2017; Nikaido*et al.,* 2015; Ololade and Olagunju, 2013; Akugudu 2012; Oyedele*et al.,* 2009
School years	+	Nikaido*et al.,* 2015; Otunaiya*et al.,* 2014
Vocational Training	+	Deekor and Adekola, 2017
Per capita asset value	+	Biyase and Fisher, 2017; Gilligan *et al.,* 2005; Sorokina, 2013;
Marital Status	+	Ololade and Olagunju, 2013
Rel. with Fin. Insti.	+	Akugudu, 2012; Akran*et al.,* 2007
Production Enterprise	+	Bamiro*et al*., 2008; Ewubare and Ozar, 2018
Flock Size	+	Otunaiya*et al.,* 2014; Nouman*et al.,* 2013; Saleem*et al*., 2010; Okunade, 2007
Labour engagement	+	Isitor*et al.,* 2014; Olomola and Gyimah-Brempong, 2014

Total Income	+, -	Biyase and Fisher, 2017; Otunaiya*et al*; 2014; Sorokina, 2013; Akpan *et al*., 2013; Gilligan *et al.,* 2005.
Secondary occupation	+,-	Kochar, 1997; Moahid and Maharjan, 2020.

Choice of Variables for the DoubleHurdle Model

The variables included in the model were chosen based on related researches and theories such as Mpuga (2004); Akugudu (2012); Akpan *et al*. (2013) andAwunyo-Vitor *et al*. (2014).

The age of farmer (X_1): included in the modelto indicate maturity as regards capacity to make credit decisions and pay back without default (Akugudu, 2012). It is a continuous variable, defined as the age of the farmer at the time of interview, measured in years for both the first and second hurdles. Age is expected to have important implications on farmer's access to credit as well as the amount of credit got. The relationship is expected to be positive, hypothesized to assume a quadratic function such that the older a farmer gets, so is the experience in the production activities being financed, leading to increased trust and confidence by the lenders regardingability to utilize credit and repay, this thereby enhances the capacity of farmers to accessmore credit. Additionally, farmers' level of vibrancy reduces as they advance in age which by extension affect their engagement economically once they outgrown their economically dynamic age (age squared- X_2), this has a negative influence on their level of credit access and the amount that could be obtained from lending institutions (Mpuga, 2004; Awunyo-Vitor *et al*., 2014). The age squared shows a clearer picture of how credit access status and the amount obtainable change at different values of age.

Sex (X_3): was included in the estimation; the relationship with credit access and amount of credit obtained is hypothesized to be either positive or negative. The variable is specified as a dummy and takes a value of 1, if the farmer is male and 0, if otherwise. It is expected that male farmers have greater or sometimes lesser access to credit than females. Similarly, the amount of credit received by male farmers could be greater or lesser than female farmers (Omonona*et al.*, 2010; Nikaido*et al.*, 2015; Biyase and Fisher, 2017).

School years (X_4): this is the number of years spent in school, and hypothesized to be positive. There is a presumption that the length of years expended in the acquisition of formal education has a positive relationship with farmer's credit access and the amount. Literacy level is adjudged to be a critical factor which influences the level of awareness on credit availability, induces exceptional capacity and human capital positively making it easier to recognise investment possibilities and conversion of opportunities that are made possible through access (Otunaiya*et al.*, 2014; Nikaido*et al.*, 2015).

Vocational training (X_5): This is specified as a dichotomous variable with a value of 1 if a farmer attended training, a proxy for skill or knowledge of poultry farmingand 0otherwise. It is hypothesized to be positive andanticipated that farmers that attended vocational training would obtain more skills for production enhancement. Furthermore, training improves capacity building and the understanding of new technologies which canboth assist in the appropriate use of credit and better appraisal of available credit which will ultimately improve credit access as well as the amount (Mpuga, 2004; Deekor and Adekola, 2017).

Per capita asset value (X_6): This is defined as the measure of asset value by the household size and hypothesized to be positive. A positive relationship is anticipated between credit access and per capita asset value such that, the higher the per capita asset value, the greater the credit access and amount obtainable. However, the household size is a critical factor to the variable;a larger household size will probably shrink the asset value. The consideration of higher asset value for most lenders is the provision of comfort in the occurrence of loan default, borrowers with higher asset value are often viewed to be of lower risk, since the assets can be liquidated in case of

default to offset outstanding obligations or offset debts. (Gilligan*et al.*, 2005; Sorokina, 2013).

Marital Status (X_7):This was included in the model and specified as a dummy variable with a value of 1 for a married farmer, otherwise 0. It is anticipated that married farmers are more stable and often viewed by lending institutions as more reliable. This increases their probability of increased access to credit and the amount of credit as against unmarried farmers. The relationship is expected therefore to be positive as being married makes credit access a probability and increases the amount obtainable (Ololade and Olagunju, 2013).

Relationship with Financial Institution (X_8): This was included in the model and used as a proxy for financial knowledge. It is specified as a dummy, if farmer has operational accounts or savings relationship with a financial institution,it will be 1,but 0 otherwise. The relationship is expected to be positive with credit access and amount. Furthermore, it is anticipated that farmers with operational relationship with financial institutions have better financial knowledge which enhances the understanding of lending requirements and focus of the financialinstitutions with whom they have relationship with. This has implication forthe awareness of available loan products, pricing,improved packaging of loan requests, durationof loan processing andthe turn-around time of loan requests(Awuku, 2009).

Production enterprise (X_9): this is defined as the type of enterprise engagement by a farmer; whether egg only, chicken only or a combination ofchickenmeat and egg production. It is specified as a dummy using combined egg and chicken meat production as a base to be 1, 0 if not. It is hypothesized to be positive, anticipated to have a positive relationship with credit access and amount of credit. It is anticipated that farmers that engage in both egg and chickenmeat production would have increased chances of earning more and are better insured against income loss due to the failure of one enterprise, which offers a positive implication with respect to increased credit access and the amountobtainable. Besides,enterprise combination has more prospects compared tothe sole enterprise of egg or chickenmeat only. Lenders often view combined enterprise as being better equipped to repay loans as a result of diversified or multiple production enterprise, if one source fails, the other source can be relied on to

defray loan obligations instead of a sole enterprise (Bamiro*et al*., 2008; Ewubare and Ozar, 2018).

Flock size (X_{10}): is defined as the number of birds, used as proxy for the farmer's scale of operation. It is classified into different groups- small, medium and large. Large flock sizes are expected to access credit more and also obtain greater amount of credit. A positive relationship is anticipated between the number of birds and access to credit with the amount such that increase in flock size increases credit access probability and amountobtainable (Nouman*et al*., 2013; Otunaiya*et al*., 2014).

Labour engagement (X_{11}): The variable was incorporated in the modelto give an estimate of possible expenditure of the farmer and the magnitude. The relationship between the variable and access to credit with credit amount is projected to be positive. It has implication on labour engagement for production activities, whether family labour only, hired labouronly or a combination of family and hired labour. It is anticipated that medium and large- scale farmers might depend more on hired labourfor production activities, while small-scale farmers might find it a bit convenient to depend on family labour for activities on the farm. The larger the flock size, so is the need for hired labour which by extension increaseswage payment and cost in terms of increased expenditure. Increase in wages might make farmers recourse to credit to meet obligations with respect to the payment of wage and the amount to be expended (Olomola and Gyimah-Brempong, 2014).

Total income (X_{12}): This is defined as total money received by the farmer on a regular basis from production or other investment activities. It is used as a proxy to measure farmer's profitability or ability to self-finance. This has implication on the access to credit and the amount;it is a key consideration for lending institutions. Higher income level is anticipated to lead increase in the access of farmer to credit which also attracts increased amount of credit offerings by lending institutions, implying a positive relationship (Awunyo-Vitor *et al*., 2014). Conversely,increased total income might increase the possibility of a farmer to plough back earned profit or re-invest gains into the business instead of outrightly accessing credit. In addition, the amount of credit may further reduce due to the fact that farmersprefer to use loans to supplement available funds (Akpan *et al*., 2013; Sorokina, 2013; Otunaiya*et al*.,2014).

Secondary occupation (X_{13}): This variable was included in the estimation to measure other earnings aside the poultry production earning activities. It is specified as a dummy 1if farmer engages in other occupation but 0 if not. It is expected that the relationship between credit access and amount be ambiguous, either negative or positivebecause if adequate income is received from the secondary occupation, farmers may decide against accessing credit to sort needs in poultry production at all but rather make use of income received from the secondary occupation. Besides, it is anticipated that income from other sources or secondary occupation could serve as cash collateral, positioning the farmer in a better stead to be able to access credit from lending institutions which might increase the amount of loanable fund or be used to offset debt obligations in the instance of loan default or reneging on loan agreement (Kochar, 1997; Moahid and Maharjan, 2020).

Objective 3: To determinethe asset poverty status of poultry farmers in the study area. The study adapted and made use of the class of decomposable poverty measures by Foster, Greer and Thorbecke (FGT) frequently referred to as the p-alpha (P_α) class of poverty measure, widely used due to its consistency and being "additively decomposable" (Foster *et al.*, 1984). The α in the class of poverty measure as stated is a policy parameter and approximately altered to show asset "poverty aversion" while the P_α class of poverty indices is group decomposable, as mentioned. Furthermore, drawing from Haveman and Wolff (2004), and Awotide*et al.*(2015) the farmer's net worth was also used in the study, defined as the difference between total worth of existing marketable[5] assets and the total worth of the farmer's existing liabilities[6].

As established in earlier studies, asset poverty measurement brings to the open economic advantages which are not conspicuous, viewing from an income poverty point of view. For instance, asset poor households may show deficiency in terms of adequate resources required to overcome unforeseen economic shocks such as a medical emergency from consumption stand point. The asset poverty[7] line was derived as a borderline separating the asset poor farmer from the non-asset poor. In this case, a

---

[5]Marketable assets are a stock of resources that can be converted to cash within a short period
[6]Liabilities are debts owed.
[7]Asset poverty is having insufficient net worth to cover three months of living expenses without income. (Haveman and Wolff (2004); Awotide*et al.*, (2015)

poultry farmer is adjudged asset poor if he falls less the asset poverty line in accordance with asset poverty measurements which is calculated and expressed as "two-thirds of the meanper capita total asset accumulation measured in monetary" terms (in naira, ₦). Following the works of Omonona (2010) and Awotide*et al.*(2015), "a relative asset poverty line" was adopted in this study instead, because of the economic distance induced by inequality in income among the farmers relative to the resources available to them, and how income is distributed between meeting consumption needs and by keeping a little aside for savings that could be converted to accumulate assets afterwards (Adeyonu*et al.*, 2017).

The poverty model (FGT) was used to aggregate information on the asset povertyof poultry farmers in the area of studyand gavesummary snapshots for asset poverty headcount index, gap and the severity index in order to generate asset poverty status.

The FGT index used is given by:

$$P_\alpha = (y, z) = \frac{1}{n} \sum_{i=1}^{t} \left(\frac{z - y_i}{z} \right)^\alpha \tag{3.6}$$

Where

z	relative asset poverty line which is "defined as two-thirds of the Mean Per CapitaTotal Asset Accumulation" (MPCTA)
y_i	The value of poverty indicator/welfare index per capita in this case, per capita asset accumulation of the *i*th poultry farmer.
t	number of poultry farmers sampled below the asset poverty line
n	entire sum of sampled poultry farmers
$z - y_i$	asset poverty gap of the *i*th farmer
$\dfrac{z - y_i}{z}$	asset poverty gap ratio
α	a positive parameter of poverty aversion which could be 0,1 or 2 which is a reflection of social valuation of diverse poverty intensity. Poverty incidence or headcount is 0, poverty depth is 1 while poverty severity is 2.
$\alpha = 0$	equation (3.6) gives the headcount of asset poverty (AP_0)
$\alpha = 1$	equation (3.6) gives the depth of asset poverty (AP_1)

$\alpha = 2$ equation (3.6) gives the severity of asset poverty (AP_2)

Objective 4: To evaluate the impact of credit access on asset accumulation of poultry farmers in Southwestern Nigeria; thePropensity Score Matching (PSM) was used to appropriately establish the counterfactual situation (Cochran and Rubin, 1973; Heckman *et al.,* 1999;Awotide*et al.*, 2015; Yaqoob *et al.*, 2017). This is because it is impossible to observe what would have been the value of asset accumulation of credit user farmers without credit use and vice versa.

The average treatment effect of the treated which in this study is the impact of credit on credit using poultry farmers, is the parameter that is pertinent in PSM, how asset accumulation has changed as a result of credit for credit using poultry farmers. The PSM matches credit using poultry farmers with those that do not use credit on the basis of farmers with similar values of covariates X. Given that the Conditional Independence Assumption (CIA) holds and the common support which is the overlap between both groups of credit users and non-credit users such that the probability of persons being credit users or non-credit users is positive, given that they have the same covariates X (Heckman *et al.*, 1999); the average treatment effect of the treated (ATT) is given as:

$$\tau_{ATT}^{PSM} = E_{\underset{D=1}{P(X)}}\left\{E\left(\frac{Y(1)}{D=1},P(X)\right) - E(\frac{Y(0)}{D=0} = 0,P(X))\right\} \qquad (3.7)$$

τ_{ATT}^{PSM} is the PSM estimator which is the mean difference in the outcomes over the common support that is appropriately weighted by the propensity score distribution of credit users.

$\frac{Y(1)}{D} = 1$ is the actual change in the asset accumulation observed in credit using farmers, $\frac{Y(0)}{D} = 0$ is the change observed in the non-credit using farmers while, $P(X)$ is the propensity score defined as the conditional probability that a poultry farmer will be in the credit using group, given his observed covariates X. In situation where propensity score is used for the matching instead of actual direct matching of the covariates, the challenge of dimensionality is circumvented especially where many covariates are involved (Rosenbaum and Rubin, 1983).

Farmer's use of credit is a dichotomous choice; Y=1 for credit use and Y=0 for no credit use. Farmers' use of creditis based on the perception that the accrued benefit from credit far outweighs not using credit.

Let Y* represent the net benefit from credit such that Y* > 0 shows that the benefit from credit use is greater than not using credit. It is impossible to observe Y* in real terms, but expressed asshown in equation (3.8):

$$Y_i^* = \gamma X_i + \delta_i Y_i = 1(Y_i^* > 0) \tag{3.8}$$

Where:

Y   is abinary indicator variable, 1 if a farmer uses credit, and 0 if not

γ is a vector of a parameter that is to be estimated

Xi is a vector of a farmer's socio-economiccharacteristics and

δ_i is an error term which is assumed to be distributednormally.

The probability of credit use can be expressed as:

$$Pr(Y_i = 1) = Pr(Y_i^* > 0) = Pr(\delta_i > -\gamma X_i)$$
$$= 1 - F(\gamma X_i) \tag{3.9}$$

Where F is the cumulative distribution function for γ_i

Use of credit by poultry farmers is expected to yield increased returns on investments which invariably is expected to lead to increased income and an improved generation of assets accumulation of the farmer (productive and household assets). It is suggested that the more assets owned by a poultry farmer, the wealthier and economically secured he becomes and the more profitable ventures he is able to undertake to improve his livelihood (Awotideet al., 2015).Therefore, credit use is expected to affect a farmer's asset accumulation status as well as the asset poverty level. Thus, the relationship between credit access and asset accumulation is expressed implicitly as:

$$\rho_i = \beta_0 + \beta_i Y_i + \beta_2 X_i + \varepsilon_i \tag{3.10}$$

Where:

ρ_i represents a vector of outcome variable (asset accumulation and reduction in asset poverty) for the poultry farmer i

Xi represents farmer's socio-economic[8] characteristics

π_i is the error term that reflects unobserved characteristics affecting ρ

The specification above in equation (3.10) expresses access to credit as an exogenous variable. Table 3.3 shows the list of socio-economic characteristics considered in estimation of the propensity score used for covariates matching.

---

[8]Socio-economics characteristics as listed and defined in Table 3.3. Rubin and Thomas (1996) on the guide forvariable selection suggested the inclusion of variables that are strongly related to the outcome. Robins *et al.*, (1992); Rubin (1997) and Perkins *et al.*, (2000).

Table 3.2 Socio-economicCharacteristics for Propensity Score Matching

Variable	Description and Definition
Age	Age of the farmer in years
Years of Experience	The number of years the farmer has been engaged in poultry farming
Number of Dependents	Number of people who are reliant on the farmer for financial aid or support
Flock Size	Total number of birds
Total Assets Value	Worthof assets owned by the farmers in naira
Sex	Dummy =1 if farmer is male, 0 0therwise
Marital Status	Dummy =1 if married, 0 otherwise, separated =1, 0 otherwise, Widowed =1, 0 otherwise
Contact Extension	Dummy = 1 shows interaction between farmer and extension agent, 0 if none
Occupation Status	Dummy = 1 if farmer's occupation is primarily poultry farming, 0 otherwise
Association membership	Dummy =1 for a farmer that belongs to an association and 0 otherwise
Vocational Training	Dummy= 1 if farmer attended any training that emphasizes skill or knowledge for the poultry farming; 0 otherwise
Account Relationship	Account Relationship (dummy: yes= 1, if farmer has operational account relationship with a financial institution, 0 otherwise)

Studies have shown that a key variable in credit supply is collateral requirement which involves the availability of an asset that could be used as security before a loan is granted by the lender (Mpuga, 2004; Beck and de la Torre, 2007). A 2-stage least square regression model analysis was therefore conducted to test for a bi-causal relationship between credit and asset accumulation. This is because assets sometimes may serve as collateral for loans which could impose an endogeneity problem of simultaneity bias. An endogeneity problem could arise from a farmer with assets-likely to have access to credit than those without assets-which could be used as collateral to secure loan facility. Checking for endogeneity in this study therefore becomes necessary and important to know with certainty the correct direction of impact, if it is credit that is driving asset accumulation or if it is the other way round and thereby isolate.

Following Imbens and Angrist (1994), it is noted that a farmer's access to credit is an instrument for credit use (which is the treatment variable in this study). First of all, a farmer cannot use credit without having access to it. Furthermore, it is assumed that credit access will affect the income and asset accumulation of the poultry farmers only through credit use (having access to credit without the actual use of credit does not in any way affect the asset accumulation of a farmer). Hence both requirements which validates access to credit status as an instrumental variable for credit use weremet. The outcome of the 2SLS result shows that there was no endogeneity. The wald estimator was not significant Prob > chi2 = 0.1075 with corr =0 showing that there was no endogeneity or simultaneity bias between asset accumulation and credit.

Let z be a binary outcome variable that takes the value of 1, when a poultry farmer has access to credit, and the value of 0 otherwise. Let d_1 and d_0 be the binary variables representing the two-potential use of credit with and without credit access respectively (with 1 indicating credit use and 0 otherwise). Credit access precedes use, therefore, d_0 takes the value of zero for all farmers while the observed credit result given by d = zd_1. Hence, the condition d_1= 1 describes the sub-set of the population of potential credit users and$d$ = 1 (which is equivalent to the condition z = 1 and d_1 = 1)describes that of actual credit users. Assuming, z is independent of the potential outcomes d_1, y_1 and y_0(an assumption equivalent to the randomness of credit access in the population), then

the mean impact of credit use on asset accumulation of the sub-population of potential credit users is as given by

$$E\left(y_1 - \frac{y_0}{d_1} = 1\right) = cov(y,z)/cov(d,z) \tag{3.11}$$

$$= \frac{E(\frac{y}{z=1}) - E(\frac{y}{z=0})}{E(\frac{d}{z=1}) - E(\frac{d}{z=0})}$$

$$= \frac{E[y_1 .(z - E[z_i])]}{E[d_i.(z - E(z_i))]}$$

The PSM estimated each poultry farmer's propensity for credit usewithProbitregression model expressed as a function of farmer's overt characteristics after which poultry farmer that have similar propensities are matched. Propensity score was generated using the probit model and used to create matched samples, so as to balance characteristics between the sampled farmers (Guo and Fraser, 2009) aimed at reducing the dimensions of conditioning which was void of behavioural assumptions.The propensity score was presented in Table 3.4, estimated as 0.2585.

The propensity score (P(x)) is written as:

$$P(x) = \Pr\left(T = \frac{1}{X} = x\right) \tag{3.12}$$

The number of covariates was reduced subsequently until a good match was obtained and influential covariates that determined the participation in the programme were retained. The probit outcome was essential to scrutinize the consistency of causal effect that might likely be influenced by the set of predictors employed in the generation of the p-score as proposed by Smith and Todd (2005). The assessment to check the balance of the PSM matching was conducted using the common support, mean and median before and after matching with histograms to show that the PSM approach assessment used was unbiased and consistent.

Table 3.3 Predicted Propensity Score (P score)

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
Propensity score	539	0.2585	0.1821	0.0003	0.9963

Computing the Impact of the Matching

The Nearest Neighbour Matching (NNM) wasused for the evaluation of the Average Treatment Effect for the treated (ATT) which is the pertinent focus point as far as this study is concerned. Others are the Average Treatment Effect (ATE) and Average Treatment Effect on the Untreated (ATU). The average treatment effect (ATE) is the mean impact of credit on the asset accumulation of population of poultry farmers, average treatment effect on the treated (ATT) is the impact of credit on the asset accumulation of poultry farmers that use credit while average treatment effect on the untreated (ATU) is the impact of credit on the asset accumulation of poultry farmers that do not use credit. This is crucial if credit is to be extended to those poultry farmers that do not use credit. However, since unobserved bias had not been taken care of, the ATE results cannot be used as the impact of credit on asset accumulation.

 The Average Treatment Effect for the treated was calculated as follows:

$$ATT = E\left(Y^1 - \frac{Y^0}{D=1}\right) = E\left(\frac{Y^1}{D=1}\right) - E\left(\frac{Y^0}{D=1}\right) (3.13)$$

Where D =1 represents treatment participation,

$E(\frac{Y^1}{D=1})$ is the observed outcome of the treated, that is the expected asset accumulation of credit-using poultry farmers, while those that did not use credit $E(\frac{Y^0}{D=1})$, is the counterfactual outcome. The counterfactual outcome represents the asset accumulation of non-credit using poultry farmers since they have similar characteristics with those poultry farmers that use credit.

The estimation of credit impact on the asset accumulation of credit users was computed by matching the treated and untreated groups that are nearest in propensity scores. The untreated or control group which in this case is the non-credit users is then employed in the estimation of the unobservable or the counterfactual outcome of credit users. In

this study, credit using poultry farmers are regarded as treated group while the non-credit using poultry farmers are untreated group. The within-match differences in the asset accumulation between poultry farmers that use credit and those that do not is averaged in order to estimate the Average Treatment Effect on the Treated (ATT) as shown:

$$E\left(Y_i1 - \frac{Y_i0}{T} = 1\right) = E\left[E\left(Y_i1 - \frac{Y_i0}{T} = 1, P(x)\right)\right]$$

$$= E\left[E\left(\frac{Y_i1}{T} = 1, P(x)\right) - E(\frac{Y_i0}{T} = 0, P(x))\right] \qquad (3.14)$$

Where:

$E(\frac{Y_i1}{T} = 1)$ represents the expected asset accumulation outcome of poultry farmers that use credit and $E(\frac{Y_i0}{T} = 0)$ represents the expected asset accumulation outcome of poultry farmers that do not use credit. The controlled estimates represent what the asset accumulation of credit users would have been if they had not used credit.

The generated propensity score is shown in Table 3.4 using the probit model. The estimated propensity score became handy for balancing the observed distribution of covariates across credit using poultry farmers and non-credit users while ascertaining the common support region which was sufficient for the two categories of farmers, the differences in the two matched groups were removed. The matching estimator depends on the data and particularly on how well the treated and control groups overlapped as regards the propensity scores. The three main tasks of predicting the propensity scores, the imposition of the distributions of the propensity score of participants with or without credit and the common support were accomplished before conducting the matching estimator. The study provided evidence confirming the use of credit or non-use has indeed contributed any changes in the accumulation of assets among poultry farmers in the study area significantly.

The covariance balancing test estimates (Table 3.6), before and after showed reduction in bias after matching, as expected in PSM with differences observed in unmatched data exceeding matched data. The standardized bias difference between treatment and control samples of credit users and non-credit users was to quantify the bias between

them; the matching process therefore created a degree of covariate balance between the control and treatment samples which was then used for the estimation.

The common support region and elimination of variances in the covariates within the two matched groups were the necessary and pre-conditional issues which guarantees the reliability of the estimations from the treatment impacts as the case may be. The balancing property was set after the common support condition had been imposed (Tables 3.5 and 3.6). The Pseudo-R^2 showed the goodness of fit (Pradham and Rawlings, 2002), from 16.7% variation to 0.4% in characteristics of the treated and control, resulting in significant reduction in bias after matching, an indicator that both treated and control groups have similar characteristics (Table 3.7). Some covariates that exhibited statistically significant difference balanced out after matching. Furthermore, the insignificance of likelihood ratio test after matching lends credence to both groups having similar distribution in covariates X. The common support test (Fig. 4.2) showed a visual representation of the propensity scores reflecting a considerable overlap which indicated a good matching estimate.

Tables 3.5 shows the common support and treatment assignment, the common support region was between 0.0003 and 0.9963. This means that farmers with estimated score outside the common support range were excluded. As a result of this, only 1 farmer was excluded in the estimation of impact computation, an indication that there was no match found among non-using credit farmer with similar characteristics.

The PSM and covariate balancing estimates were shown in Table 3.6. Information regarding the balancing for each of the covariate and propensity scores is presented in Table 3.6showing before and after matching revealed that the standardized bias difference as reflected between credit using and non-credit using poultry farmers was a convenient of quantifying the bias between the treated and control samples. The contrasts in the sample of unmatched data exceeded that of matched samples significantly as shown. A high degree of covariate balance was created by the matching process between treatment and control samples used in the estimation procedure. Furthermore, Table 3.6 indicated that before matching, some variables exhibited statistically significant difference. However,all the covariates as expected in propensity score matchingafter matching balanced off.

Table 3.4 CommonSupport and Treatment Assignment

Common Support Treatment assignment	Off Support	On Support	Total
Untreated	0	401	401
Treated	1	137	138
Total	1	538	539

Table 3.5 PSM and Covariance Balancing Test Estimates

Variable	Unmatched Matched	Mean Treated	Control	%bias	% reduct /bias/	t - test t	p>t
Respondent Age	U	44.54	43.35	11.4		1.16	0.247
	M	44.48	42.56	18.4	-61.4	1.60	0.111
Years of Experience	U	9.62	7.67	26.6		2.97	0.003
	M	9.66	7.85	24.8	6.6	2.10	0.037
Number of dependent	U	2.31	1.99	22.1		2.29	0.023
	M	2.30	2.33	-2.0	91	-0.17	0.868
Flock Size	U	2532.20	4400	-7.3		-0.61	0.541
	M	2547.00	2060.6	1.9	74	1.00	0.317
Total Asset Value	U	6500000.00	25000000	29.6		3.78	0.000
	M	5100000.00	34000000	12.4	58.3	2.87	0.004
Sex	U	0.87	0.91	-12.1		-1.28	0.202
	M	0.87	0.86	2.3	80.9	0.18	0.860
Marital Status	U	0.96	0.89	24.3		2.25	0.025
	M	0.96	0.95	2.8	88.6	0.28	0.777
Extension Contact	U	0.34	0.34	-0.7		-0.08	0.940
	M	0.34	0.35	-3.1	-310.1	-0.25	0.800
Occupancy Status	U	0.72	0.52	43.9		4.33	0.000
	M	0.72	0.71	3.1	93	0.27	0.790
Association Member	U	0.69	0.53	33.1		3.30	0.001
	M	0.69	0.64	9.1	72.6	0.77	0.445
Vocat. Training	U	0.64	0.47	35.9		3.61	0.000
	M	0.64	0.69	-8.9	75.1	-0.77	0.445
Rel. with Fin. Instituti	U	0.91	0.59	78.8		7.19	0.000
	M	0.90	0.92	-3.6	95.4	-0.43	0.670

The distribution of observational bias in Table 3.7 shows a low Pseudo-R^2, however, the likelihood tests confirm the hypothesis of comparable distribution in covariates X by both groups after matching was done. It was obviously shown by the result that the characteristics of both the treated and the matched comparison groups (the control) were properly balanced by the matching procedure. The low Pseudo-R2 value shows fair randomness in the way the treatment has been allocated (Pradhan and Rawlings, 2002). Results indicated that the attributes of treated (credit using poultry farmers) are not divergentwhich makes it easier to obtain a good match between treatment and control farmer. These results were employed for the evaluation of credit impact among groups of farmers with observed characteristics that aresimilar, thereby allowing for the comparison of asset accumulation (which is the outcome of interest) for credit users and the comparison group sharing a common support.

Table 3.6 Distribution of Observational Bias

Sample	Pseudo-R^2	LR $\chi2$ (ρ-value)	Mean Bias
Unmatched	0.167	102.57 (0.000)***	27.2
Matched	0.046	17.55 (0.130)	7.7

***, significant at 1% level.

The joint significant factor of Pseudo-R^2, p>chi2 and common support in Table 3.7 were Pseudo-R^2 and mean bias before matching was 0.167 and 27.2 respectively but reduced to 0.046 and 7.7 after matching; showing a significant reduction in bias resulting from matching, close to zero as expected for the values of Pseudo-R^2 and mean bias. For p>chi2, as expected after matching, it is greater than 0.1, from 102.57 to 17.55, this indicated no statistical difference between treated farmers and the control group of the matched units.

Three criteria were employed to assess the quality of match; these are t-test, joint significance and common support. The t-test values for matched units indicated no statistical difference between the matched groups of the treated and control especially for those mostly with the p>/t/ values being greater than 0.1 (Table 3.6). For instance, the p>/t/ values for unmatched units with respect to respondents' age, number of dependants, sex, marital status, occupancy status, association member, vocational training, relationship with financial institution were 0.247, 0.023, 0.202, 0.025, 0.000, 0.001, 0.000 and 0.000 showing statistical difference but after matching, the p>/t/ values showed no difference statistically, the units became 0.111, 0.868, 0.860, 0.790, 0.445, 0.445 and 0.670 for the same covariates.

The common support test is shown in Figure 3.2 and this is the visual representation of the propensity scores. The graph shows the density distribution of the propensity scores for the credit using as well as non-credit using farmers showing a considerable overlap, most of the treated or credit users were found moderately at the middle and right side while most of the control or non-credit users were found at the centre and partly the left side of the distribution. Figure 3.2 portrays that the matching was a good one. Afterwards, the impact of credit on farmers' asset accumulation was evaluated.
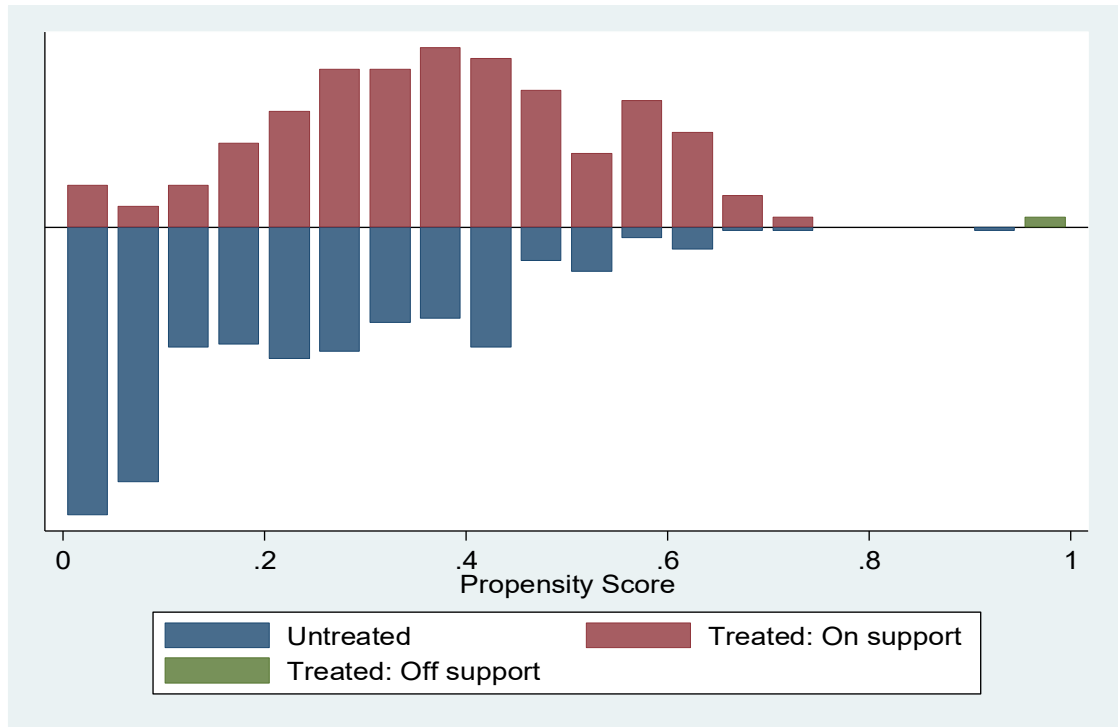
Figure 3.2 Common Support for Propensity Score Matching (P score)

CHAPTER FOUR

RESULTS AND DISCUSSION

There are five main sections in this chapter. Poultry farmers'socio-economic characteristicsas well as the level of credit usein the area of studyis presented in section one. Section two presented the results of the test of mean's difference between the asset accumulation of credit users and non-credit users with the level and type of asset accumulation among the poultry farmers in the study areaDiscussions on empirical results were presented in section three with the estimates of the double hurdle model showingfactors that influence credit access and amount. The asset poverty status of the farmers in the study area were presented in section four. Finally, the discussion on the impact of credit access on the asset accumulation of poultry farmers concluded the section.

4.1   Socio-economic Characteristics and Credit Use among Poultry Farmers in Southwestern Nigeria

An outline of the discussions on the distribution and level of credit use among the poultry farmers across socio-economic characteristics which include sex, enterprise type, age, marital status, household size, educational level, years of farming experience, enterprise type, farming status, flock size, labour engagement, account relationship with financial institution and association membershipisshown in Fig.4.1. Credituse among the sampled poultry farmers in the study area waslow,138 poultry farmers representing 25.7% of the 539 sampleof poultry farmers use credit whereas 74.3%do not use credit.The average amount of credit obtained was ₦831,000 per annum while the maximum amount was ₦12,000,000 per annum. The distribution of credit sources available to the credit-using farmers in the study area is as shown in Figure 4.2 with cooperative societies a major source of credit with 44% and the least was microfinance bank with 6%, others
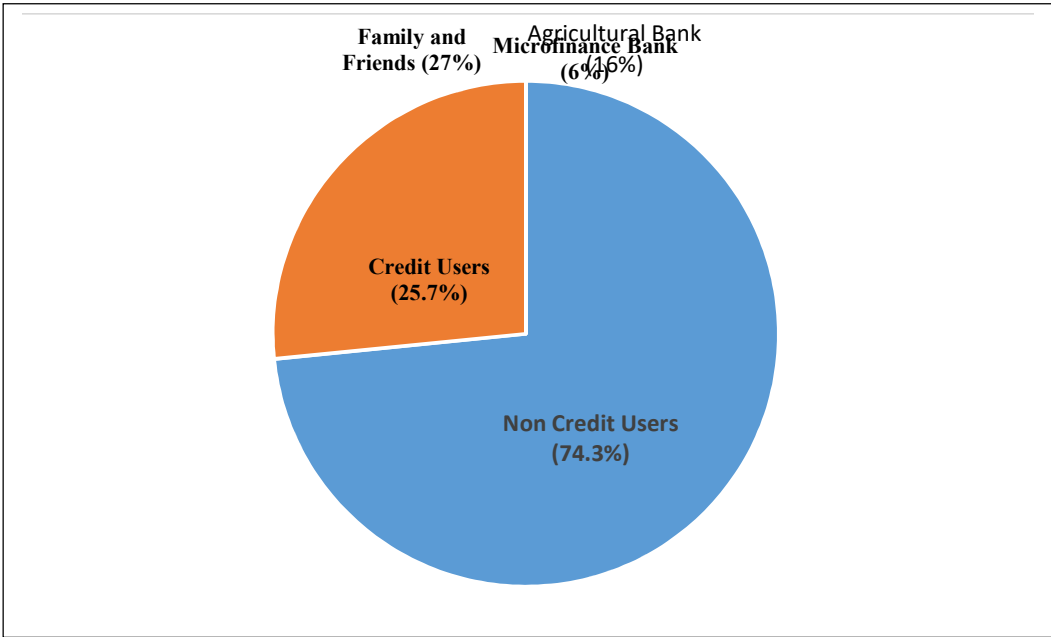
Figure4.1Distribution of sample with credit use

Loan Sources

[Chart showing Major loan source* (blue) and Loan source ever (orange) values]

- Agricultural Bank: 22 (16%), 70
- Commercial Bank: 10 (8%), 57
- Cooperative: 60 (44%), 85
- Family and Friends: 37 (27%), 69
- Microfinance Bank: 9 (6%), 43

■ Major loan source*   ■ Loan source ever
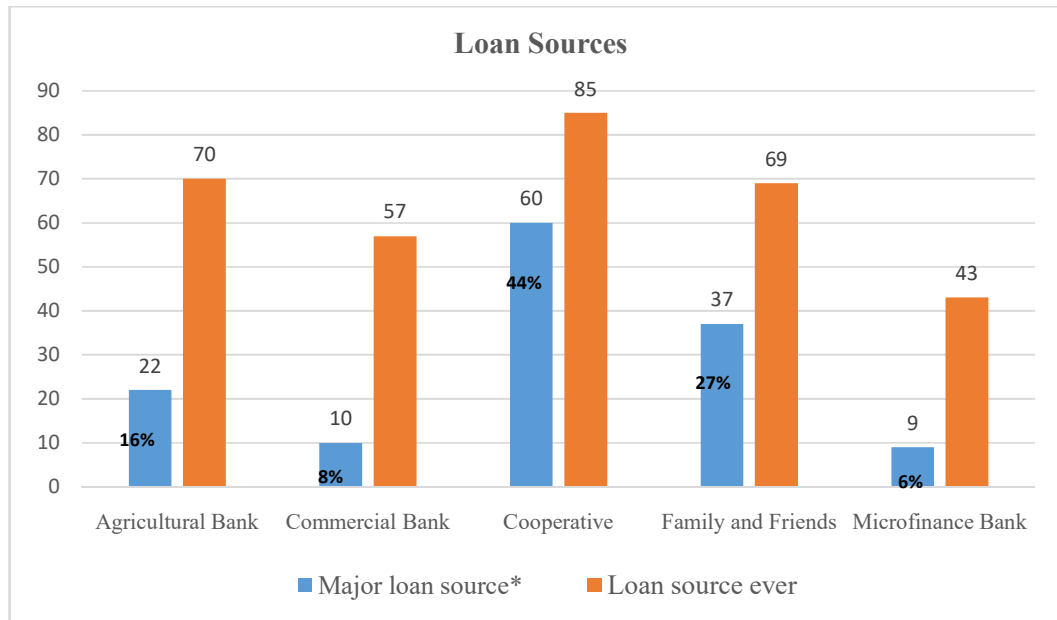
[9]Figure 4.2Distribution of Credit Sources among Sampled Poultry Farmers

[9] Major loan source shows the number of credit users that obtained credit more than once from that particular source of credit. Agricultural bank was a major source of credit to 16% of the credit users (22) among the sampled poultry farmers in the study area, commercial bank was a major credit source to 8% of the credit users, cooperative societies was a major credit source to 44% of the credit users, family and friends was a major credit source to 27% of the credit users while microfinance bank was a major source of credit to 6% of the credit users.
Loan source ever shows the number of credit-users that had everobtained loan from the loan source

were agricultural bank, commercial bank and family and friends. Test of significance using the analysis of variance (ANOVA) was furthermore conducted to checkfor difference between the means of groups of credit users based on their socio-economic characteristics.

4.1.1 Age of Poultry Farmers.

The distribution of ageas presented inTable 4.1 revealedthat one fifth of the sampled poultry farmers were below 35- years while less than 10% were above; showing thatgreater number of the poultry farmers are young witha mean age of 43.7 years, indicative of an active farming population. This result agrees with the findings of Ashagidigbi*et al*. (2011) and Afolabi *et al.*(2014), who had reported an average age of 44 years for poultry farmers in Ogun State.This result supports Olagunju (2010) who had reported that most poultry farmers are young, agile and have the capacity to bear risk considering the nature of poultry business, therebycontradicting Oke*et al*.(2007) that younger farmers are less engaged in agriculture. Similarly, most credit using poultry farmers were found to be in the age bracket of 35-59years, whileolder poultry farmers above 59 years use less credit. This also contradicts Akram*et al*. (2008) and Akugudu*et al.* (2012) that younger farmers are less likely to demand and use credit. The proportion of credit users is less than non-credit users across all age categoriesfor the sample of poultry farmers in the study area.

The level of credit, in terms of the percentage of credit obtained among the sampled poultry farmers in the study area showed variations in the amount of credit received across the age categories. The average amount of credit obtained by credit using poultry farmers between ages 35 and 59 years was₦1,012,313 while the least was by farmers who were 24 years and below. This result agrees with the research findings of Ololade and Olagunju, (2013), andAdeyonu*et al*. (2017) that farmers do not get all the amount of credit requested. Nevertheless, all the sampled poultry farmers that use credit, got more than average of requested credit, which was deemed important according to Nweze (1991) and a great source of encouragement and support for farmers to show that credit is obtainable.The analysis of variance conducted showed

that there is no significant difference among the age groups of credit users with $F_{(4,8)} = 1.14$, $p < 0.05$.

.

Table 4.1 Distribution of Poultry Farmers by Age

Age (years)	Percentage (%)	With Credit (%)	Average	Percentage[10] of credit obtained (%)	Standard Deviation
≤ 24	1.7	33.3	200,000	100	0
25-34	18.2	23.5	533,333	76	258,199
35-59	71.4	25.7	1,012,313	88	1,486,008
≥ 60	8.7	27.7	462,500	60	402,854
Total	100.0	25.7			
Mean	43.7				
Standard Deviation	10.38				

$F_{(4,8)} = 1.14$, $p < 0.05$[11]

---

[10] Percentage of credit shows the proportion of credit requested by the credit using poultry farmers and the amount disbursed/used which is the level of credit obtained.

[11] Accept the null hypothesis (H_0), there is no significant difference among the means of credit users.

4.1.2 Sex of Poultry Farmers

Table 4.2 showing the sex distribution of sampled poultry farmers in the study area revealedthat most of the poultry farmers aremale. This is consistent with research findings from Afolabi (2010) and Nikaido*et al*. (2015),who had observed male dominance in primary agricultural production activities,oftenattributed to its doggedness nature while females are more involved increasingly in processing and off-farm activities (Ologbon*et al*., 2012; Awogboro*et al*., 2019).Similarly, more credit using farmers were male confirming the results of Oyedele*et al*.(2009) and Biyase and Fisher (2017) that less females use credit, whichcontradicts the findings of Olomola and Gyimah-Brempong (2014) that female participation in credit market was higher than male. The higher participation of males with respect to credit use could be linked to reservation of lending institutions to grant loans to female farmers as revealedin the focus group discussions held in the study area where most female farmersreluctantly approach lending institutions for credit, this is also supported by reports from Fletschner(2009),FAO (2015) andWorld Bank (2019).

The level of credit uses according to sex among the sampled poultry farmers in the study area showed that the average amount of credit use by male farmers was 20% more than females. This supports the credit rationing findings of Biyase and Fisher (2017) and Oyedele*et al*. (2009) that being female reduces credit use. In addition, the interaction with the poultry farmers during the focus group discussion also confirms the inaccessibility of credit by female farmers. The low access of credit has implication on the available credit for investment in production activities especially for female farmers as there will be limitation in the expansion plans and the income that could accrue to them. Although, the test of significance conducted showed that the difference in means of male and female credit users is not statistically significant with $F_{(2,4)} = 10.60$, $p < 0.05$ leading to the acceptance of the null hypothesis. The low access to credit by female farmers might not be necessarily be due primarily to the disparity in gender but in combination with other influencing factors.

Table 4.2 Distribution of Poultry Farmers by Sex

Sex (years)	Percentage (%)	With Credit (%)	Average	Percentageof credit obtained (%)	Standard Deviation
Male	90.0	25.2	1,020,143	83	1,504,321
Female	10.0	29.1	849,412	84	750,171
Total	100.0	25.7			

F (2,4) =0.60, p<0.05

4.1.3 Marital Status of Poultry Farmers

The distribution of marital status of sampled poultry farmers presented in Table 4.3 showsmany of the sampled poultry farmers are married, implying that a large number of the poultry farmers have families which require them to be involved in productive ventures to meet their obligations. This finding corroborates Afolabi (2010) who discussed that being married suggests stability andresponsibility.Itfurther shows that married poultry farmers use credit more than poultry farmers that are unmarried and also dominate the categories of poultry farmers that do not use credit. This finding supports Olomola and Gyimah-Brempong(2014) that the proportion of married poultry farmers that use credit and those that do not use credit are higher than non-married poultry farmers. According to Olomola and Gyimah-Brempong (2014), the marriedstatus is an indicator of reputation and reliability which often makes lenders to view married individuals as more dependable when it comes to repayment of loans; this could then explain the higher proportion of married poultry farmers' use of credit. The higher proportion of non-credit use as seen among married poultry farmers in the study area also might not be unconnected to availability of financial support fromspouse rendering the need for credit less considerablein some other instances (Aladejebi*et al*., 2019).

The level of credit uses according to marital status of sampled poultry farmers as presented shows that married poultry farmers who constitute the majority of credit users are also credit rationed in terms of the proportion of credit obtained but not as compared with other poultry farmers who are not married in the study area but use credit. The married category obtained an average amount of₦978,553 with a confidence interval showing the possibility of obtaining more than a widowed farmer would. This result supports Olomola and Gyimah-Brempong (2014), who posited the occurrence of credit rationing among farmers as well as severity among unmarried farmers compared with the married. Furthermore, the result is at variance with the research outcome ofSebopetji and Belete (2009) that unmarried farmers obtain a larger amount of credit when compared with the amount of credit obtainable by married

farmers. The test of significance however revealed that there is no significant difference among the means of different marital status with respect to the credit use; $F_{(4,8)} = 0.51$, $p < 0.05$. The null hypothesis is accepted.

Table 4.3 Distributionof Poultry Farmers by Marital Status

Marital Status	Percentage (%)	With Credit (%)	Average	Percentage of credit obtained (%)	Standard Deviation
Never married	8.2	9.1	864,000	78	839,929
Married	90.9	27.1	978,553	83	1,463,373
Widowed	0.9	20.0	1,000,000	100	0
Total	100.0	25.7			

$F_{(4,8)} = 0.51$, $p < 0.05$

4.1.4 Household Sizeof Poultry Farmers

The profile of poultry farmers by household size as shown in Table 4.4 revealsa mean size of 5 with standard deviation of 1.95 persons per household.Adopting Otunaiya*et al*. (2014)'s family size classification, household sizesof 4-6 constitute a majority of the total poultry farmers in the study area, followed by those with household size of 3 and below, showing a fairly moderate sized farming household (Anyiro and Oriaku, 2007).It was observed that poultry farmerswith household sizesof4 and 6 persons had the most use of credit while poultry farmers with household size 7 and aboveused credit the least in the study area. This outcomediffers fromCampero and Kraiser (2013), who had concluded thatlargehousehold sizesusecredit more because of the need to support members of the household with more resources. Inversely, poultry farmers with bigger household sizes may exploit members of the household ascheap labour in orderto reduce the need for credit associated with labour relatedcostbeing a key determinant in a poultry farmer's profitability, after the cost of feeding as posited by Olagunju(2010) and Aladejebi*et al*.(2019).

The distribution of various levels of credit use in Table 4.4;according to the size of the household among the sampled poultry farmers revealed that the total amount of credit requested was not obtained across the various household sizes, confirming rationing along household sizes as well. In terms of credit amount, household sizes of 4 and 6 persons obtained the highest average amount of credit (₦1,012,313) when compared with other categories. Although the household size of 3 persons and below had the highest proportion, the average amount of credit obtained was one-fifth the average amount obtained by the household size of 4 to 6 persons. Larger household sizes of 7 and above had the least average amount of credit lending credence to Oboh and Ekpebu's (2011) report that large household sizes obtained less credit and was attributed to extra caution on the part of lenders borne out of the perception that large household size farmers might divert funds originally meant for farm production to cater for other needs due to the requirement for more resources to sustain large household members.However, the test of significance showed that the difference in

means for the household sizes of credit using poultry farmers is not statistically significant with F $(3,6) = 1.58$, p< 0.05, null hypothesis was accepted that there was no significant difference in the groups means.

Table 4.4 Distribution of Poultry Farmers by Household Size

Household size	Percentage (%)	With Credit (%)	Average	Percentage of credit obtained (%)	Standard Deviation
≤ 3	21.7	17.1	200,000	88	505,556
4 - 6	67.0	28.8	1,012,313	83	1,486,008
≥ 7	11.3	23.0	365,000	79	322,533
Total	100.0	25.7			
Mean	5				
Standard Deviation	1.95				

F $(3,6) = 1.58$, p< 0.05

4.1.5 Educational Level of Poultry Farmers

The highlights of the distribution of poultry farmers in the study area according to educational status in Table 4.5 shows a high level of literacy among the sampled poultry farmers, which is an underlying requirement for dynamic innovation as well as an impetus to effective management methods in poultry enterprise (Awotide*et al*., 2015; Adeyonu*et al*., 2017). More than half of the sampled poultry farmers had tertiary education, lending credence to the findings ofAkugudu (2012) and Afolabi *et al*.(2014),who observed a large number of educated farmers in poultry farming compared to other livestock and related it to the high literacyrequirement in poultry enterprise as a factor requiredin keeping pace with the evolving challenges for improved returns.Furthermore, in terms of credit use, the result shows variation along the hierarchy of educational level; poultry farmers with tertiary education had the highest proportion of credit using farmers, followed by those with secondary education level, then primary education and others. This result is agreement withAyamga*et al.* (2006) andMpuga (2004) that credit demand increases with the level of education.The same trend was noticed among non-credit using poultry farmers, tertiary educational level poultry farmers constitute the majority probably due to inadequate credit knowledge necessary to bridge financial exclusiveness gap among poultry farmers that do not use credit in the study area (Ugwuja, and Onwuachu, 2019).

The average amount of credit obtained by credit using poultry farmers according to educational level ranges between ₦200,000 to ₦1,119,691. Credit using poultry farmers with secondary educational level appeared to be less credit rationed compared with tertiary education with respect to the proportion of credit received. Although the average amount of credit obtained by the latter was more than the former, showing that the maximum amount increased as the level of education grows, this supports Otunaiya*et al*.(2014), and Nikaido*et al*.(2015) findings of direct relationship between increase in credit use and the level of education. Education was found to be an impetus to greater understanding of credit market and facilities in a manner that increases the level of credit use. The result of the ANOVA conducted showed that there is no

difference among the means of educational groups of credit users, the test was not statistically significance with $F_{(4, 8)} = 1.27$, $p < 0.05$

Table 4.5 Distribution of Poultry Farmers by Educational Level

Educational level	Percentage (%)	With Credit (%)	Average	Percentage of credit obtained (%)	Standard Deviation
Qur'anic	0.8	50.0	200,000	100	0
Primary	3.7	35.0	487,500	68	340,955
Secondary	38.4	21.3	806,863	88	932,977
Tertiary	57.1	27.6	1,119,691	82	1,693,540
Total	100.0	25.7			

$F_{(4, 8)} = 1.27$, $p < 0.05$

4.1.6   Years of Experienceof Poultry Farmers

The distribution of years of experience of the sampled poultry farmers is shown in Table 4.6a while Table 4.6b shows the distribution with age, educational level and flock size. It revealedan average year of farming experience of 8.2 years with ±6.7standard deviation among sampled poultry farmers. These findings agree with Afolabi *et al*. (2014) that an average year of experiencefor poultry farmers is 8.2 years.According to Olagunju (2010), it is expected that the more the number of years of poultry farming experience, the better the management ability of the poultry farmer.

The level of credit usein Table 4.6a shows that poultry farmers with farming experience of 5 years and below obtained almost twice average amount of credit compared withpoultry farmers with years of experience of 11 and above. Less use of credit among the latter may well be attributable to the wealth of experience garnered over the years and reliance on past savings instead of credit (Mpuga, 2004; Olagunju, 2010). Although, the result is at variance with the research findings of Henri-Ukoha*et al*.(2011) and Akpan *et al*. (2013), who posited that credit demand increases the same way that years of experience among poultry farmers increases.

Credit rationing was observed among the sampled poultry farmers according to the level of credit use with years of farming experience, considering the proportion of credit obtained across the different categories. Poultry farmers with farming experience of 11 years and above were more credit constrained considering the proportion of credit amount obtained when compared with others This contradicts Olomola and Gyimah-Brempong (2014) findings that with higher farming experience, the prospect of being credit rationed is less becauseexperienced farmers expectedly are presumed to have good record of operations which is vital to credit appraisal by lenders to assist in credit review and the amount to be offered. The test of significance conducted revealed that the difference in the means of different categories of credit users is statistically significant relative with years of experience of farming with $F_{(3,6)} = 8.88$, $p < 0.05$, the alternative hypothesis of significant difference among means was therefore

accepted. The significance of years of poultry farmers of credit using poultry farming could be attributed to increased experience which comes with enhanced capacity for better management of resources and improved efficiency even with or without the use of credit.

Table 4.6a Distribution of Poultry Farmers by Years ofFarming Experience

Years of Experience (Years)	Percentage (%)	With Credit (%)	Average	Percentage of credit obtained (%)	Standard Deviation
1-5 years	45.6	24.0	1,012,313	86	1,486,008
6 - 10 years	31.2	25.6	283,333	91	225,463
≥ 11 years	23.2	28.8	566,667	71	404,145
Total	100.0	25.7			
Means	8.2				
Standard Deviation	6.7				

$F_{(3,6)} = 8.88$, $p < 0.05$[12]

---

[12] Alternative hypothesis (H_a) was accepted of significant difference among the means of credit users relative to the years of farming experience.

Table 4.6b Distribution of Poultry Farmers by Years of Farming Experience with Age, Educational Level and Flock Size

	Poultry Years of Farming Experience (years)			
	1-5	6-10	≥ 11	Total
Age in years				
≤ 24	6	1	2	9
25-34	70	20	8	98
35-59	159	138	88	385
≥ 60	11	9	27	47
Educational level				
Qu'ranic	1	0	3	4
Primary	8	7	5	20
Secondary	96	60	51	207
Tertiary	141	101	66	308
Flock Size				
Small	112	46	20	178
Medium	72	64	52	188
Large	62	58	53	173

The higher number of poultry farmers with poultry farming experience below 5 years among the sampled poultry farmers (Table 4.6a) could be a response to increased demand for poultry and poultry products in recent years due to population increase, consumption per capita, value chain as well as opportunities for export leading to increased participation in poultry farming (Nwandu*et al*., 2016, Adeyonu*et al*., 2017).

The commercialisation drive in recent times coupled with increasing economic advantage without doubt as observed by Nwandu*et al*. 2016, causing a rush into the poultry sector as seen in the distribution of poultry farmers according to years of experience with age. Table 4.6balso revealed thatalmost one-thirdof the sampled poultry farmers with age below 60 years are new entrants into poultry farming with experience of less than 6 years.

The distribution of sampled poultry farmers' years of experience with educational level revealed increasing involvement of more educated individuals into poultry business (Table 4.6b). This further establishes the importance of poultry business as having potentials for employment generation as well as being an attractive investment option(Nwandu*et al*., 2016; Adeyonu*et al*., 2017; Njoku *et al*., 2018). In terms of operational scale, sampled poultry farmers with years of experience less than 6 years in poultry farming constitute almost half of the small-scale poultry farmers in the study area. This shows that a larger a percentage of the poultry farmers are new entrants with less number of years in terms of the experience and are cautious of the associated risk factors that may likely wipe out the entire poultry business. They would rather expand scale of operations to accommodate larger flock size, as more experience is gained which confirms the findings of Emaikwu*et al*. (2011). As farmers gain more experience in production process, the flock size expands barring all unforeseen circumstances. During the focus group discussion, the poultry farmers attested to experience as vital to sustainability of poultry production. They explained that viability has a lot to do with handling of birds in terms of feeding, drug and vaccination, marketing of products, management of the housing and environment. Many of them affirmed the necessity of practical training of young and prospective producers using

fewer birds before they are left off to start out on their own after enough experience must have been garnered to aid success and reduce loss to a large extent.

4.1.7 Enterprise Type of Poultry Farmers

The distribution of enterprise type among sampled poultry farmers with the level of credit useis shown in Table 4.7a.Egg producers were more than two third of the total sampled poultry farmers, followed by producers of both egg and meat while poultry farmers that raised birds for meat aloneaccounted for less than two percent of the sample.This confirms reports that egg is the most widely demanded poultry product, unlike meat product which is often targeted at festive periods, particular season or to meet certain market demands (Awogboro*et al*., 2019). Egg producers were more than other enterprise types across different quantiles of flock size (small, medium and large scale) aspresented in Table 4.7b. The increased number of egg producers may also be attributed to all-year round demand for egg and its acceptabilityacross people of all races.

The level of credit uses according to the type of enterprise engagementsas shown in Table 4.7arevealed that egg producers increased in the averagecredit amount of ₦1,063,348 when compared with other groups. Demand for eggs could induce higher investment needs when compared with meat production or joint production of meat and egg, hence recourse to credit in order to meet up with demand could be an option (Afolabi *et al*., 2014;Oladejo, 2016). Although, in terms of the proportion of credit obtained, egg producers were also credit rationed like other categories of producers with the highest proportion of credit, obtained by poultry farmers that engage in dual production of meat and egg. The advantage of combining egg and meat production over sole enterprises could be attributed to the advantages that diversification offerssuch asdifferences in production cycles for egg and meataccording to Bamiro*et al*.(2008). Dual production of meat and eggis seen as a coping strategy or mechanism often experienced with glut in egg markets, and in order to prevent what would have been a total loss, returns from the other enterprise could be depended on (Oladejo, 2016;Aladejebi*et al*., 2019;Awogboro*et al*., 2019).

The test of significance conducted revealed that the difference in the means of different categories of credit users is not statistically significant with $F_{(3,6)} = 0.97$, $p < 0.05$, the null hypothesis of no significant difference among means was therefore accepted.

Table 4.7a: Distribution of Poultry Farmers by Enterprise Type

Enterprise Type	Percentage (%)	With Credit (%)	Average	Percentage of credit obtained (%)	Standard Deviation
Chickenmeat Only	1.3	14.3	300,000	71	0
Egg Only	72.7	25.5	1,063,348	80	1,602,281
Both Egg and Chicken meat	26.0	26.4	955,000	94	867,563
Total	100.0	25.7			

$F_{(3,6)} = 0.97$, $p < 0.05$

Table 4.7b Distribution of Poultry Farmers by Enterprise Type and Flock Size

Enterprise Type	Flock Size Quantile			Total
	Small Scale	Medium Scale	Large Scale	
Chicken Only	3	4	0	7
Egg Only	140	130	122	392
Both Egg and Chicken	35	54	51	140
Total	178	188	173	539

4.1.8   Management System of Poultry Farmers

The distribution of management systems among poultry farmers in the study area is presented in Table 4.8a showing that majority of the sampled poultry farmers used battery management system while about one-third combined both the battery and deep litter system and less than 2% of the sampled poultry farmers using deep litter management system only.

Many of the sampled poultry farmers in the study area are engaged in production of eggs only, with a larger percentage using the cage systems (Table 4.8b) compared with the deep litter system or combination of both. Battery system of management in poultry production despite initial high "capital outlay" was noticed among egg producers across years of poultry experience and flock sizes as shown in Table 4.8b. According to Amos, 2006 and Ajiboye*et al.* 2019, battery system's preference among egg producers is due to its high efficiency and profitability through reduction in feed and water wastages, improved stock monitoring, conservation of energy which improves level of production and low incidence of diseases due to less contacts with droppings. This is contrary to deep litter system which is often associated with egg losses resulting from breakages, high incidence of cannibalism, dissipation of energy (due to movement of birds) that could have been converted for egg production and increased labour requirement for litter maintenance as well as difficulty in stock counting and monitoring.

The proportion of credit using poultry farmers that operated battery system was more thanother management systems (Table 4.8a). Thehigher proportion of credit users among battery system operators could be associated with the cost involved in the acquisition of cages which might not be easily sorted with owned-funds, hence recourse to credit (Nmadu*et al.,* 2014). The average amount of credit obtained (₦1,012,313) by poultry farmers that used battery cage was greater than the combined average amount of credit

obtained by poultry farmers that were engaged in deep litter with those that combined battery cage and deep litter management systems. This supports the finding of Ogunyemi and Orowole (2020) who had reported that credit reliance for acquisition and maintenance of production equipment among poultry farmers that use battery management systems is common because of the high cost of capital involvement. The differences among the means with respect to management systems was not statistically significant; $F_{(3,6)} = 0.98$, $p < 0.05$, the null hypothesis of no significant difference among means was therefore accepted.

Table 4.8a Distribution of Poultry Farmers by Management System

Management System	Percentage (%)	With Credit (%)	Average	Percentage of credit obtained (%)	Standard Deviation
Deep litter	1.1	50.0	566,667	75	404,145
Battery	74.6	31.8	1,012,313	93	1,486,008
Both	24.3	5.3	443,750	84	282,131
Total	100.0	25.7			

$F_{(3,6)} = 0.98$, $p < 0.05$

Table 4.8b Distributionof Poultry Farmers by Management System, Years of Poultry Farming Experience, Flock Size and Enterprise Type

	Management System			
	Deep Litter	Battery	Deep litter and battery	Total
Years of poultry experience				
1-5 years	5	208	33	246
6-10 years	1	125	42	168
>11 years	0	69	56	125
Flock size				
Small	3	152	23	178
Medium	2	141	45	188
Large	1	109	63	173
Enterprise type				
Chicken	1	5	1	7
Egg Only	3	342	47	392
Both chicken and egg	2	55	83	140

4.1.9   Farming Statusof Poultry Farmers

The distribution of farming statusis shown in Table 4.9a. The result reiterated earlier findings that a greater percentage of people in developing nations are involved in poultry production as an income generating activity either as a sole or a supporting source of income (Oni *et al.*, 2005;Olagunju, 2010; Nouman*et al*., 2013; Njoku *et al.,* 2018). The number of sampled poultry farmers engagedin poultry production as part-time occupation was almost as much as those that were engaged full-time.In terms of level of credit use, the average amount of credit by full-time poultry farmers was about 35% more than part time farmers, this could be due to the fact that reliance on credit is the only way full-time poultry farmers could source additional funds for production activities, unlike the part time farmers with the other income generating activities to rely on as source of fund(Ojo, 2003; Okantah*et al*., 2003).

The distribution of credit sources according to farming status in Table 4.9b, revealed that the percentages of commercial and microfinance credit utilization for part-time farmers were more than full-time farmers. although cooperative societies' source of funding was higher for both compared with other sources of credit among sampled poultry farmers in the study area. This finding supports Ezihe*et al*.(2016) thatthe possibility of farmers with other income sources to obtain loan from lending institutions is positive and high because income from other occupations could be used as guarantee or comfort to obtain loan.

Furthermore, the distribution of farming status among the sampled poultry farmers relative to flock size revealed that about 40% of the small-scale farmers wereinvolved

in poultry farming as a part-time vocation compared with medium and large-scale poultry farmers in the study area. Large scale poultry producers were made up of more full-time poultry farmers than part-time; this may be connected to the required level of coordination, supervision and management necessary to guaranteeing the success of the poultry farm (Afolabi *et al*., 2014). Although, more of the sampled farmers with medium scale operations were engaged fully but not as observed among the large-scale operators as shown in Table 4.9c. The test of significance conducted revealed that the difference in the means of farming statuses of credit users is statistically significant with $F_{(2,4)} = 90.4$, $p < 0.05$, the alternative hypothesis was therefore accepted.

Table 4.9a Distribution of Poultry Farmers by Farming Status

Poultry Farming Status	Percentage (%)	With Credit (%)	Average	Percentage of credit obtained (%)	Standard Deviation
Full-time	53.6	27.0	1,167,907	78	1,740,250
Part-time	46.4	24.0	764,058	89	948,135
Total	100.0	25.7			

$F(2,4) = 90.41, p < 0.05$

Table 4.9b Sources of Credit according to Farming Status

		Full-time Farmer		Part-time Farmer	
Source of Credit	Frequency	Frequency	Percentage (%)	Frequency	Percentage (%)
Cooperative Societies	60	34	44	26	43
Commercial Bank	11	3	4	7	12
Agricultural Bank	22	13	17	9	15
Family & Friends	37	25	32	12	20
Microfinance Bank	8	3	3	6	10
Total	138	78	100	60	100

Table 4.9c Distribution of Poultry Farmers by Farming Status and Flock Size

	Poultry Farming Status		
Flock Size	Full-time	Part-time	Total
Small	76	102	178
Medium	104	84	188
Large	109	64	173
Total	289	250	539

4.1.10 Flock Size of Poultry Farmers

The distribution of flock size among the sampled poultry farmers in the study area is shown in Table 4.10. FollowingBinuomoteet al. (2008) and Afolabi et al.(2014), flock size was categorized into small, medium and large scale. Table 4.10 revealed that medium scale poultry farmers with a flock sizeof 1,000 to4,999birds constituted the majority, closely followed by farmers with smaller scale of 999 birds and less while large scale farmers with number of birds above 5,000 were the least. The distribution confirms studies byBinuomoteet al. (2008);Olagunju (2010) and Afolabi et al.(2014), that many of the poultry farmers are involved at small and medium levels.

In terms of level of credit use, large scale farmers had more average amount compared with other categories. This could be attributed to operational costs in terms of feeding, labour, energy, veterinary services and technological requirements in production activities as posited by Akpan et al.(2013) andMunyakaet al. (2015).This wasalso corroboratedby Olagunju (2010) that additional fund is frequently required by poultry farmers to strengthen their financial base in order to sustain increased production levels. However, medium scale farmers are in the majority with respect to credit users compared with small- and large-scale farmers. This supports the findings of Kochar (1997) and Okojieet al. (2010), who had reported low demand of credit among small-scale farmers as a resultant effect of strict lending terms and the cost of borrowing. One would have expected that more of large-scale farmers would use credit, but this was not the case. Theeconomics of scale often enjoyed by large scale farmers might be responsible for a smaller number of credit users among them, this has to do with bulk purchases or large volumes of items that presents them with opportunity of discounts and lower prices compared with what would have been expended on low volumes of items. This on the long run couldprove beneficial as it helps to reduce cost of operations further and by extension need for credit, since the extra fund that is saved could be ploughed to meet other needs instead of request for credit.

The test of significance conducted to check the means of different flock sizes showed that the difference was statistically significant at $F_{(3,6)} = 71.53$, $p < 0.05$, the alternative hypothesis was accepted that there is significance difference between the means of flock sizes.

Table 4.10 Distribution of Poultry Farmers by Flock Size

Poultry Farming Status	Percentage (%)	With Credit (%)	Average	Percentage of credit obtained (%)	Standard Deviation
Small[13]	33.0	22.5	450,000	90	686,871
Medium	34.9	34.0	550,000	74	1,639,633
Large	32.1	19.7	1,012,313	94	1,949,045
Total	100.0	25.7			

$F(3,6) = 71.53$, $p < 0.05$

---

[13] The means of scale of operations, small, medium and large are 354, 1,029 and 10,975, respectively.

4.1.11 Labour Engagementof Poultry Farmers

The distribution of poultry farmers by labour engagement is presented in Table 4.11a, revealingthat halfof thesampled poultry farmers in the study area combined family and hired labourforfarm operations. The essence of combining family and hired labour as observed among the sampled poultry farmers in the study area might be connected with the need to reduce the cost of labour which is the second most significant part of production cost after feeding (Nimoh*et al.,* 2011; Isitor*et al.*, 2014). Majority of the poultry farmers in the study area are small and medium scale farmers, a combination of family and hired labour therefore is seen as supplementary.

It is expected that with increasing or rising production cost, farmers might demand for more credit to finance some operational activities, but this also depends on the farm size or expansion plan requirement for capital investment needs as well as sustenance (Olomola and Gyimah-Brempong, 2014). As the scale of production increases, more funds often would be required (Isitor*et al.*, 2014). Family labour appeared as preferred source of labour engagement especially among the small-scale farmers and only reduces as the scale increases. This was aimed at reducing the cost that could have been incurred if hired labour only was exclusively used for farming operations (Olomola and Gyimah-Brempong, 2014). Hired labour nonetheless, formed the bulk of labour engagement among large scale farmers as shown in Table 4.11b.The combination of family labour and hired labour was prominent and highest for egg enterprise in the study area, while family labour was least for poultry farmers involved in dual production of egg and meat.

The average amount of credit level for poultry farmers that engaged the combination of family and hired labour was more compared with the average amount of poultry farmers that engage family labour or hired labour only. This result is in agreement with findings from Olomola and Gyimah-Brempong (2014), that increased production cost as a result of wage could stimulate the need for credit for wage financeBesides the average amount obtained, the proportion of credit was equally more, showing they were also less credit rationed.Test of significance conducted showed that the difference in the means of labour types engaged for farming operations is statistically significant with $F_{(3,6)} = 4.70$, $p < 0.05$, the alternative hypothesis was accepted instead.

Table 4.11a Distribution of Poultry Farmers by Labour Engagement

Labour Engagement	Percentage (%)	With Credit (%)	Average	Percentage of credit obtained (%)	Standard Deviation
Family only	29.1	21.7	537,692	81	686,871
Hired only	20.2	33.9	1,511,250	76	1,639,633
Both Family and Hired	50.7	24.5	1,161,970	92	1,949,045
Total	100.0	25.7			

F (3,6) = 4.70, p < 0.05

Table 4.11b Distribution of Poultry Farmers by Labour Engagement, Flock Size, Enterprise Type andFarming Status

| | Labour engagement | | | |
	Family	Hired	Both family and hired	Total
Flock Size				
Small	104	9	65	178
Medium	48	41	99	188
Large	5	59	109	173
Enterprise Type				
Meat Only	3	1	3	7
Egg Only	134	76	182	392
Both meat and egg	20	32	88	140
Farming Status				
Full-time	74	64	151	289
Part-time	83	45	122	250

4.1.12 AccountRelationship of Poultry Farmers with Financial Institution

Table 4.12 shows the distribution of sampled poultry farmers according to relationship with financial institution revealing that a lot of the sampled poultry farmers have account relationship with financial institutions. The motive for initiating relationship with financial institutions for many poultry farmers in the study areaas discovered during the focus group discussion was the probable future demand forcredit to complement own funds. There is an underlying rule of holding savings account before credit could be grantedby many lending institutions. More than sixty percent of the sampled poultry farmers have account relationships with financial institutions irrespective of their credit using status.

According to the reasons given for initiating account relationship with financial institutions during the focus group discussion, many of the poultry farmers agreed to opening accounts and commencing relationships with financial institutions for future credit needs,although no demand for credit has been made. This lends support to Akram*et al.*(2008) and Akugudu (2012), that operating savings account in formal financial institutions is part of the basic prerequisite to credit access in such institution. This agrees withAwunyo-Vitor *et al*., (2014) that account relationship with financial institutions often helps to improve the amount of credit that could be obtained by the farmers. Often times, account relationship with financial institutions helps to uncover credit opportunities and understanding of credit operations in a way that helps the farmer to be better positioned for possibility of making credit demands (Akugudu*et al*., 2012).

The average amount of credit level among farmers with account relationship with financial institutions was more as well with credit proportion; lending credence to the findings ofOlomola and Gyimah-Brempong (2014); Akugudu (2012); Donkor and Duah (2013) and Awunyo-Vitor *et al*. (2014) that maintaining active account relationships with financial institutions enhance credit amount.

Test of significance was conducted to check if difference between the means of whether farmers have account relationship with financial institution or otherwise is

significant or not. The result showed that there is no significant difference with F (2,4) = 4.19, p < 0.05; the null hypothesis is accepted.

Table 4.12 Distribution of Poultry Farmers by Account Relationship

Account relationship with financial institution	Percentage (%)	With Credit (%)	Average	Percentage of credit obtained (%)	Standard Deviation
Account relationship	66.8	30.6	1,594,160	85	1,489,461
No account relationship	33.2	15.6	1,259,063	69	1,227,421
Total	100.0	25.7			

F (2,4) = 4.19, p < 0.05

4.1.13 Association Membership of Poultry Farmers

Association membership provides avenue for information sharing, exchange of ideas, networking, collaboration, innovations, creation of opportunities and deliberations ofcritical matters pertaining to common interests among members(Akpan *et al*., 2013; Afolabi *et al*., 2014; Asante-Ado *et al*., 2016). Table 4.13ahighlights the distribution of sampled poultry farmers according to association membership. The result shows thatmajority belongs to at least one associationwhile a considerable number of the sampled poultry farmers do not belong to any association.The distribution of poultry farmers according to membership of association and age shows that most sampled farmers of 35-59 years belong to an association, expectedly so because most of the sampled poultry farmers fell within the age range. Nevertheless, it was found that the proportion of farmers that belong to the association increases along the age categories showing that more older farmers are members of the association (Table 13b). This is not detached from the fact that as farmer advances in age, their reliance on others for increased networking, collaboration and information sharing also grows, thus confirming the findings of (Akpan *et al*., 2013) that participation in association membership increases with age.

Similarly, more experienced farmers were found to belong to at least an association (Table 13b). In other words, the proportion of farmers that were found to be members of association among the sampled poultry farmers are more among farmers with greater number of years of poultry farming experience. This scenario was observed with the level of education, more educated farmers were found to be members of an association. Increased participation in the membership of an association was also observed among poultry farmers that are older, more educated and more experienced in the study area. This cannot be unconnected with the importance of association as a key element in the dissemination of information, knowledge transfer, and social and economic development purpose for the members of association (Olagunju, 2010and Adeyonu*et al*., 2017).

Table 4.13a Distribution of Poultry Farmers by Association Membership

Association membership	Percentage (%)	With Credit (%)	Average	Percentage of credit obtained (%)	Standard Deviation
Member	57.0	32.6	995,739	86	1,483,172
Non-member	43.0	16.4	919,767	78	1,338,876
Total	100.0	25.7			

$F_{(2,4)} = 17.24$, $p < 0.05$

Table 4.13b Distribution of Poultry Farmers by Association Membership, Age, Years of Poultry Farming Experience and Level of Education

	Association Membership				
	Member (307)	Percentage (%)	Non-member (232)	Percentage (%)	Total
Age in years					
≤ 24	2	22.2	7	77.8	9
25-34	35	35.7	63	64.3	98
35-59	230	59.7	155	40.3	385
≥ 60	40	85.1	7	14.9	47
Poultry years of experience					
1-5 years	102	41.5	144	58.5	246
6- 10years	114	67.9	54	32.1	168
11 years and above	91	72.8	34	27.2	125
Educational level					
Qur'anic	2	50.0	2	50.0	4
Primary	9	45.0	11	55	20
Secondary	101	48.8	106	51.2	207
Tertiary	195	63.3	113	36.7	308

The membership of a group or association is sometimes used to screen loan prospects, especially in the absence of collateral among small scale farmers (Akugudu, 2012). In some instances, lenders do group lending where credit products are specifically designed to be given out to members of an association as a group with group guarantee. The motive of group guarantee is to ensure that members of the group work together as a team towards loan repayment; failure of loan repayment can be met with sanctions, such that if a member defaults, it will adversely affect other members' future borrowing (Abdul-Jalil, 2015).

As shown in Table 13a, members of the association obtained more credit in terms of average amount, though both members and non-members were credit rationed; the proportion of credit obtained by association members was still more, this supports the findings of Isitor*et al*. (2014) that being a member of cooperative societies or associations enhances the level of credit use.This could also be attributed to available opportunities with regard to information exchange between members, hence supporting previous studies conducted by Siyanbola (2012); Ololade and Olagunju (2013) of benefits that members of association or any other groups of common interest enjoy. Furthermore, that lenders oftentimes view membership of association ascomfort towards mitigating the non-payment risk especially for group lending (Asante-Addo *et al*., 2016;Moahid and Maharjan, 2020).

The test of significance conducted revealed that the difference in the means of categories of association membership is statistically significant with $F_{(2,4)} = 17.24$, $p < 0.05$, the alternative hypothesis of significant difference among means was therefore accepted. This implies that there is connection between association membership of poultry farmers and their credit using status.

4.2   Level of Asset Accumulation among Poultry Farmers in the Study Area

Descriptive statistics and test of mean's difference were used to assess the level of asset accumulation among the sample of poultry farmers in the study area.

4.2.1   Descriptive Statistics of Asset accumulation

The accumulated assets by sampled poultry farmers in the study area, disaggregated into productive and household assetsand further broken down based on the credit status of the farmer, showing the number of assets owned, the estimated amount and the contribution of each asset to the overall cost of assetsareas shown in Tables 4.14 and 4.15 respectively.

The composition of assets held vary from one farmer to the other, showing differences in the volume of accumulated assets, with respect to the type and the number. Table 4.14 shows the composition of productive assets held by the sampled poultry farmers considering their credit status. Monetary values of the assets in naira were used in calculating the worth of assets held by the sampled farmers in the study area, taking into considerationdepreciation over their useful life. The type of productive assets accumulated more by sampled poultry farmers in the study area include pens, cages, generators, feed mixer, brooders or heaters, feeders, water troughs which further support the importance of controlling housing, environment and feeding in poultry production to ensure guaranteed productivity which by extension leads to increased returns on investments as proposed by Oluyemi and Robert (1979), andAkanni (2007). Total productive assets accumulated by credit users were 2,605 in number, estimated at ₦385,520,000 which represented 0.86% increase in monetary value above the total number of assets (2,245)accumulated by non-credit users- estimated at ₦208,788,000. This signifies that for every ₦1 spent by a non-credit user for accumulating productive assets, a credit user spent₦1.86k more.

The number of assets held by credit users were more than those accumulated by non-credit users as they were able to invest in the acquisition of specialized and sophisticated equipment (Smith, 2011), such as incubators, ventilation fan, dressing machine, compressors, hatchers, egg washer with more counts of pens, cages, brooders, feed mixers, grinders, generators and acquire more assets than non-credit users.

Table 4.14 Components of Productive Assets by Credit Status

PRODUCTIVE ASSETS	Credit Users			Non-credit users		
	Number owned	Estimated Amount (₦)	% Contribution to Total Assets	Number owned	Estimated Amount (₦)	% Contribution to Total Assets
Farm building/ Pens	309	216,300,000	56.10	174	121,805,000	58.34
Cages	175	78,750,000	20.42	98	44,100,000	21.12
Brooders or heaters	42	21,000,000	5.45	10	5,000,000	2.39
Generator/ power	459	14,688,000	3.81	258	8,256,000	3.95
Feed Mixer	35	14,000,000	3.63	23	9,200,000	4.41
Incubator	4	12,000,000	3.11	0	0	-
Feed Grinder	24	10,800,000	2.80	15	6,750,000	3.23
Pumping machine	169	4,225,000	1.10	212	5,300,000	2.54
Ventilation Fan	10	3,650,000	0.95	0	0	-
Sprayer	212	2,650,000	0.69	195	2,437,500	1.17
Dressing Machine	2	1,600,000	0.42	0	0	
Water troughs	131	1,467,200	0.38	230	2,576,000	1.23
Chick box	300	690,000	0.18	258	593,400	0.28
Feeders	142	681,600	0.18	205	984,000	0.47
Egg tray	247	617,500	0.16	210	525,000	0.25
Shovels	138	414,000	0.11	256	768,000	0.37
Egg Scale	34	374,000	0.10	15	165,000	0.08
Egg Washer	1	325,000	0.08	0	0	-
Vaccinator/lancet	32	320,000	0.08	0	0	-
Reflectors/ Hovers	30	300,000	0.08	1	10,000	0.00
Compressor	25	250,000	0.06	0	0	-
Hatcher	8	132,000	0.03	0	0	-
Rake	41	102,500	0.03	55	137,500	0.07
Wheel Barrow	12	72,000	0.02	28	168,000	0.08
Egg Candler	15	60,000	0.02	0	0	-
Setter	1	30,000	0.01	0	0	-
Beak Trimmer	5	17,500	0.01	3	10,500	0.01
Plucker Rubber	2	3,700	0.001	1	2,100	0.001
Total	2,605	385,520,000	100.00	2,247	208,788,000	100.00

In the case of household asset accumulation among sampled poultry farmers in the study area, total accumulation by credit users (Table 4.15) was 3,173 estimated at ₦639,900,000 which represents a percentage decline of 0.14 in monetary value compared with the total number of assets (4,169) accumulated by non-credit users-estimated at ₦731,520,000. This implies that for every ₦1 spent by credit users for accumulating household assets, non-credit users spent ₦1.14k more. In general, more household assets were accumulated compared with productive assets irrespective of credit using status.

The estimated assets held by non-credit users was ₦941,070,000 (total), ₦208,788,000 (productive) and ₦731,520,000 (household), just as the estimated assets worth of credit users were₦1,025,420,000 (total), ₦386,520,000 (productive) and ₦639,900,000 (household).

However, considering the number of non-credit users in the sample, it therefore means that the worth of total assets, household assets and productive assets held on average per 401 non-credit users were ₦2,470,000; ₦1,920,000 and ₦548,000, respectively. On the other hand, the worth of total assets held on average by 138 credit users were ₦6,490,000, ₦4,050,000 (household assets) and ₦2,440,000 (productive assets). These results suggest that the average stock of resources held by a credit using farmer is 61.9% more than a non-credit using farmer; whose household asset was 52.6% more than a non-credit using farmer and 77.5% more in terms of worth of productive assets held when compared with non-credit using farmers in the study area. The implication of this is that credit-using farmers had more worth of assets compared to non-credit using farmers. The total stock of accumulated assets for the whole population of credit users and non-credit users as well as the average farmer for productive and household assets with percentage differences are as presented in Table 4.16.

Table 4.15 Components of Household Assets by Credit Status

HOUSEHOLD ASSETS	Credit Users			Non-credit users		
	Number owned	Estimated Amount (₦)	% Contribution to Total Assets	Number owned	Estimated Amount (₦)	% Contribution to Total Assets
Corrugated iron sheet	174	287,100,000	44.87	238	392,700,000	53.68
Car	175	227,500,000	35.55	156	202,800,000	27.72
Motorbike	212	25,440,000	3.98	184	22,080,000	3.02
Chair	365	23,725,000	3.71	412	26,780,000	3.66
Thatched house	38	16,720,000	2.61	4	1,760,000	0.24
Jewellery	66	13,200,000	2.06	23	4,600,000	0.63
Television	185	10,545,000	1.65	502	28,614,000	3.91
Cell phone	277	9,695,000	1.52	491	17,185,000	2.35
Bed	235	7,520,000	1.18	466	14,912,000	2.04
Table	190	4,370,000	0.68	323	7,429,000	1.02
CD Player	334	4,008,000	0.63	421	5,052,000	0.69
Radio	252	3,780,000	0.59	282	4,230,000	0.58
Metal box	92	2,576,000	0.4	44	1,232,000	0.17
Bicycle	42	1,470,000	0.23	15	525,000	0.07
Wooden box	78	1,170,000	0.18	26	390,000	0.05
Stove	276	690,000	0.11	328	820,000	0.11
Others	182	391,000	0.06	254	411,000	0.06
Total	3,173	639,900,000	100.00	4,169	731,520,000	100.00

Table 4.16 Asset Accumulation of Credit Users and Non-Credit Users

Asset Accumulation	Credit Users		Non-Credit Users		Difference per farmer	% Diff.
	Sample	Average	Sample	Average		
Total	1,025,420	6,490	941,070	2,470	4,020	61.9
Household	639,900	4,050	731,520	1,920	2,130	52.6
Productive	385,520	2,440	208,788	548	1,892	77.5

All figures are in ₦'000

4.2.2   Hypothesis Testing

Test of statistics was conducted to further assess if there exist any significant difference in the level of asset accumulation among sampled poultry farmers in the study area by the type of accumulated assets and credit status.Using one- tailed t-test statistics, the statement of hypothesis was stated as:

H_0: ALCU = ALNCU

Ha: ALCU>ALNCU

H_0: The level of asset accumulation among credit user poultry farmers is equal to non-credit user poultry farmers.

Ha: The level of asset accumulation among the credit user poultry farmers is greater than non-credit user poultry farmers.

The result of the summary statistics presented in Table 4.17provides information regarding the asset accumulation of poultry farmers in the study area, the t-tests showssignificant differences among total value of assets, and per capita productive assets value for credit using and non-credit using poultry farmers as well as productive and household assets values.

The summary statistics of productive asset accumulation using credit status of poultry farmers reveals that credit using poultry farmers have more farm assets (cages, heaters, incubators, dressing machines, compressors, hatchers, setters, chick boxes and vaccinators) than the non-credit using poultry farmers. The test of mean difference in the overall value of the assets, per capita asset value, productive asset value, household asset value, per capital productive asset value and per capita household asset value reveals that poultry farmers that use credit have significantly higher values than non-credit using poultry farmers. By implication, it therefore means that credit use ensures stability against shocksand reduceasset poverty of the farmers through increase of the asset variables.

The corresponding one-tailed test of α-level at 95% level conducted shows significance in the means difference greater than the p-value, the null hypothesis is therefore

rejected that the level of asset accumulation among credit user poultry farmers is equal to

Table 4.17 Result of Summary T-test statistics

Variable (₦)	Credit Non-user ₦ n = 401 Mean (SE)	Credit User ₦ n = 138 Mean (SE)	Mean Difference	t-value
Household asset	1,920,000 (327000)	4,050,000 (437000)	-2130000***	1.45
Productive asset	548,000 (49528.69)	2,440,000 (1460000)	-1892000**	2.87
Total asset value	2,470,000 (334000)	6,490,000 (1530000)	-4020000***	1.55
Average per capita household assets	400,000 (58826.24)	819,000 (98461.48)	-419000**	3.81
Average per capita productive assets	146,000 (14456.94)	377,000 (184000)	-231000***	2.14
Average per capita assets	546,000 (62430.32)	1,200,000 (209000)	-654000***	1.25

"Figures in parentheses are the standard errors"

***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

non-credit user poultry farmers whereas the alternative hypothesis that the level of asset accumulation among credit users is greater than the level of asset accumulation among non-credit users was accepted. The average per capita asset values also show similar trend for total accumulated assets, productive and household assets with 1%, 5% and 1% level of significance respectively.

4.3   Factors Influencing Credit Access and Amount Obtained among the Sample

The probit model was used to determine factors influencing poultry farmers' credit access as shown in Table 4.18. Fifteen variables were chosen based on related studies such as Mpuga(2004);Akugudu (2012); Akpan *et al*.(2013); Ololade and Olagunju, (2013). The log likelihood was -263.83, likelihood ratio chi-square of 0.000 (df = 15) and a p-value of 0.0000, an indication that the model fitted better with the included explanatory variables which jointly explained the probability of credit use by the poultry farmers. The estimated coefficients of the first hurdle provided the direction of effects of the explanatory variables on credit access, such that positive sign implied thatwith higher values of the variables, there is an increased probability that the farmer would access credit, while a negative sign indicated reduction in the probability of credit access with higher values among the sample of poultry farmers in the study area.

Furthermore, 11 of the 15 variables used in the analysis werefound to be consistent with the a-priori expectations with 5 statistically significant. Furthermore, marginal effects reveal variations in the possibility of farmers accessing credit when the independent or decision variables increases by an additional unit. The variables that were statistically significant in the model include being married, vocational training, account relationship with financial institution, per capita asset value and flock size while farmer's age, enterprise type, school years, secondary occupation, sex, labour type, and total income were not statistically significant. The significance of being married, having vocational training and operating an account relationship with financial institution was positive which suggested that the probability of credit access increases with the higher values of the variables. However, the negative sign for flock size reveals that higher values would reduce the probability of credit access among the sample of poultry farmers.

Account relationship with financial institution was a significant factor influencing access to credit among the sampled poultry farmers in the study area. A dummy variable set at a value of 1, if a farmer has an active and operational account or savings with financial institution and 0, otherwise. The estimated coefficient was found to be positive and statistically significant at 1% level. The marginal effect showed that a

farmer that has an active or operational savings or account relationship with the financial institution has

Table 4.18 Result of the First Hurdle Showing Factors Influencing Credit Access

Variable	Coefficients	Standard Error	z-value	Marginal effects
Constant	-1.2882	0.9452	-1.36	0.2161
Age2	0.0001	0.0004	0.28	3.50E-05
Age (years)	-0.0206	0.0401	-0.51	-0.0060
Marital Status	0.5683*	0.2793	2.03	0.1351
Secondary occupation	-0.0416	0.1277	-0.33	-0.0122
School years (years)	-0.0106	0.0239	-0.45	-0.0032
Vocational Training	0.3947**	0.1325	2.98	0.1149
Sex	-0.1805	0.2030	-0.89	-0.0558
Per capita asset value (₦)	1.58E-07*	7.77E-08	2.03	4.63E-08
Rel. with Fin. Insti	1.0735***	0.1670	6.43	0.2675
Egg Enterprise	0.0734	0.6192	0.12	0.0221
Meat Enterprise	0.0475	0.1472	0.32	0.0138
Family labour type	-0.1008	0.1594	-0.63	-0.0290
Hired labour type	-0.0344	0.1700	-0.20	-0.0100
Total income (₦)	7.10E-09	5.22E-09	-1.36	2.08E-09
Flock size (number)	-3.24E-06**	1.01E-06	-3.20	-9.51E-07
N	539			
Likelihood ratio	-263.84			
LR Chi2(15)	0.000			
Pseudo-R^2	0.139			
Wald > chi2	64.45			

Note: *** ,**, * ,significant at 1%, 5% and 10% respectively.

about 27% chance of credit access compared to farmers that have no active or operational savings or account relationship. The marginal effect showed that a farmer that has an active or operational savings or account relationship with the financial institution has about 27% chance of credit access compared to farmers that have no active or operational savings or account relationship. The result satisfied the *a- priori* expectations of positive relationship because savings or account relationship with a financial institution implies exposure, experience and a financial knowledge with respect to the lending institutions' credit products, requirements, and better understanding of terms and conditions of accessing credit which could have been garnered through relationship. Financial knowledge as a result of an account relationship with a financial institution is in no small measure of great assistance as it is capable of removing ambiguity concerning the terms and conditions of available and accessible credit from the lending institution and other credit frameworks which could facilitate credit access. This result supports the findings of Akugudu (2012) and Akram*et al*. (2008), that having savings accounts or relationship with financial institution improves credit access.

The second significant determining factor that influences access to credit among the sampled poultry farmers was being married, at 10% significant level. The result showed that the estimated coefficient of a farmer being married is positive and this was consistent with a priori expectation. The marginal effect shows further that the plausibility of a married farmer to access credit is about 14% than if not married. The positive relationship between being married and credit access as well as the prospect of credit access as seen for married farmers could be attributed to the impression of married people being more reliable, stable and responsible; and these are positive considerations by lending institutions with respect to the credit access of farmers. This result corroboratesOlolade and Olagunju (2013)'s research findings that likelihood of accessto credit increases with being married.

Another determining factor of credit access as estimated in the first hurdle and found significant was vocational training; the variable was significant at 5% level and found

to be positively related to the probability of credit access among sampled poultry farmers in the study area, thereby confirming the a priori expectation. It was estimated as a dummy variable with a value of 1, if a farmer was vocationally trained and 0, if otherwise. The marginal effect revealed further that the likelihood of a farmer who had vocational training to access credit increased by 12%. This might be connected with the fact that vocational training exposes farmers to better skill acquisition and it is a tool for knowledge sharing, especially information that has to do with credit access, improved agricultural technologies, innovation, capacity building as well as opportunities in the area of finance, market, price, input, infrastructural development and so on. Trainings that unveil knowledge this way positively influence farmers' disposition towards the conversion of opportunities that could increase their income generating abilities. This result agrees with the study of Spiller and Voss (2007) on the positive effects of vocational training on the economic development of farmers.

Another significant factor was the per capita asset value which positively influences the access of poultry farmers in the study area to credit, with 10% level of significance. The finding was in conformity with the a priori expectation that increase in the per capita asset value of a farmer increases credit access. The marginal effects analysis confirms the likelihood ofcredit access of a farmer to increase with an increase in per capita asset value, though at a very small margin in the estimated first hurdle analysis. This invariably suggests a positive relationship that as per capital asset value of a poultry farmer to access credit increases, thus confirming the study of Gilligan *et al.* (2005), increase in per capita asset value increases access to credit.

The fifth significant variable that influences credit access among sampled poultry farmers was flock size, at 5% level of significance. However, contrary to expectation the coefficient estimate was negative, suggesting an inverse relationship with the prospect of access to credit, showing that increase in flock size will lead to reduction in the probability of access to credit. The marginal effect stated that as flock size increases, the possibility of farmers to access credit reduces, though at a very minimal percentage. This finding is at variance with Nouman*et al.*2013 and Asante-Ado *et al.* 2016 findings that relationship between the number of birds and probability of credit access was positive and significant. The negative relationship between credit access and flock size probably could be linked toreluctance of financial institutions owing

tothe perception of agriculture being risky and their disposition towards giving out loans despite the availability of collateral. Most often, large scale farmers are not members of farmer's group as discovered during the focus group discussion held; this limit them from enjoying the benefits of group-arranged-borrowing but on the other hand, it is of advantage to small-scale farmers who constituted the majority of the farmers' groups or associations.

The assessment of the second hurdle using tobit as shown in Table 4.19revealed factors influencing the amount of credit obtained among the sample of poultry farmers in the study area. The results revealed that six variables were statistically significant out of which two were also found to be significant in the first hurdle, these were account relationship with financial institutions and per capita asset value. The remaining four significant variables in the second hurdle were secondary occupation of the poultry farmer, egg enterprise, meat enterprise and hired labour type. In Table 4.18 showing the results of the first hurdle; marital status, vocational training, account relationship with financial institution and flock size werefound statistically significant factors influencing credit access. The essence of double hurdle model was further reinforced in that not all the variables that were found to be statistically significant in the first hurdle and were the determining factors of farmers' access to credit were responsible for the amount of credit obtained, just two variables were significant in the first hurdle and the second hurdle (credit amount) among sampled poultry farmers in the study area.

The estimated coefficient of account relationship with financial institution was statistically significant at 1% level and positive; this was as projected for both the first and second hurdles. The result suggested that increased farmer's account operations with financial institution increases the amount of credit obtainable. The marginal effect was the highest among other significant variables and it shows that a percentage increase in the farmer's account operations with financial institution will likely increase the amount of credit obtained by about 32%. This result supports Awunyo-Vitor *et al*. (2014) that the higher the balance of savings in bank account, the lower the probability of being credit rationed. An active operation shows the actual capacity of the farmer for better assessment and hence justifies the actual need with respect to the amount of credit required for the enterprise because more often than not, relationships

with financial institutions gives salient information on the borrower's potential with respect to capacity to borrow or repay.

The estimated second hurdle result as shown in Table 4.19showed the secondary occupation variable to be positive and statistically significant at 10%.

Table 4.19 Result of the Second Hurdle with Marginal Effects

Variables	Coefficients	Standard Error	z-value	Marginal Effects
Constant	0.7311	0.2013	3.64	0.2568
Age2	1.49E-05	0.0004	-1.47	0.42E-06
Age (years)	0.0151	0.0092	1.63	0.0101
Marital Status	-0.0602	0.0681	-0.89	0.1392
Secondary occupation	0.0473*	0.0252	1.92	0.0051
School years (number)	0.0042	0.0043	0.89	-0.0013
Vocational Training	1.90E-05	0.0281	0.00	0.1374
Sex	-0.0393	0.0362	-1.10	-0.0204
Per capita asset value (₦)	3.21E-08 *	0.0005	1.73	4.63e-08
Acct Rel. with Fin. Institu.	0.0542***	0.0291	1.86	0.3272
Enterprise Egg	-0.0891*	0.0402	-2.22	-0.1412
Enterprise Meat	-0.0712**	0.0272	-2.63	-0.0173
Family labour type	-0.0214	0.0323	-0.67	-0.0381
Hired labour type	-0.0623*	0.0314	-2.00	-0.0662
Total income (₦)	1.87E-09	1.22E-09	1.54	4.67E-10
Flock size (number)	-8.12e-06	5.84E-06	-1.39	-7.74E-07
sigma squared	0.15	0.0147		
N	539			
Likelihood ratio	-254.6			
LR Chi2(15)	77.87			
Pseudo-R^2	0.165			
Wald > chi2	0.000			

Note: ***, **, *, significant at 1%, 5% and 10% respectively.

The sign was expectedly positive suggestive of greater probability of farmers that are engaged in agriculture as a secondary occupation to receive increased credit amount. This is against the backdrop that the additional income from primary occupation could be saved and used as a leverage to guarantee loans from the lender (Awotide*et al*., 2015). The marginal effect shows the likelihood that the amount of credit increased about 0.5% if agriculture is engaged as a secondary occupation instead of as a primary occupation. This result agrees withAwotide*et al*. (2015) who posits thatfarmer that engage only in agriculture obtain lesser credit than farmer that engage in agriculture as a secondary occupation because the income from the primary occupation can be relied upon as a safe nest to the lender to advance more credit.

The estimated coefficient of per capita asset value which is defined as the ratio of total asset value to the size of household was positiveand at 10% level of significance, showing a direct relationship with the amount of credit obtained. The implication is that as per capita asset value increases, the amount of credit obtained also increases. Assets serve as a kind of comfort to lenders where it could be used to recover principal amount given out as loans should there be failure to repay (Gitman, 2003). This substantiates the outcome of studies conducted by Gilligan *et al*. (2005);Sorokina (2013);Biyase and Fisher (2017) that asset value increases the prospect of a farmer gaining access to credit in the first instance of use. Marginal effects showed that with an increase of one naira in the per capita asset value, the credit amount obtainable will also increase.

The coefficient of enterprise egg in the second hurdle as estimated was significant at 10% level and negative, indicating an inverse relationship with the amount of credit obtained relative to the base category dual enterprise of egg and meat. A dummy variable takes the value of 1 if a farmer is engaged in a sole enterprise of egg or 0, if otherwise. The marginal effect shows that the amount of credit obtained by a poultry farmer engaged in egg production as a sole enterprise is 14% less than the poultry

farmer engaged in dual production of egg and meat. Theestimate of meat enterprise coefficient was negative at 5% significant level which depicts an inverse relationship with the obtained credit amount by the poultry farmers in the study area relative to the base category dual production of egg and meat. In addition to this, the marginal effect maintains that farmers that were engaged in the sole enterprise of meat only obtained credit amount that is 1.7% less than farmers involved in both egg and meat production. This result contradictedIsitor*et al*. (2014) who had suggested that egg producers obtained more credit than other categories of poultry producers while agreeing to credit access by dual producers of egg and meat. A combined production of egg and meat by some poultry farmers instead of sole enterprises could be a means of diversifying risks and uncertainties. This practice may probably be advantageous to gaining positive assessment from lenders who could view this as a way of diversifying risk that may affect a line of production due to unforeseen circumstances, which could make the farmer depend on the other line of production for sustenance and recovery.

The estimated coefficient of hired labour variable for the second hurdle showed that hired labour is a significant variable at 10% level affecting the amount of credit obtained but the sign was negative. This indicates an opposite directional movement or negative relationship with the amount of credit obtained relative to the base category of both family and hired labour. In other words, if the number of hired labour increases, the amount of credit obtained reduces compared with the base category. The cost of labour in poultry production has been adjudged to be the highest after feeding (Isitor*et al*., 2014). The negative sign could probably be due to increased production activities and the output level which by extension improves the income level consequent on the use of an additional employed labour. This might make the need for credit unnecessary or low if at all, mimicking a substitution effect scenario of more labour and less credit or vice versa.

The marginal effect shows that an extra hired labour will reduce the amount of credit obtained relative to farmers that engage both family and hired labour by 7% as shown in Table 4.19. At the same time, engaging an extra family labour will reduce the amount of credit obtained by poultry farmers relative to those farmers that engage both family and hired labour by 4%, although this is not significant. It is noteworthy that usage of family labour to drive a certain production level could be limiting because of

the difficulty to demand a certain output level from family members as could be done with hired labour, where work done can be easily measured and tracked for an agreed wage. Combining the use of both family and hired labour increases the amount of credit obtained compared with the use of hired labour only.

Multicollinearity was used to ascertain the true independence of the regressors and guarantee the consistency and unbiasedness of the estimated probit model. The correlation coefficients were determined in order to be able to recognise any explanatory variable that might be correlated, so as to exclude such from the model. Contingency coefficients were computed to check if there exists the problem of multicollinearity among the explanatory variables. The results show that there was no degree of association between the explanatory variables, with the highest coefficient correlation of 0.30 (Appendix 5).

The correlation matrices were decomposed into a linear combination of the variables selected as the explanatory variables. In a situation where two or more of the combined variables have proportions that are large in terms of variance of 0.50 or more, such combinations are labelled as large showing that there is a problem of multicollinearity in the variables which will make the regression estimates to be biased. Thus, one of the assumptions of regression model is violated that two or more regressors should not be correlated with one another. The implication of multicollinearity is that it will be difficult to isolate the exact influence of the explanatory variables independently on the dependent variable.

The presence of multicollinearity among the explanatory variables would have made the estimates of regression to be unstable. However, this did not play out with the explanatory variables included in the model to isolate the factors influencing the access to credit as well as the amount of credit obtained among the sampled poultry farmers in the study area.

4.4   Asset Poverty Status of Poultry Farmers

4.4.1   Asset Poverty Status of the Sampled Farmers

Following the works of Omonona, (2001) and Awotide*et al.* (2015), the asset poverty indices adopted the Foster-Greer-Thorbecke (FGT) measurement for the headcount(incidence), depth and the severity from the poverty aversion parameter "α" calculated using the "two-thirds of the mean per capita asset" accumulation (MPCAA)which is regarded as the threshold and asset poverty line relatively. Farmers with accumulated assets less than the estimated borderline is considered asset poor while those equal or above are non-asset poor. Total asset poverty line was estimated at ₦477,436.97 per annum while theproductive and household asset poverty lines were estimated at ₦137,476.22 and ₦339,960.75 per annum, respectively.

The results of FGT measurements with respect to the incidence ofasset poverty (AP_0)among the sample of poultry farmers were 60%, 68% and 64% for the total sample, productive asset (PAP_0) and household asset (HAP_0), respectively. This implies thatfor AP_0 of 60%, 323 of the 539 sampled poultry farmerswere asset poor(meaning that the 323 have insufficient assets to either provide for basic needs or cover living expenses without any income for a certain period) while216 farmers were non-asset poor. For PAP_0 of 68%, 367 poultry farmers were poor while 172 were not. For the $HAP_0$of 64%, 345 poultry farmers were poor and 194 were not. This means that more of the sampled poultry farmers were productive asset poor than those that were household asset poor.

The asset poverty gapor depth (AP_1)which captures how far below the threshold a farmer was supposed to bewas 43% for the total sample.Given the estimated asset poverty line of₦477,436.97, itimplies that the current worth of assets held by an average poor farmer was₦272,138.07 and would require assets worth ₦205,298.90

(representing 43% of the shortfall from threshold) to bridge the gap and exit asset poverty. Productive asset poverty gap (PAP_1) was 52% implying that the current worth of productive assets held by an average poor farmer was ₦65,988.59 and would require productive assets worth ₦71,487.63 to close the gap and exit. Household asset poverty gap (HAP_1) was 51% which means that the worth of household assets held by an average poor farmer was ₦166,580.77 and would require household assets worth of ₦173, 379.98 to exit asset poverty. The cost of eliminating AP_1 for the entire population of 323 asset poor farmers was estimated at ₦66,311,254 which equals the total sum of all the shortfalls in the population;the sum of ₦26,235,960 would be required to eliminate PAP_1 for the entire 367 who were productive asset poor whereas ₦59, 816,093 would be needed to eliminate HAP_1 for 345 household asset poor farmers. By implication, it means that for every ₦1 required to eliminate productive asset poverty ₦2.53k would be needed to eliminate household asset poverty,this shows that a higher amount is needed to eradicate household asset poverty compared to what would be required to eliminate productive asset poverty among the sample of poultry farmers in the study area.

The severity index of FGT which is the squared poverty gap ($\alpha=2$) is an indicator of variability or divergence within the asset poor farmers; the greater the inequality, the higher the severity. The asset poverty severity (AP_2)for the entire sample was35% which meansthat the poorest people were 35% worse off compared to the average poor people in terms of assets. The implication of this thatthe poorest people would need to mobilize asset resources worth three times more per person than what is required for an average asset poor farmer. In other words, for every ₦1 required by an average asset poor farmer, the poorest person will require ₦3. Productive asset poverty severity (PAP_2) was 46% while household poverty severity (HAP_2) was 44%, it means that the poorest people would need to mobilize assets worth four times more per poor person than would be required for an average asset poor farmer in terms of productive and household assets.

However, using the credit status of poultry farmers relative to asset poverty, the asset poverty incidence (AP_0) for credit user poultry farmers was 39%, which impliesthat 54 out of 138 credit users are poor, almost 4 out of every 10 poultry farmers that used

credit were asset poor andhad insufficient asset to cover their expenses or provide basic needs without income for a certain period.On the other hand, for non-credit users, AP_0 was 67% meaning that almost 7 out of every 10 poultry farmers that did not use credit were asset poor with 269 out of the 401 non-credit users found poor, this indicates that morenon-credit using farmers were asset poor.Disaggregation into productive and household asset poverty incidence using the credit status shows that PAP_0 was 65% while HAP_0 was 55%; this implies that while 6 out of every 10 credit user poultry farmers were productive asset poor, 5 were household asset poor. In other words, 90 out of 138 poultry farmers that used credit were productive asset poor while 48 were not and for household assets, 76 out of 138 poultry farmers that used credit were household asset poor while 62 were not. In the case of non-credit users, PAP_0 was 69% while HAP_0 was 81%, showing that 277were productive asset poor while 325were household asset poor. This also implies that more farmers were household asset poor than they were productive asset poor.

Theasset poverty gap index (AP_1) for credit users (CU) was 25%, which means that the worth of assets held by a credit using farmer was 75% (₦358,077.73) of the asset poverty line and would require assets worth ₦119,359.24 to exit asset poverty. However, for a non-credit user, $AP_1$was 49% (₦243,492.85) implying that more asset worth of ₦233,944.12 would be required to exit asset poverty. This result implies thatfor every one-naira (₦1) worth of assets required by asset poor credit users to exit asset poverty, two-naira ₦2worth of assets would be required by asset poor non-credit user to bridge the gap and exit asset poverty. The cost of eliminating AP_1 for 54 asset poor credit users and 269 asset poor non-credit users was estimated at ₦6,445,398.96 and ₦62,930,968.28, respectively.

For productive asset poverty gap index, the PAP_1 of a credit using farmer was 51% which implies that the worth of productive assets held was ₦67,363.35 and would require assets worth of ₦70,112.87 to exit the gap. Nevertheless, for non-credit users, $PAP_1$was 52%, meaning that the worth of productive assets held was ₦65,988.59 and would require productive assets worth of ₦71,487.63 to close the gap and exit. PAP_1 for the non-credit user was the same as the PAP_1 of the sample and almost at par with PAP_1 of a credit using farmer because for every one-naira worth of asset required by a

credit user to exit asset poverty, an equal sum of one naira would also be required for a non-credit user. This is because sampled poultry farmers in the study area were generally poor in terms of productive assets than they were for household assets. Moreover, the level of operational activities among the farmers was similar, a greater number of farmers in the study areais involved in egg production of small-medium scale, similar equipmentwould often beutilized for same level of operations. However, the cost of eliminating PAP_1 for the 90 productive assets poor credit users wasestimated at ₦6,310,158.3 while ₦19,802,073.51 would be needed for productive assets poor non-credit users. Although, the difference in the cost of eliminating productive asset poverty among an average credit user farmer and non-credit user farmer is very minimal.

On the other hand, the household asset poverty gap index, HAP_1 of a credit using farmer was 42% (₦142,783.52) and 69% (₦234,572.92) for a non-credit using farmer, showing a considerable difference in asset poverty gaps between the two groups compared with PAP_1 where the poverty gap index was at par for credit and non-credit users. It means that the worth of household assets held were ₦197,177.24 and ₦105,387.83 by credit users and non-credit users, respectively.This therefore implies that while ₦234,572.98 was required by a household asset poor non-credit user to exit asset poverty, ₦142,783.52 would be needed by an averagehousehold asset poor credit user poultry farmer. In other words, for every ₦1 required for an asset poor credit using poultry farmer to exit asset poverty, ₦1.6k would be needed by an asset poor non-credit user to exit asset poverty. The cost of eliminating HAP_1 for 76 household asset poor credit users was estimated at ₦10,851,547.52 and ₦76,236,218.50 for 325 household asset poor non-credit users.

In addition, asset poverty severity (AP_2) for credit users was 19% but 41% for non-credit users for the entire sample. This implies that the poorest of the poor among non-credit users are thrice as much worse offthan the poorest of the poor among credit users; in other words, the poorestnon-credit user will be required to mobilize at least thricethe worth of assets per poor person thanwas expected of an average asset poor non-credit user. It indicates that if the poorest of the asset poor credit usermobilized₦2 worth of assetsand was still being considered as averagely poor, an asset poor non-

credit farmer would need ₦6. This indicates that, the level of poverty was higherfor the poorest of the asset poor non-credit user than it was for the poorestasset poor credit user. For the PAP_2, poverty severity was the same for credit and non-credit users at 46%, as the poorest of the asset poor among credit and non-credit using farmers would be required to mobilize an equal amount to be considered as averagely asset poor. However, the case was different for the HAP_2 where the asset poverty severity for credit users was 35% and 63% for non-credit users as shown in Table 4.34. This means that the poorest of the poor among non-credit users would mobilize twice as much as would be required by the poorest of the poor among credit users.

The estimated asset poverty status indices of poultry farmers in the study area are as shown in Table 4.20.

Table 4.20 Asset Poverty Indices among Sample

Asset Poverty Indices	Total Sample	Credit User	Non-Credit User
Productive Asset Poverty Headcount (PAP_0)	0.6790 (0.0628)	0.6449 (0.0683)	0.6908 (0.0654
Household Asset Poverty Headcount (HAP_0)	0.6363 (0.0193)	0.5500 (0.0251)	0.8101 (0.0294)
Asset Poverty Headcount (AP_0)	0.6048 (0.0241)	0.3913 (0.0423)	0.6783 (0.0276)
Productive Asset Poverty Depth (PAP_1)	0.5165 (0.0392)	0.5135 (0.0489)	0.5175 (0.0415)
Household Asset Poverty Depth (HAP_1)	0.5081 (0.0169)	0.4166 (0.0248)	0.6920 (0.0307)
Asset Poverty Depth (AP_1)	0.4274 (0.0195)	0.2456 (0.0415)	0.4901 (0.0202)
Productive Asset Poverty Severity (PAP_2)	0.4567 (0.0308)	0.4606 (0.0419)	0.4554 (0.0341)
Household Asset Poverty Severity (HAP_2)	0.4404 (0.0170)	0.3480 (0.0317)	0.6263 (0.0414)
Asset Poverty Severity (AP_2)	0.3488 (0.0184)	0.1855 (0.0504)	0.4050 (0.0189)

"Figures in parentheses are the standard errors"

The analysis shows that sampled poultry farmers accumulated more household assets than productive assets and were also more household asset poor than they were for productive assets irrespective of credit status. In other words, asset poverty was more pronounced with household assets than productive assets as generally indicated by asset poverty indices. The sampled poultry farmers were generally poor in productive asset irrespective of credit status whereas there were noticeable variations among the household asset poverty indices. Similarly, credit using poultry farmers appeared to be well-off when compared with non-credit users which appeared to be worse off. These findings are in tandem with Haveman and Wolff (2000)'s definition which suggested that more non-credit users are unable to handle minimal necessities required for sustenance due to insufficient asset stock compared with credit usersfor certain periods. Although, this outcome could also be due to other factors that were not related to credit use, but could affect the extent or level of asset accumulation or asset poverty among the poultry farmers in the study area. Literature established a strong relationship between credit and household assets as the former was found to assist in the accumulation of assets, setting long time economic goals and in some cases reduce liabilities (Cohen and Sebastad, 2000; Manlagnit, 2016).

4.5   Impact Analysis of Credit Use on Asset Accumulation of Poultry Farmers

The study adopted the propensity score matching to predict the probable credit use impact on asset accumulation of poultry farmers in the area of study. Drawing on theories (randomization, potential outcome, conditional probability) and existing literature(Cochran and Rubin, 1973; Heckman *et al.,* 1997; Baker, 2000; Dehejia and Wahba, 2002; Smith and Todd, 2005; Awotide*et al*., 2015; Yaqoob *et al*., 2017); farmers' socio-economic characteristics as well as variables that simultaneously influencedtreatment (credit) and outcome of interest (asset accumulation) were included as covariates in the model.The propensity score or balancing score was first estimatedfrom the probit regression analysis (any probability model can actually be employed for this whether probit or logit)maintaining only influencing covariates that were not affected by the decision to use credit or not.

4.5.1   Impact of Credit on Total Asset Accumulation of Poultry Farmers

The impact of credit on the asset accumulation of poultry farmers in Southwestern Nigeria was estimated using the Nearest Neighbour Matching (NNM).It is important to note that whenever the propensity score distribution between the comparison (non-user) and treatment (user) groups show a considerable overlap, the results will be the same for many of the matching algorithms (Caliendo and Kopeinig, 2005). Hence, the

choice of NNM as a matching method, being the most straightforward matching algorithm method to match farmer with credit (treated unit) and farmer *i* (control unit) using their nearest propensity scores (Rubin, 1973a; 1973b; Rosenbaum and Rubin, 1983) with the matched control units as the counterfactual for the treated units.

The results of NNM as presented in Table 4.21 shows a positive and insignificant differencesbetween the credit user and non-credit user in terms of the accumulated assets of poultry farmers in the study area. After balancing the characteristics in the treated (credit users) and the matched (non-credit users) groups using the matching estimator (NNM); it was found on the average that, credit increased the accumulation of assets. The average treatment effect on the treated (ATT/ATET) gave the average effect of credit on the asset accumulation of poultry farmers as ₦1,639,997.01.

Table 4.21   The Impact of Credit on Total Asset Accumulation of Poultry Farmers

Total Asset Value (Credit Source)	Sample	Treated	Controls	Difference	S.E.	T-Stat
All credit sources	Unmatched	6490743.80	2468466.60	4022277.19	1062840.95	3.78
	ATT	6490743.80	3722893.81	2767849.99	2232110.33	1.24
	ATU	2468466.60	3720324.69	1251858.08		
	ATE			1639997.01		
Cooperative societies	Unmatched	7688746.04	2543742.93	5145003.11	1188543.59	4.33
	ATT/ATET	7688746.04	4703110.86	2985635.18	3043871.74	0.98
	ATU	2543742.93	3995987.69	1452244.76		
	ATE			1736732.78		
Family and Friends	Unmatched	3512152.00	3497892.12	14259.88	2857487.20	0
	ATT/ATET	3512152.00	2205273.33	1306878.67	1494402.70	0.87
	ATU	3497892.12	4170269.05	672376.92	.	
	ATE			690034.67	.	
Agricultural Bank	Unmatched	2385810.00	3517180.12	-1131370.12	3667734.71	0.31
	ATT/ATET	2385810.00	1880900.00	504910.00	805701.35	0.63
	ATU	3517180.12	1252139.17	-2265040.95		

Commercial Bank	ATE			-2218789.45		
	Unmatched	5761651.05	3664847.68	2096803.38	2667246.58	0.79
	ATT/ATET	5761651.05	4150504.95	1611147.11	1599484.74	1.01
	ATU	3664847.68	3707752.93	42905.25	.	.
	ATE			103714.63		
Microfinance Bank	Unmatched	1944943.75	4365380.07	-2420436.32	4629499.00	-0.52
	ATT/ATET	1944943.75	1065932.50	879011.25	1051484.00	0.84
	ATU	4365380.07	2200412.36	-2164967.71	.	.
				-2097323.74		

The NNM causal effect of credit showing differences between the exposure to intervention and control indicated that the proportion of asset accumulation of credit user is higher by ₦2,767,849.99 than non-credit user, deducing that credit indeed hasa positive increasing effect on asset accumulation. This outcome supports other studies who have shown that the effect of credit on asset accumulation or asset ownership is positive (Barnes, 1996; Manlagnit, 2004).

The descriptive statistics showing different available credit sources to credit user poultry farmers in the study area was presented in figure 4.2. Additionally, the ATT was estimated by different credit sources for the poultry farmers in the study area so as to give an overview of the credit source with the most impact on a credit user's asset accumulation. Attempts made at estimating asset accumulation from credit sources such as commercial and microfinance banks gave spurious results making it difficult to make meaningful inference. This probably could be due to the number of farmers that actually got credit from the sources as shown in figure 4.2.

Table 4.21reveals that ATT was highest for credit sourced from cooperative societies as ₦2,985,635.18, followed by commercial bank with ₦1,611,147.11but lowest for

credit sourced from agricultural banksas ₦504,910.00, translating to 83.1% difference in ATT between the credit sourced from cooperative societies and agricultural bank sources.This could be due to the fact that credit from cooperatives istimely, less bureaucratic with clear terms and conditions for members, consequently member-farmers always access timely credit that are used in productive activities which further improves their income generation and by extension their asset accumulation. Similarly,the ATE for credit sourced from cooperativesocieties as₦1,736,732.78 was the highest but lowest for agricultural banksat -₦2,218,789.45 among sampled poultry farmers in the study area. This translates into a difference of about 227.8% and this confirmed the fact that cooperative societies' credit source plays important role in ensuring use and accumulation of assets in the population of poultry farmers in the study area.

4.5.2   Impact of Credit on Poultry Farmers' Productive Assets Accumulation

The estimation results presented in Table 4.22provides the impact of credit on the accumulation of productive assets of sampled poultry farmers in the study area. Theaverage treatment effect (ATT) was shown to be positive and insignificant for all the credit sources except for agricultural bank that was negative and significant. In essence, it means thatthe impact of credit sourced from commercial banks, cooperative societies, family and friends and microfinance banks on productive assetaccumulation were positive but not significant whereas, credit sourced from agricultural banksthough was negative but significant at 10% level for accumulated productive assets.

The impact of credit on productive assets was ₦1,920,081; showing that the effect of credit on the accumulation of credit is positive though not significant. In terms of credit sources with the most impact, credit from cooperative societieshad the highest impact. This implies that credit sourced from cooperative societies will increase the accumulation of productive assets by ₦2,551,164. However, the impact was lowest for credit sourced from agricultural bank with -₦289,790implying that credit from agricultural bank will lead to lossesin the accumulation of productive assets by the

poultry farmer. The greater impact of credit sourced from cooperative societies could be a result of fund availabilityand joint finance of agricultural inputs with flexible repayment plan (Yamusa and Adefila, 2014) thereby increasing the productive asset count for the farmer. The ease at which the farmers also get credit for productive activities could also be responsible for the significance of the credit source compared with other credit sources including agricultural bank which is often characterised with bureaucracy and loads of paper work as found out during the focus group discussion conducted with the sampled poultry farmers in the study area.

Moreover, the negative significant impact of credit sourced from agricultural bank to the accumulation of productive assets of sampled poultry farmers in the study area could not be detached from the submission of Eze*et al.* (2010) that agricultural bank has not been able to deliver its target of upgrading rural agricultural production infrastructure and boost productivity because of inadequate budgetary allocation and financing leading to inability of many farmers to secure credit for productive asset accumulation.

Table 4.22 Impact of Credit on Poultry Farmers' Productive Assets Accumulation by Source

Productive Asset	Coefficient	Std. Err.	Z	P>z
ATET				
All credit sources	1,920,081	1440336	1.33	0.183
Commercial Bank	536,848	1888328	0.28	0.776
Cooperative societies	2,551,164	1988348	1.28	0.199
Family and Friends	7,455	2144301	0.00	0.997
Microfinance Bank	202,530	763005	0.27	0.791

Agricultural Bank	-289,790*	167259	-1.73	0.083

***, **, *, significant at 1%, 5% and 10% respectively.

4.5.3 Impact of Credit on Poultry Farmers' Household Assets Accumulation

Theestimation of ATET which revealed the average treatment effect on the treated as presented in Table 4.23; shows that the impact of credit was positive but not significant with ₦312,896.0. Disaggregating the sources of credit to show the source with the most impact among the available sources of credit to the sampled poultry farmers, shows that commercial bank sourced credit will increase the accumulation of household assets by ₦2,222,442. However, the impact of credit was negative for microfinance and agricultural banks. In addition, the impact of credit from commercial bank was significant at 10% level but insignificant for other sources of credit with respect to household asset accumulation.

Table 4.23 presents the credit impact on household asset accumulation; further disaggregated into different sources of credit available to the sampled poultry farmers in the study area. It reveals that the ATET was highest for commercial bank credit with ₦2,222,442 more than others and lowest for agricultural bankwith -₦303,144.

The difference in ATET between commercial bank, cooperative societies, family and friends, microfinance bank and agricultural bank were about73.4%, 77.9%, 102% and 113.6%, respectively. This confirmed the prominent role being played by commercial bank in the accumulation of household assets. This may be due to the ease at which the household assets could be converted to cash or in some instances, the assets purchased could be retrieved by the lending institutions in the event of loan default as found out during the focus group discussion. Another reason attributed to increased household asset accumulation and the significance of commercial banks credit source is premised on instalmental credit products targeted at owning household assets compared with productive assets. Productive assets are specialized equipment which are not easily disposable and be converted to cash should there be a default.

Agricultural bank source had the least impact even for the accumulation of household assets among the poultry farmers, same for microfinance banks. This implies that obtaining credit from both sources for accumulating household assets have negative effect. Credit from agricultural bank is for agricultural production activities while micro-finance banks are set up to assist small and medium scale businesses.

Table 4.23 Impact of Credit on Poultry Farmers' Household Assets Accumulation by Source

Household Asset

ATET	Coefficient	Std. Err.	z	P>z
All credit sources	312,896	1033851	0.30	0.762
Commercial Bank	2,222,442*	1147781	1.94	0.053
Cooperative societies	591,397	1364021	0.43	0.665
Family and Friends	491,600	433081	1.14	0.256
Microfinance Bank	-44,188	900600	-0.05	0.961

Agricultural Bank	-303,144	578515	-0.52	0.666

CHAPTER FIVE

5.0   SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1   Summaryof Major Findings

This study examined the impact of credit on asset accumulation among poultry farmers in Southwestern Nigeria. Data was drawn from 550 poultry farmers in Oyo and Ogun Stateselectronically by Computer Assisted Personal Interviewing (CAPI) through the use of Surveybe Implementer, while 539 were used for the final analysis. The data was analysed using descriptive statistics, double hurdle model, test of means difference,

Foster, Greer and Thorbecke (FGT) poverty model and the propensity score matching (PSM).

Results revealed that a greater number of the poultry farmers were male (90%) with average age of43.7±10.4, married (91%) and with mean household size of5±1.9 persons. The farmers were well educated, 57.1% had tertiary education, 54% of the sampled farmers were fully engaged in poultry farming as primary occupation, egg producers accounted for 72.7% of farming enterprise in the study area while 45.6% had less than 5 years poultry farming experience. Majority of the poultry farmers were small-medium scaled. One hundred and thirty-eight (26%) farmers were credit users while four hundred and one (401) were not. The average amount of credit obtained by poultry farmers was ₦831,000 and a maximum amount of ₦12,000,000.

The average total assets accumulation per poultry farmer was ₦8,959,210. The average worth of productive assets held by credit user and non-credit user were ₦2,440,000 and ₦548,000 respectively, while for household assets, ₦4,050,000 was held by a credit user while ₦1,920,000 was held by the non-credit user. The level of asset accumulation by credit user was higher than non-credit user at 5% level of significance.

The first hurdle of double hurdle model estimates revealed that being married, vocational training, account relationship with financial institution, per capita asset value and flock size were the determining factors of farmers' credit access. The estimates of the second hurdle showed that engaging in poultry farming as a secondary occupation, per capita asset value, account relationship with financial institution, egg enterprise, meat enterprise and hired labour were the factors that influence the amount of credit obtained by sampled poultry farmers in the study area.

The asset poverty lines of ₦477,436.97, ₦339,960.75 and ₦137,476.22 per annum were estimated for total assets, household assets and productive assets among the sampled poultry farmers, respectively. The FGT estimation showed that 6 out of ten poultry farmers were asset poor in total accumulated assets, 7 out of 10 were productive assets poor while and 6 out of 10 were householdassets poor. For every one-naira (₦1) worth of assets required by asset poor credit users to exit asset poverty, two-naira (₦2) worth of assets would be required by an asset poor non-credit user.The sampled poultry farmers were generally poor in productive assets compared with household assets.

The analysis of impact of credit on asset accumulation showed that the average credit effect on the asset accumulation was ₦1,639,997.01 for the poultry farmers and ₦2,767,849 for credit using poultry farmers at 5% level of significance. The average treatment effect on the treated (ATT) was highest for cooperative societies'sourced credit for productive assets while ATT was highest for credit sourced from commercialbanks with respect to accumulation of household assets. ATT was lowest for credit sourced from agricultural banks for both productive and household assets accumulation.

5.2   Conclusion

This research study aimed to analyse credit impact on asset accumulation among poultry farmers in Southwestern Nigeria. Theassessment of assets accumulation level of sampledpoultry farmers in the study area showed high asset poverty level. This implies that majority of the sampled farmers do not have sufficient assets to either provide for basic needs or cover living expenses without any income for a certain period. The significance of account relationship with financial institutions and per capita asset values to credit access as well as amount of credit obtainable establishes their importance to viability and sustainability of commercial poultry production in Nigeria.

Understanding the terms and conditions of available credit will in no small measure position farmers towards enjoyingthe benefits of credit and improve their earningcapacity to accumulate assets for future deployment.

The significant negative impact of agricultural bank credit on the accumulation of productive assets has reiterated the need to review the structure of the agricultural bank, its terms of engagement and service delivery, such that the purpose for creating the bank can be explored and achievedby the target population especially the poultry farmers.

5.3   Recommendations

The following recommendations were proposed based on the outcome of this study:

1. Mandatory registration of poultry farmers with financial institutions to encourage account operations and financial inclusiveness. Financial institutions

in conjunction with the Central Bank of Nigeria should design a financial programme specifically to assist the registered poultry farmers with available opportunities in credit and financial planning to enhance their growth and development. Qualified poultry farmers should be entitled to a certain percentage of their turnover as credit at the end of the year in line with conditions of the designed financial programme. This will deepen financial literacy, create financial awareness among the poultry farmers and assist in the review of their financial activities, thereby making it easier for the lending institutionsto help them build relationship for future growth and expansion.

2. Manageable household sizes should be advocated for and encouraged among poultry farmers relative to their asset holdings because large household sizes will be difficult to maintain with little assets in the advent of a challenging situation. There is an increasing prospect for farmers that are able to accumulate assets to build formidable fronts against shocks and production crises with fewer household sizes.

3. Identification and classification of poultry farmers should be carried out based on their level ofoperations, locations and linked to at least one agricultural extension departments of a state or federal institution for periodic trainings. The vocational trainings in form of seminars, conferences, workshops, and interactive sessions should frequently be held and monitored for effectivenessto keep thepoultry farmers abreast of developments and changes in thepoultry industry. Attendance at such trainings should form part of recommendations and requirements to secure facilities or loans in the financial programme stated in the first recommendation of this study.

4. Revolving start-up fund with a moratorium (principal and interest) of at least one year should be set up in every government establishment and privately owned organisation to encourage employees that are interested in poultry production. Periodic monitoring and appraisal of funds usage should be carried out by an external body especially for government establishments to ensure accountability and prevent diversion. This will assist to incorporate poultry production as a secondary occupation to enhance revenue generating capacity of individuals and production explosion in Nigeria.

5. Organisation and harmonisation of remunerations among hired labour in poultry production. This becomes necessary in curbing fluctuations often experience in the cost of labourwhich is the second highest production cost after feeding.The review of labour costsand standardisation of remunerations among hired labour will help to stabilise prices of poultry products, enhance the profit margin of producers, help in proper planning and mitigate fluctuations in price of poultry products which often distorts profit analysis and forecast in poultry production. Labour in poultry production can be categorised into skilled and unskilled and remunerated based on level of education, experience, training and scope of engagements.

6. A discount programme or rebate regime should beincorporated for producers involved in production of egg and chicken meat especially bymanufacturers of poultry vaccines and financial institutions. This will assist to lower production cost, enhance credit access, enhance revenue generation, maximize labour usage and improve access to more profitable markets aimed at improving returns on investments by dual producers. This will also encourage dual production and entrench it as a coping strategy against shocks or vulnerability, thereby improving sustainable production.

7. Asset accumulation policy should be formulated to assist poultry farmers especially with respect to productive assets. This could be done by subsidising the cost of asset acquisitiondirectly to farmers, finance production companies or local fabricators to reduce cost of production. In addition, colleges of technology in association with Ministries of Science and Technology should be tasked and facilitated to design home-grown machinery suitable for use in poultry production. This will reduce cost of importation, conserve foreign exchange and also enhance automation of poultry production which by extension will boost production capacity of poultry producers and increase income generation among producers and the nation as a whole.

8. Agricultural banks' operations should be reviewed and re-structured in a way to render actualsupport, aid effective credit delivery to poultry farmers and achieve its target aim of agricultural development especially among poultry farmers. Qualified personnel should be employed for effectiveness, consistency and efficiency.

Commercial banks must be organised in a way that will aid improved lending especially to small and medium scale poultry farmers. Agricultural desks should be instituted in every branch of commercial banks with dual reporting lines to the Development Finance Office of the Central Bank of Nigeria to aid actual and measurable development of agriculture in Nigeria. Each commercial bank should be responsible for at least a sector of agriculture with specific developmental goal and initiative. The proposed goal must be monitored and appraised at the end of the financial year.

5.4   Contributionsto Knowledge

This thesis presented an attempt at evaluating the asset accumulation of poultry farmers in Southwestern Nigeria relative to credit. The study made use of an asset-based approach, thereby extending the income-based approach often used to analyse the poverty status of farmers. The following contributions were made:

(i)   Poultry farmers with farming experience below 5 years were found to use credit more among other experienced poultry farmers.

(ii)   Female poultry farmers were less credit rationed in terms of the amount of credit obtained, although their use of credit was rather low compared with male poultry farmers.

(iii)   The probability of sampled poultry farmers with account relationship with financial institutions to access credit was higher than those without account relationships. Similarly, the amount of credit obtainable increased with account relationships.

(iv)   Dual production of eggs and meat in poultry production have higher probability of obtaining more credit that sole enterprises.

(v)   The level of assets accumulation among the sampled poultry farmers was very low in the study area. Six out of ten poultry farmer was asset poor.

(vi)   The severity of asset poverty among non-credit using sampled poultry farmers was more than credit using sampled poultry farmers in the study area.

(vii) The impact of cooperative societies sourced credit on the accumulation of assets among the sampled poultry in the study area was the highest compared with other sources of credit.

(viii) The impact of credit from agricultural bank was significant for the accumulation of productive assets but negative. The impact was also negative for the accumulation of household assets, though not significant.

(ix) The impact of commercial banks credit on household assets of the sampled poultry farmers was significant and positive.

5.5 Suggestions for Further Study

The study area selected for this study encompass Oyo and Ogun States based on the high population of poultry farmers in the two states; a state with lower population of poultry farmers may be selected to make for a closer and clearer comparisonin future studies.

The study also looked at the impact of credit on asset accumulation; the consideration of other avenues through which assets could be accumulated,avenues such as remittance and inheritance could introduce another dimension to this discourse if isolated and criticallyassessed.The only impact methodology adopted in the study was propensity score matching; the study could be subjected to different impact analyses for valid conclusion with respect to the actual impact of credit on asset accumulation. Other impact methodologies such as endogenous or exogenous switching regression model could be used for future analysis to explicitly isolate observed or unobservable characteristics that may account for selection bias among the farmers with respect to impact of credit.

REFERENCES

Abdallah, A.H. 2016. "Agricultural credit and technical efficiency in Ghana: is there a nexus?". *Agricultural Finance Review*76.2:309-324.

Abdallah, A., Ayamga, M. and Awuni, J.A. 2018. Impact of agricultural credit on farm income under the savanna and transitional zones of Ghana. *Agricultural Finance Review* 79:2.

Abdul-Jalil, M. 2015. Determinants of access to credit and its impact on household food security in Kagara district of Northern Region of Ghana. PhD Thesis. Department of Agricultural Economics, Agribusiness and Extension, Kwame Nkrumah University of Science and Technology.

Abula, M. and Agada, E. 2013. An evaluation of the amount of credit obtained by rural farmers and its determinants from the microfinance banks in Kogi State,Nigeria.*Issues in Business Management and Economics*1.7:184-192.

Abula, M., Otitolaiye, J. O., Ibitoye, S. J. and Orebiyi, J. S.2013. Repayment performance of rural farmers loan beneficiaries of microfinance banks in Kogi State, Nigeria. *International Journal of Farming and Allied Sciences* 2.5:104-110.

Adegeye A.J. and Dittoh J.S. 1985. *Essentials of agricultural economics*. Impact publishers, Nigeria Ltd.

Adene, D.F. and Oguntade, A.E. 2006. *The structure and importance of the commercial and village-basedpoultry industry in Nigeria*. FAO, Rome ECTAD/AGAP.

Adepoju, A.O., Timothy, O.A. and Oyekale, A.S. 2013. Risk coping behaviour of small-scalepoultry farmers in Ogun State, Nigeria. *Asian Journal of Animal and Veterinary Advances*8:786-795.

Adewunmi, O.I., Adesimi, B. and Akerele, E.O. 2011. Non-farm activities and poverty among rural farm households in Yewa Division of Ogun State. *Journal Social Science*26.3:217-224.

Adegbite, D.A, Momoh, S. and Alade, A. 2007. Determinants of informal saving mobilization among farmers in Ogun State, Nigeria. *Journal of SustainableDevelopment 4*:1- 2.

Adegbite, D.A. 2009. Repayment performance of beneficiaries of Ogun State Agricultural and Multipurpose Credit Agency (OSAMCA) in Ogun State, (2004-2007). *American- Eurasian Journal of Sustainable Agriculture* 3.1:117–125.

Adewole,G. 2017. Poultry Production in Nigeria. *This Day News*. Retrieved December 10, 2018, from https://www.thisdaylive.com/index.php/2017/12/12/adewole-nigerias-poultry-industry-is-worth-over-n1-2tn/

Adeyonu, A., Ajiboye, B., Isitor, S. and Faseyi, S.A. 2017. An analysis of the factors influencing access to credit by poultry farmers in Abuja, Nigeria. *Journal of Agric. Conspectus Science*82.1:15-22

Adjei, J.K., Arun, T. and Hossain, F. 2009. The role of microfinance in asset-building and poverty reduction: The case of Sinapi Aba Trust of Ghana. The University of Manchester, Brooks.*World Poverty Institute Working Paper Series*.

Afolabi, J.A.2010. Analysis of loan repayment among small scale farmers in Oyo State, Nigeria. *Journal of Social Science* 22.2:115–119.

Afolabi, O.I., Adegbite, D.A., Akinbode, S.O., Ashaolu, O.F. and Shittu, A.M. 2014. Credit constraints: its existence and determinants among poultry (egg) farmers in Nigeria. British *Journal of Economics, Management and Trade* 4.12:1834-1848.

Africa Sustainable Livestock. 2018. Livestock production systems spotlight Nigeria(ASL 2050). FAO, Rome, Italy. 2.

Agom, D.I.2001. Impact of microcredit on agricultural enterprises in Cross River State, Nigeria. PhD Thesis. University of Ibadan, Nigeria.

Ajiboye, B.O., Bamiro, O.M., Adeyonu, A.G. and Faseyi, S.A. 2019. Technical efficiency of battery cage and deep litter systems in poultry production. Department of Agricultural Economics, Landmark University, Omu-Aran, Kwara State, Nigeria. *International Journal of Poultry Science.*

Akanni, I.A. 2007. Effect of micro-finance on small scale poultry business in South Western Nigeria. *Emirate Journal of Food and Agriculture* 19.2:38-47.

Akanji, O.O.2001. Microfinance as a strategy for poverty alleviation.*Central Bank of NigeriaEconomic and Financial Review* 39.4:111-134.

Akerlof, G. 1970. The market for lemons: quality uncertainity and the market mechanism. *The Quarterly Journal of Economics*84.3:488–501.

Akpan, S.B., Inimfon, V.P., Samuel J.U., Edem A.O. and Uwemedimo, E.O. 2013. Determinants of credit access and demand among poultry farmers in Akwa Ibom State, Nigeria. *American Journal of Experimental Agriculture*3.2:293-307.

Akram, W., Hussain, Z., Sial, M.H. and Hussain, I. 2008. Agricultural credit constraints and borrowing behavior of farmers in rural Punjab. *European Journal of scientific research*23.2: 294-304.

Akugudu, M.A., Egyir, I.S. and Mensah-Bonsu, A. 2009. Women farmers' access to credit from rural banks in Ghana. *Agricultural Finance Review*69.3:284-299.

Akugudu, M.A. 2012. Estimation of the determinants of credit demand by farmers and supply by rural banks in Ghana's Upper East. Region. *Asian Journal of Agricultural Rural Development*2.2:189-200.

Akugudu, M.A., Guo, E.and Dadzie, S.K. 2012. Adoption of modern agricultural production technologies by farm households in Ghana: What factors influence their decisions? *Journal of Biology, Agriculture and Healthcare*2.3:2224-3208

Alabi, R.A. and Isah, A.O. 2002. Poultry production constraints: the case of Esan West LGA of Edo State, *Nigeria. African Journal of Livestock Extension* 1.1:2-5.

Aladejebi, J.O., Fakayode, B.O., Oronti, O.O. and Sani, P. T. 2019. Post economic recession and agricultural production in Nigeria: A case study of small-scale poultry egg farming. Invited paper presented at the 6th African Conference of Agricultural Economists, September 23-26, 2019, Abuja, Nigeria.

Amos, T. T. 2006. Analysis of backyard poultry production in Ondo State, Nigeria. *International Journal of Poultry Science* 5.3:247–250.

Anyiro, C. and Oriaku, B. N. 2011. Access to and investment of formal micro credit by small holder farmers in Abia State, Nigeria. A case study of Absu Micro Finance Bank, Uturu. *Journal of Agricultural Sciences*6.2:3861.

Apantaku, S.O. 2006. Analysis of participation of farmers in participatory poultry production research in Lagos State, Nigeria. *Livestock Research for Rural Development*18.1:1-12.

Arowolo, R.O.A., Soetan,K.O., Arowolo O.O. and Sodimu, O.O. 2012. The level of awareness and use of anticoccidials in poultry farms in South Western Nigeria. *African Journal Pharm. Pharmacol*6.2:3158-3164.

Asante-Addo, C., Mockshell, J., Siddig, K. and Zeller, M. 2016. Agricultural credit provision: What really determines farmers' participation and credit rationing? 5th International Conference of AAAE, United Nations Conference Centre. Addis-Ababa Ethiopia.

Ashagidigbi, W.M., Sulaiman, S.A. and Adesiyan, A. 2011. Technical and allocative efficiency of poultry egg producers in Nigeria. *Agricultural Journal*, 6: 124-130.

Awogboro, T.T., Yusuf, W.A. and Yusuf, S.A. 2019. Optimum poultry enterprise combinations among small holder farmers in Osun State, Nigeria. *Nigerian Journal of Animal Production*. 44.3:167–177

Awotide, B.A., Abdoulaye, T., Alene, A. and Manyong, V.M. 2015. Impact of access to credit on agricultural productivity: Evidence from smallholder cassava farmers in Nigeria. A contributed paper prepared for oral presentation at the International Conference of Agricultural Economists (ICAE) Milan, Italy August 9-14, 2015.

Awotodunbo, A.A. 2008. Appraisal of finance constraints to small scale farming in Etsako East Local Government Area. *International Journal of Agricultural Economics Rural Development* 1.2:35-41.

Awoyinka, Y.A. and Adeagbo, S.O. 2006. Analysis of demand for informal and formal credit among small-scale cassava farmers in Oyo State, Nigeria. *Journal of Agricultural Social Science* 4.2:196-202.

Awuku, M.S. 2009. Access to farm credit: The case of AfDB and poultry farmers in the Ga East Municipality. PhD Thesis. Kwame Nkrumah University of Science and Technology, Kumasi-Ghana.

Awunyo-Vitor, D., Al-Hassan, R.M. and Sarpong, D.B. 2014. Impact of formal financial market participation on farm size and expenditure on variable farm inputs: The case of maize farmers in Ghana. *International Scholarly Research Notices*2014: 329674.

Awunyo-Vitor, D. 2018. Theoretical and conceptual framework of access to financial services by farmers in emerging economies: implication for empirical analysis. *Sapientiae, Economics and Business*.6.1:43–59.

Ayamga, M., Sarpong, D.S. and Assuming-Brempong, S. 2006. Factors influencing the decision to participate in microcredit: An illustration for Northern Ghana. *Ghana Journal of Development Studies* 3.2:431-34

Ayaz, S. and Hussain, Z. 2011. Impact of institutional credit on production efficiency of farming sector. A case study of District Faisalabad. *Pakistan Economy and Social review*49:2.

Azzi, C.F. and James C.C. 1976. A theory and test of credit rationing: comment. *The AmericanEconomic Review*66.5:911–17.

Badiru, I.D. 2010. Review of small-scale farmers' access to agricultural credit in Nigeria. International Food Policy Research Institute (IFPRI). *Nigeria Strategy Support Program Policy Note* 25.

Baiyegunhi, L.J.S. and Fraser, G.C.G. 2014. Smallholder farmers' access to credit in the Amathole District. Municipality, Eastern Cape Province, South Africa. *Journal of Agriculture and Rural Development in the Tropics and Subtropics.*115.2:79–89.

Baker, J.L. 2000. *Evaluating the impact of development projects on poverty: a handbook for practitioners*. Directions in development. Revised edition.

Balogun, E.D. and Otu, M.F. 1991. Credit policy and agricultural development in Nigeria: *CBN Economic and Agric Review* 4:2.

Bamiro, O.M., Shittu, A.M. and Kola-Olutokun, A.S. 2008. Private feed production as a costreduction strategy: Effects on profitability of poultry business in Ogun State, Nigeria. *TheOgun Journal of Agricultural Sciences* 1.1:37–51.

Barnes, C. 1996. *Assets and the impact of microenterprise finance programs* (June). Assessing the Impact of Microenterprise Services (AIMS) paper. Washington, D.C.: Management Systems International.

Barrett, C.B.and Swallow,B.M. 2006. Fractal poverty traps.*World Development*34.1:1–15.

Beck, T. and de la Torre, A. 2007. The basic analytics of access to financial services' financialmarkets, institutions and instruments. *World Bank Policy Research Working Paper* 4026.16:79-117.

Beck, T., Demirguc-Kunt, A., Martinez, P. and Soledad, M. 2007. Reaching out: access to and use of banking services across countries', *Journal of Financial EconomicsElsevier* 85.1:234-266.

Belbase, K. 1991. Rural household data collection in developing countries: Designing instruments and methods for collecting general household information data.

Department of Agricultural Economics and Cornell food and nutrition policy program.

Beverly, S.G., Moore, M. and Schreiner, M. 2001. A framework of asset accumulation stages and strategies. *Journal of Family and Economic Issues* 24.2:143–156.

Beverly, S., Sherraden, M., Zhan, M., Trina R., Shanks. W. and Nam, Y. 2008. Poor finances: Assets and low-income households.Determinants of asset building, areport in the series. Center for Social Development, Washington University in St. Louis, and Reid Cramer New America Foundation.

Binuomote, S.O., Ajetomobi, J.O. and Ajao, A.O. 2008. Technical efficiency of poultry egg producers in Oyo state of Nigeria. *International Journal ofPoultry Science* 7:1227-1231.

Biyase, M. and Fisher, B. 2017. Determinants of access to formal credit by the poor households. studia Universitatis Babes-Bolyai O *Economica*62.1:50-60.

Blinder, A. and Stiglitz, J. 1983. Money, credit constraints, and economic activity. *American Economic Review* 73.2:297-302.

Blundell, R. and Dias, M.C. 2005. Evaluation methods for non-experimental data. Institute for fiscal studies, *Journal of Applied Public Economics*21.4:427-468.

Bourguignon, F. 2002. From income to endowments: The difficult task of expanding the income poverty paradigm.*Journal of Development Studies* 28.2:121-132.

Brad, H., Yang Seung, L. and Brian, S. 2010. Consumer behaviour in lottery: The double hurdle approach and zeros in gambling survey data. *Journal of International Gambling*10.2:165-176.

Caliendo, M. and Kopeinig, S. 2005. Some practical guidance for the implementation of propensity score matching. Discussion paper1588, IZA, Bonn.

Campero, A. and Kriser, K. 2013. Access to credit: awareness and use of formal and informal credit institutions. *Working papers* 2013:07, Banco de Mexico.

Carter, M.R. and Barrett, C.B. 2006. The economics of poverty traps and persistent poverty: An asset-based approach. *Journal of Development Studies* 42.2:178-199.

Carter, M.R. and May, J. 2000. One kind of freedom: Poverty dynamics in post-apartheid Africa.*World Development Studies*29.2:13-18

Central Bank of Nigeria, 2008. Annual Report and Statement of Accounts for the year ended 31st of December, 2009. pp 115-118.

Central Bank of Nigeria,2016. Annual Report and statement of Accounts. CBN Publications.

Central Bank of Nigeria,2019. Annual Report and statement of Accounts. CBN Publications.

Chowa, G.A. and Sherraden, M. 2009. Wealth effects of an asset-building intervention among rural households in Sub-Saharan Africa. *Center for Social Development Working papers*9:57. Washington University in St. Louis.

Christen, R. and Anderson, J. 2013. Segmentation of smallholder households: Meeting the range of financial needs in agricultural families. Consultative Group to Assist the Poor [CGAP]. Washington DC.

Claessens, S. 2006. Access to financial services: A review of the issues and public policy objectives. *The World Bank Research Observer*21:2.

Cochrane, W. and Chambers, S. 1965. The planning of observational studies of human populations, *Journal of the Royal Statistical Society*A.128:234-266.

Cochran, W. and Rubin, D. 1973. Controlling bias in observational studies. Sankhya.*The Indian Journal of Statistics.* Series A (1961-2002). 35: 417-446.

Cohen, M. and Sebstad, J. 2000. Synthesis report on microfinance, risk management and poverty. The report is based on field studies by Ronald T. Chua, Paul Mosley, Graham A.N. Wright, and Hassan Zaman. Paper submitted to USAID by AIMS. Washington, D.C.: Management Systems International.

Cragg, J.G. 1971. Some statistical models for limited dependent variables with application to the demand for durable goods.*Econometrica*39:829- 844.

D'Agostino, R.B. 1998. Propensity score methods for bias reduction in the comparison of a treatmentto a non-randomized control group. *Statistics in Medicine* 17.19:2265-2281.

Deaton, A. S. 1993. Household savings in LDC's: Credit markets, insurance and welfare, *Scandinavian Journal of Economics* 94.2:253-273.

Deaton, A.S. 2005. Franco Modigliani and the life cycle theory of consumption. Presented at the ConvegnoInternazionale Franco Modgliani, Accademia Nazionale deiLincei, Rome, Feb. 17th–18th, 2005.

Deekor, H. and Adekola, G. 2017. Vocational training needs of rural farmers for enhanced productivity in Rivers and Bayelsa States of Nigeria. *International Journal of Educational Research*3.2:34-42.

Dehejia, R.H. and Wahba, S. 1999. Casual effects in non-experimental studies. Re-evaluating the evaluation of training program.*Journal of the American Statistical Association*5.94:1053-1062.

Dehejia, R.H. and Wahba, S. 2002. Propensity score-matching methods for non-experimental causal studies. *Reviewof Economics and Statistics* 84.1:151-161.

DFID. 2000. Sustainable livelihoods guidance sheets. Department for International Development. Retrieved November 7, 2018, from http://www.livelihoods.org/info/info_guidancesheets.html..

Dillon, A. and Quinones, E. 2011. Gender differentiated asset dynamics in Northern Nigeria. Food and Agriculture Organization of the United Nations. *Agricultural Development Economics*(ESA)*working paper* 11:06.

Donkor, J. and Duah, F. 2013. Relationship between savings and credit in rural banks with specific reference to Ghana.*International Journal of Business and Social Science* 4:8.

Duflo, E. Kremer, M. and Glennerster, R. 2008. *Using randomization in development economics research: a toolkit*. In Handbook of Development Economics4, ed. T Schultz, J Strauss, chapter. 15.Amsterdam: Elsevier Sci. Ltd. North Holl.

Dunn, E. 1994. *Analytical tools manual for rural economic programming*. Atlanta, GA: CARE International.

Durojaiye, A.M., Yusuf, S.A. and Balogun, O.L. 2014. Determinants of demand for microcredit among grain traders in Southwestern States, Nigeria. *Journal of Agriculture and Veterinary Science* 7.11:01-09

Eboreime, M.I. 2008. *Approaches to microfinance in developing countries;lessons for rural poverty reduction in Nigeria*. In Igbozurike*et al*. (eds.) Rural poverty in Nigeria. Cape Publishers Int'l Ltd. Abuja, Nigeria. 343-354.

Ellis, F. 2000. The determinants of rural livelihood diversification in developing countries. *Journal of Agricultural Economics* 51.2:289-302.

Emaikwu, K. K., Chikwendu, D. O. and Sani A. S. 2011. Determinants of flock size in broiler production in Kaduna State of Nigeria*. Journal of Agricultural Extension and Rural Development*3.11:202-211.

Esiobu, N.S., Onubuogu, G.C. and Okoli, V.B.N. 2014. Determinants of income from poultry egg production in Imo State, Nigeria: An econometric model approach. *Global Advanced Research Journal of Agricultural Science* 3:7.

Essay Sauce, 2020. Poultry industry in Nigeria. Retrieved September 15, 2019 from https://www.essaysauce.com/economics-essays/poultry-industry-in-nigeria/.

Ewubare, D. and Ozar, V. 2018. Effect of poultry production on agricultural production in Nigeria.*Journal of Economy*8:16.

Eze, C.C., Lemchi, J.I., Ugochukwu, A.I., Eze, V.I., Awwulonu, C.A. and Okon, A.X. 2010. Agricultural financing policies and rural development in Nigeria. The 84th Annual Conference of the Agricultural Economics Society Edinburgh 29th to 31st Mar. 2010

Ezihe, J. A. C., Akpa, J. A. and Ayoola, J. B. 2016. Accessibility and repayment of agricultural loan among farmers in Benue State, Nigeria. IOSR *Journal of Agriculture and Veterinary Science*9.8:39-46

FAO. 2015. Food and Agriculture Organization of the United Nations. 2015. Investments in Agriculture mechanization in Africa: Technical report of

conclusions and recommendations of a round table meeting of experts. Retrieved July 5, 2018, from http://www.fao.org/docrep/014/i213

FAO. 2019.Food and Agriculture Organization of the United Nations. 2019. The future of livestock in Nigeria.Opportunities and challengesin the face of uncertainty. Rome. Italy. Retrieved July 5, 2018, from http://www.fao.org/docrep/028/i363

FAOSTAT. 2018. Food and Agricultural Organization of the United Nations. Retrieved October 18, 2019, http://www.fao.org/faostat/en/#data/QA

Fatogbe, F. 2010. Current banking sector reforms and initiatives of the Central Bank of Nigeria. Paper presentation by the special adviser to the Governor on risk and Director of Risk Management, Central Bank of Nigeria.

Filli, F.B.,Onu, J.I., Adebayo, E.F. and Tizhe, I. 2015. Factors influencing credit access among small scale fish farmers in Adamawa State, Nigeria. *Journal of Agricultural Economics*, *Environment and Social Sciences* 1.1:46–55.

Fisher, M. and Weber, B.A. 2004. Does economic vulnerability depend on place of residence? Asset poverty across Metropolitan and Nonmetropolitan Areas.*Review of Regional Studies* 34.2:137-155.

Fletschner, D. 2009. Rural women access to credit: market imperfections and intra household dynamics. *World Development Studies-Elsevier* 37.3:618.

FMARD, 2016. *Nigeria's Agriculture Promotion Policy 2016-2020.* The Green Alternative. Retrieved October 8, 2018, from https://fmard.gov.ng/the-green-alternative/.

Foster, J., Greer, J. and Thorbecke, E. 1984. A class of decomposable poverty measures. *Econometrica* 52:4:761-765

Ghatak, M., Morelli, M. and Sjostrom, T. 2002. *Credit rationing, wealth inequality and allocation of talent*. London School of Economics and STICERD. eds. Ohio State University Pennsylvania State University October 2002.

Gilligan, D. O., Harrower, S. and Quisumbing, A. 2005. *How accurate is reports of credit constraints? Reconciling theory with respondents' claims in Bukidnon, Phillipines*. International Food Policy Research Institute, Washington, D.C.

Gitman, L.J. 2003. *The principles of managerial finance* (7th ed.). New York: Pearson Education Inc.123-124.

Glewwe. P. and Gillette, H. 1998. Are some groups more vulnerable to macroeconomic shocks than others? Hypothesis tests based on panel data from Peru.*Journal of Development Economics*56.1:181-206

Greene, W. H. 1997. *Econometric analysis*. 3rd ed. Upper Saddle River, NJ, US: Prentice Hall International.

Grzelak, A., 2019. Accumulation of assets in agricultural holdings in Poland in view of production types and context of the sustainable development paradigm. *Problems of Agricultural Economics*3.360:89-106.

Guo, S. and Fraser, W.M. 2009. *Propensity score analysis. Statistical methods and applications*. Thousand Oaks: Sage publications. 25-38.

Haveman, R. and Wolff, E.N. 2000. Who are the asset-poor? levels, trends and composition, 1983-1998. *Center for Social Development Discussion* 1227.1. St. Louis, MO: Washington University.

Haveman, R. and Wolff, E.N.2004. The concept and measurement of asset poverty: Levels, trends and composition for the U.S., 1983-2001. *Journal of Economic Inequality*2:145-169.

Heckman, J. 1979. Sample selection bias as a specification error.*Econometrica* 47.1: 153-161.

Heckman, J. and Smith, J.A. 1997. Making the most out of programme evaluations and social experiments: Accounting for heterogeneity in programme impacts. *Review of EconomicStudies* 64.4: 487–535.

Heckman, J., LaLonde, R. and Smith, J. 1999. *The economics and econometrics of active labormarket programs*. Handbook of LaborEconomics Vol.III, ed. by O. Ashenfelter, and D. Card, Elsevier, Amsterdam.1865–2097.

Heckman, J.J. and Vytlacil, E. 2005. Structural equations, treatment effects and econometric policy evaluation. *NBER working Paper* 11259.

Heise, H., Crisan, A. and Theuvsen, L. 2015. The poultry market in Nigeria: Market structures and potential for investment in the market. *International Food and Agribusiness Management Review*18.A.

Henri-Ukoha, A., Orebiyi, J.S., Obasi, P.C., Oguoma, N.N., Ohajianya, D.O., Ibekwe, U.C. and Ukoha I.I. 2011. Determinants of loan acquisition from the financial institutions by small-scale farmers in Ohafia Agricultural zone of Abia State, South East Nigeria. *Journal of Development and Agricultural Economics*3.2:69-74.

Hosmer, D. and Lemeshow, S.2000. *Applied logistic regression*. 3rd Edition. A Wiley-Interscience Publication. New York.

Humphreys, B., Lee, Y.S. and Soebbing, B. 2010. Consumer behaviour in lottery: The double hurdle approach and zeros in gambling survey data. *International Gambling Studies* 10.2:165-176.

Ibrahim, A.H. and Bauer, S. 2013. Access to microcredit and its impact on farm profit among rural farmers in dryland of Sudan. *Global Advances Research Journal of Agricultural Science*2.3:88–102.

Iheke, O.R. and Igbelina, C.A. 2016. Risks management in poultry production in Ikeduru Local Government Area of Imo State. *Nigerian Journal of Agriculture, Food and Environment* 12.1:67-74

Imbens, G. 2004. Nonparametric estimation of average treatment effects under exogeneity: A review.*The Review of Economics and Statistics* 86.1:4-29.

Imbens, G.W. and Angrist. J.D. 1994. *Identification and estimation of local average treatment effects*. *Econometrica*62.2: 467–75.

Imbens, G.W. and Wooldridge, J.M. 2009. Recent developments in the econometrics of program evaluation. *Journal of Economic Literature* 47.1:5–86.

Isitor, S. U., Babalola, D.A. and Obaniyi, K.S. 2014. An analysis of credit utilization and farm income of arable crop farmers in Kwara State, Nigeria. *Global Journal of Science Frontier Research: Agriculture and Veterinary* 14.10:26-34.

Jabbar, M.A., Rahman, M.H., Talukder, R.K. and Raha, S.K. 2007. Alternative institutional arrangements for contract farming in poultry production in Bangladesh and their impacts on equity. International Livestock Research Institute, Nairobi, Kenya.Research Report 7. 98

Jaffee, D.W. and Russell, T. 1976. Imperfect information, uncertainty, and credit rationing.*The Quarterly Journal of Economics* 90.4:651-666.

Jeiyol, E.N., Akpan, S.B. and Tee, T.N. 2013. Gender analysis of access to credit by rural small-scale farmers in Benue State Nigeria. *American International Journal of Social Science*1:6.

Jones, A.M. 1989. A double-hurdle model of cigarette consumption, *Journal of Applied Econometrics*4:23-39.

Karlan, D. and Morduch, J. 2008. Finance for all? policies and pitfalls in expanding access. Retrieved February 15, 2018, from www.siteresources.worldbank.org/INTFINFORALL/Resources/4099583-1194373512632/FFA_book.pdf.

Kiplimo, J. C., Ngenoh, E., Koech, W. and Bett, J. K. 2015. Determinants of access to credit financial services by smallholder farmers in Eastern and Western Kenya. Nairobi. Strathmore Business School, Strathmore University.

Kochar, A. 1997. An empirical investigation of rationing constraints in rural credit markets in India. *Journal of Development Economics*53.2:339-371.

Kodieche, K.C. 2002. Analysis of loan repayment among the farmers: A case study of ACGSF in Enugu State.B.Sc Project, Department of Cooperative and Rural Development. EUST.

Mahmood A.N., Khalid, M. and Kouser, S. 2009. The role of agricultural credit in the growth of livestock sector:A case study of Faisalabad. *Pakistan Veterinary Journal*29: 81-84.

Mamun, A., Malarvizhi, C., Hussain, S., Abdul, W. and Sazali. 2011. Examining the Effect of Participation in Microcredit Programs on Assets Owned by Hardcore Poor Households in Malaysia. *African Journal of Business Management*5:2.

Manlagnit, M.C. 2004. Extent of asset accumulation of the households. *Philippine Institute for Development Studies*4. A Community-Oriented Financial Intermediaries (COFI) project.

Masoud, N. 2013. Neoclassical economic growth theory: An empirical approach. *Far East. Journal of Psychology and Business*11.3:10.

Mckinnon, R.T. 1973. *Money and Capital in Economic Development*. The Brookings Institution, Washington D.C.

Mejeha, R.O. and Obunadike, A. 1998. The impacts of credit on adopting innovations on fertilizer use, yam minisett and cassava in Anambra State of Nigeria. *Nigeria Journal of Agricultural Teacher Education* vii.1&2: 92-100

Mendola, M. 2007. Agricultural technology adoption and poverty reduction: A propensity–score matching analysis for rural Bangladesh. *Journal of Food Policy* 32:372–393.

Mghenyi, E.W. 2015. The impact of agricultural credit on demand for factors of production, farm output, and profitability in Kenya. PhD Thesis. Department of Agricultural, Food, and Resource Economics, Michigan State University.

Moahid, M. and Maharjan, K.L. 2020. Factors affecting farmers' access to formal and informal credit: Evidence from rural Afghanistan: *Sustainability*12:1268.

Modigliani, F. and Brumberg, R.H. 1954. *Utility analysis and the consumption function: an interpretation of cross-section data*. in Kenneth K. Kurihara, ed., PostKeynesian Economics, New Brunswick, NJ. Rutgers University Press. 388–436.

Moffatt, P. 2003. Hurdle models of loan default. School of Economic and Social Studies. University of East Anglia Norwich NR4 7TJ United Kingdom.

Montgomery, R., Debapriya, B. and David H. 1996. Credit for the poor in Bangladesh: The BRAC rural development programme and the government Thana Resource Development and employment programme. *In Finance Against Poverty*II: 123-227. Country Case Studies, edited by David Hulme and Paul Mosley. London: Routledge.

Moser, C.O.N. 2006. Asset-based approaches to poverty reduction in a globalized context; An introduction to asset accumulation policy and summary of workshopfindings. *Brookings Global Economy and Development Working paper*.

Moser, C. and Felton, A. 2007. *Intergenerational asset accumulation and poverty reduction in Guayaquil, Ecuador, 1978-2004*, in Moser, C. (ed.) Reducing global poverty: the case forasset accumulation, Washington, D.C., Brookings Institution Press.

Mpuga, P.2004. Demand for credit in rural Uganda: who cares for the peasants? Presented at the conference on Growth, Poverty Reduction and Human Development. The centre for the study of African Economies and the Global Poverty Research. Group, University of Oxford, St Catherine's College, Oxford.

Mukasa, A.N., Simpasa, A.M. and Salami, A.O. 2017. Credit constraints and farm productivity: micro-level evidence from smallholder farmers in Ethiopia. *Working Paper Series*. Development Research Department of the African Development Bank.

Munyaka, F.G., Ouma,B.O. and Ndirangu, A.W. 2015. Factors affecting the performance of small and medium scale poultry farming enterprises in Karuri, Kenya. *Research Journal of Finance and Accounting*6:19.

Nanono, M.S. 2019. Animal agriculture: Anchor for sustainable economic and human development in Nigeria'. A paper presented during the 8th Joint Annual Meeting of the Nigerian Institute of Animal Science, (NIAS) and the Animal Science Association of Nigeria, (ASAN)

Nigeria Bureau of Statistics. Nigeria General Household Survey 2012/13. Retreieved July 17, 2018, from http://www.nigerianstat.gov.ng/nada/index.php/catalog/51

Nguezet, P. M., Okoruwa, V., Adeoti, A. and Adenegan, K. 2012. Productivity impact differential of improved rice technology adoption among rice farming households in Nigeria. *Journal of Crop Improvement*26.10: 1080.

Newman, C. and Henchion, M. 2003. *A double-hurdle model of Irish household expenditure on prepared meals*. A Matthews - Applied Economics, Taylor & Francis. Pages 1053-1061 | Published online: 05 Oct 2010

Nikaido, Y., Paisb, J. and Sarmac, M. 2015. What hinders and what enhances small enterprises' access to formal credit in India? *Review of Development Finance*5.1:43-52

Nimoh, F., Addo, K. and Tham-Agyekum, E.K. 2011. Effect of formal credit on the performance of the poultry industry: The case of urban and peri-urban Kumasi in the Ashanti Region. *Journal of Development and Agricultural Economics*3.6:236-240.

Njoku, G.K., Olweny, T. and Njeru, A. 2018. Relationship between farm production capacity and agricultural access from commercial banks. *International Academic Journal of Economics and Finance*3:1:159-174.

Nmadu, J.N.1., Ogidan, I.O.1. and Omolehin, R.A. 2014. Profitability and resource use efficiency of poultry egg production in Abuja, Nigeria. *Kasetsart Journal - Social Sciences*5:2.

Nouman, M., Siddiqi, M.F., Asim, S.M. and Hussain, Z. 2013. Impact of socio-economic characteristics of farmers on access to agricultural credit. *Sarhad Journal of Agriculture*29.3:469-476.

Nwandu, P.I., Ojogbane, J.A., Okoh, C. and Okechukwu, F. 2016. Effect of poultry production on agricultural production in Nigeria. *International Journal of Innovative Agriculture and Biology Research* 4.2:21-30.

Nweze, N. J. 1991. The role of women's traditional savings and credit cooperative in small-farm development. Winrock International Institute Agricultural Development. 234-253.

Oboh, V.U. and Ekpebu, I.D. 2011. Determinants of formal agricultural credit allocation to the farm sector in Benue State, Nigeria. *African Journal of Agricultural Research* 6.1:181-185

Oboh, V.U. and Kushwaha, S. 2009. Socio-economic determinants of farmers' loan size in Benue State, Nigeria. *Journal of Applied Sciences Research* 1:1

Oboth, G.A.T. 2003. Financing poultry production in Nigeria: The role of commercial banks. Publication of Poultry Association of Nigeria, Ogun State chapter. 37.

Ogundeji, A. 1998. *Nigeria: How to run a small-scale business*. Able press publication. 40 eds.

Ogundipe, A.A., Ogunniyi, A., Olagunju, K. and Asaleye, A.J. 2019. Poverty and income inequality in rural agrarian household of Southwestern Nigeria: The gender perspective. *The Open Agriculture Journal* 13:1.

Ogunyemi, I.O. and Orowole, F.P. 2020. Poultry farmers socio-economic characteristics and production limiting factors in Southwest Nigeria. *Journal of Sustainable Development in Africa* 22:1.

Ojo, S.O. 2003. Productivity and technical efficiency of table egg production in Nigeria. *International Journal of Poultry Science* 2.6:459-464.

Okantah, S.A., Aboe, P.A.T., Boa-Amponsem, K., Dorward, P. and Bryant, M.J. 2003. Small-scale chicken keeping in Peri-urban Accra and Kumasi. Technical Report on the DFID (LPP) Project No. R7631, Animal Research Institute, Achimota.

Oke, J.T.U., Adeyemo, R. and Agbonlahor, M.U. 2007. An empirical analysis of microcredit repayment in southwestern Nigeria. *Humanity and Social Sciences Journal* 2.1: 63–74.

Okojie C., Monye-Emina A., Eghafona K., Osaghae, G. and Ehiakhamen, J. O. 2010. Institutional environment and access to microfinance by self-employed women in the rural areas of Edo State. NSSP Brief No. 14. Washington. D.C. The International Food Policy Research Institute.

Okpara, E.U. 2017. Analysis of Small-Scale Cassava based farmers' demand and utilization for microfinance banks credit in Imo State, Nigeria.M.Sc thesis. Department of Agricultural Economics, Federal University of Technology, Owerri.

Okunade, E.O. 2007. Effectiveness of extension teaching methods in acquiring knowledge, skills and attitude by women farmers in Osun State. *Journal of Applied Science Research*. 4:282-286.

Oladejo, J.F. 2016. Factors associated with accessibility to credit among poultry egg marketers in Oyo State. *Scientia Agriculturae*15.2:367-370.

Olagunju, F.I. 2010. Impact of credit on poultry productivity in Southwestern Nigeria. *World Rural Observation*2.4:29-37.

Olagunju F.I.I. and Babatunde R.O. 2011. Impact of credit on poultry productivity in South-western Nigeria. Asian Research Publishing Network (ARPN).*Journal of Agricultural and Biological Science*6:10.

Olaoye, O.J., Ashaolu, O.F., Idowu, A.A., Akintayo, I.A.and Talabi, J.O. 2011. Fish production variables and determinants of demand for Ogun State agricultural and multipurpose credit agency loans among fish farmers in Ogun State, Nigeria. *Journal of Sustainable Development in Africa*13:4.

Olayemi, J.K. 2004. *Principles of microeconomics for applied economic analysis*. SICO Publishers, Ibadan, Nigeria.

Ologbon, O. A. C. and Ambali, O. I. 2012. Poultry enterprise combination among small-scale farmers in Ogun state, Nigeria: A Technical efficiency approach. *Journal of Agriculture and veterinary sciences* 4.

Ololade R.A. and Olagunju F.I. 2013. Determinants of access to credit among rural farmers in Oyo State, Nigeria. *Global Journal of Science Frontier Research Agriculture and Veterinary Sciences*13.2:1

Olomola, A.S. and Gyimah-Brempong, K. 2014. Loan demand and rationing among small-scale farmers in Nigeria. *IFPRI Discussion Paper 01403.*

Olowofeso, O.E, Adeyemi A.,Adeboye, V. and Adejo, T. 2017. Agricultural sector credit and output relationship in Nigeria: Evidence from nonlinear ARDL. CBN.*Journal of Applied Statistics*8.1.

Oludimu, O.L., Awojobi, A.A. and Akanni, K.A. 2004. Analysis of poultry insurance and risk management in Ogun State, Nigeria. *Journal of Agricultural Management and Rural Development* (JAMARD). 1:64-84.

Oluyemi, J.A. and Robert, F.A. 1979. *Management and housing of Adult Birds*.Poultry production inwarm wet climates. Macmillian Press Ltd., London.49-106.

Omonona, B.T. 2001. The determinants of poverty among farming households in Kogi State, Nigeria. PhD Thesis. Department of Agricultural Economics, University of Ibadan, Ibadan.

Omonona, B.T. 2010. Quantitative analysis of rural poverty in Nigeria. The Nigeria Strategy Support Program (NSSP) of the International Food Policy Research Institute IFPRI, Brief P. 17.

Omonona,B.T.,Lawal,J.O. andOyinlana,A.O.2010. Determinantsof credit constraints, conditionsand production efficiencyamong farming households inSouthwesternNigeria.In: paper presented at the joint thirdAfrican AssociationofAgriculturalEconomistsand Forty-Eight Agricultural EconomistsAssociationofSouth Africa conference,CapeTown,South Africa, 19-23October 2010. pp.22–35.

Oni, O.A., Oladele, O.J. and Oyewole, I.K.2005. Analysis of factors influencing loan default among poultry farmers in Ogun State Nigeria. *Journal CentralEuropean Agriculture*6.4: 619-624.

Otero, M. and Rhyne, E. 1994. The new world of microenterprise finance: building healthy financial institutions for the poor. Intermediate Technology Publications Ltd (ITP).

Otunaiya, A.O., Okuneye, P.A. andAihonsu, J.O. 2012. Patternof inorganic fertilizer use among food crop farmers in OgunState, Nigeria. *Asian Journal of Agricultural Science in Pakistan*4:26-31.

Otunaiya, A.O., Ologbon, O.A.C. and Akerele, E.O. 2014. Analysis of agricultural loan use decision among poultry farmers in Oyo State, Nigeria. *International Journal of Poultry Science* 13.2:108-113.

Oyedele, G.A., Akintola, J.O., Rahji, M.A.Y. and Omonona B.T. 2009. Credit constrained condition of farm households and profitability of agricultural production in Nigeria agriculture. Agricultural Journal4:14:192-201.

Poultry Association of Nigeria, 2005. American Health Organization WHO: 13th inter-Americanmeeting at the ministerial level, on health and agriculture Washington, D.C, 24th -25th April, 2005.

Petrick, M.2005. Empirical measurement of credit rationing in agriculture: a methodological survey. *Journal of Agricultural Economics* 33.2:191–203.

Perkins, S.M., Tu, W., Underhill, M.G., Zhou, X and Murray, M.D. 2000. The use of propensity scores in pharmacoepidemiologic research.*Journal of Pharmacoepidemiology and drug safety* 9.2:93–101.

Phillip, D., Nkonya, E., Pender, J. and Oni, O.A. 2009. Constraints to increasing agricultural productivity in Nigeria; A Review. NSSP Background Paper 006. International Food Policy Research Institute (IFPRI) September, 2009.

Pradhan, M. and Rawlings, L. 2002. The impact and targeting of social infrastructure investments: Lessons from the Nicaraguan Social Fund. *World Bank Economic Review*2: 275-295.

Pradhan, K. and Mukherjee, S. 2009. Covariate and idiosyncratic shocks and coping strategies for poor and non-poor rural households in India.*Journal of Quantitative Economics*16:2.

Pradhan, K. and Mukherjee, S. 2017. Covariate and Idiosyncratic Shocks and Coping Strategies for Poor and Non-poor Rural Households in India. *Journal of the Indian Econometric Society* 16:2.

Quoc D.V. 2012. Determinants of household access to formal credit in the rural areas of the Mekong Delta, Vietnam. MPRA Paper No. 38202. Retrieved July 12, 2016, from http://mpra.ub.uni-muenchen.de/38202/

Rahji, M.A.Y. and Fakayode, S.A. 2009. A multinomial logit analysis of agricultural credit rationing by commercial banks in Nigeria. *International Research Journal of Finance and Economics*24: 91.

Rahji, M.A.Y. and Adeoti A.I.2010. Determinants of agricultural credit rationing by commercial banks in South-Western, Nigeria. *International Research Journal of Finance and Economics* 37:1.

Ravallion, M. and Chen, S. 2001. How did the world's poorest fare in the 1990s?*Journal of Review of Income and Wealth* 47:283-300.

Ravallion, M. 2005. Evaluating anti-poverty programs. World bank policy research, working paper 3625. The World Bank, Washington, D.C.

Robins, J.M., Mark, S.D. and Newey, W.K. 1992. Estimating exposure effects by modelling the expectation of exposure conditional on confounders. *Biometrilca*. 48.2:479-495.

Robinson, O. 2017. Biosecurity training customers' forum for poultry farmers in Kwara State. training organized by valentine chickens in collaboration with BolaniksAgro-vet Nigeria Enterprise. The Punch Newspaper. *September 1, 2017.*

Rosenbaum, P.R. 2002. Covariance adjustment in randomized experiments and observational studies (with discussion). *Journal of Statistical Science*17:27.

Rosenbaum, P. and Rubin, D.B. 1983. The central role of the propensity score in observational studies for causal effects. *Biometrilca* 70.1:41-55

Rosenzweig, M. and Wolpin, K.I. 1993. Credit market constraints, consumption smoothing, and the accumulation of durable production assets in low-income countries. *Journal of Political Economy*101.2: 223-44

Rothschild, M. and Stiglilz, J.E. 1976. Equilibrium in competitive insurance markets.*Quarterly Journal of Economics* 80:629-649.

Rubin, D.B. 1973a. Matching to remove bias in observational studies. *Biometrilca*29.1:159-83.

Rubin, D. B.1973b. The use of matched sampling and regression adjustment to remove bias in observational Studies. *Biometrilca*29.1:184-203.

Rubin, D. B.1990. Formal mode of statistical inference for causal effects. *Journal of Statistical Planning and Inference* 25.3:279–292.

Rubin, D. B.1997. Estimating causal effects from large data sets using the propensity score. *Ann International Medicine* 127:757–63.

Rubin, D.B. and Thomas, N. 1996. Matching using estimated propensity score: relating theory to practice. *Biometrilca*52:249–64.

Rungie, C., Coote, L. and Louviere, J. 2012. Latent variables in discrete choice experiments. *Journal of Choice Modelling*. 5. 145-156. 10.1016/j.jocm.2013.03.002.

Saleem, M.A., Jan F.A. and Khattak, R.M. 2010. Impact of landholding and farmers characteristics in obtaining credit for agricultural productivity in District D.I.Khan. Abasyn. *Journal of Social. Science*3.2:177-193.

Sanusi, W.A. and Olagunju, F.I. 2013. Efficiency differentials and access to credit among poultryfarmers in Ogbomosoagricultural zone. *Research on Humanities and Social Sciences*3:10.

Sawada, Y. 2002. Credit constraints and poverty dynamics; theory evidence and field survey strategy. *Journal of Political Economy*. 97[2], 305-346

Schiller, H.R. 2001. Poverty in irrigated settlements. Should it deserve emphatic attention in future? *Irrigation Development London*. 98-101.

Scoones, I. 1998. Sustainable rural livelihoods: A framework for analysis. Working Paper 72. Brighton, Institute of Development Studies.

Scott, I.1957. The availability doctrine: theoretical underpinnings. *Review of Economic Studies*25.1:45-48

Sebopetji, T.O. and Belete, A. 2009. An application of profit analysis to factors affecting small-scale farmers'decision to take credit: a case study of the greater Letaba local municipality in South Africa. Africa. *Journal of Agricultural Research*. 4.8:718-723.

Sen, A.K. 1997. Inequality, unemployment and contemporary Europe. Paper presented at the CalousteGulbenkian Conference,May1997. *International Labour Review*.

Shephard, W.G. 1979. *Market Power and Economic welfare*. New York: Random House.

Sherraden, M. 1991. *Assets and the poor: A new American welfare policy*. Armonk, NY: M. E. Sharpe, Inc.

Silverman, B.W. 1986. *Density estimation for statistics and data analysis*. Chapman & Hall, London.

Simtowe, F., Zeller, M., and Diagne, A. 2008. Who is credit constrained? evidence from rural Malawi. *Agricultural Finance Review* 68.2:255-257.

Siyanbola, A.A. 2012. Investigating the determinants of appropriate use of microcredit by poultry in Western Nigeria.*British Journal of Poultry Sciences* 1.1:1-4.

Smith, H. 1997. Matching with multiple controls to estimate treatment effects in observational studies.*Sociological Methodology*27:325-353.

Smith, J.A. 2011. Experience with drug-free broiler production. *Poultry Science*90.11:2670–2678.

Smith, J. and Todd, P. 2005. Does matching overcome LaLonde's critique of non-experimental estimators? *Journal of Econometrics*125.1-2:305-353.

Sorokina, O. 2013. Parental credit constraints and children's college education. *Journal of Family and Economic Issues*34.2:157-171.

Spiller, A. and Voss, J. 2007. Vocational training in the field of agriculture. Empirical results. Contributed Paper prepared for presentation at the 105th EAAE Seminar 'International Marketing and International Trade of Quality Food Products', Bologna, Italy, March 8-10.

Stiglitz, J. and Weiss, A. 1981. Credit rationing in markets withimperfect information. *American Economic Review*71:393-419.

Stijn, C. 2005. Access to financial services: A review of the issues and public policy objectives. World Bank Policy Research Working Paper No. 3589. Washington DC: World Bank.

Sturm, P.H. 1983.Determinants of saving: theory and evidence.*OECD Economic Studies* 1:147–96.

Uchendu, G.G., Ihedioha, J.I., Ogbu, C. andOnyeaka, E.C.2015. Distribution and characteristics of poultry farms in Enugu state, Nigeria after 2007 outbreak of highly pathogenic avian influenza. *International Journal of Livestock Production* 6.3:41- 46

Ugbajah, M.O. 2011. Gender analysis of the structure and effects of access to financial services among rural farmers in Anambra State, Nigeria. *Journal Agricultural Science*2.2: 107-111.

Ugwuja, V.C. and Onwuachu, O.E. 2019. Assessment of farm financial literacy among poultry farmers in Anambra State, Nigeria pp 43-48 *Nigerian Agricultural Policy Research Journal* (NAPReJ) 7:1.

Unaeze, H. C.1.and Akinola, L.A.F. 2016. Analysis of poultry f armer's willingness-to-accept compensation measure for risk averse mechanisms in IkwerreLocalGovernment Area of Rivers State, Nigeria. *Global Journal of Biology, Agriculture and Health Sciences 5.3:38-42.*

United States Department of Agriculture. 2013. Poultry production and final value estimates. *International egg and poultry review*16:8.

Vardan, U., Mariana, A. and Vardges, H.2006. The role of specialized agricultural credit institutions in the development of the rural finance sector of Armenia: case of credit clubs. Poster paper presented at the International Association of Agricultural Economists Conference, Gold Coast, Australia

Vojáček, O. and Pecáková, I. 2010. Comparison of discrete choice models for economic environmental research. *Prague Economic Papers* 2010, 19(1):35-53 | DOI: 10.18267/j.pep.363.

Wight, V.R., Chau, M., and Aratani, Y. 2011. Who are America's poor children? the official story. National Center for Children in Poverty (NCCP) Brief. Mailman School of Public Health, Columbia University.

World Bank Annual Report, 2019. Retrieved September 15, 2020, from https://knoema.com/WBANREP2018/world-bank-annual-report-2019.

Yaqoob, A.M., Yusuf, W.A, and Yusuf, S.A. 2017. Impact of microcredit program on poverty reduction among rural households in Saki East Local Government area of Oyo State, Nigeria. *Journal of Scientific Agriculture* 314-319

Zeller, M. 1994. Determinants of credit rationing: a study of informal lenders and formal credit groups in Madagascar. *World Development Studies* 22.12:19.

Zeller, M. and Sharma, M. 2002. Access to demand for financial services by the rural poor: a multicountry synthesis. The triangle ofmicrofinance: financial sustainability, outreach, andimpact. Baltimore and London: John Hopkins University.

Zhao, Z. 2004. Using matching to estimate treatment effects: Data requirements, matching metrics, and Monte Carlo evidence. *The Review of Economics and Statistics* 86.1:91-107.

APPENDIX 1

Definition of Concepts

Poultry	domesticated birds that are raised for the purpose of meat or egg production. Examples are chickens, turkeys, geese and ducks.
Poverty	a condition in which an individual lacks financial resources essential to be able to provide fundamental necessities of life like food, dwelling place, raiment or dress.
Assets	stock of resources which have economic value and can be converted to cash
Household Assets	stock of resources (assets) owned by the household or family
Productive Assets	assets that the ability to generate income or cash flow
Asset accumulation	acquisition of stock of resources (household or productive)
Asset ownership	the state of possessing an exclusive right or control over stock of resources
Net worth	value of all assets owned by an individual after all debts have been backed out
Asset Poverty	lack of stock of resources sufficient to provide or sustain basic needs for three months
Credit	any form of deferred payment or acquisition ofauthority over funds, services, goods with a pledge or assurance to return it later at an agreed period.
Credit Intensity	Magnitude, degree, size or amount of credit obtained
Credit Source	Supplier of the credit, it could be formal or informal.
Formal Credit Sources	Structured financing from Commercial Banks, Agricultural bank, Cooperative Society, Microfinance Banks
Informal Credit Sources	Unstructured financing from Family and Friends
Credit User	someone who has ever obtained credit for use
Non-Credit User	someone who has never obtain credit for use
Remittances	Transfers, allowances, pensions, gifts and payments aside earned income

Analysis of Objectives

S/N	OBJECTIVES	MEANING OF OBJECTIVES	REQUIRED DATA	SOURCE OF DATA	TOOLS OF ANALYSIS
1	To assess the level of asset accumulation among the credit users and non-users	To profile assets accumulated by credit using poultry farmers and non-credit using poultry farmers. Also test if the difference in their level of assets accumulation is statistically significant or not.	Total assets of credit users and non-credit users, current marketable assets of the farmers	Primary Data	Test of mean difference, Standard deviation
2	To isolate factors influencing credit access and its intensity among Poultry farmers in Southwestern Nigeria	To ascertain those factors that induce credit access and the amount of credit obtainableby poultry farmers	Age, monetary value of assets (naira), account relationship, sex, secondary occupation, enterprise type, net farm income, association membership, loan duration, number of school years, vocational training, number of dependents, labour type, flock size, feed source	Primary Data	Double hurdle model
3	To determine the asset poverty status of poultry farmers in the study area	Appraisal of poverty level among the poultry farmers with respect to asset poverty relative to asset holdings.	Household size, sum total of monetary worth of the existing marketable assets, total number of farmers with credit access and those without, total number of farmers in the sample.	Primary Data	Foster-Greer-Thorbecke (FGT) poverty model
4	To evaluate the impact of credit on asset accumulation of poultry farmers in Southwest Nigeria	Investigation of the effects of credit access on asset holdings and of poultry farmers in the area of study.	Age, years of experience, number of dependents, flock size, total assets value, sex, marital status, contact with extension agents, primary occupation, association membership, vocational training, household size,	Primary Data	Propensity Score Matching

APPENDIX 3

Results of the Focus Group Discussion

S/N	QUESTIONS	➢ STATE: OGUN ➢ LGA: IJEBU NORTH ➢ LOCATION: IJEBU IGBO ➢ NO OF PARTICIPANTS: 7	➢ STATE: OYO ➢ LGA: AFIJIO ➢ LOCATION: ILORA ➢ NO OF PARTICIPANTS: 10	INFERENCE
1	Do you patronize any bank or lending institutions? Such as banks, MFBS, Cooperative Society? Mutual Contributions (Ajo, Esusu etc)? If No, Why?	Some have never collected loan for their poultry business before due to non-availability of such services in their vicinity while some got from cooperative or one group or the other.	70% of the participants answered in affirmative with cooperative society as the lending institution because of the small interest rate. The cooperative society is being operated by the association members with the loan availed dependent on the contributed amount. The process is that after application for loan has been submitted by the applicant, the committee on loan disbursement vets the application. One of the determining factors is the consistency in payment of monthly contribution of the applicant and the amount usually granted is the double of total contribution so far as at the time of application. The remaining 30% did not state any reason for not applying for loan.	The responses further established loan source, interest rate and nearness to credit sources as considerable factors in credit access and usage. In addition, most poultry farmers in the study area, cooperative still form the major source of credit among the poultry farmers when compared with other sources of credit
2	Have you collected loan before? From where?	Cooperative, Family and friends	Yes. Sources are cooperatives and microfinance bank.	Cooperative appeared to have more patronage due to its capacity to meet credit needs of majority of the poultry farmers.
3	What are the problems/challenges associated with loan/credit availability or accessibility?	High interest rate and government agricultural bank loan is always not accessible to common farmer besides, the paper work is too much	1. Commercial bank and Microfinance bank loan interest is too high, cumbersome application procedures and loan not guaranteed to be received even after followed due process the loan may not be granted at the end of the day. 2. The problem associated in getting cooperative loan is the non-availability of money long after application just because funds is no longer available as some members failed in repayment. 3. Lack of knowledge about loan availability in the commercial and agricultural banks.	Interest rate, loan procedures as well as relationship with financial institutions are important with respect to loan availability and accessibility. Consistent relationship will expose farmers to suitable products that can be helpful to the poultry farmers.

S/N	QUESTIONS	IJEBU IGBO CLUSTER	ILORA CLUSTER	INFERENCES
4	Did you collect loan from commercial banks? If No, Why? If Yes, Why?	No. interest rate too high. Requested collateral by commercial banks is always too high.	1. The rate is too high and one cannot break even with such loan. 2. All commercial banks request for collateral which ordinary poultry farmer does not have.	Poultry farmers are price sensitive, rational consumer and profit maximizer. Furthermore, it shows that many of them are unable to break forth the low output and low input cycle to the extent of savings and assets accumulation.
5	What are the challenges /constraints associated with poultry farming?	The feeds and drugs for birds are costly nowadays because of the foreign exchange rate for imported drugs. Also, maize which serves as the main ingredient for feeds is expensive hence low supply of maize to feed mills. The price egg commands in the market is considerable low compared to the cost of feed with which birds are being fed. So, many farmers with high number of birds are selling them off to reduce feed costs and labour cost in order to increase profit margin.	1. There is glut in the market. Both eggs and chickens are not being patronized by the consumers may be because of recession thereby making eggs to be surplus in the market hence low pricing for eggs and chicken. 2. Maize the essential ingredient of poultry feeds is scarce due to disease outbreak of last two seasons hence the cost of feed has gone up whereas egg is being sold at same old low price. 3. Poultry farming is risky because of diseases outbreak which may wipe out the entire population of chicken in an environment if one is not careful unannounced. 4. Single digit interest loan is not always available to poultry farmers to jump start their business when production is going down on the farm. Working capital is required to buy feeds and to maintain healthy birds on the farm.	Source, pricing, availability of feed and raw materials are a major concern to the poultry farmers. Feed availability at cheaper prices will assist a long way to increase the farmers' profit margin and ensure that they do not alone remain in business but are sustainable.

S/N	QUESTIONS	IJEBU IGBO CLUSTER	ILORA CLUSTER	INFERENCES
6	What are your suggested solutions to the challenges?	Government should regularize the price of maize in the market and policies that will enable naira to appreciate against dollar should be made so that imported drugs and vaccines will be sold at cheaper rate.	1. Single digit loan should be made available for poultry farmers. 2. If maize could be supplied to feed mills in large quantity with friendly price, feeds will be cheaper and maintaining birds on the farms becomes easier. 3. Drugs and vaccines for birds should be made available at cheaper price so that birds can be vaccinated against disease outbreak.	Poultry production is costly, especially with respect to meeting some immediate needs such as feeds, vaccination, drugs. Compromising these can lead to total wipe out of the flock.
7	Kindly comments on reasons for loan default among farmers?	Inadequate planning before getting the loan, Diversion of loan meant for business for personal use, Lack of integrity	1. Many at times, birds do not produce eggs as expected. So when production did not meet the projected threshold in the proposal it becomes problem and the farmer will be looking for money elsewhere to service the loan which he may not find most times. 2. Disease outbreak raises mortality rate in chickens and death of birds hamper production levels 3. Some farmers lack commitment to fulfil loan obligations.	Poultry business is not immuned from risk and uncertainties peculiar to agricultural production while loan default is shown to be due to lack of integrity among some farmers.
8	How do you think Government can be of assistance to poultry production in Nigeria?	Government should regularize the price of maize in the market and policies that will enable naira to appreciate against dollar should be made so that imported drugs and vaccines will be sold at cheaper rate.	1. Government should lower the exchange rate so that the cost of drugs can be affordable to farmers at cheaper price because most of these drugs are imported. If the disease outbreak is curtailed, poultry farming will be less risky. 2. Loan with low interest rate spread over a long period of time should be made available to poultry farmers. 3. Importation of poultry products from outside the country makes the market to be saturated with poultry products making local farmers to run at loss.	Low interest rate, loan duration could serve as a buffer to poultry farmers and increase their output levels for an enhanced income.

S/N	QUESTIONS	IJEBU IGBO CLUSTER	ILORA CLUSTER	INFERENCES
9	Have you ever benefited from government interventions before in terms of credit facilities/finance? If No, Why? If Yes, Why?	No. Its not always available	NO. It is not always available. Even when it is available, only the big guns in the society benefit from the program.	Government interventions with respect to credit provision is not available to secure.
10	Do you belong to any association or cooperative? If No, Why? If Yes, Why?	Yes- It gives one opportunity to tap into future opportunities that may come in near future whether through government or private agencies. It the group that the private or government agency deals with not individual. Besides there are mutual benefits we derive from being a member e.g monthly contribution, cooperative which gives soft loan.etc. No- there is no benefit but waste of time and unnecessary meeting.	Yes. 90% of the poultry farmers belong to Poultry Association of Nigeria because of the benefits they enjoy in terms of loan and easy purchase of feeds from the millers. The association most times serves as the guarantor for small credits especially from the feed millers. The feed millers know that if you belong to the association you can be traced and you have a face.	Association membership is very crucial among the poultry farmers as a support system in the area of raw materials accessibility, information share and guarantee.
11	Do you think agricultural associations are helpful? Comments freely if Yes or No	At times they are but most times they are not.	Yes. 90% of the poultry farmers belong to Poultry Association of Nigeria because of the benefits they enjoy in terms of loan and easy purchase of feeds from the millers. The association most times serves as the guarantor for small credits especially from the feed millers. The feed millers know that if you belong to the association you can be traced and you have a face.	Association membership is often proven to be important among farmers

S/N	QUESTIONS	IJEBU IGBO CLUSTER	ILORA CLUSTER	INFERENCES
12	How helpful do you find extension officers or agencies?	They don't even come visit at all	No. Never seen them around. Only private organizations like Animal Care come around to check what is happening to birds on the farm primarily as an avenue to market their products..	Extension officers are somewhat non-existent as sources of information/ research findings. Majority of the poultry farmers are literate, knowledgeable and could source information by themselves instead of waiting on the extension officers.
13	Do you sell collectively or individually? What informs your choice or decision of products sale?	We sell privately and most times its on-farm; market availability	Every one sells individually	Poultry business is an open market with free entry and free exit.
14	How do you market your products?	People come to the farm to buy and at times when market is dull we can make cold calls to some of our consistent buyers to inform them that egg and spent layers are available in case they do not know.	The middle men from the southeast come to farm to buy chickens during festive periods while egg wholesalers do come to buy eggs on the farm from nearby towns like Ibadan, Lagos, Oyo, Ogbomoso. etc.	Individuals source for market and are open to ready buyers or patronage
15	Comment generally on poultry market?	The market is not so favorable now because feeds for birds are very expensive now while the price of egg is not increasing appreciably to close the gap so many poultry operators are backing out by selling off their birds.	There is glut in the market now, so poultry products command low price in the market. Foreign poultry products should be removed from the market.	There is competition between the foreign poultry products and the local poultry products which is counterproductive to the local producers. The latter at higher cost and often find it difficult to command higher returns for their efforts.

S/N	QUESTIONS	RESPONSES (IJEBU IGBO CLUSTER)	RESPONSES (ILORA CLUSTER)	INFERENCES
16	How do you curb/ prevent disease outbreak on poultry farm?	Once birds are not in contact with their litters and pen is cleaned regularly there will not be outbreak of disease. Also general sanitation rules of washing of hands and not allowing visitors to enter farm will go a long way in curbing the disease.	1. By observing proper sanitation procedures on the farm. e.g cleaning of litters and proper disposal of waste very far to the farm. 2. Good and timely vaccination of birds	Poultry farmers are learned, well informed and experienced in the management of their production and business.
17	What are the sources of information readily available to you concerning poultry production?	Through fellow farmers majorly and media as well.	1. Fellow poultry farmers. 2. Radio and Televison. 3. Association	There is a high network and relationship among the poultry farmers in terms of information exchange with the media also playing a major role in this wise.
18	Comment generally on poultry production?	Same as above.	Exhausted	All related point have been mentioned with respect to poultry production in the study area.

APPENDIX 4

Sampling Procedure

1st Stage	2nd Stage		3rd Stage	Retrieved for analysis
Purposive selection of 2 States from 6 States of the Southwestern states	Selection of LGAs in the selected states with consideration for high prevalence of poultry production		Random selection of poultry farmers	
Oyo	33(6)	Iddo	55	53
		Afijio	55	52
		Atiba	55	55
		Oyo West	55	53
		Oyo East	55	55
		Oluyole	55	55
Ogun	20 (4)	Ijebu North	55	55
		Ijebu Ode	55	52
		Abeokuta South	55	54
		Ewekoro	55	55
Total	53 (10)		550	539

APPENDIX 5

Result of Collinearity Test

	Credit use	Age2	Marital Status	Secondary Occup	School years	Vocational Trainir	Age
credituseall	1						
Age2	0.0497	1					
Marital Status	0.0968	0.2937	1				
Secondary Occupation	-0.0342	-0.0997	0.0482	1			
School years	-0.0079	-0.026	-0.0858	0.0104	1		
Vocational Training	0.1538	0.1856	0.0798	-0.078	0.0674	1	
Age	0.05	0.9885	0.3403	-0.088	-0.0134	0.1865	1
Sex	-0.055	0.0348	-0.0426	-0.0306	0.1611	-0.009	0.0372
Per capita asset value	0.1705	0.1106	-0.0096	-0.0583	0.025	0.053	0.1032
Rel. with Financial Insti	0.2963	0.1437	0.0648	-0.0472	0.0761	0.1024	0.1431
Enterprise egg	0.0078	0.0712	0.0363	0.0905	-0.1587	0.046	0.0655
Enterprise meat	0.0157	-0.0647	-0.0536	0.0417	0.055	-0.1686	-0.0655
Hired labour	-0.0486	-0.2629	-0.1808	0.0752	-0.0645	-0.0873	-0.2718
Family labour	0.0751	0.2314	0.0789	-0.0237	0.0995	0.1292	0.219
Total income	0.0337	0.1262	0.0001	0.0032	0.1484	0.0407	0.1296
Flock size	-0.0264	-0.0018	0.0316	-0.0799	-0.0109	0.0011	-0.0015

	Sex	Per capita asset value	Rel. with Financial	Enterprise egg	Enterprise meat	Hired labour	Family labour
Sex	1						
Per capita asset value	0.0437	1					
Rel. with Financial Insti	-0.0425	0.0945	1				
Enterprise egg	-0.0155	-0.0112	0.0113	1			
Enterprise meat	-0.0875	0.0414	0.1128	-0.1839	1		
Hired labour	-0.1076	-0.13	-0.0161	0.0347	0.1726	1	
Family labour	0.0171	0.2165	0.1294	-0.017	-0.0562	-0.3228	1
Total income	0.0524	0.2297	0.1611	-0.0305	0.0932	-0.1135	0.1662
Flock size	0.025	0.0039	0.055	-0.012	0.0428	-0.0692	-0.0139

	Total income	Flock size
Total income	1	
Flock size	0.0378	1

APPENDIX 6

Result of Endogeneity Test

Variables	Coefficients	Standard Error	z-value	p>/ Z /
CONSTANT	-0.5603	0.3640	-1.54	0.124
Total Asset Value (Naira)	0.0000	0.0000	-15.96	0.000
Age (years)	0.0020	0.0075	0.27	0.788
Years of experience	0.0098	0.0093	1.05	0.293
Number of dependents	-0.0145	0.0361	-0.40	0.688
Size of flock	0.0000	0.0000	-0.54	0.589
Sex (1/0)	0.1271	0.1477	0.86	0.390
Marital Status (1/0)	0.0826	0.1872	0.44	0.659
Extension Farmer contact (1/0)	-0.0286	0.1194	-0.24	0.811
Primary Occupation (1/0)	0.4429	0.1242	3.57	0.000
Member of Association (1/0)	0.0723	0.1055	0.69	0.493
Vocational training (1/0)	0.0896	0.1383	0.65	0.517
Account relatio. with fin. Inst. (1/0	0.2235	0.2199	1.02	0.310
Corr(e.totalassetvalue,e.credituseall)	0.9946	0.0197		
Sd(e.totalassetvalue)	10500000	313565		

Instrumented: totalassetvalue

Instruments: Age, Years of experience, number of dependants, flock size, marital status, sex,extension contact, primary ocupation, association membership, vocational training

Log likelihood	*-9726.91*
Number of Obs	*539*
Wald chi2(12)	*819.33*
Prob> chi2	*0.0000*

Wald test of exogeneity (corr = 0): chi2(1) = 2.59   Prob > chi2 = 0.1075

APPENDIX 7

List of Productive and Household Assets.

Productive Assets		Household Assets	
Incubator	Egg Washer	Radio	Table
Cages	Dressing Machine	CD Player	House
Shovels	Setter	Television	
Water troughs	Hatcher	Cell phone	
Brooders or heaters	Egg Candler	Stove	
Feeders	Compressor	Bicycle	
Wheel Barrow	Reflectors/ Hovers	Motorbike	
Feed Grinder	Vaccinator/lancet	Car	
Feed Mixer	Beak Trimmer	Jewellery	
Chick box	Rake	Wooden box	
Egg tray	Sprayer	Metal box	
Poultry Plucker Rubber	Egg Scale	Bed	
Ventilation Fan	Pumping machine	Chair	

APPENDIX 8

Rosenbaum Bounds Sensitivity Analysis

.
rboundstotalassetvaluegamma(1(1)10
)

Rosenbaum bounds for totalassetvalue (N = 539 matched pairs)

Gamma	sig+	sig-	t-hat+	t-hat-	CI+	CI-
1	0.00	0.00	2.30E+06	2.30E+06	2.00E+06	2.60E+06
2	0.00	0.00	1.10E+06	3.40E+06	8.29E+05	3.80E+06
3	0.00	0.00	6.87E+05	4.10E+06	5.46E+05	4.50E+06
4	0.00	0.00	5.17E+05	4.60E+06	4.04E+05	5.00E+06
5	0.00	0.00	4.19E+05	5.00E+06	3.26E+05	5.60E+06
6	1.10E-16	0.00	3.57E+05	5.30E+06	2.72E+05	6.10E+06
7	1.50E-14	0.00	3.13E+05	5.70E+06	2.28E+05	6.60E+06
8	5.90E-13	0.00	2.78E+05	6.00E+06	1.92E+05	7.00E+06
9	1.00E-11	0.00	2.48E+05	6.30E+06	1.66E+05	7.50E+06
10	1.00E-10	0.00	2.22E+05	6.60E+06	1.47E+05	8.10E+06

* gamma -log odds of differential assignment due to unobserved factors
sig+   - upper bound significance level
sig-   - lower bound significance level
t-hat+ - upper bound Hodges-Lehmann point estimate
t-hat- - lower bound Hodges-Lehmann point estimate
CI+   - upper bound confidence interval (a= .95)
CI-   - lower bound confidence interval (a= .95)

UNIVERSITY OF IBADAN

FACULTY OF AGRICULTURE AND FORESTRY
DEPARTMENT OF AGRICULTURAL ECONOMICS
INDIVIDUAL SURVEY QUESTIONNAIRE

CONSENT STATEMENT

The Department of Agricultural Economics, University of Ibadan Nigeria is conducting a study on Impact of Credit on Asset Accumulation of Poultry Farmers in South Western Nigeria. You have been randomly selected as a survey participant. I would like to request series of questions. Your response will be used to document the impact of credit on poultry farmers' asset accumulation in South west. Your involvement in this studyis **optional,**you are not under any compulsion or threat, neither is there any penalty for refusal or withdrawal at any period.Kindly be assured that every provided information will **be discreetly kept and maximally protected** as well as your privacy.Should you require further clarifications or questions, kindly contactGbayegeAyobami, Agricultural Economics Department, Faculty of Agric and Forestry, University of Ibadan, Nigeria. Phone: +234-803-3923594; e-mail: hrd_ayob@yahoo.co.uk

Do you have any questions for me? <Enumerator: pause and respond to any questions raised, then continue with the following statement>. May I continue to ask you some questions?

By continuing this interview, it is regarded that your participation in the study is voluntary.

Survey Identification Number (Number of the questionnaire) __/90030/AGE/2017/03/07/

PART A: *RESPONDENTS BACKGROUND INFORMATION*

Module A1. RESPONDENT'S IDENTIFICATION

STATE _____LGA_____

ENUMERATION AREA--

VILLAGE/LOCALITY _____

GPS readings of homestead: WAYPOINT ID_____LONGITUDE_____

LATITUDE_____ALT_____MOBILE PHONE NO_____

RESPONDENT'S NAME: _____

INTERVIEWER'S NAME _____ DATE OF INTERVIEW_____

SUPERVISOR'S NAME _____ DATE CHECKED_____

DATA ENTERED BY _____ DATE ENTERED_____

Module A2. RESPONDENT'S CHARACTERISTICS

Age in Years	Gender (Codes A)	Marital Status (Codes B)	Educational Level (Codes C)	Number of Years in School	Household Size	Number of Household Members below 18 years	Number of Household Members above 60 years	Have you attended any vocational training before? (Codes D)	How many trainings have you attended	Do you have contact with extension agents? (Codes D)	How many years of experience do you have in poultry farming?	Do you belong to any organization? (Codes D)
1	2	3	4	5	6	7	8	9	10	11	12	13

Codes A	Codes B	Codes C	Codes D
1.Male	0.Single 3.Separated	1.Islamic 4.Tertiary	0.No
2.Female	1.Married 4.Divorced	2.Primary 5.Vocational	1.Yes
	2.Widowed	3.Secondary 6.Others	

PART B: RESPONDENT'S FARM AND FINANCIAL SOURCE DATA

Module B1. RESPONDENT'S FARM INFORMATION DATA

Are you a full-time poultry farmer? (Codes A)	If No; then what secondary occupation do you engage in? (Codes B)	Why do you engage in poultry farming? (Codes C)	How did you acquire your poultry location or farm? (Codes D)	Cost of Poultry farm in Naira (N)	Management System (Codes E)	Enterprise Type (Codes F)	Flock size in number	Cost of initial stock (birds) in Naira (N)	Labour engagement (Codes G)
1	2	3	4	5	6	7	8	9	10

Codes A	Codes B	Codes C	Codes D	Codes E	Codes F	Codes G
0.No	1.Civil servant	0.Unemployment	1.Inherited	1.Deep liter	1. Meat	1.Family
1.Yes	2.Trading	1.Extra income	2.Lease	2.Battery	2.Egg	2.Hired
	3.Artisan	2.Passion	3.Purchased	3.Both 1 and 2	3.Both 1 and 2	3.Both 1 and 2
	4.Crop Farming	3.Retirement option	4.Others (pls be specific)			4. Others (pls be specific)
	5.Others (Pls be specific)	4.Others (pls be specific)				

Module B2. FARM RESOURCES AVAILABLE

S/N	Item	Availability	Number/Unit	Initial Cost (N)	Estimated current cost (N)	Expected useful life (years)
1	Housing					
2	Stock (Birds)					
3	Incubator					
4	Cages					
5	Shovels					
6	Heater					
7	Lighting					
8	Water trough					
9	Brooders					
10	Litters					
11	Feeders					
12	Vehicle					
13	Wheel barrow					
14	Weighing Scale					
15	Others					

Module B3.   INPUTS USE

S/N	Input	Quantity per week (kg)	Amount (N)
1	Feed		
2	Drugs		
	Vaccination		
3	Egg crates		
4	Supplements		
5	Vaccines/ Drugs/Chemicals		
6	Others (Specify)		

Module B4. FEED USED

Types of Feed Used	No of birds	Number of times of feeding per day	Quantity of feed (Kg) per application	Cost of feed (N)
Imported poultry Feeds				
Locally Compounded Feeds				
Both Company and Locally Branded poultry feeds				

Module B5.INFORMATION ON MARKET/SALES OF OUTPUT

Enterprise	Number Sold	Weight per Unit (Kg)	Unit Price (N)	Given as Gift	Family Consumption	Total Output
Birds (Meat)						
Eggs						
Spent layers						

Module B6: CREDIT ACCESS

Have you ever taken loan before? (Codes A)	If No; what could be responsible? (Codes B)	If Yes, where? (Codes C)	If Yes; How many times have you taken loan?	Loan Purpose (Codes D)	Loan Duration Requested (Codes E)	Loan Amount Requested in Naira (N)	Loan Amount Granted in Naira (N)	Did you get the loan on time?	If No; what was the reason for the delay? (Codes F)
1	2	3	4	5	6	7	8	9	10

Codes A	Codes B	Codes C	Codes D	Codes E	Codes F
0.No 1.Yes	0=No reason 1. It is dangerous 5.No asset for collateral 2.High interest rate 6.Not available on time 3.Too much procedures 7. Lack of loan information 4.Applicationwas denied 8.Others (Pls specify........)	1.Commercial Bank 2.Microfinance 3.Agricultural Bank 4.Cooperative Society 5.Family and Friends 6.Others(pls specify...........)	1.Start up 2.Working capital 3.Machinery 4.Expansion 5. Others(pls specify.............)	1.Short 2.Medium 3.Long	1.Processing time 2.Delay in providing required documents 3.Delay in the fulfilment of preconditions stipulated for loan disbursement 4.Delay in the settlement of previous loan 5. Others (pls specify……....)

Module B7: LOAN CHARACTERISTICS

Was the loan repayment scheduled properly? (Codes A)	Was there any shortfall in the amount of loan requested and granted by the lending party? (Codes A)	If Yes; what was responsible? (Codes B)	How do you find the method of disbursement of the loan? (Codes C)	What do you think is the suitable form of disbursement?	Was the loan enough for the intended purpose? (Codes A)	Was part of the loan used for an unintended purpose? (Codes A)	If Yes; why was part of the loan used for an unintended purpose? (Codes D)
1	2	3	4	5	6	7	8

Codes A	Codes B	Codes C	Codes D
0.No	0=No reason	0.Not suitable	1.Delay in the loan disbursement
1.Yes	1.Institution's policy	1.Suitable	2.Another business opportunity
	2.Insufficient Collateral		3.Government policy
	3.Regulatory benchmark		4.Family emergency
	4.Others (Pls specify..........)		5. Others (pls specify........................)

Module B8: LOAN DEFAULT

Did you pay back your loan as scheduled? (Codes A)	If No; what was responsible? (Codes B)	How many times did you default? (Codes C)	What was the motivation for paying back your loan as scheduled, If Yes? (Codes D)	If Yes; How many times have you taken loan?	Were you well briefed about the loan contract before signing? (Codes A)	Did you undertake any form of training before loan disbursement? (Codes A)	If Yes, what type of training did you receive? (Codes E)	Number of times for the training	Was the training helpful? (Codes A)
1	2	3	4	5	6	7	8	9	10

Codes A	Codes B	Codes C	Codes D	Codes E
0.No	0=Intentional	0.None	1.Reputation	1.Financial Management
1.Yes	1.Natural disaster	1.Once	2.Fear of losing the collateral	2.Record Keeping
	2.Change in government policy	2.Sometimes	3.Expectaion of getting another loan	3.Product Marketing
	3.Problems with machine	3.Often	4.Loan payment is an obligation	4.Enterpreneural Skill acquisition
	4.Improper scheduling of loan repayment		5. Others (pls specify..............)	5. Others (pls specify....................)
	5.Others (Pls specify..........)			

Module B8ii: LOAN DEFAULT (contd)

Did you encounter any challenge during the entire duration of the loan? (Codes A)	If Yes; did you bring the challenge to the notice of your lending institution? (Codes A)	If No; Why? (Codes B)	Did the bank officials visit your farm at any time before and after loan disbursement? (Codes A)	If Yes; How often? (Codes C)	Did the bank provide any technical support during the loan term? (Codes A)	If Yes; how often? (Codes C)	Was the support helpful? (Codes A)	Did you encounter any problem in obtaining loan? (Codes A)	State problem (s) encountered in obtaining loan from the lending institution (Codes D)
1	2	3	4	5	6	7	8	9	10

Codes A	Codes B	Codes C	Codes D
0.No	0=No reason	1.Once a month	1.Administrative bottlenecks
1.Yes	1.Do not know how to go about it	2.Semi monthly	2.Inadequate credit information
	2.Challenge was not threatening	3.Quarterly	3.Lender's stringent conditions
	3.Others (Pls specify..........)	4.As the need arises	4.Lack of suitable personnel for Agric loans
		5.On Request	5.. Others (Pls specify...............)

PART C: ACCESS TO FUNDS AND SERVICES

Module C1: Sources and need of credit. Kindly specify the naira equivalent for non-cash items.

Activity	Needed credit? Codes A	If No in column 2, then Why? Codes B	If Yes in column 2, then did you get it? Codes A	If NO in column 4, then why? (codes C)	If Yes in column 4					
					Credit Source, Codes D	How much did you get? (N)	Has the loan been repaid? Codes A	Frequency of payment? Use Code E	How much do you pay based on the Freq. of payment in 11	Duration of payment (Code F)
1	2	3	4	5	8	9	10	11	12	13
1. Poultry Stock										
2. Incubator										
3. Cages										
4. Shovels										
5. Water troughs										
6. Brooders										
7. Feeders										
8. Vehicle										
9. Wheel Barrow										
10. Feed Grinder										
11. Feed Mixer										

12. Chick box										
13. Egg tray										
14. Poultry Plucker Rubber Finger										
15. Ventilation Fan										
16. Egg/ Weighing Scale										
17. Egg Washer										
18. Dressing Machine										
19. Setter										
20. Hatcher										
21. Egg Candler										
22. Compressor										
23. Reflectors/ Hovers										
24. Vaccinator/lancet										
25. Beak Trimmer										
26. Rake										
27. Sprayer										
28. Buy food										
29. Medical expenses										
30.Products evacuation										

Codes A	Codes B	Codes C			Codes D		Code E
0. No	1. No	0. None	4. Not promising	7. Lenders hardly provide all the required amount	1. Money lender	5. Savings and Credit	1. Daily
1. Yes	2. Activity is unprofitable	1. Borrowing is risky	5. Noasset to be used as collateral	8. Unavailability of credit association	2. Farmer group/coop	6. Relative/friend /neighbor	2.Weekly
	3. Did not consider the investment	2. High interest	6. No money lenders in this area for this purpose	9. Not timely	3. Microfinance	7. Other, specify…………..	3. 2 weeks
	4. Other, specify.......	3. Cumbersome procedures		10. Other, specify………	4. Bank		3.Once a month
							4.Twice a year
							5. Yearly
							7. Other (specify)

Module C2: Access to Extension/information services

Type of service	Did you or any of your worker receive training or information on […...] in the past 1 year 1= Yes, 0= No	If Yes in column 2, main source of information/ training, (see Codes)	If Yes in column 2, number of contacts in the past 1 year	Who attended training/extension?
1	2	3	4	
1.Improved Egg production techniques				
2. Improved Meat production techniques				
3. Improved Feed Production techniques				
4. Improved Poultry management technique				
5. Disease control				
6. Output markets and prices				
7. Input markets and prices				
8. Feed formulation				
9. General Farm Sanitation				
10. Poultry processing				

Codes

1. Government extension service

2. Farmer Coop or groups

3. Neighbour/relative farmers

4. NGOs

5.Private Company

6. Research centre

7. Farmer field school

8. Radio/TV

9. Newspaper

10. Mobile phone

11. Town hall meetings

12. Farmer's training centres

13.Traders/Agro-dealers

14. Other, specify........

PART D. INCOME AND EXPENDITURE

Module D: TRANSFER, REMITTANCES AND OTHER SOURCES OF INCOME

(Kindly indicate using the codes other flow of earnings received last year apart from income received from poultry farming)

| S/N | Sources of Income Use Codes A | Total income (cash & in-kind) | | Total Income (N) |
		Cash (N)	Payment in kind (Cash equivalent)	
1	2	3	4	5=3+4
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Codes A

1. Poultry waste sale

2. Salaried employment

3. Other business NET income (shops, trade, tailor,sales, etc)

4.Pension income

5. Drought relief

6. Remittances (sent from non-resident family and relatives living elsewhere)

7.Marriage gifts

8.Sales of firewood/charcoal

9.Rent of asset

10. Interest from deposits

11.Social cash transfer

12. Others, specify…………………

PART E. HOUSEHOLD ASSETS

Module E1: Physical Characteristics of Housing

No	ITEMS	No/Code
1	Occupancy status: 1=Landlord, 2=tenant, 3=other, specify	
2	Amount paid per month for rent if tenant (Naira N)	
3	Number of Houses owned	
4	Total number of rooms in the house	
5	Main material (outside walls):1=Concrete; 2=Cob; 3= Stabilized earthen brick; 4= Sun Baked brick; 5=wood; 6= mud; 7=bamboo; 8=other	
6	Is the house painted? (Yes. =1; No = 0)	
7	Main roofing material: 1=Straw/raffia leaves/thatch; 2=roofing sheet; 3=roof tiles; 4=slab; 5=other (specify)	
8	Sources of water supply (household): 1=River/stream; 2= wells; 3= borehole; 4=water pump; 5=other	
9	Main sources of light: 1=Lamp; 2=Generator; 3=Electric power; 4=candles, 5=Sun panels, 6=firewood, 7=other	
10	Main source of fuel used for cooking: 1=Agricultural by-product ;2=Charcoal; 3=firewood; 4=Gas; 5=Electric power, 6= Kerosene, 7=other	
11	Type of sanitation: 0=None; 1=Latrines; 2= Modern toilet, 3=other	

Module E2: LIVESTOCK OWNERSHIP

Type	Number owned	Type	Number owned
1	2	1	2
1.Cattle		9.Rabbits	
2.Donkeys		10.Poultry (such as Guinea fowl, Ducks)	
3.Horses		11.Doves/pigeons	
4.Goats		12.Pigs	
5.Donkeys		13. Others (Specify1 …………………….)	
6.Turkey			
7. Ostrich			
8.Sheep/Ram		13. Others (Specify2 …………………….)	

Module E3: OWNERSHIP OF PRODUCTIVE AND OTHER HOUSEHOLD ASSETS

Asset	Number (Input zero if none)	How much would a unit cost, if you were to sell? (Naira) (Kindly input the average price if more than one item is reported in column 2)
1	2	3
PRODUCTIVE ASSETS		
Incubator		
Cages		
Shovels		
Water troughs		
Brooders or heaters		
Feeders		
Wheel Barrow		
Feed Grinder		
Feed Mixer		
Chick box		
Egg tray		
Poultry Plucker Rubber Finger		
Ventilation Fan		
Egg Scale		
Egg Washer		
Dressing Machine		
Setter		
Hatcher		
Egg Candler		
Compressor		
Reflectors/ Hovers		

Vaccinator/lancet		
Beak Trimmer		
Rake		
Sprayer		
HOUSEHOLD ASSETS		
Radio		
CD Player		
Television		
Cell phone		
Stove		
Bicycle		
Motorbike		
Car		
Jewellery		
Wooden box		
Metal box		
Bed		
Chair		
Table		
Thatched house		
Corrugated iron sheet house		
Other, specify		